

TOTALLY INTEGRATED POWER

SIVACON 8PS

Technical Planning Information

SIEMENS

SIVACON 8PS –

Technical Planning Information

Power Transmission and Distribution for Industry and Infrastructure

System Selection

BD01 System – 40 to 160 A

BD2 System – 160 to 1,250 A

LData System– 1,000 to 2,500 A

LD System – 1,100 to 5,000 A

LI System – 800 to 6,300 A

LR System – 400 to 6,300 A

Planning Instructions for Busbar Trunking Systems

Planning Manual
SIVACON 8PS Busbar Trunking Systems

The availability of the latest data, information, and technical selection criteria is fundamental for the efficient management of planning tasks.

In the present planning manual we have compiled for you essential decision factors and technical information related to the use of SIVACON 8PS busbar trunking systems and their components.

At the same time, with this planning manual we are providing valuable information about available planning tools from Siemens for generating target-oriented, viable system solutions.

You have a project-specific problem and are not getting anywhere?

We will not leave you alone –
technical experts from Siemens are there for you, worldwide.

Benefit from the comprehensive support offer from Siemens, which is provided in this manual.



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Chapter 1

Power Transmission and Distribution for Industry and Infrastructure

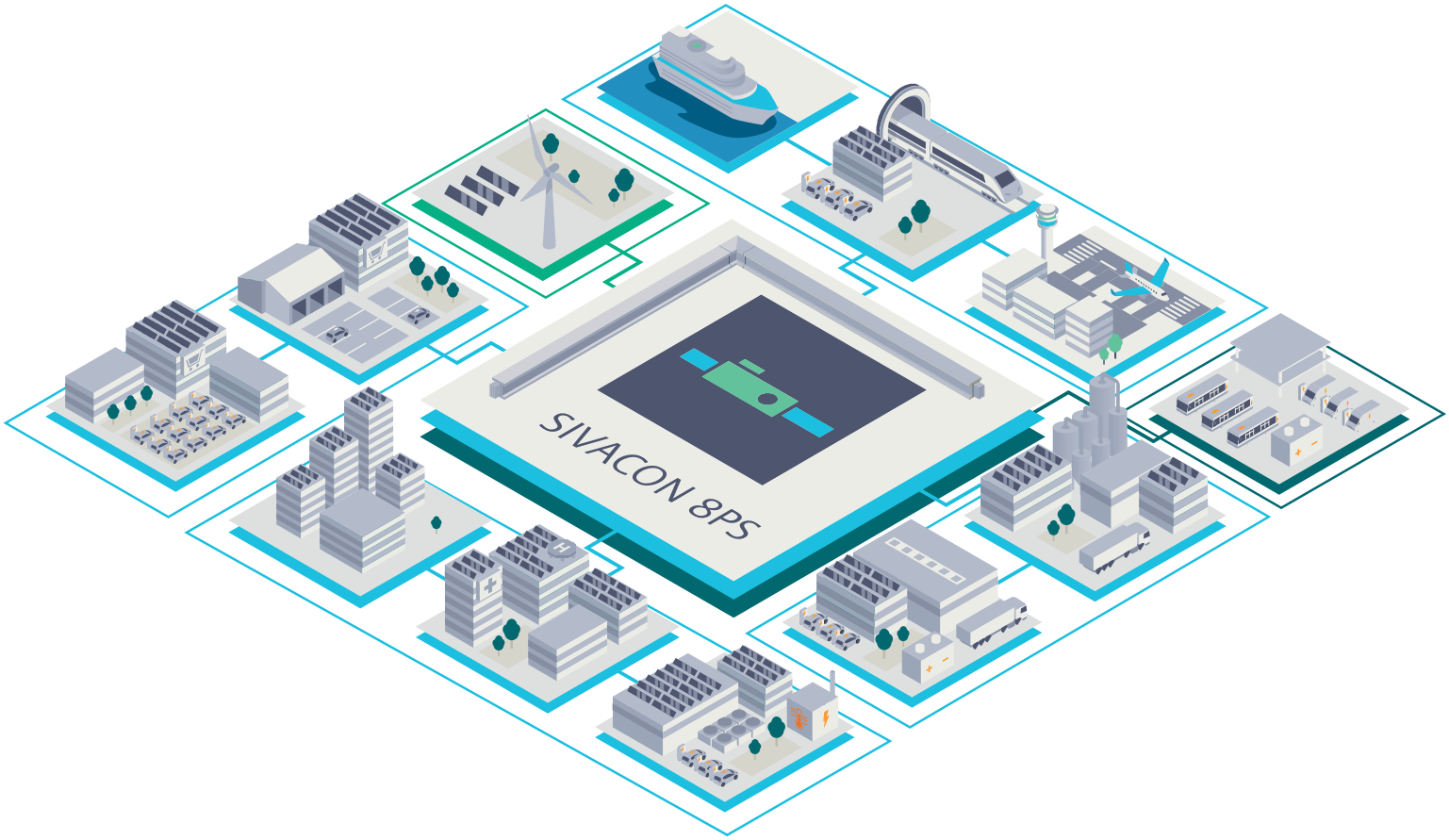
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1 Power Transmission and Distribution for Industry and Infrastructure

When a high level of flexibility is requested for transmission, distribution, switching, and protection of electrical energy with, at the same time, low space requirements and a high reliability, the busbar trunking systems are the innovative alternative to conventional cable installations.
The combination of design verified standard components such as trunking units and tap-off units enables easy planning and installation, and secure operation is ensured. Easy integration in building management systems is another advantage for the Siemens busbar trunking systems.

Advantages of the system solution during planning:
- Modularity of individual systems
- Use of tested standard components
- Freedom in selecting the communication bus system
- Use of matching components
- Full integration in the SIMARIS planning tools
- Sustainable and efficient planning using the BIM planning process.

Advantages of the system solution during installation and commissioning:
- Easy and fast installation
- Availability of data from the digital twin in the BusbarCheck app
- Stepwise commissioning
- Support and installation documentation by the BusbarCheck app
- Flexibility in the event of changes and extensions.

Advantages of the system solution during operation:
- Assured short-circuit withstand strengths and EMC
- Transparent switching states
- Increase of system availability thanks to transparent design
- Preventive maintenance supported by continuous recording of system states
- Use of 3D planning documents from the BIM process during later operation or in the event of upcoming changes in use (Building X Lifecycle Management).

1.1 Planning Aspects in the Power Supply Concept

When developing the planning concept for an electric power distribution, not only the applicable standards and regulations must be observed, but also the economic and technical contexts need to be clarified and discussed. To do this, electrical equipment, e.g., distribution boards and transformers, must be dimensioned and selected in a way that they do not only represent an optimum individually, but in totality.

All components must be dimensioned sufficiently for loads both during rated operation and in case of failure.

During the development of the energy concept, the following important items are also considered:

- Type, use, and shape of the buildings (e.g., high-rise or low-rise building as well as the number of floors, floor areas)
- Determination of load centers, verification of possible supply lines as well as locations for transformers and main distribution boards
- Verification of building-related connected loads according to specific surface loading based on building use.

All these boundary conditions create numerous options for solutions which differ regarding their technical and economic effects, and require an assessment.

Additionally, several general requirements must commonly be considered, such as:

- Simple and manageable planning
- Long service life
- High availability
- Low fire load
- Flexible adaptation to changes in the building.

For most applications, the requirements regarding power transmission and power distribution can be met easily and simply by employing suitable busbar trunking systems (Fig. 1/1, Fig. 1/2). Siemens offers busbar trunking systems from 40 up to 6,300 A:

- BD01 busbar trunking system from 40 to 160 A for supplying workshops and event facilities with tap-offs up to 63 A
- BD2 system from 160 to 1,250 A for supplying medium-sized loads in buildings and the industrial sector
- Ventilated LD system from 1,100 to 5,000 A for supplying loads with medium to high power consumption in the industrial sector
- LI sandwich system from 800 to 6,300 A for power distribution of large amounts of power in buildings
- Encapsulated LR system from 400 to 6,300 A for power transmission in extreme ambient conditions (IP68)
- LData system for efficient and reliable power supply in data centers.

Overview of SIVACON 8PS busbar trunking systems

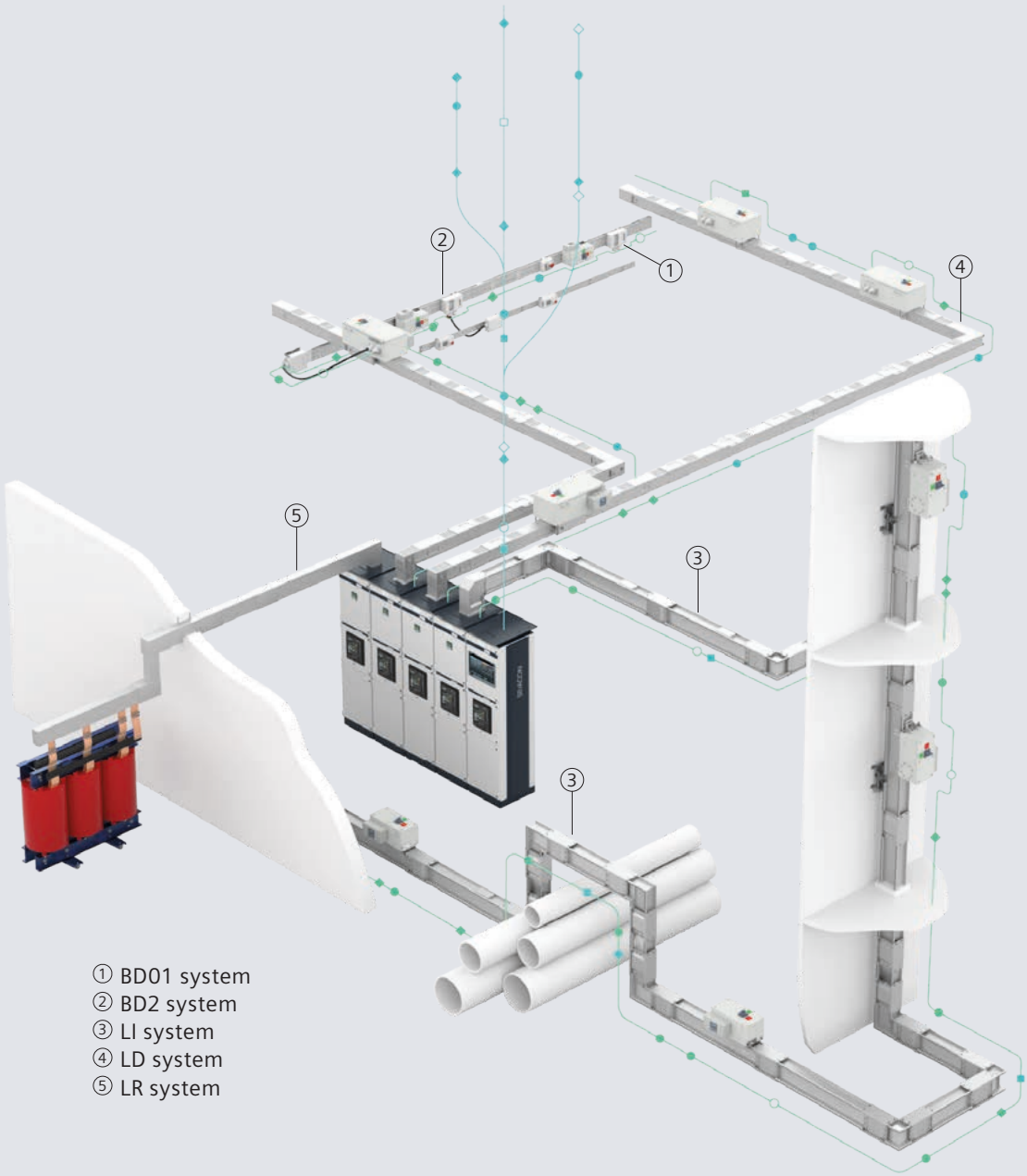


Fig. 1/1: **Overview of SIVACON 8PS busbar trunking systems**

Power transmission

For power transmission between the transformer and the low-voltage switchboard, or from the main distribution board to the sub-distribution board, trunking units of a busbar trunking system without tap-off points are used. Besides standard lengths, the user can select any desired lengths to fulfill the structural conditions.

Power distribution

Power distribution is the main application of busbar trunking systems. This way, electrical energy can be drawn not only at definitively specified spots, as in the case of cable installation, but can be taken to new or spatially changed loads via pluggable tap-off units. The result is a variable distribution system for a decentralized linear- and/or surface-type power supply.

The tap-off points can be mounted on one or both sides of the straight trunking units. Depending on the design and the requirements, the busbar trunking system offers tap-off units up to a rated current of 1,250 A from one tap-off point in order to draw power and to connect the loads. The tap-off unit is optionally equipped with fuses, fuse switches, fuse switch disconnectors, miniature circuit breakers, or circuit breakers.

To be able to modify the tap-off units without isolating the busbar, it must be ensured that:

- The PE contact of the tap-off unit is the first to be connected during installation, and is the last to be disconnected during removal
- Those parts which are energized during installation, removal, or connection work are fully protected against direct contact (degree of protection IP2X)
- Installation is only possible in the correct phase sequence
- No-load condition of the tap-off unit is ensured for installation and removal
- Local regulations allow modifications while energized.

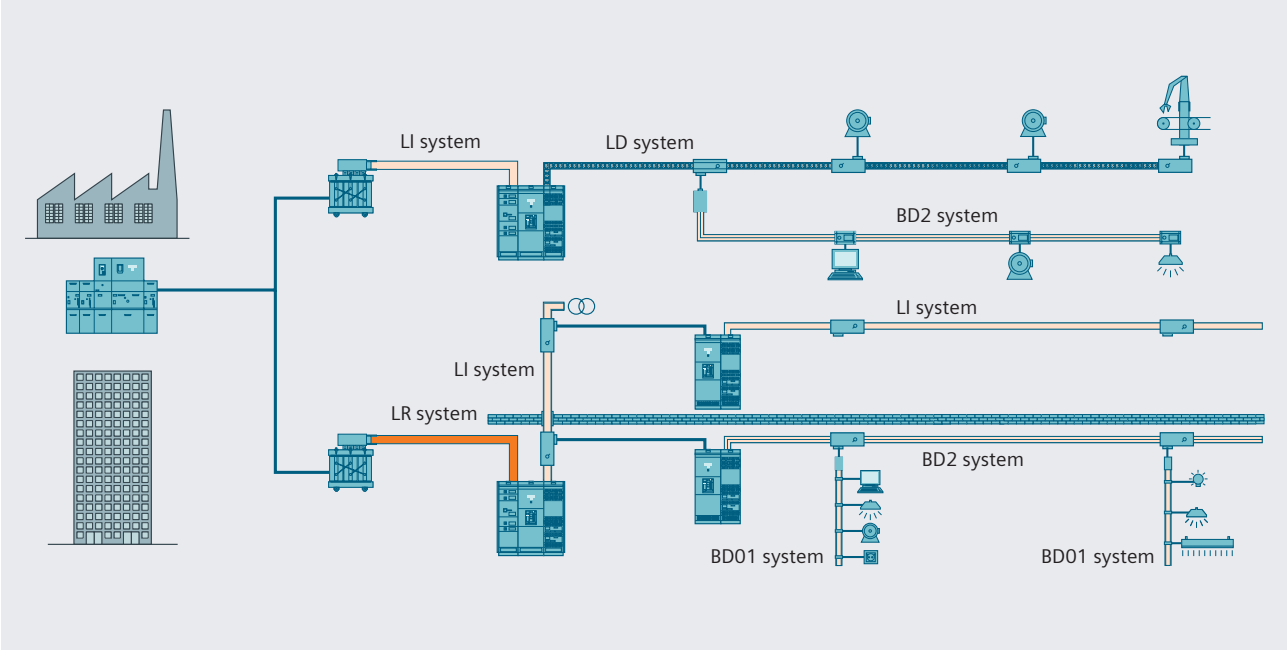


Fig. 1/2: **Application of busbar trunking systems in the industrial and infrastructure sectors**

1.2 Overview of Busbar Trunking Systems



siemens.com/busbar

BD01 system up to 160 A

The busbar trunking system for power distribution in craft and trade:
- High degree of protection up to IP55
- Flexible power supply
- Easy and fast planning
- Time-saving installation
- Reliable mechanical and electrical connection technology
- High stability, low weight
- Small number of basic components
- Variable junction units
- Versatile tap-off units
- Positive opening and closing of the tap-off-point.

BD2 system up to 1,250 A

The busbar trunking system for universal use in many applications:
- High degree of protection up to IP55
- Easy and fast planning
- Time-saving and cost-efficient installation
- Reliable and safe in operation
- Flexible modular system with simple solutions for every use case
- Early planning of power distribution without exact knowledge of load locations
- Quickly ready for service thanks to fast and easy installation
- Innovative design: Compensation units are not required for expansion compensation
- Tap-off units and tap-off points can be coded at the factory
- Fully sealable.

LData system up to 2,500 A for application in data centers

- Enables a high energy density on minimum space
- Modular design
- Compact design
- Easy operability
- Maximum level of flexibility
- Visually appealing system with black enclosure color
- Optionally with powerline technology to provide data transparency.

LI system up to 6,300 A

The busbar trunking system for power transmission and distribution in the infrastructure sector – e.g., in multi-floor buildings – as well as in industrial applications:
- Reliable and easy installation
- Reliable and safe in operation
- Load tap-offs up to 1,250 A
- High degree of protection IP55 or IP66 (power transmission)
- Tested connection to distribution boards (design verified connection to SIVACON S8) and transformers.

LD system up to 5,000 A

The busbar trunking system for optimum power distribution in the industrial sector:
- Degree of protection up to IP54
- Tested for sprinkler and carbon dust
- Fast and easy installation
- Reliable and safe in operation
- Space-saving compact design up to 5,000 A in one enclosure
- Load tap-offs up to 1,250 A
- Tested connection to distribution boards (design verified connection to SIVACON S8) and transformers.

LR system up to 6,300 A for extreme ambient conditions

The busbar trunking system for power transmission in extreme ambient conditions (IP68):
- Reliable and safe in operation
- Cast-resin system up to 6,300 A
- Safe connection to distribution boards and transformers
- Standard fire resistance class EI 60 without additional measures
- Application in critical ambient conditions
- High degree of protection IP68 for outdoor applications.

1.3 Innovation and Sustainability from Planning to Installation

Sustainability in the power generation and consumption processes, as well as renewability of the energy sources, forces the power grid of the future to focus on distributed solar and wind power generation. Moreover, the energy flow will become bidirectional due to storage solutions. At the same time, this will be of crucial importance for power transmission and distribution.

One of the sustainability targets Siemens wants to achieve in their "Sustainability Information 2017" is to assure access to affordable, reliable, sustainable, and modern energy for everybody.

www.siemens.com/sustainability

This also includes the development of technologies leading to permanent improvement of the energy efficiency, and thus contributing to fight climate change. The reference is goal 7 of the "Agenda 2030" (Resolution: A/Res/70/1), passed by the United Nations in 2015.

Agenda 2023 by the United Nations

Among others, notable efficiency increases in power transmission and distribution shall contribute to achieving this goal.

Busbar trunking systems from Siemens satisfy the relevant standards IEC 61439-1 (VDE 0660-600-1) and IEC 61439-6 (VDE 0660-600-6), and are subject to a permanently ongoing development. They contribute significantly to achieving the set goals. The technical features which are commonly relevant according to IEC 61439-1 Suppl. 1 (VDE 06060-600-1 Suppl. 1) for the planning of busbar trunking systems are specified in Tab. 1/1.

Electrical network	Versions according to IEC 61439-6
System according to the type of earth connection	TT / TN-C / TN-C-S / TN-S / IT
Rated voltage in V	Max. 1,000 V AC or 1,500 V DC
Transient overvoltages	Overvoltage categories III / IV
Temporary overvoltages	To be specified
Rated frequency in Hz	DC / 50 Hz / 60 Hz
Additional requirements for tests on site: wiring, operating behavior, and function	Type-specific options
Short-circuit withstand strength	
Prospective short-circuit current at the infeed terminals I_{cp} in kA	To be specified
Prospective short-circuit current in the neutral conductor	To be specified
Prospective short-circuit current in the protective conductor circuit	To be specified
Requirement whether short-circuit protection device (SCPD) in the infeed	Yes / No
Specifications for coordinating short-circuit protection devices including short-circuit protection devices outside of the switchgear and controlgear assembly	To be specified
Specifications on loads which possibly contribute to short-circuit current	To be specified
Characteristics of the fault current circuit	To be specified
Protection of persons against electric shock according to IEC 60364-4-41	
Type of protection against electric shock – basic protection (protection against direct contact)	According to local installation regulations
Type of protection against electric shock – fault protection (protection against indirect contact)	Automatic shutdown of power supply / electrical separation / double or reinforced insulation
Installation	Less installation material and auxiliary means, short installation times
Halogen-free design, PVC-free design	Trunking units are generally halogen-free and PVC-free
Installation environment	
Place of installation	Indoor/outdoor installation
Protection against ingress of solid foreign objects and water	After removing tap-off units: like in service position, or reduced protection
External mechanical impacts (IK according to IEC 62262)	To be specified
Mechanical load	Normal / heavy
UV resistance (only valid for outdoor installation, if not determined otherwise)	Indoor / outdoor installation
Corrosion resistance	Indoor / outdoor installation
Ambient temperature – lower limit	To be specified
Ambient temperature – upper limit	To be specified
Ambient temperature – maximum daily mean value	To be specified
Highest relative air humidity	To be specified
Pollution degree (of the installation environment)	1, 2, 3, 4
Altitude	To be specified
EMC environment (A or B)	A / B
Electromagnetic field	To be specified
Resistance against spread of fire	Yes / No
Fire resistance for building cut-outs	0 / 60 / 90 / 120 / 180 / 240 min
Special operating conditions (e.g., extraordinary condensation, heavy pollution, corrosive atmosphere, strong electric or magnetic fields, fungi, small animals, installation near sensitive IT devices, explosion hazard, maintaining a defined function in case of fire, strong tremors and impacts, earthquakes, special mechanical loads, high and periodically recurring overcurrent)	Commonly type-specific

Tab. 1/1: **Characteristic features of busbar trunking systems and versions according to IEC 61439-6 (request details from manufacturers)**

Type of installation	Versions according to IEC 61439-6
External design — Mounting position of the trunking units Position of conductors in the trunking units	Horizontal / vertical Edgewise / flat
Maximum external dimensions and weight	To be specified
Type(s) of the conductor(s) inserted from outside	Cables / lines / busbar trunking systems
Position of the conductors inserted from outside	No stipulations
Material of the conductors inserted from outside	Copper / aluminum
Cross-section and connection of the phase conductors inserted from outside	To be specified
Cross-section and connection of the PE, N, and PEN conductors inserted from outside	To be specified
Special requirements for identification of connections	No stipulations
Storage and handling	
Maximum dimensions and weights of transport units	To be specified
Type of transport (e.g., fork-lift truck, crane)	No particularities
Ambient conditions deviating from service conditions	To be specified
Details about packing	To be specified
Operability	
Disconnection of outgoing circuits	No particularities
Maintenance and extension	
Requirements referred to accessibility in service by unskilled persons; requirement to operate devices or change components while the busbar trunking system is energized	No particularities
Requirements referred to accessibility for inspection and similar operations	No particularities
Requirements referred to accessibility for maintenance in service by authorized persons	No particularities
Requirements referred to accessibility for extension in service by authorized persons	No particularities
Method of functional units connection	Fixed / pluggable
Protection against direct contact with hazardous live internal parts during maintenance or upgrade (e.g., functional units, main busbars, distribution busbars)	No particularities
Current-carrying capacity	
Rated current of the busbar trunking system I_{nA} in A	To be specified
Significant shares of harmonics	Type-specific (usually low)
Characteristics of phase conductors / voltage drop	Type-specific (usually low)
Rated current of circuits I_{nC} in A	To be specified
Rated diversity factor	To be specified
Ratio of the neutral conductor's cross-section to the phase conductor's cross-section: phase conductor up to and including 16 mm²	To be specified
Ratio of the neutral conductor's cross-section to the phase conductor's cross-section: phase conductor greater than 16 mm²	To be specified

Tab. 1/1: **Characteristic features of busbar trunking systems and versions according to IEC 61439-6 (request details from manufacturers)** (continued)

1.3.1 EcoDesign, EcoTech Certification

The challenges of the 21st century, particularly climate change and the loss of biodiversity, require new approaches for the product design.

In this context, ecodesign plays a central role, aiming at ensuring the environmental compatibility of products by minimizing the consumption of new materials throughout the entire life cycle of a product and maximizing the value of all components. This approach is an integral part of Siemens' efforts to reduce the environmental impact and foster sustainable practice.

80% of the later environmental impacts are already defined in the planning and design phase. It is therefore imperative to integrate ecological aspects in the development process right from the beginning.

Traditional economic models are frequently based on the "take-make-waste" principle, in which resources are extracted, products are manufactured, and disposed of after use. This linear model is not only resource-intensive, but also creates considerable amounts of waste. In contrast to this, ecodesign fosters the transition to a circular economy, in which the resources are processed in a closed loop without generating waste. Recent studies show that only 7.2% (Circle Economy, The Circularity Gap Report 2023, P. 8) of the materials used are recycled today, which underlines the urgency of avoiding waste and preserving resources. Using circular models such as sharing, leasing, repairing, and recycling, companies can reduce their procurement costs and increase their resilience in view of price fluctuations and interruptions of the supply chain.

To support this change, Siemens has developed the Robust Eco Design (RED). This approach aims to systematically integrate environmental compatibility into the product development and derive ecological specifications. The RED approach shall support the goals of sustainable development, contribute to decarbonization, and preserve biodiversity. Integrating this approach into the development process enables us to minimize the environmental impact of our products, systems, solutions, and services while maintaining a leading position in sustainable technologies.

Another important tool in the ecodesign process is the life cycle analysis (LCA). This method can be used to assess the environmental impact of a product in the various phases of its life cycle – from raw material extraction through production to disposal. The results of this analysis are incorporated in Environmental Product Declarations (EPDs), which serve to make environmental impacts transparent under certain conditions and to use them as a basis for product optimization. This enables Siemens and its customers to optimize processes, achieve efficiency gains, and reduce emissions.

Siemens has set themselves the goal of covering all relevant product families with the RED approach by 2030. Today, 57% of the portfolio is covered by RED criteria, with the implementation of these criteria already being completed for 35% of the relevant product families.

EcoDesign is therefore much more than just a concept – it is an essential part of a sustainable future. By consistently applying the RED approach and leveraging digital innovations, Siemens strives to maximize both the ecological and economic benefits, and minimize the environmental impact of their products. The EcoTech label is a symbol for products that are particularly environmentally friendly and reflect Siemens' sustainable goals. This holistic approach helps create a more sustainable world where economic growth and environmental protection go hand in hand.

The Siemens EcoTech framework provides a comprehensive set of criteria in three dimensions, which cover the entire product life cycle. The products must meet mandatory requirements and fulfill at least one criterion in each dimension. In addition, they must submit a transparent validation declaration in the externally accessible Siemens EcoTech profile. This ensures maximum transparency regarding the materials, construction, usage phase, and end of life of our products.

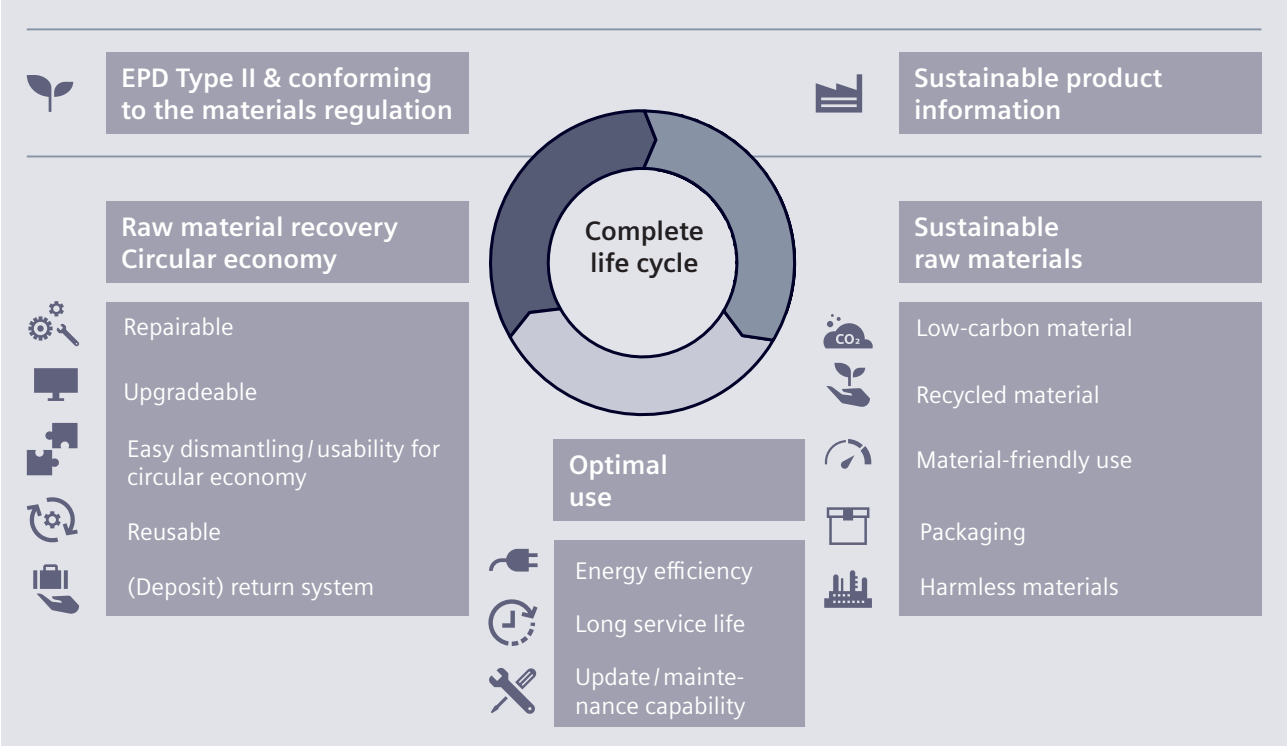


Fig. 1/3: **Siemens EcoTech framework**

For its outstanding properties in terms of environmental friendliness and sustainability, the SIVACON 8PS busbar trunking system LDM for wind power and PV systems has been awarded the Siemens EcoTech label.

For further information on the SIVACON 8PS busbar trunking system LDM, visit: *LMD system*

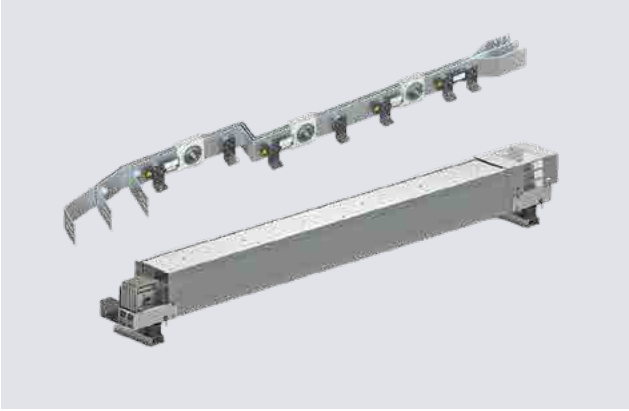


Fig. 1/4: **SIVACON 8PS busbar trunking system LDM**

1.3.2 BIM in Electrical Planning

Building Information Modeling (BIM) is a process that involves creating and managing digital representations of the physical and functional features of buildings and other assets.

The process is based on four basic principles:

- At the beginning, you build twice – first, you create a digital representation of your building before you start building a real building.
- The second principle is to plan and build collaboratively, coordinating and approving design solutions already during the planning phase.
- The third principle states that data is generated only once. This means that the role that originally creates the data is the only one that really needs to create data, and other roles can reuse this data.
- The fourth principle is that BIM considers the entire life cycle of a building and takes all requirements into account.

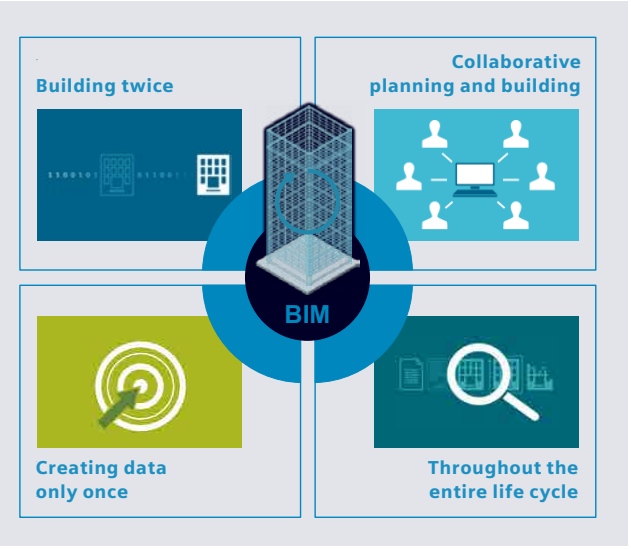


Fig. 1/5: **BIM and its key principles**

BIM is supported by various tools, technologies, and contracts. In the electrical part of a BIM project, the SIMARIS planning tools are a good example to demonstrate this.

Within the framework of the existing, extensive BIM-compatible SIMARIS tool portfolio, Totally Integrated Power observes future-proof market trends and is continuously developing the SIMARIS tools to optimally meet the requirements of the BIM process and to support users with BIM objects including high-end information data.

The data exchange of BIM objects takes place in the IFC (Industry Foundation Class) file format. Its scope is defined by criteria called LOIN (Level of Information Need) and by categories:

- LOI – Level of Information
- LOG – Level of Geometry
- DOC/LOT – Level of Technical Documentation.

The data extent of BIM objects depends on the respective project phase, the role of the project partner from whom the data is required, and the respective BIM use case (Fig. 1/6).

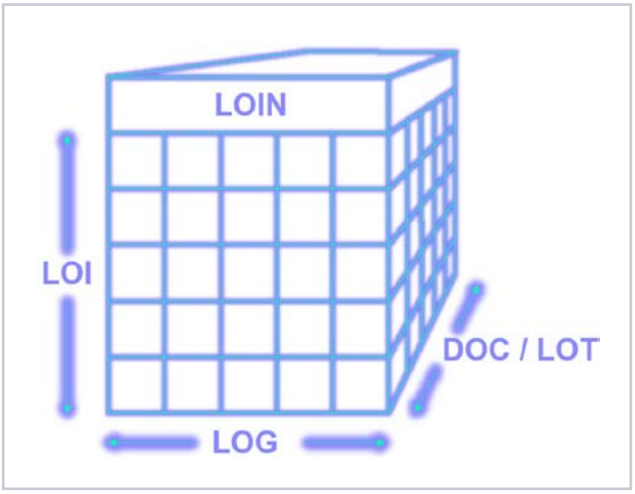


Fig. 1/6: **Data extent of a BIM object defined by LOIN (Level of Information Need)**

As construction progresses, the BIM object approaches the "as-built model", which steadily increases the amount of data and its accuracy (Fig. 1/7).

In order to meet the challenges of the BIM process, the SIMARIS tool landscape has an extensive portfolio and is always oriented towards the latest developments in digital planning for the electrical engineering area.

Some SIMARIS planning tools from the SIMARIS Suite and their particular advantages for BIM construction planning are presented in the following using practical application examples.

A brief introduction to the SIMARIS Suite and its valuable assets for electrical planning can be found in Chapter 1.3.3.

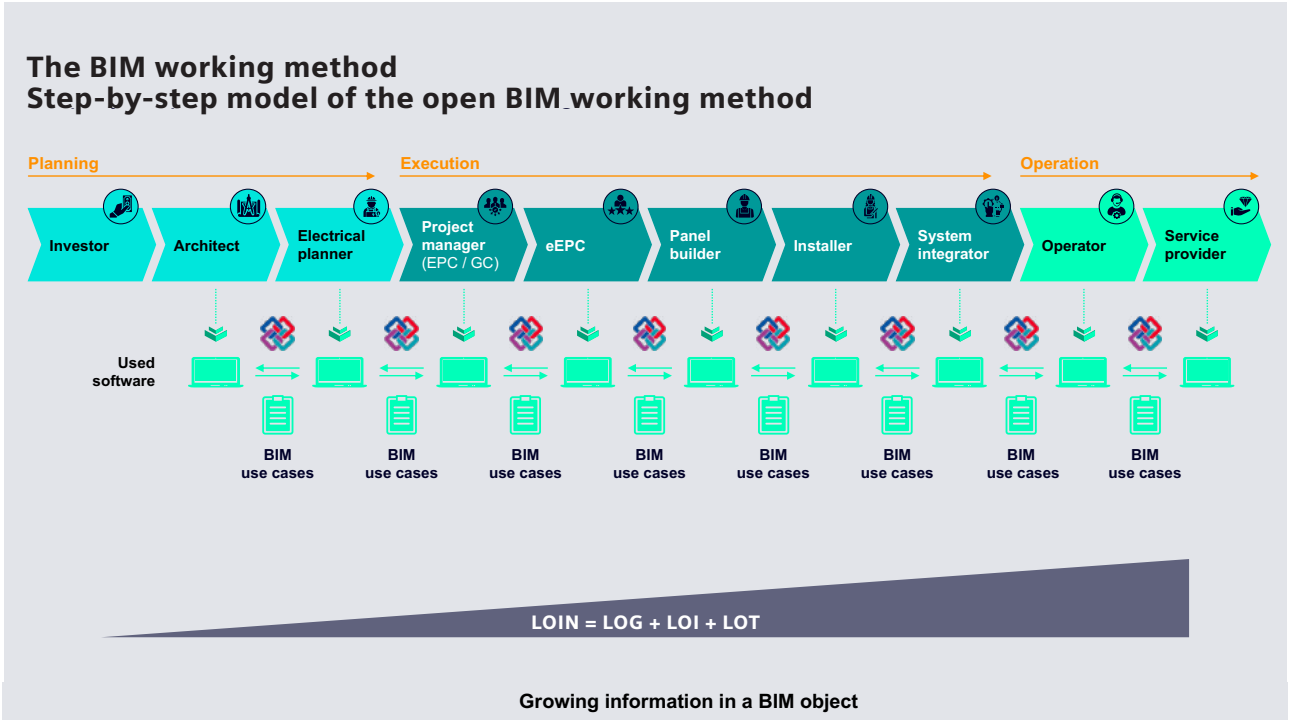


Fig. 1/7: **Growing information in a BIM object**

The SIMARIS Suite offers the **SIMARIS busbarplan** tool as a plugin for Autodesk Revit. Electrical planners often use this combination to create – depending on the use case – an "as-planned" or an "as-built" model of the intended SIVACON 8PS busbar trunking system in accordance with the highest LOIN (Fig. 1/8).

In Mai 2024, the tool platform was supplemented with **SIMARIS sketch** as a standalone tool for 3D representations of SIVACON 8PS busbar trunking systems. Among other things, it also allows to preview files in IFC format. This new tool also supports participation in the BIM process, as it can be used by electrical planners who do not use specialized CAD software.

This tool can be considered a simple version of SIMARIS busbarplan. It has a self-explanatory program interface and can therefore be used for quick visualizations of project ideas. At the same time, high-quality 3D project outputs can be generated (Fig. 1/8).

Typically, the low-voltage main distribution (LVMD) is the connection point between the busbar trunking system and the power supply system. It is therefore useful if digital 3D models with a high level of detail are available for both system components. For this purpose, the functionality of **SIMARIS configuration** was extended accordingly in Mai 2024. Now, not only the planning phase of low-voltage switchboards is supported, but also other project phases and use cases (Fig. 1/9).

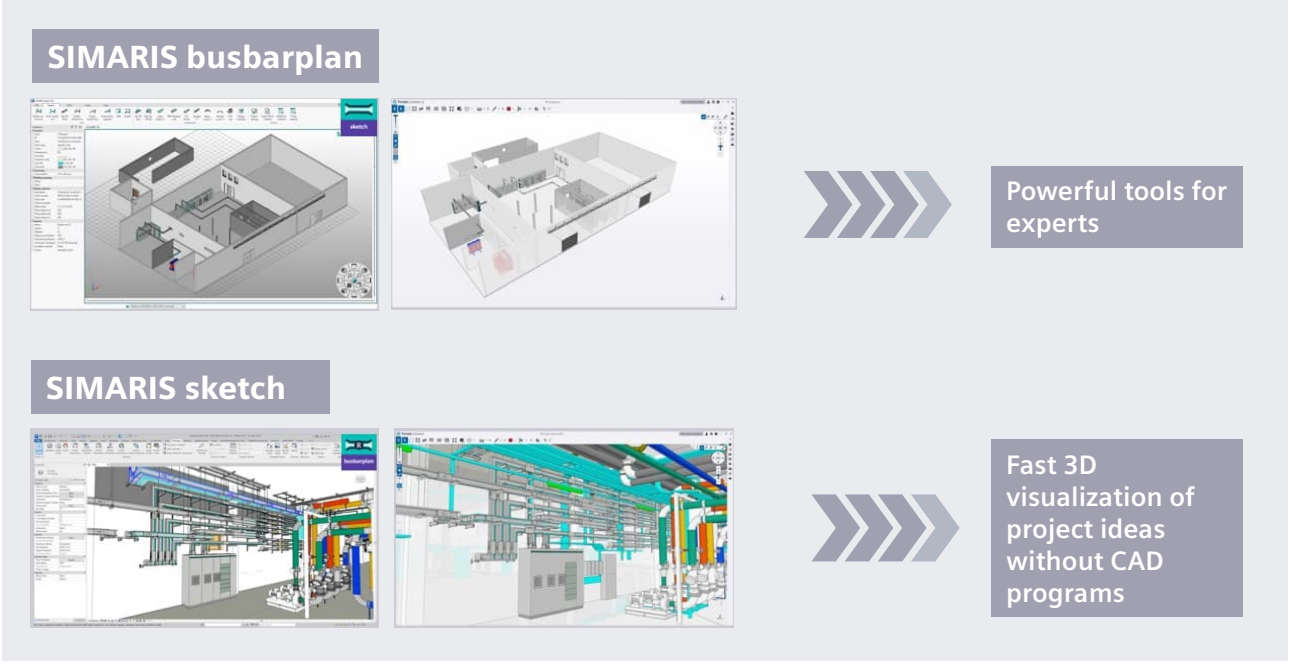


Fig. 1/8: **"As-planned" and "as-built" models of SIVACON 8PS busbar trunking systems created with SIMARIS busbarplan and SIMARIS sketch**

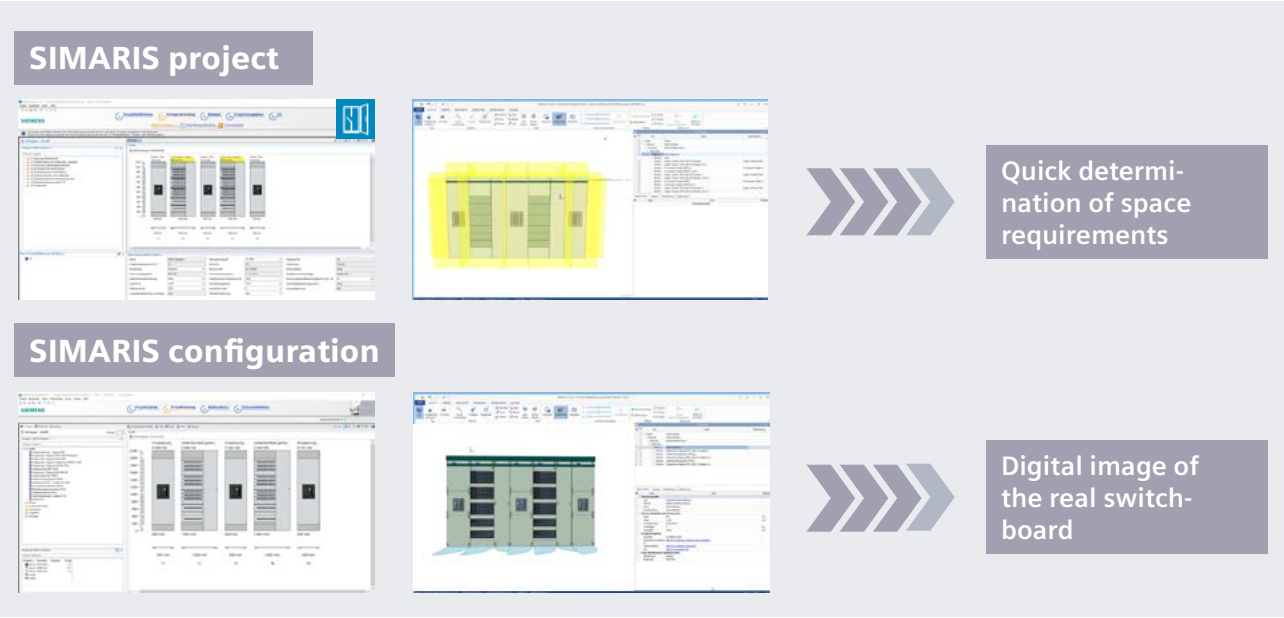


Fig. 1/9: **"As-planned" and "as-built" models of SIVACON 8PS busbar trunking systems created with SIMARIS project and SIMARIS configuration**

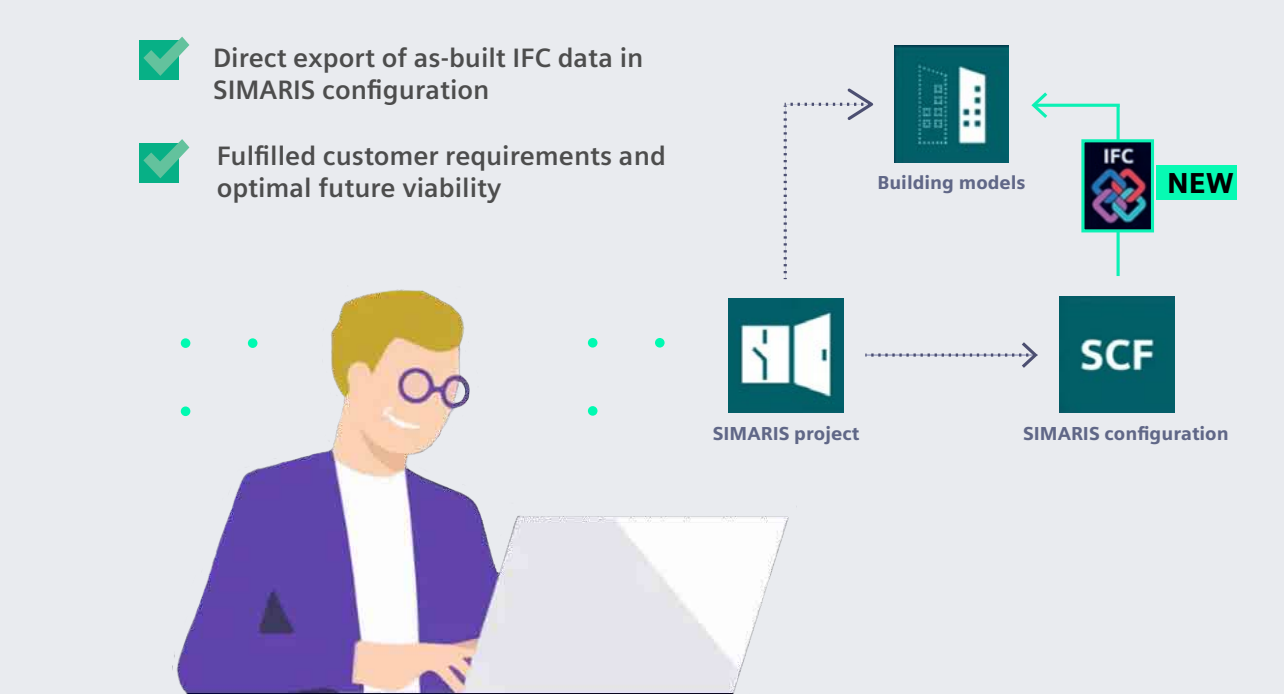


Fig. 1/10: **New software functionality – generation of an IFC file directly out of SIMARIS configuration**

With the new software functionality in SIMARIS configuration, panel builders can directly export the planned SIVACON S8 switchboard as an IFC file.

The 3D (as-built) model is created in the background, and the data is stored on the cloud-based SIMARIS Xchange platform.

The as-built BIM data from SIMARIS configuration has a higher level of detail compared to the as-planned data from SIMARIS project:

- The system and cubicle dimensions as well as the degree of protection, rated nominal currents, ambient conditions, power loss, representation of the exact system layout including the top-mounted units on the cubicles and the functional units.
- Representation of the essential facilities in doors and covers with precise position information and graphical details, including switching and protection devices in doors and covers.
- Direction detection for door openings to be taken into account when planning escape routes.
- Exact details of the system footprint taking into account the shape of the switchboard including corner cubicles and roof-mounted components.
- Consideration of required clearance areas around the switchboard for installation measures, operation, and maintenance.
- Storage of reference points for cable connections or connections with busbar trunking systems.
- Level of detail for basic technical data of the connected switching and protection devices.

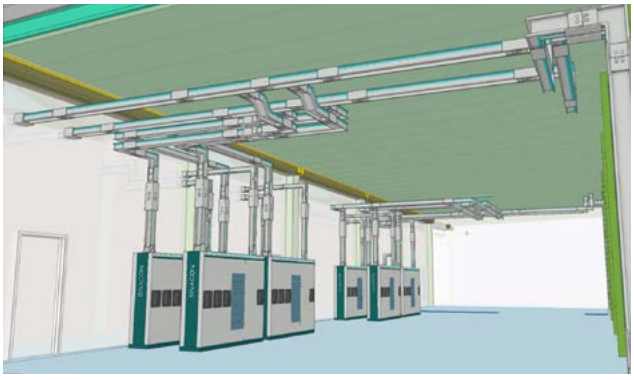


Fig. 1/11: **Application example 1 – supporting the BIM planning process with the SIMARIS planning tools**

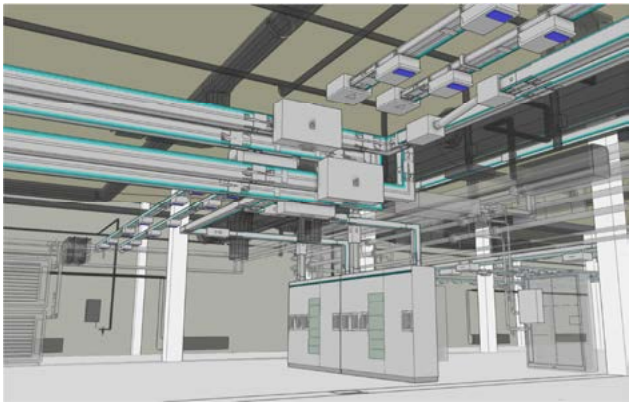


Fig. 1/12: **Application example 2 – supporting the BIM planning process with the SIMARIS planning tools**

1.3.3 SIMARIS Suite & SIMARIS Planning Tools

Planning the electric power distribution for industrial plants, infrastructure, and buildings is becoming more and more complex. To help you as an electrical planner work faster and better, the SIMARIS Suite supports you with its valuable collection of software tools and information material on technical topics.

siemens.com/simaris

The NEWS section provides daily information about updates, additional functions, and all kinds of news relating to electrical planning. This also includes the availability of new webinars, which you can register for via the suite.

The SOFTWARE section contains the latest versions of the respective SIMARIS planning tool and shows the availability of new versions.

New versions can be installed or started here. If you have worked on older projects with a previous version, you can also start these easily using the SIMARIS Suite.

In addition to the SIMARIS planning tools, the suite in the SIMARIS ONLINE Toolbox also offers a range of highly interesting standalone tools for electrical planning.

The SUPPORT section contains a valuable compilation of worldwide TIP contact partners as well as available information and innovations relating to BIM or the SIMARIS planning tools.

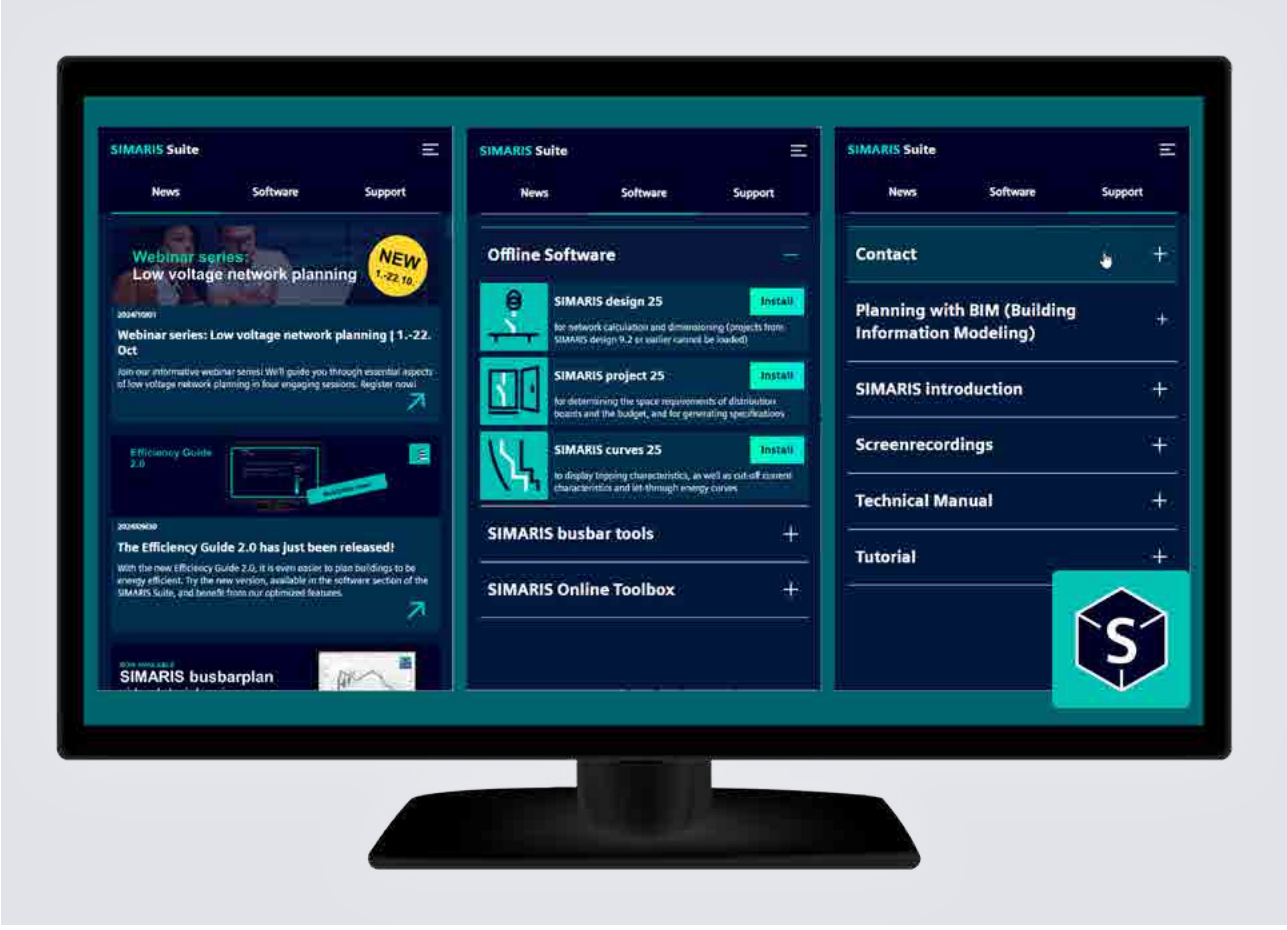
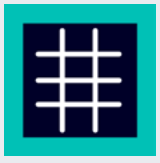


Fig. 1/13: **SIMARIS Suite**

SIMARIS design	
With the SIMARIS design software you can perform the network calculation, including the calculation of short-circuit currents, based on real products with minimum input effort.	
SIMARIS project	
Free planning tool that allows you to plan electrical distribution systems easily, quickly and clearly, including budget pricing, tender specification texts, and detailed documentation.	
SIMARIS curves	
For graphical display or comparison of characteristic curves of the switching and protection devices used (current-time, let-through current, let-through energy).	
SIMARIS busbarplan	
With this tool, available as a plug-in for Autodesk Revit®, you can carry out the 3D planning of SIVACON 8PS busbar trunking systems.	
SIMARIS sketch	
This free software is a standalone solution for the 3D planning of SIVACON 8PS busbar trunking systems in the context of BIM.	

Tab. 1/2: **SIMARIS Suite – SIMARIS planning tools and SIMARIS busbar trunking system tools**

SIMARIS Online Toolbox

SIMARIS curves web	
A web-based version of SIMARIS curves with identical functionality, without the need for installation. This enables more flexible access and use on different end devices.	
Tender specification texts	
Central platform for provision and download of tender specification texts for Siemens products and systems. The main topics include: - Electrical power distribution - Industrial switching technology - Building technology - Drive technology - Automation technology - Safety technologies Optionally, data export in the formats .TXT, .RTF, or GAEB (.X81, .D81) *siemens.com/specifications*	
Efficiency Guide	
A free tool for energy efficiency assessment of buildings according to DIN VDE 0100-801.	
EMC Busbar	
Tool for calculating the magnetic radiated disturbance for SIVACON 8PS busbar trunking systems according to the distance to the busbar run.	
Selectivity & Backup Manager	
Tool for creating individual selectivity or backup limit value tables for specific device combinations from the low-voltage sector.	
Sitrato	
Tool for spatial pressure calculation for GEAFOL transformers in case of an arc fault.	

Tab. 1/3: **SIMARIS Suite – additional tools of the SIMARIS Online Toolbox**

1.3.4 BusbarCheck

SIVACON 8PS busbar trunking systems are the innovative alternative to cable installations. They are high-quality standard components, manufactured and fully tested in an industrial production environment. To ensure the same high quality even on site during the installation of the busbar trunking system, BusbarCheck provides all necessary installation documentation via an app, identifies each busbar connection using a built-in QR/barcode reader, and documents the correct installation.

BusbarCheck is a software-based application that can be used to improve the quality of the installation of SIVACON 8PS busbar trunking systems. At the same time it can simplify the documentation to be handed over to the customer by creating an “electronic bolt record”.

The application consists of a
– BusbarCheck backend and the
– BusbarCheck app.

The BusbarCheck backend is a database application which can be accessed via a web browser. It can only be used by explicitly released Siemens employees and Siemens partner companies following a role system.

The BusbarCheck app is a freely available app which runs on both Android and IOS (Apple) devices.
All current smartphones as well as tablet computers are supported. Only when the app user has been explicitly released for a project via the backend, the app user can access the data of this project.

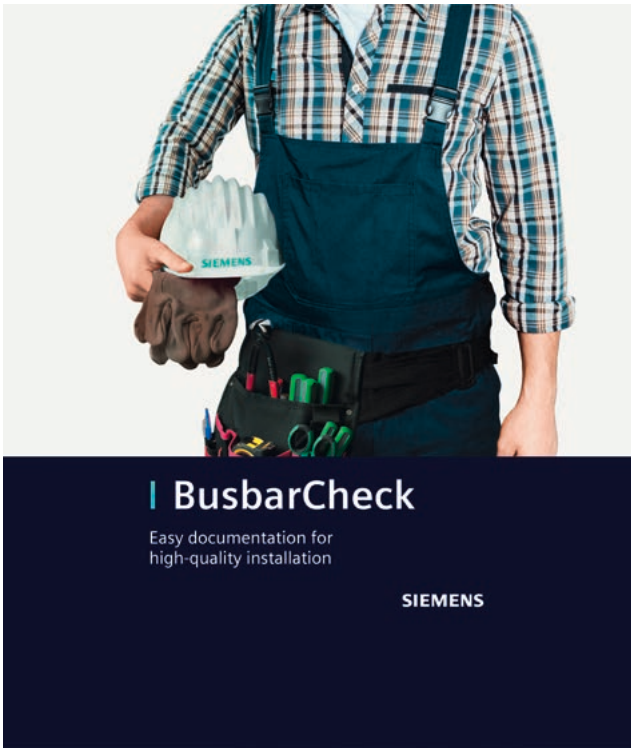


Fig. 1/14: **BusbarCheck**

Download link to the BusbarCheck app
for IOS end devices: *https://sie.ag/busbar-itunes*

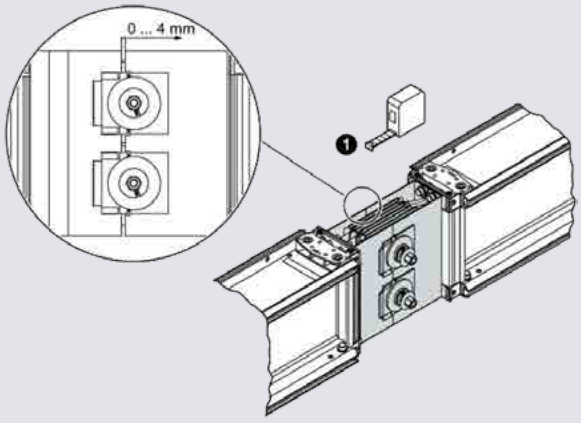
Download link to the BusbarCheck app
for Android end devices: *http://sie.ag/busbar-android*

Functional principle

The components of a SIVACON 8PS busbar trunking system are manufactured in industrial series production and are 100% quality-tested. On site, the installation of a busbar trunking system is performed by partner companies. To ensure always the same installation quality, the use of BusbarCheck is recommended:

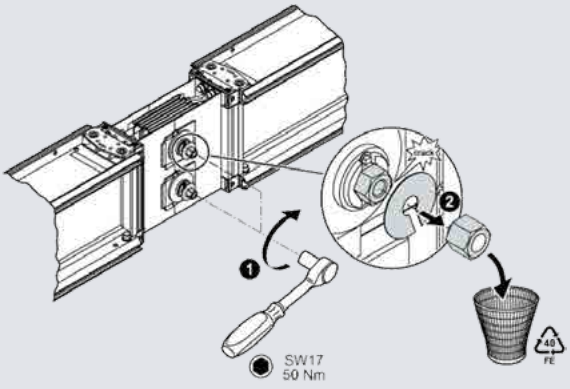
BusbarCheck is based on the visual recording and checking of the connection points of a busbar trunking system installation. To do this, the following concept is used: Using the example of LI, there are two simple indicators which show a high-quality installation.
With the help of these two indicators, a qualitative assessment can be made regarding the installation quality, and the installation can be proven as "perfect" during handover.

Indicator 1



aligned

Indicator 2



tightened

Fig. 1/15: **BusbarCheck – indicators for the installation quality by the example of the SIVACON 8PS busbar trunking system type LI**

An "electronic bolt record" can be easily and effectively created thanks to the pictures taken using the app and the built-in smartphone/tablet camera, the identification of the connection point, and the documentation of who installed the connection point and when.

The connection point is identified using a barcode or QR code (Fig. 1/16a and Fig. 1/16b).

There are two possibilities to identify the connection point:

1. Via the iBase or ID-link QR code (preferred method): Each busbar component is supplied with a so-called iBase QR code next to the nameplate. This QR code contains, among others, a “serial number” that is unique and with the help of which the connection point can be identified unequivocally. Simply read the iBase QR code closest to the connection point with the app’s built-in QR code reader. The app detects automatically whether the code is an iBase or ID-link QR code (Fig. 1/16a).

2. Via a barcode / QR code attached by the installer: The content is read using the barcode / QR code reader installed in the app and used 1:1 as a “unique identifier” (Fig. 1/16b).

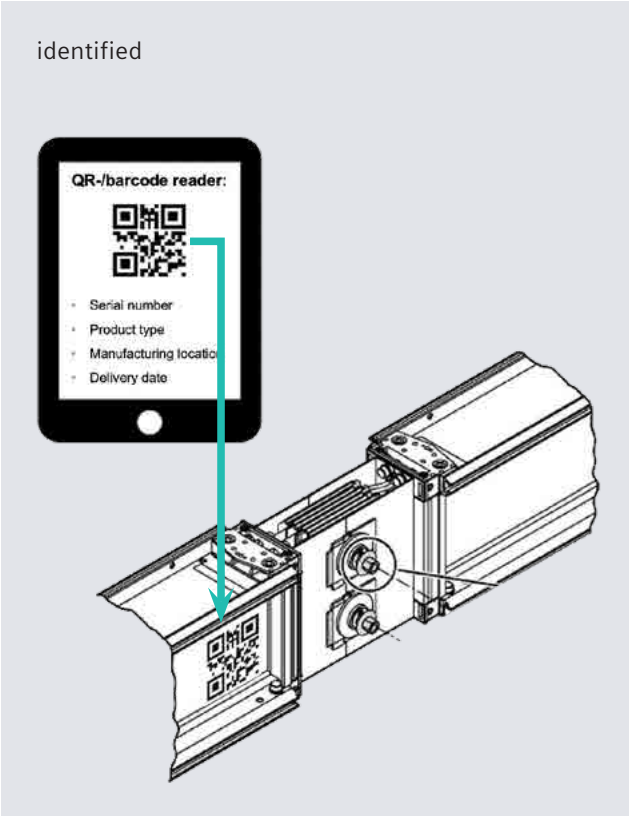


Fig 1/16a: **BusbarCheck – identification of a connection point via adhesive barcode label (option 1)**

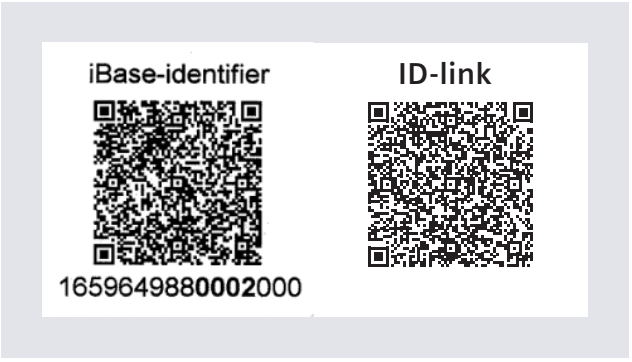


Fig. 1/16b: **BusbarCheck – identification of a connection point via iBase- or ID-link QR code (option 2)**

This way, each connection point can be identified, documented with pictures, and complemented with additional information about when and by whom the works were carried out.

The person responsible for the project at Siemens can confirm the perfect installation based on the pictures. Through a protocol function, an “electronic bolt record” can be created by the backend and handed over to the customer.

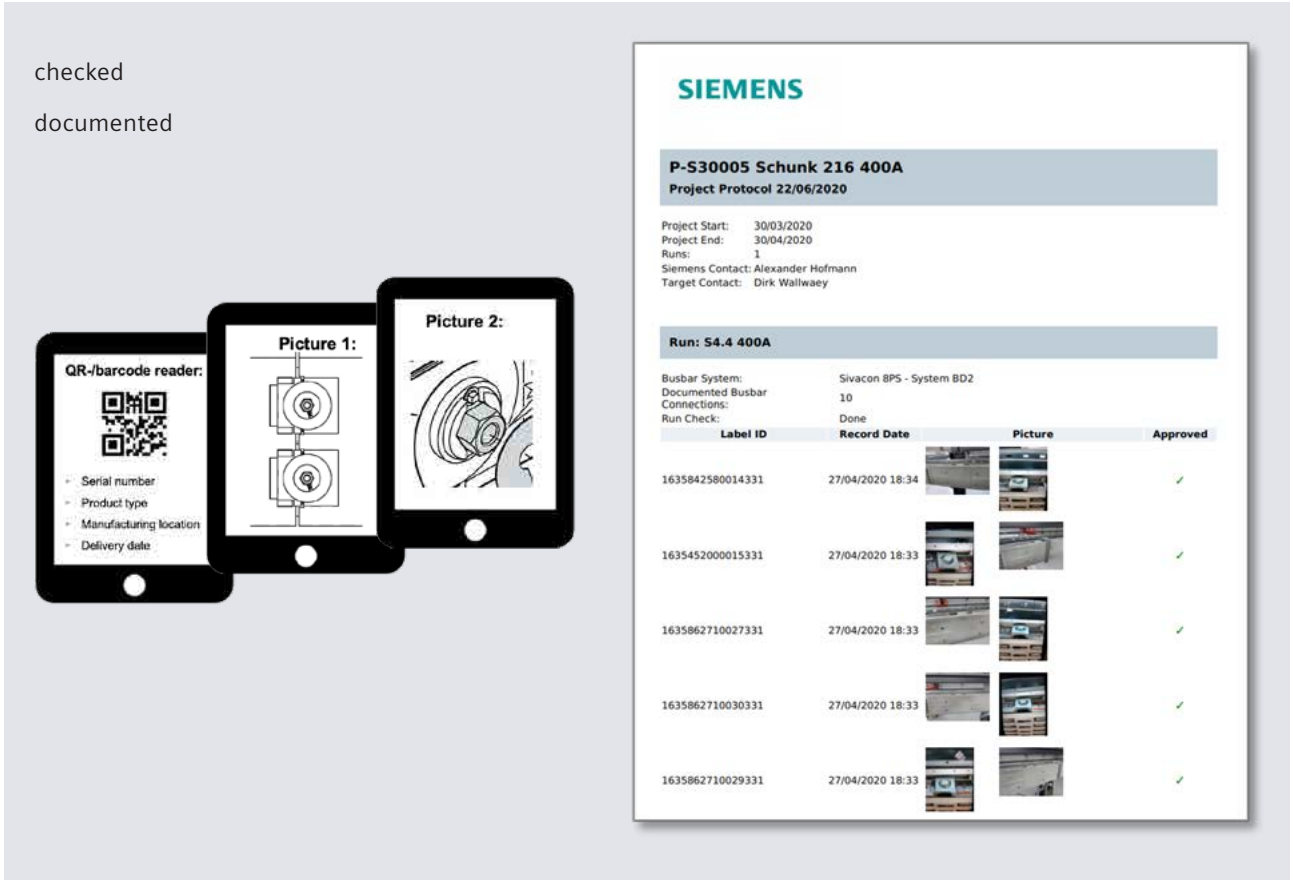


Fig. 1/17: **Automatically generated bolt record for successful busbar installation**

1. New: With “BusbarCheck Export” in SIMARIS busbarplan, the graphical information and component data are transferred to the BusbarCheck backend. This information is also available in the BusbarCheck app.

2. Installing the busbar component

3. Reading the QR code to identify the component

4. Creating images to document proper installation

5. New: Assigning the installed component in the digital twin by selecting the corresponding component in the 3D display of the busbar run

6. New: Importing the BusbarCheck data back into SIMARIS busbarplan. The added data is displayed in the component data of the busbar run.

This allows the project manager to check the progress of the installation directly in SIMARIS busbarplan.

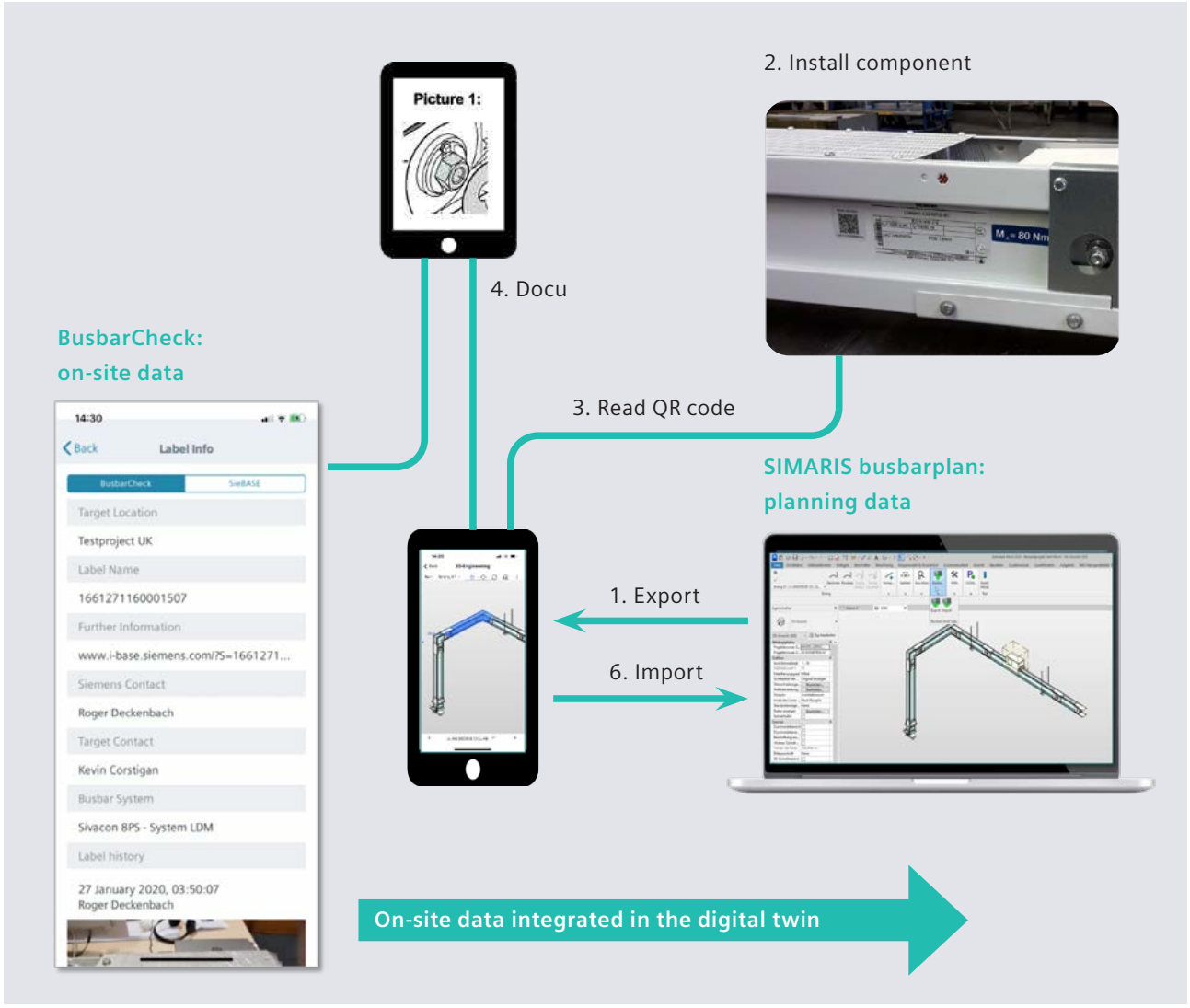


Fig. 1/18: **Coupling of BusbarCheck and SIMARIS busbarplan**

1.4 Energy Management and IoT Integration

Modern smart grids not only require a reliable power distribution, but also the transmission of energy data – for energy management and predictive maintenance of the energy installations.

Powerline technology

Powerline technology enables direct energy and data transfer via the SIVACON 8PS busbar trunking systems, highly efficiently without additional wiring.

siemens.com/sivacon-8PS

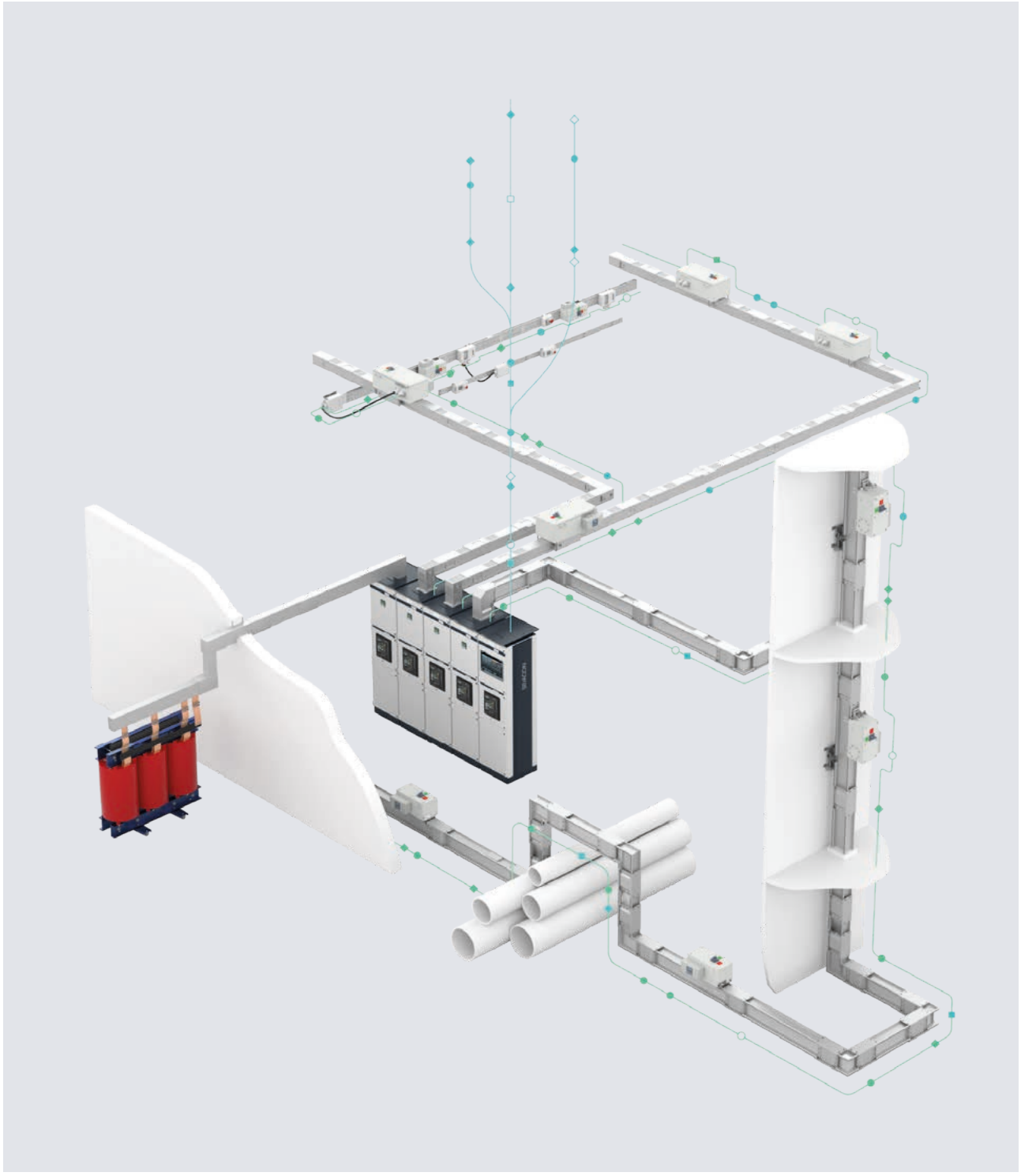


Fig. 1/19: **Smart data transmission with the SIVACON 8PS busbar trunking systems**

Powerline communication (PLC)
Making energy data easily available

With the help of powerline communication, it is easy to integrate communication-capable measuring and switching devices into the tap-off units of the busbar trunking system. No separate communication lines are required for data and information exchange.

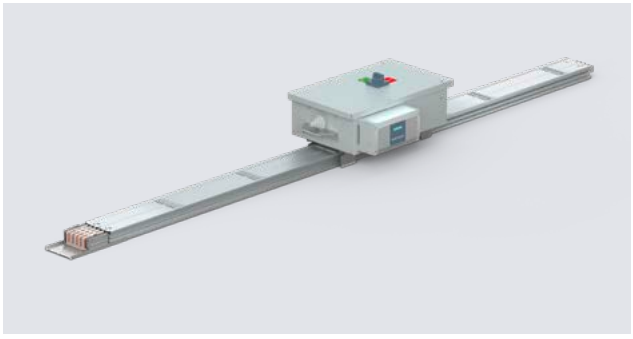
The PLC technology of the SIVACON 8PS busbar trunking systems ensures safe and reliable data transmission via the busbar conductors.

The SIVACON 8PS powerline technology is designed for plug-and-work operation and can be retrofitted to existing SIVACON 8PS power distribution boards at any time. This enables optional adaptation of the power distribution to changes in automated operation, machine, and process sequences.

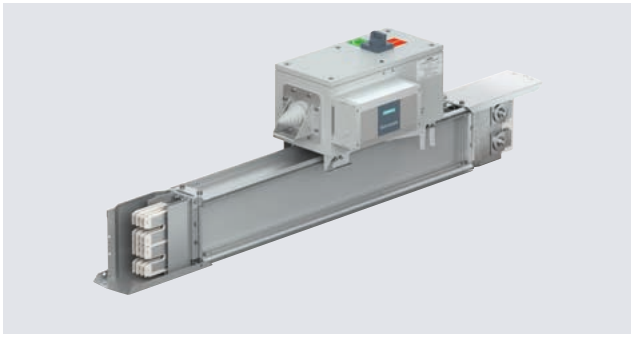
Your benefit
- Space-saving and easy installation
- Cost-efficient and safe power and data transmission
- Optimized maintenance operations based on operational data
- Transparent power flows to identify savings potential and allocate energy costs (e.g., for cost center accounting)
- Future-oriented solution thanks to possible integration in cloud-based solutions (IoT).

Four dedicated system solutions

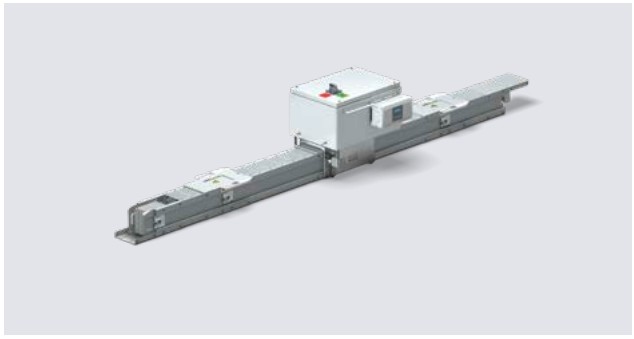
SIVACON 8PS offers you powerline technology with four different busbar trunking systems that are specialized for different areas of application.



BD2 system – the universal solution
for maximum power in minimum space



LI system – compact all-round system in sandwich design.
An integrated solution for safe and efficient power supply in infrastructure and industry



LD system – optimized to the requirements of industrial production.
The proven busbar for production



LData system – so that data centers can count on energy reliably.
Efficient and reliable power supply for data centers

SIVACON 8PS can do more – with powerline

With the so-called powerline box or even integrated into the tap-off unit – depending on the system installed –, powerline technology ensures data transmission without any additional transmission media.
Particularly clever: The necessary sensors are already on board. This allows you to easily record and transfer your energy data. The integrated powerline modem modulates the data onto the low-voltage network to ensure a long range and reliable transmission of data without additional wiring. The energy data is received and demodulated by the powerline modem in the low-voltage switchboard.

Simple and space-saving installation via plug-and-work is the motto, not only for power distribution with SIVACON 8PS, but also for the energy data. For the SIVACON 8PS systems BD2, LD, and LI, two versions are available:

- As a complete solution for new projects, consisting of tap-off unit, measuring technology, and powerline data transmission
- As a retrofit kit for upgrading existing installations.

Manage your energy data – systematically

Define your goals
The systems and components of low-voltage switchgear and controlgear offer you the technical possibilities for data acquisition, transmission, and transfer to higher-level evaluation and automation systems.

Use the potential of your energy data

Depending on your requirements for modern power distribution, SIVACON 8PS with powerline technology offers you a suitable communication solution. If you want to ensure a high availability of your production plant or infrastructure, you need a correspondingly reliable power distribution system. Greater transparency based on operational and energy data gives you the opportunity to uncover trends, predict failures, and reliably estimate the remaining service life of a system. In addition, the data is available for many other evaluations. Our software applications, platforms, and components also support connection to automation and energy management systems as well as to cloud-based solutions (IoT).

1.5 Siemens Close to You

Personal local support

Our local experts are there for you around the world, helping you to develop solutions for your energy supply, and providing you with specific expertise on project management and financial services. Important aspects of safety, logistics, and environmental protection are of course considered.

Furthermore, the Totally Integrated Power team offers professional assistance for the planning and conception of consistent power supply solutions for applications in infrastructure, buildings, and industry.

siemens.com/tip



SIVACON 8PS busbar trunking systems – information options

Our website offers you a broad range of information as well as helpful tools for the SIVACON 8PS busbar trunking systems. Just click and have a look!

siemens.com/busbar

SIVACON 8PS busbar trunking systems – configurator

The product configurator (selection aid) allows for orders of busbar trunking systems up to 1,250 A.
The following configurations are available:
- SIVACON 8PS BD01 system, 40 ... 160 A
- SIVACON 8PS BD2 system, 160 ... 1,250 A

The selection aid is available at the Siemens Industry Mall

https://mall.industry.siemens.com/mall/en

SIVACON 8PS busbar trunking systems – catalogs

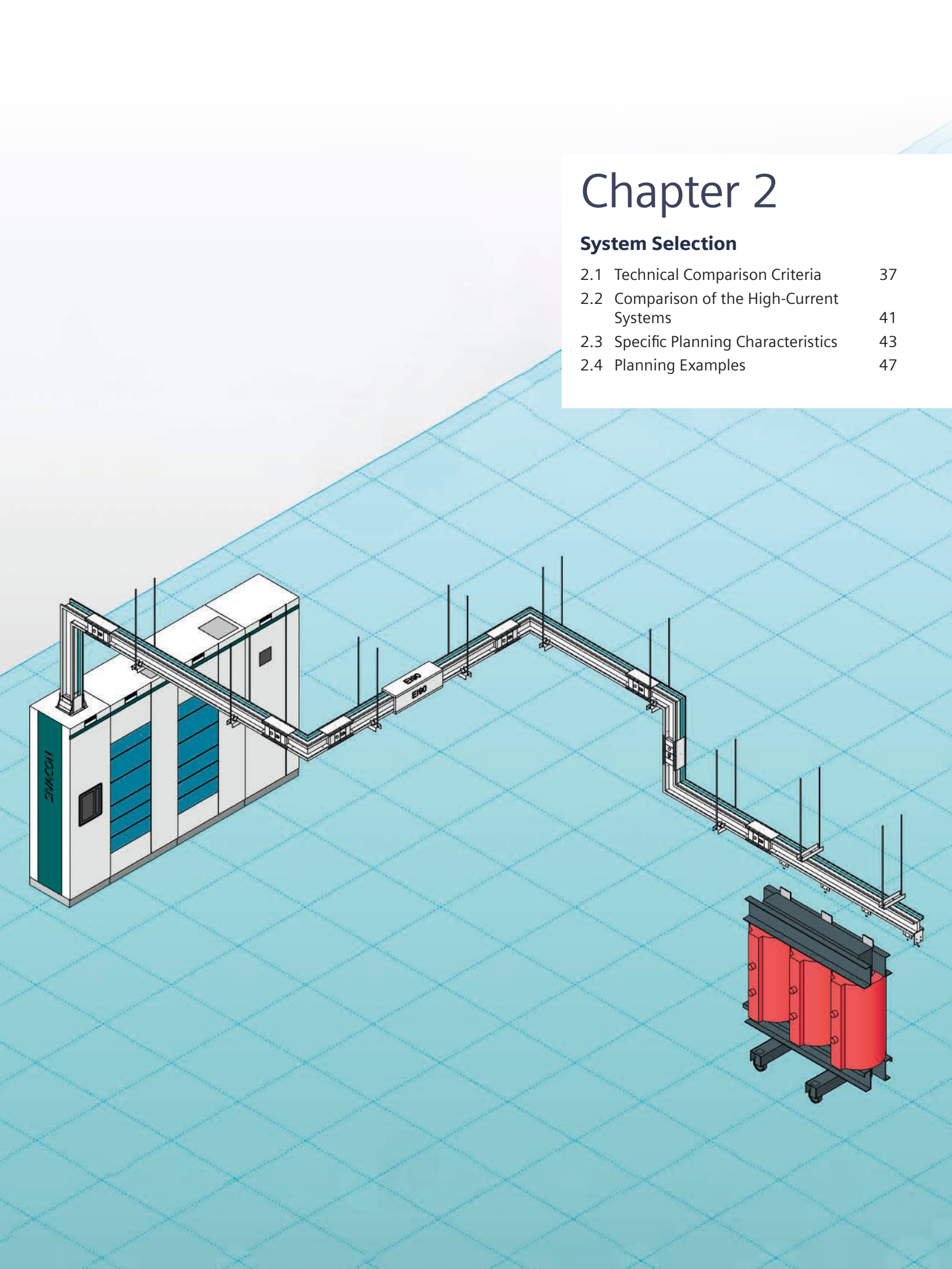
The product catalog LV70 contains information for selecting the appropriate system components for the BD01 and BD2 systems.

System components for the BD01 and BD2 systems

Chapter 2

System Selection

2.1 Technical Comparison Criteria 37
2.2 Comparison of the High-Current Systems 41
2.3 Specific Planning Characteristics 43
2.4 Planning Examples 47



2 System Selection

When creating an energy distribution concept, a general comparison is commonly made – in the preliminary planning phase – between busbar trunking systems and cable installations for different areas of application and boundary conditions. When choosing between a centralized (cable installation and power distribution boards) and a decentralized (busbar trunking systems) supply concept (Fig. 2/1), the advantages of busbar trunking systems shown in Tab. 2/1 should be considered.

For dimensioning a suitable busbar trunking system, the following parameters must be determined in the preliminary planning and design phase:
- Rated currents and short-circuit currents of the infeed
- Connected loads and dimensions of individual systems
- Voltage drop
- Required degree of protection
- Network configuration for the supply concept
- Configuration data for connected loads.

Rated currents and short-circuit currents of standard transformers

For infeed via transformers, rated currents and symmetrical short-circuit currents can be calculated approximately using the rated apparent power S_{rT} of the transformer:

$$I_r = k \cdot S_{rT}$$

With factor:
k = 1.45 for rated voltage U_{rT} = 400 V
and:
k = 0.84 for U_{rT} = 690 V

Based on this, the prospective initial short-circuit current of a transformer can be calculated approximately using:
$I_k'' = I_r / u_{kr}$

With the rated value of the impedance voltage u_{kr} (4% or 6%)

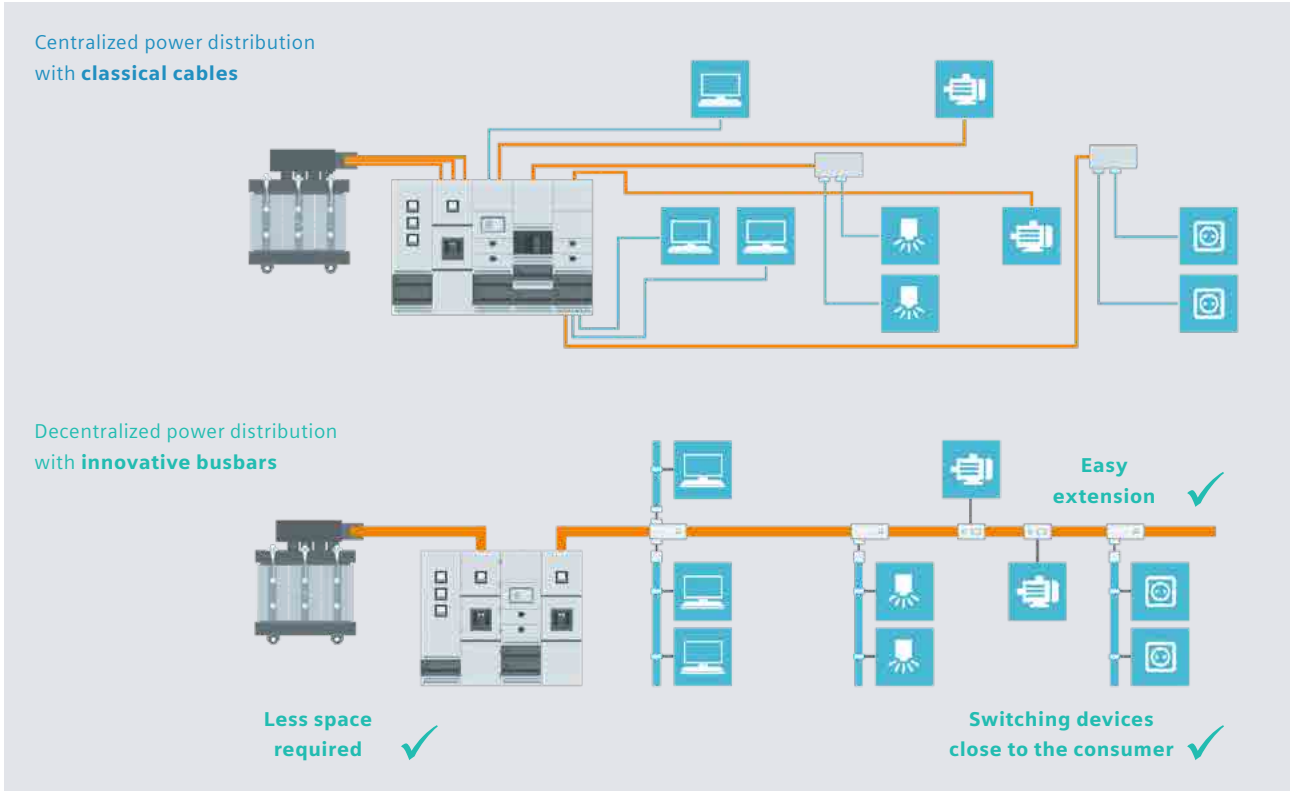


Fig. 2/1: **Comparison of line routings for cable installation and busbar trunking systems**

Feature	Busbar trunking system	Cable installation
Security of operation	Design verification test according to IEC 61439-6 (VDE 0660-600-6)	Depending on the respective execution quality
Mechanical safety	High	Low
Fire load	Low	High: PVC: up to 10 times higher PE: up to 30 times higher
Temperature characteristic	Ambient temperature max. +40 °C and +35 °C in the 24-hour mean according to IEC 61439-1 and -6	Cable loads are referred to +30 °C according to DIN VDE 0298-4
Network configuration	Clear due to linear- and/or surface-type network configuration with serially arranged load tap-offs via the tap-off units	Very high cable accumulation at the infeed point due to the radial supply to the loads from the central power distribution
Placement of switching and protection devices for loads	In the tap-off unit: thus immediate assignment to the load on site	Centrally in the distribution board: thus only indirect assignment to the load. The correctness of the cable and load labeling is crucial and must always be checked
Space requirements	Low, thanks to compact design due to high current-carrying capacit y and standard junction units	High, as routing criteria such as accumulation, type of routing, bending radii, current-carrying capacity, etc. must be observed
Retrofittability in case of change of load tap-offs	Greater flexibility due to tap-off points in the trunking units and large number of different tap-off units	Only possible with high costs. Routing of additional cables from the central distribution to the load
Planning and configuration	Easy, fast, and consistent thanks to DBIM-compatible planning tools	High configuration costs (distribution and cable designs, cable diagrams, etc.)
Dimensioning (operational and short-circuit currents, voltage drop, earthing conditions)	Low costs	High costs
Troubleshooting effort	Low	High
Fire barrier	Design verified, factory-assembled	Depending on the execution quality on site
Functional endurance	Tested functional endurance according to DIN 4102-12	Depending on the execution quality on site
Electromagnetic influence	Low, and exactly defined	Relatively high for standard cables and depending on the execution quality on site
Installation	Less installation material and auxiliary means, short installation times	Complex installation material and comprehensive auxiliary means, long installation times
Weight	Weight reduction to half or even a third compared with cables	Up to 3 times the weight of a comparable busbar trunking system
Halogen-free design, PVC-free design	Trunking units are generally halogen-free and PVC-free	Standard cables are not halogen-free and PVC-free. Halogen-free cables are more expensive than standard cables

Tab. 2/1: **Comparison of characteristic features of busbar trunking systems and classical cable installation (request details from the manufacturers)**

2.1 Technical Comparison Criteria

The SIVACON 8PS busbar trunking systems can be used for nearly all applications in buildings, industry, and infrastructure. The differences between the individual systems characterize their typical main applications. Based on the required technical planning criteria, such as conductor configuration, dimensions, or IP degree of protection, a suitable busbar trunking system can be selected (Tab. 2/3). The overview of the most important rated values and technical data for the individual Siemens busbar trunking systems on the next spread (Tab. 2/4) simplifies the classification.

Rated power in kVA	**Rated voltage U_{rT}**			**Rated voltage U_{rT}**			**Rated voltage U_{rT}**		
	400/230 V, 50 Hz			525 V, 50 Hz			690 V, 50 Hz		
		Rated value of impedance voltage			Rated value of impedance voltage			Rated value of impedance voltage	
		u_{kr} = 4%	u_{kr} = 6%		u_{kr} = 4%	u_{kr} = 6%		u_{kr} = 4%	u_{kr} = 6%
	Rated current I_r in A	**Initial symmetrical short-circuit current I_k" in A [1)]**		**Rated current I_r in A**	**Initial symmetrical short-circuit current I_k" in A [1)]**		**Rated current I_r in A**	**Initial symmetrical short-circuit current I_k" in A [1)]**	
50	72	1,933	1,306	55	1,473	995	42	1,116	754
100	144	3,871	2,612	110	2,950	1,990	84	2,235	1,508
160	230	6,209	4,192	176	4,731	3,194	133	3,585	2,420
200	288	7,749	5,239	220	5,904	3,992	167	4,474	3,025
250	360	9,716	6,552	275	7,402	4,992	209	5,609	3,783
315	455	12,247	8,259	346	9,331	6,292	262	7,071	4,768
400	578	15,506	10,492	440	11,814	7,994	335	8,953	6,058
500	722	19,438	12,020	550	14,810	9,158	418	11,223	6,939
630	910	24,503	16,193	693	18,669	12,338	525	14,147	9,349
800	1,154	–	20,992	880	–	15,994	670	–	12,120
1,000	1,444	–	26,224	1,100	–	19,980	836	–	15,140
1,250	1,805	–	32,791	1,375	–	24,984	1,046	–	18,932
1,600	2,310	–	39,818	1,760	–	30,338	1,330	–	22,989
2,000	2,887	–	52,511	2,200	–	40,008	1,674	–	30,317
2,500	3,608	–	65,547	2,749	–	49,941	2,090	–	37,844
3,150	4,550	–	82,656	3,470	–	62,976	2,640	–	47,722

[1)] The prospective initial symmetrical short-circuit current of the transformer when connecting to a network with unlimited short-circuit power is calculated considering the voltage factor and the impedance correction factor for the transformer according to IEC 60909-0 (VDE 0102)

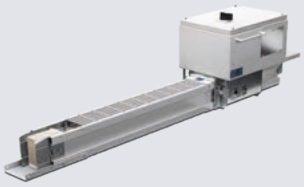
Tab. 2/2: **Rated currents and short-circuit currents of standard transformers**

For the values in Tab. 2/2 from a more exact calculation of the prospective initial symmetrical short-circuit current of the transformer when connecting to a network with unlimited short-circuit power, the voltage factor and the impedance correction factor for transformers were considered according to IEC 60909-0 (VDE 0102).

			System					
Conductor configurations			**BD01**	**BD2**	**LD**	**LI**	**LR**	**LData**
L1, L2, L3, N, PE=enclosure			×	–	–	×	–	–
L1, L2, L3, PE=enclosure			–	–	–	×	–	–
L1, L2, L3, PEN			–	–	×	×	×	–
L1, L2, L3, N, PE=busbar			–	×	×	×	×	×
L1, L2, L3, 2N, PE=enclosure			–	–	–	×	–	–
L1, L2, L3, N, (PE) [1], PE=enclosure			–	–	–	×	–	–
Dimensions: width x height								
Al systems	for 40 A	mm × mm	90 × 25	–	–	–	–	–
	for 160 A		90 × 25	167 × 68	–	–	–	–
	for 400 A		–	167 × 68	–	–	90 × 90	–
	for 1,000 A		–	167 × 126	180 × 180 [2]	155 × 132	120 × 110	180 × 220
	for 2,000 A		–	–	240 × 180	155 × 230	120 × 230	220 × 220
	for 4,000 A		–	–	240 × 180	410 × 230	120 × 460	220 × 220
Cu systems	for 40 A	mm × mm	90 × 25	–	–	–	–	–
	for 160 A		90 × 25	167 × 68	–	–	–	–
	for 400 A		–	167 × 68	–	–	–	–
	for 1,000 A		–	167 × 126	–	155 × 111	90 × 90	–
	for 1,250 A		–	167 × 126	180 × 180	155 × 117	120 × 110 [3]	–
	for 2,000 A		–	–	240 × 180	155 × 174	120 × 190	–
	for 5,000 A		–	–	240 × 180	410 × 213	120 × 460	–
	for 6,300 A		–	–	–	410 × 280	120 × 540	–
Max. fixing distances								
Al systems		m	1.5 ... 3.1	2.5 ... 4.0	5.0 ... 6.0	2.0 ... 3.0	1.5 ... 3.0	3
Cu systems		m	1.5 ... 3.0	1.5 ... 1.0	2.0 ... 3.0	2.0 ... 3.0	1.5 ... 3.0	–

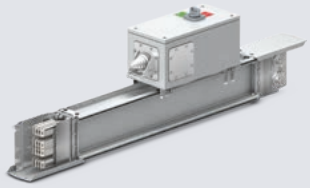
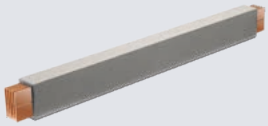
[1] (PE) = additionally isolated PE conductor (Clean Earth)
[2] For LDA1 (I_{nA} = 1,100 A)
[3] For LRC05 (I_{nA} = 1,350 A)

Tab. 2/3: **Selection of SIVACON 8PS busbar trunking systems based on technical planning criteria**

Busbar trunking system	BD01 [1), 2)]	BD2 [1), 2)]	LD [1), 2)]
			
System description	The flexible power supply in workshops and production facilities of craft, trade, and commercial enterprises	The universal solution for maximum power in the smallest space, above all in office buildings and industrial transfer lines	The safe busbar for industrial production lines, for exhibition halls, in wind turbines, and for ships
Typical application	• Workshops and production facilities • Supermarkets • Data centers • High-rise buildings • Exhibition halls • Automotive industry	• Workshops and production facilities • Manufacturing industry • Home improvement centers • Data centers • High-rise buildings • Food industry • Exhibition halls • Hospitals • Automotive industry	• Automotive industry • Manufacturing industry • Food industry • Exhibition halls • Wind turbines • Semiconductor production
Rated insulation voltage U_i	400 V AC / 400 V DC	690 V AC / 800 V DC	1,000 V AC / 1,000 V DC
Rated operational voltage U_e	400 V AC	690 V AC	1,000 V AC
Degree of protection	IP54, IP55	IP52, IP54, IP55	IP34, IP54 [3)]
Rated current I_{nA}	40 A to 160 A	160 A to 1,250 A	1,100 A to 5,000 A
Rated peak withstand current I_{pk}	Up to 15.3 kA	Up to 90 kA	Up to 286 kA
Rated short-time withstand current I_{cw} (1 s)	Up to 2.5 kA	Up to 34 kA	Up to 116 kA
Conditional short-circuit withstand strength I_{cf} / I_{cc} for TOU [5)] up to 630 A	[7)]	[7)]	120 kA / 100 kA
Conditional short-circuit withstand strength I_{cf} for TOU [5)] from 800 A	–	–	100 kA
Number of conductors	4 (PE = enclosure)	5	4, 5
Fire load	Max. 0.76 kWh/m (incl. tap-off point)	1.32 - 2.0 kWh/m (incl. tap-off point)	4.16 – 8.83 kWh/m
Fire load (per tap-off point)	–	–	7.8 - 10.8 kWh
Tap-off point	Either 0.5 m or 1 m on one side Max. 6 nos.	Every 0.5 m on one side, offset on both sides every 0.25 m Max. 11 nos. up to 16 A, max. 10 nos. up to 125 A, max. 6 nos. up to 250 A, max. 4 nos. up to 630 A (only from BD2-630)	Every 1 m on one side Max. 3 nos. up to 630 A, max. 2 nos. up to 1,250 A
Tap-off unit	Up to 63 A	Up to 530 A	Up to 1,250 A
Connection technology	Connecting flanges with integrated expansion compensation	With integrated expansion compensation, bolt joint block	Clamped connection with hook and bolt
Conductor material	Aluminum or copper	Aluminum or copper	Aluminum or copper
Enclosure material	Galvanized and painted sheet steel	Galvanized and painted sheet steel	Painted sheet steel
Mounting position	Horizontal (edgewise, flat) (tap-off points downwards)	Horizontal (edgewise, flat) and vertical	Horizontal (edgewise) and vertical

1) Country-specific approval Eurasia (EAC)
2) Marine classification DNV (Det Norske Veritas)
3) For IP54, a derating by up to 36% must be observed
4) IP66 for mere power transmission
5) TOU: Tap-Off Unit
6) On request
7) Value generally corresponds to the value of the switching and protection device installed (< I_{cw}; see technical specifications of the switching and protection device)

Tab. 2/4: **Comparison of technical data for SIVACON 8PS busbar trunking systems**

Busbar trunking system	LI [1]	LR [1]	LData
			
System description	An integrated solution for safe and efficient power supply in the infrastructure – e.g., in multi-floor buildings – as well as in industrial applications	The reliable busbar for high protection in harsh ambient conditions, e.g., for outdoor networking of building sections, or for the supply of tunnels	Efficient and reliable power supply for data centers now and in the future
Typical application	• Data centers • High-rise buildings • Manufacturing industry • Chemical industry • Airports • Exhibition halls • Hospitals • Home improvement centers • Shopping malls and supermarkets	• Chemical industry • Oil and gas • Tunnels and underground • Outdoor applications	• Data centers
Rated insulation voltage U_i	1,000 V AC	1,000 V AC	600 V AC
Rated operational voltage U_e	1,000 V AC	1,000 V AC	600 V AC
Degree of protection	IP55, IP66 [4]	IP68	Trunking units: IP21 Tap-off units: IP21, IP41
Rated current I_{nA}	800 A to 6,300 A	400 A to 6,300 A	1,000 A to 2,500 A
Rated peak withstand current I_{pk}	Up to 330 kA	Up to 220 kA	84 kA
Rated short-time withstand current I_{cw} (1 s)	Up to 150 kA	Up to 100 kA	40 kA
Conditional short-circuit withstand strength I_{cf} / I_{cc} for TOU [5] up to 630 A	120 kA / 100 kA	[6]	
Conditional short-circuit withstand strength I_{cf} for TOU [5] from 800 A	100 kA	[6]	
Number of conductors	3-7 conductors incl. Clean Earth and 200% N conductor	3 and PEN or 3, N, and PE	5 conductors
Fire load	2.13 – 15.54 kWh/m	13.01 – 86.96 kWh/m	
Fire load (per tap-off point)	0.89 kWh	[6]	
Tap-off point	Up to 3 per 3 m length (per side) Max. 6 nos. up to 250 A, max. 4 nos. up to 630 A, max. 1 no. up to 1,250 A	Single-sided, trunking elements with tap-off point (1.5 to 3 m long)	Pluggable all along the system
Tap-off unit	Up to 1,250 A	Up to 630 A	Up to 250 A
Connection technology	Clamped bolt connection with shear-off nut	Joint block	Direct hook and bolt connection (LD technology)
Conductor material	Aluminum or copper	Aluminum or copper	Aluminum
Enclosure material	Painted Al	Epoxy resin	Galvanized and powder-coated sheet steel
Mounting position	Horizontal (edgewise, flat) and vertical	Horizontal (edgewise) and vertical	

1) Country-specific approval Eurasia (EAC)
2) Marine classification DNV (Det Norske Veritas)
3) For IP54, a derating by up to 36% must be observed
4) IP66 for mere power transmission
5) TOU: Tap-Off Unit
6) On request
7) Value generally corresponds to the value of the switching and protection device installed (< I_{cw}; see technical specifications of the switching and protection device)

Tab. 2/4: **Comparison of technical data for SIVACON 8PS busbar trunking systems** (continued)

2.2 Comparison of the High-Current Systems

Since the rated voltage and rated currents of the LI, LD, and LR high-current systems overlap significantly, a selection structure is compiled in Tab. 2/5 with recommendations for different areas and places of application. In Tab. 2/6, the required specifications are listed for determining the suitable high-current system for connection to a standard transformer (Fig. 2/2).

The short-circuit withstand strength of the busbar trunking systems LI, LD, and LR is usually higher than the values for sustained and peak short-circuit current of the transformer. This, however, applies only to the use of one individual transformer for low-voltage supply. In ringed or meshed networks, or with transformers connected in parallel within one low-voltage main distribution (LVMD), higher short-circuit values may appear. These cases are to be considered separately. For precise specifications of the short-circuit withstand strength for the respective busbar trunking systems, please refer to the technical specifications in the following chapters.

Place of use	Application areas		System		
			LI	LD	LR
Public buildings	Banks Insurances Internet providers Data centers Broadcasting stations Shopping centers Furniture stores Fairs Airports Hospitals Clinics Office buildings	For power distribution in multi-floor buildings with predominantly vertical busbar run	×	–	–
		To avoid neutral conductor overload due to electronic loads affected by harmonics	×	–	–
		To prevent disturbance potentials in the busbar enclosure from negative impacting the operability of loads	×	–	–
		In case of a high density of load tap-offs on minimum space	×	×	–
		To protect loads from negative impacts by magnetic field emissions: 1. Systems up to and including 1,600 A 2. Systems from 2,000 A	× –	– ×	– –
		In case of power distribution with predominantly horizontal busbar run layout and degree of protection IP34	–	×	–
Industrial buildings	Industrial buildings Production Warehouses Testing centers	If arc-resistant load tap-offs are required	–	×	–
		If the degree of protection IP34 is sufficient	–	×	–
		If the degree of protection IP55 is required	×	–	–
		If the degree of protection IP6X is required	– [1)]	–	×
		For power transmission in extreme production conditions	–	–	×
		For power transmission outside closed buildings	–	–	×

[1)] For power transmission only

Tab. 2/5: **Application areas of the high-current systems**

SYSTEM

	LI-A system 10 m	5 conductors 2,500 A (IP55)	3 junction units	1 fire barrier	1 SIVACON S8 connection	1 transformer connection



Fig. 2/2: **Connection of a transformer to a Siemens power distribution board**

Transformer data				**Suitable busbar trunking system**					
Rated power	**Rated current I_r**	**Initial short-circuit current I_k'' (u_{kr} = 6%)**	**Peak short-circuit current I_{pk} (u_{kr} = 6%)**	LD (IP34)		LI (IP55 / IP66)		LR (IP68)	
				Size	Rated current I_{nA}	Size	Rated current I_{nA}	Size	Rated current I_{nA}
630 kVA	910 A	15.16 kA r.m.s.	38.58 kA	LDA1	1,100 A	LI-..1000	1,100 A	LRA04 / LRC03	1,000 A
800 kVA	1,155 A	19.25 kA r.m.s.	49.00 kA	LDA2	1,250 A	LI-..1250	1,250 A	LRA06 / LRC04	1,400 A / 1,350 A
1,000 kVA	1,444 A	24.06 kA r.m.s.	61.24 kA	LDA3	1,600 A	LI-..1600	1,600 A	LRA07 / LRC05	1,700 A
1,250 kVA	1,805 A	30.07 kA r.m.s.	76.57 kA	LDA4	2,000 A	LI-..2000	2,000 A	LRA08 / LRC07	2,000 A
1,600 kVA	2,310 A	38.50 kA r.m.s.	98.00 kA	LDA5	2,500 A	LI-..2500	2,500 A	LRA09 / LRC08	2,500 A
2,000 kVA	2,887 A	48.11 kA r.m.s.	122.50 kA	LDA6	3,200 A	LI-..3200	3,200 A	LRA27 / LRC09	3,200 A
2,500 kVA	3,609 A	60.11 kA r.m.s.	153.10 kA	LDA7	4,000 A	LI-..4000	4,000 A	LRA28 / LRC27	4,000 A
3,150 kVA	4,546 A	75.78 kA r.m.s.	192.90 kA	LDC8	5,000 A	LI-..5000	5,000 A	LRA29 / LRC28	5,000 A

Tab. 2/6: **Selection of the high-current systems depending on standard transformer data**

2.3 Specific Planning Characteristics

Apart from the technical specifications, critical boundary conditions of planning may significantly influence the selection and characteristics of a suitable busbar trunking system:

- Voltage drop
- Overload and short-circuit protection
- Loop impedance
- Magnetic fields
- Sprinkler behavior
- Degree of protection according to IEC 60529 (VDE 0470-1).

Voltage drop

In the case of longer run lengths, it may be required to calculate the voltage drop:

$$\Delta U = k \cdot \sqrt{3} \cdot I_B \cdot l \cdot (R_L \cdot \cos\varphi + X_L \cdot \sin\varphi)$$

with

ΔU	=	voltage drop in V
I_B	=	operational current in A
l	=	total length of the system in m
k	=	load distribution factor
R_L	=	ohmic resistance of the conductor in mΩ/m in case of busbar temperature rise
X_L	=	inductive resistance of conductors in mΩ/m in case of busbar temperature rise
cos φ	=	active power factor
sin φ	=	reactive power factor

For the load distribution factor k, a simple formula can be created in the case of a uniform load (identical currents) of multiple tap-offs (see Fig. 2/3). To do this, the factor is averaged from the sum of ratios of individual intervals l_i (total number n) to the interval between the infeed and the tap-off at the end of the busbar trunking system (it usually corresponds approximately to the total length l):

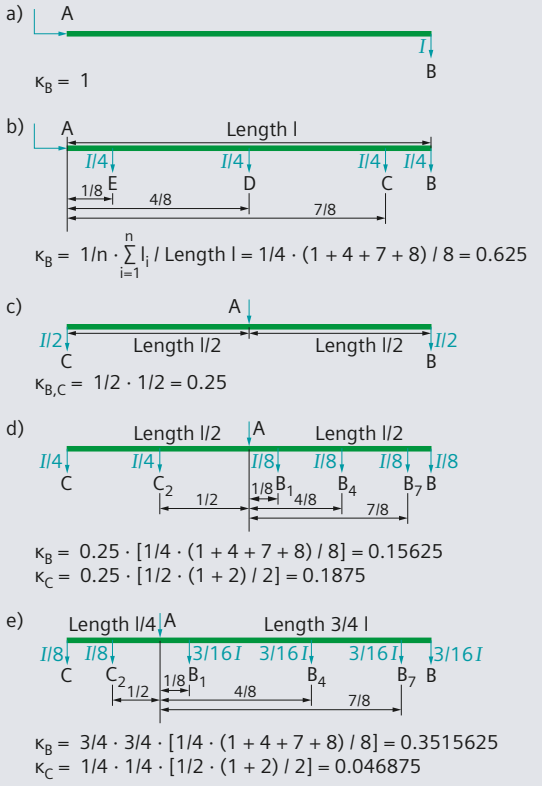
$$k = \frac{1}{n} \cdot \sum_{i=1}^{n} \frac{l_i}{l}$$

For a division with equal loads, one obtains:

$$k = \frac{(n+1)}{(2 \cdot n)}$$

Limit values:
k = 0.5 as a minimum value for countless tap-offs
k = 0.75 for n = 2

For center infeed into a busbar trunking system, each section after the infeed can be considered separately. The voltage drop, for example, is reduced to a quarter in the case of exact center infeed with the same intervals between identical loads (Fig. 2/3, example c). Due to the linear dependency of the voltage drop on the rated current and on the length of the busbar sections, the relations for power distribution between the sections and the interval distributions on the individual sections can be used. This is shown in examples d) and e) in Fig. 2/3.



a) One-sided infeed;
individual tap-off at the end of the busbar trunking system
b) One-sided infeed;
distributed across 4 equally loaded tap-offs
(tap-off B at the end of the busbar trunking system)
c) Center infeed;
one tap-off (B, C) each at each end of the busbar trunking system
d) Center infeed;
equally distributed currents, to 2 tap-offs on the left and to 4 tap-offs on the right; B and C at the respective ends
e) Center infeed;
power distribution of sections 1/4 (C) to 3/4 (B); equally, length distribution 1/4 (C) to 3/4 (B) with 2 (C) or 4 (B) tap-offs

Fig. 2/3: **Schematic examples for simple relations in case of voltage drop in busbar trunking systems**

These factors are confirmed by means of exemplary calculations in SIMARIS design. Generally, for switchboards with randomly distributed loads, the dimensioning tool SIMARIS design can be used, which determines the voltage drop for the individual lengths (*siemens.com/simaris*). SIMARIS design additionally also takes into account the operational temperature rise of the busbars when determining the resistance according to IEC 60228 (VDE 0295).

Overload and short-circuit protection

Busbar trunking systems must be protected against short circuit and overload. Fuses and circuit breakers are used as protection devices. When selecting protection devices, the level of expected short-circuit currents, selectivity requirements, or the desired operating and signaling functions can be decisive factors. When circuit breakers are used, the thermally delayed overload release is set to the rated current value of the busbar trunking system. This way, the busbar trunking system can be loaded to 100%.

When determining the short-circuit protection, the specified short-circuit withstand strengths of the busbar trunking systems must not be exceeded. It depends on the magnitude of the expected short-circuit current whether a current-limiting protection device, such as a fuse, is required and which short-circuit breaking capacity it needs to have.

The following generally applies:

$I_k'' \leq I_{cc} \leq I_{cu}$

I_k'' = expected short-circuit current at the mounting location

I_{cc} = rated conditional short-circuit current of the combination between busbar run and switching/protection device

I_{cu} = rated short-circuit breaking capacity of the circuit breaker

Generally, it has to be observed that fuses are not suitable for overload protection due to their late response threshold (1.3 to 1.6 times the rated current) and their long pre-arcing times in the case of small overcurrents. We therefore recommend using motor protecting switches or circuit breakers. The easiest way to determine a suitable protection is by calculation in the network dimensioning software SIMARIS design.

Loop impedance

The level of loop impedance is decisive for the magnitude of the 1-pole short-circuit current. Loop impedance between phase conductor and protective conductor, or between phase conductor and PEN conductor, may be determined according to IEC 60909-0 (VDE 0102) as follows:
- Measurement with measuring devices, or
- Calculation, or
- Reproduction of the network in the network model.

The loop impedances of a busbar trunking system represent an integral part of the total loop impedance.
The impedance values for calculating the loop impedances of a busbar trunking system can be found in the following chapters.

For a rough check, a simplified calculation of the expected minimum single-pole initial short-circuit current can be carried out with the help of the loop impedance of the overall system:

$I_{k1}''_{min} = c \cdot U_n / (\sqrt{3} \cdot Z_s)$

with
c = voltage factor 0.95
U_n = voltage between the phase conductors
Z_s = loop impedance

Since it proves complex to manually determine the loop impedances of all contributing equipment of a system (network infeed, transformers, distribution boards, line sections, etc.) for a more exact calculation, the use of the dimensioning software SIMARIS design together with a database containing the relevant data for customary electrical equipment significantly reduces the planning costs.

Magnetic fields

Due to physical causes, the busbars provided for power distribution and power transmission create electromagnetic alternating fields in their environment with a fundamental frequency of 50 Hz. These magnetic fields can have a negative impact on the trouble-free functioning of sensitive equipment, such as computers and measuring tools.

The EMC directives or the resulting standards do not contain any regulations or recommendations for the planning of busbar trunking systems.

If busbar trunking systems are used in hospitals, IEC 60364-7-710 is to be observed. This standard defines the limit values for magnetic induction B at 50 Hz for the patient's spaces in hospitals:

$B = 2 \cdot 10^{-7}$ Tesla
for electroencephalograms (EEG)

$B = 4 \cdot 10^{-7}$ Tesla
for electrocardiograms (ECG)

The limit value for inductive interference between multicore cables and lines in a high-voltage installation (conductor cross-section > 185 mm²) and the patient beds to be protected is safely undershot if the minimum clearance of 9 m is complied with as recommended in IEC 60364-7-710 (VDE 0100-710). When using busbars, this distance can generally be shorter, since the design characteristics of busbar trunking systems effectively reduce magnetic disturbance fields for the environment.

In order to still allow for an assessment of the intended busbars in the planning phase, extensive calculations of the magnetic field have been conducted using the finite element method. The results of the calculations for BD2, LD, and LI can be used to estimate the magnetic radiated disturbance in horizontal, vertical, and diagonal direction (Fig. 2/4) for distances larger than one meter (Chapter 8). For detailed evaluations, please contact your partner at Siemens TIP.

Sprinkler test

Sprinklers are used as a protection from fires in buildings and in the industrial sector. Sprinkler systems are automatic fire extinguishing systems. Their function consists of alerting and extinguishing fires as quickly as possible by detecting them early. During the extinguishing process, sprinkling can be assumed to take at least 30 minutes.

The busbar trunking systems BD2, LD, and LI were subjected to a sprinkler test. In the absence of a binding standard, the tests were performed based on a practical test arrangement (see Fig. 2/5).
Note: In the BD2 system, a 500 mm lateral offset of the sprinkler head towards the trunking unit must additionally be observed.

BD2 and LI test result:

In degree of protection IP54, the water tests were performed on all system arrangements in accordance with the guidelines of VdS (Verband der Sachversicherer = Association of Property Insurers in Germany) for sprinkler systems. The insulation resistances were measured before and after 90 minutes of sprinkling, and a high-voltage test was performed according to IEC 61439-6 (VDE 0660-600-6). This test was passed successfully, and proves that the busbar trunking system can be put back into operation immediately after sprinkling without any delay.

LD test result:

The LD busbar trunking system with degree of protection IP34 and the corresponding tap-off units with degree of protection IP54 were sprinkled both in horizontal and vertical busbar routings with 3/4" umbrella sprinklers and 1/2" flat spray sprinklers with a water pressure of 6 bar. To be able to assess the electrical operating behavior during the test, the insulation resistances were measured during the test. There was no functional failure in the process.

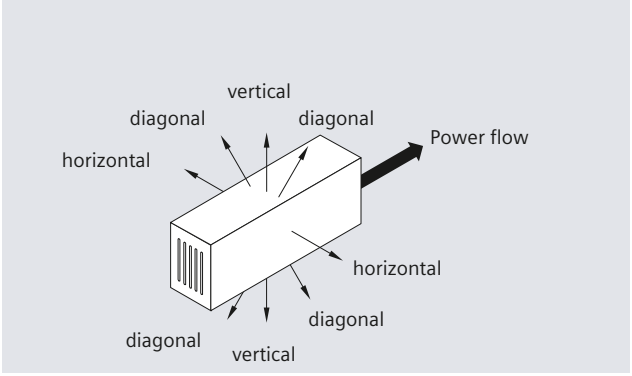


Fig. 2/4: **Coordinate system of the magnetic field measurements**

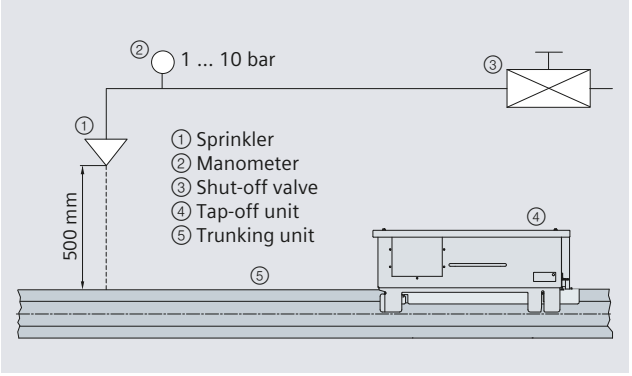


Fig. 2/5: **Schematic design of the sprinkler test**

With the LD busbar trunking system, operation can also be maintained without failure during extreme water load as in the case of sprinkling. This safe operating behavior is enabled, on the one hand, by large clearances and creepage distances and, on the other hand, by the possibility for penetrating water to run off again unhindered.

Degrees of protection of busbar trunking systems

Protection against electric shock must be ensured under normal conditions by the basic protection, and by the fault protection under single-fault conditions, which is described in IEC 61140 (VDE 0140-1). For access to a facility and the room required for operation, protection against accidental contact with hazardous live parts or against accidental access to the danger zone must be ensured by a suitable distance.

Alternatively, obstacles must be provided which offer protection against accidental contact, especially when the required distance to hazardous live parts is not given for the access route or for the room which would be required for operation. The minimum degree of protection must not be lower than IPXXB or IP2X according to IEC 60529 (VDE 0470-1). The specified busbar trunking systems fulfill these requirements. Tab. 2/7 summarizes the levels and requirements.

Remark: In IEC 61140 (VDE 0140-1), a difference is made between the direction of approach to the device or component (IP2X or IPXXB required; B = finger protection) and other possible directions (IP1X or IPXXA required; A = back-of-hand protection). The additional letter is mostly used to mark differences between the ingress of foreign objects and the protection during access to hazardous parts. For finger-proof and back-of-hand-proof arrangement described in EN 50274 (VDE 0660-514), reference is also made to the international standard IEC 60529 (VDE 0470-1).

	1st characteristic numeral		2nd characteristic numeral
Degree of protection	**Protection against access to hazardous parts**	**Protection against solid foreign objects**	**Protection against ingress of water**
IP00	No particular protection	No particular protection	No particular protection
IP20	Keeping away fingers	Against solid foreign objects Ø ≥ 12.5 mm	No particular protection
IP34	Keeping away tools	Against solid foreign objects Ø ≥ 2.5 mm	No damaging effect from splashing water
IP41	Keeping away wires	Against solid foreign objects Ø ≥ 1 mm	No damaging effect from vertically falling water drops (vertical dripping)
IP43	Keeping away wires	Against solid foreign objects Ø ≥ 1 mm	No damaging effect from spraying water
IP54	Keeping away wires	Against damaging dust layers on the inside (dust-protected)	No damaging effect from splashing water
IP55	Keeping away wires	Against damaging dust layers on the inside (dust-protected)	No damaging effect from water jets
IP65	Keeping away wires	Against the ingress of dust (dust-tight)	No damaging effect from water jets
IP66	Keeping away wires	Against the ingress of dust (dust-tight)	"Water projected in powerful jets against the enclosure from any direction shall have no harmful effects"
IP67	Keeping away wires	Against the ingress of dust (dust-tight)	"Ingress of water in quantities causing harmful effects shall not be possible when the enclosure is temporarily immersed in water under standardized conditions of pressure and time"
IP68	Keeping away wires	Against the ingress of dust (dust-tight)	"Ingress of water in quantities causing harmful effects shall not be possible when the enclosure is continuously immersed in water under conditions which shall be agreed between manufacturer and user but which are more severe than for numeral 7"

Tab. 2/7: **Degrees of protection of electrical equipment according to IEC 60529 (VDE 0470-1)**

2.4 Planning Examples

The following data is to be considered for designing the busbar runs:

- Position, direction, number, type, and approximate connected loads, cos φ
- Rated diversity factor α
- Feeding transformers (short-circuit current, position)
- Properties of place of installation (dimensions, building construction, transport routes)
- Routing of supply cables of other energy carriers
- Special requirements (degree of protection, fire barrier, etc.).

The operational current is calculated as follows:

$$I_B = \frac{P_{inst} \cdot \alpha \cdot \kappa}{\sqrt{3} \cdot U_e \cdot \cos \varphi} \qquad (1)$$

with:

I_B = operational current in A
P_{inst} = installed active power
α = rated diversity factor
κ = infeed factor:

κ = 1 for a one-sided infeed
κ = ½ for two-sided infeed or center infeed

U_e = rated operational voltage
cos φ = active power factor

If no other specifications are given regarding the actually simultaneous loads at the individual tap-off units (rated diversity factors), the values in Tab. 2/8 from IEC 61439-6 (VDE 0660-600-6) can be used.

Number of main outgoing circuits	Rated diversity factor α
2 and 3	0.9
4 and 5	0.8
6 up to and including 9	0.7
10 or more	0.6

Tab. 2/8: **Rated diversity factors α for busbar tap-off units according to IEC 61439-6 (VDE 0660-600-6)**

Example 1: Production hall with 4 production lines

The busbar runs for a production hall with 4 spatially distributed production lines are to be planned. For this, 4 tap-offs per busbar run are to be provided respectively (Fig. 2/6). The following is given:

- Total load power = 580 kW
- cos φ = 0.9
- U_e = 400 V
- Plan view and machine installation
- Rated diversity factor α = 0.8
- Transformer: 1 × 500 kVA
  Infeed from the distribution board: cable 2 × 185 mm²
- Installed power of the 4 production lines:
  110, 190, 180, and 100 kW; no crane operation
- Position of the trunking units: edgewise.

The operational current for the 4 production lines in the hall results from formula (1):

I_B (II) = 110 kW · 0.8 · 1 / (√3 · 400 V · 0.9)
= 141.1 A

I_B (III) = 190 kW · 0.8 · 1 / (√3 · 400 V · 0.9)
= 243.8 A

I_B (IV) = 180 kW · 0.8 · 1 / (√3 · 400 V · 0.9)
= 230.9 A

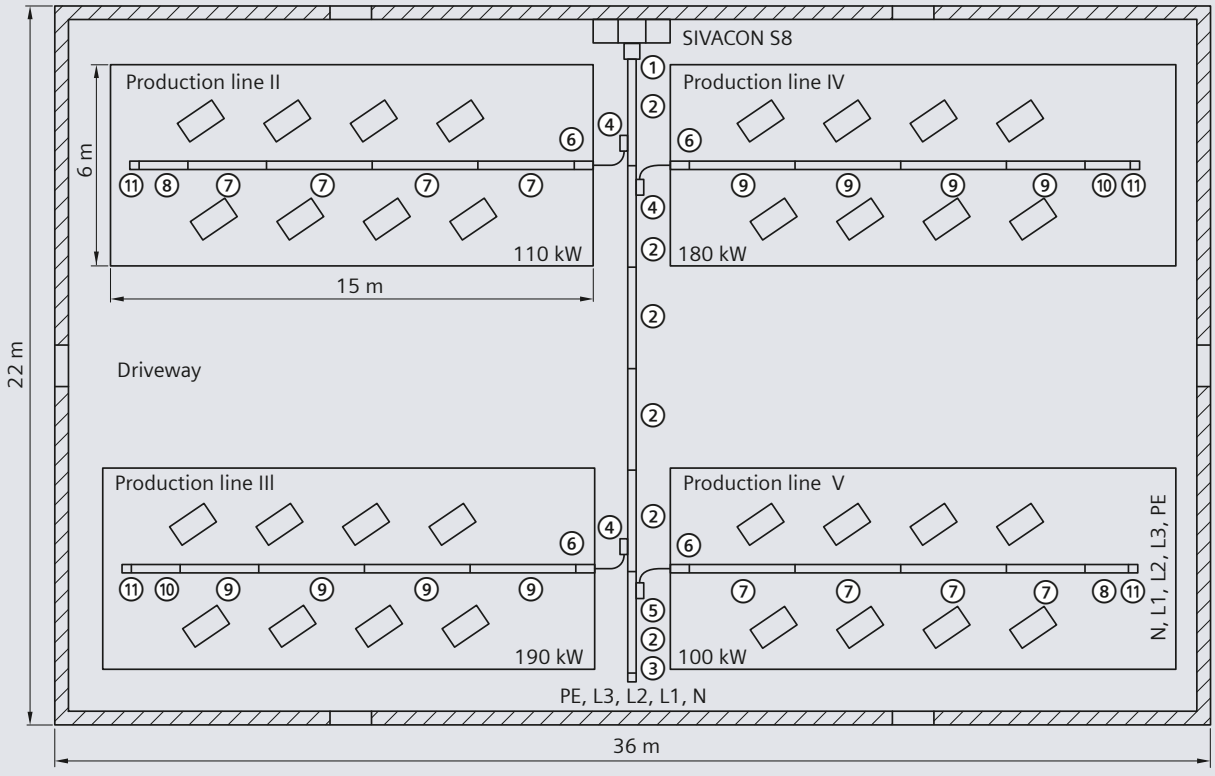
I_B (V) = 100 kW · 0.8 · 1 / (√3 · 400 V · 0.9)
= 128.3 A

The cumulated single currents are multiplied by the rated diversity factor 0.8 for the 4 tap-offs, which provides the operational current for an infeed at the beginning of the busbar trunking system:

I_B = 744 A · 0.8 = 595 A

The BD2 busbar trunking system (see Chapter 4) is suitable for the calculated currents both for the room infeed and for the individual production lines. Together with the dimensions from the installation plan in Fig. 2/6, a simplified component list can be created, in which the tap-offs to the individual machines and the fixing elements are still missing.

①	Feeding unit	1 no.	BD2A-1000-EE
②	Trunking unit	6 nos.	BD2A-2-630-SB-3
③	End flange	1 no.	BD2-1250-FE
④	Tap-off unit	3 nos.	BD2-AK04/SNH1
⑤	Tap-off unit	1 no.	BD2-AK3X/GS00
⑥	Feeding unit	4 nos.	BD2A-400-EE
⑦	Trunking unit	8 nos.	BD2A-2-160-SB-3
⑧	Trunking unit	2 nos.	BD2A-2-160-SB-1
⑨	Trunking unit	8 nos.	BD2A-2-250-SB-3
⑩	Trunking unit	2 nos.	BD2A-2-250-SB-1
⑪	End flange	4 nos.	BD2-400-FE



① Feeding unit
② Trunking unit
③ End flange
④ Tap-off unit
⑤ Tap-off unit
⑥ Feeding unit
⑦ Trunking unit
⑧ Trunking unit
⑨ Trunking unit
⑩ Trunking unit
⑪ End flange

Fig. 2/6: **Installation plan for the production hall of example 1**

Example 2: Vertical floor distribution in an office building

In a 15-floor office building, all floors are to be supplied individually via a vertically installed busbar trunking system (Fig. 2/7). The total surface of the individual floors is:

30 m · 80 m = 2,400 m²

As network configuration, a TN-S system is stipulated. According to the assumptions in the application manual for high-rise buildings by Siemens [E10003-E38-2B-T0030], the power demand for the effective area (0.8 · total surface) of a floor is calculated as follows:

0.8 · 2,400 m² · 50 W/m² = 96 kW

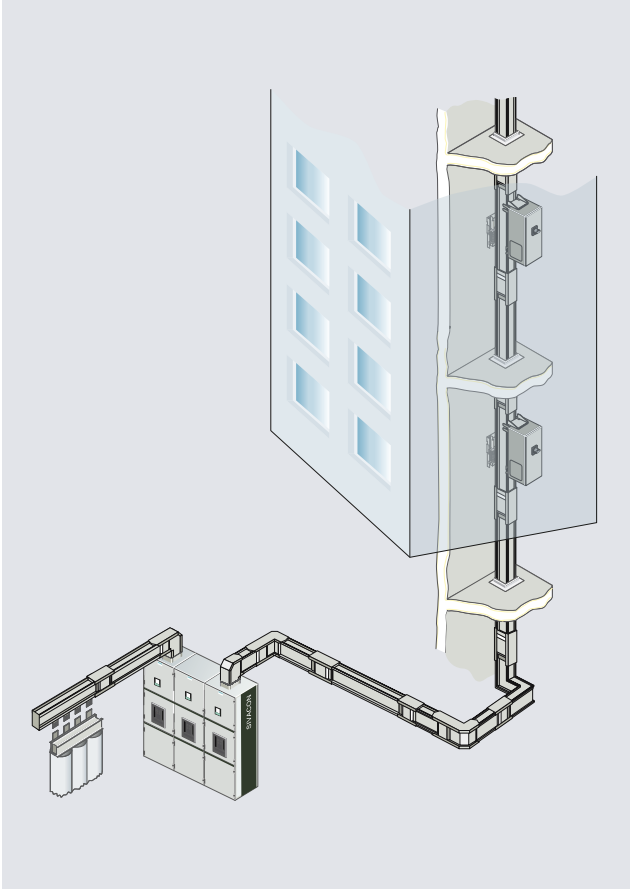


Fig. 2/7: **Floor distribution for a high-rise office building with a busbar trunking system**

For the remaining technical spaces on the floor, the below power demand is assumed:

0.2 · 2,400 m² · 10 W/m² = 4.8 kW

Given a simultaneity factor of 0.6 and cos φ = 0.9, this results in the following operational current for the busbar trunking system with an infeed (κ = 1) into the building:

I_B = 15 · 100.8 kW · 0.6 · 1 / (√3 · 400 V · 0.9)
= 1,455 A

If no exact specifications are known for the simultaneity factor, solid experience values can often be obtained from local distribution network operators.
They, however, differ regionally. Typical average values are specified in Tab. 2/9.

Together, the assessment criteria and calculations result in a busbar trunking system LI-A (see Chapter 6) with 5 conductors and full N conductor cross-section, a current-carrying capacity of 1,600 A, and a short-circuit withstand strength I_{cw} (t = 1 s) of 65 kA:

LI-A . type codes 1600 ... (see Chapter 7)

For the tap-offs to the floor distribution boards, tap-off units are used with 3-pole switch disconnectors with fuses up to 250 A (prepared for the use of NH1 fuse links):

Type code LI-T-0250-5H-55-FSF-IEC-3-RD-G-BD-OO (see Chapter 7)

Type of loads	Simultaneity factor
Apartments with electric stoves and water heaters	0.1 to 0.2
Night storage heating	0.8 to 1
Lighting in office buildings and in buildings for commercial use	0.7 to 0.9
Elevators and general installations	0.6 to 0.8
Meeting rooms	0.6 to 0.8
Small offices	0.5 to 0.7
Large offices	0.4 to 0.8

Tab. 2/9: **Typical simultaneity factors**



Chapter 3

BD01 system – 40 to 160 A

3.1 Type Codes 53
3.2 Selection Tables 56
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3 BD01 System – 40 to 160 A

The BD01 busbar trunking system from 40 A to 160 A (Fig. 3/1) is perfectly suitable for supplying power to small consumers up to 63 A.
The trunking units can be easily and quickly connected. The anti-rotation feature of the tap-off units prevents incorrect fitting and ensures easy and safe conversion.

Other advantages are the minimum stock keeping and straightforward planning thanks to one standard size for five different current ratings. Typical applications are the supply of small consumers and lighting systems as well as the supply of wallboxes in the area of e-mobility.

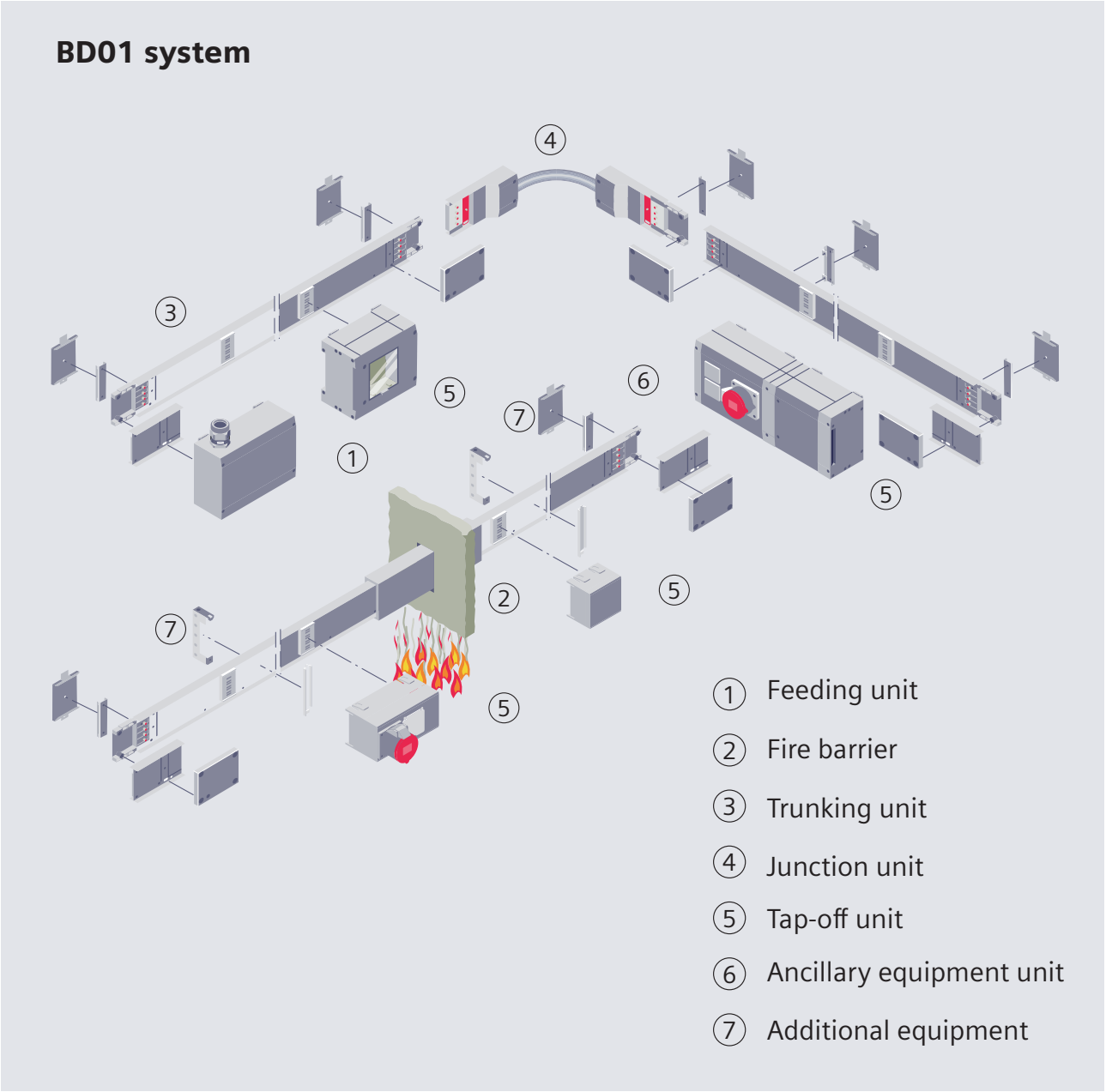


Fig. 3/1: **Overview of BD01 busbar trunking system**

Overview

- Design verified low-voltage switchgear and controlgear assembly in accordance with IEC 61439-1/-6
- Degree of protection IP54 with tap-off points at sides and bottom
- Degree of protection IP55 with additional equipment
- One size for five rated currents: 40 A, 63 A, 100 A, 125 A, and 160 A
- 5-conductor configuration with four busbars for L1, L2, L3, and N; the trunking unit enclosure also serves as PE conductor (see Fig. 3/2)
- Horizontal and vertical installation possible
- Enclosure color RAL 7035, light gray (painted).

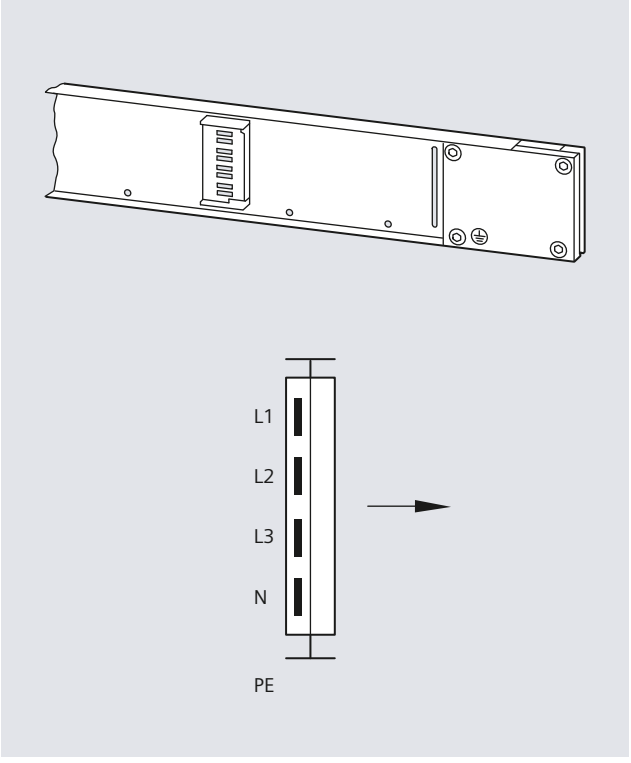


Fig. 3/2: **Design of the BD01 trunking unit**

Components

Straight trunking units

- The standard lengths are 2 m (2 or 4 tap-off points) or 3 m (3 or 6 tap-off points) with a tap-off point interval of 0.5 m or 1 m
- For 100 A, additional length of 1 m with 2 tap-off points
- Galvanized sheet-steel enclosure, painted in light gray, RAL 7035
- Busbars made of Al, made of copper for 160 A; power pick-up and connecting contacts made of copper, silver-plated
- The tap-off points are finger-safe. They are opened automatically by the tap-off units and close by themselves when the tap-off units are removed.

Junction units

- Flexible junction units
- For rated currents of 100 A and 160 A
- Each in lengths of 0.5 m and 1 m.

Feeding units

- Universal feeding unit for entry/end or center infeed
- Scope of supply with 2 end flanges (plastic cable glands with strain relief are not included in the scope of supply)
- M32, M40, and M50 cable entries are possible from four sides
- For 160 A, the M63 cable entry is possible at the side.

Tap-off units

- Molded-plastic enclosed or made of aluminum, up to 63 A
- Without or with device installation unit
- Equipped, or for free arrangement of components
- 3-pole or 5-pole versions
- Utilization category AC-20B
- Power pick-up through silver-plated Lyra contacts.

Ancillary equipment units

- For 4 or 9 modular widths (MW; 1 MW corresponds to 18 mm)
- Without or with device installation unit
- Without or with socket outlets
- An ancillary equipment unit has no electrical connection to the busbar and can only be used in conjunction with a tap-off unit.

Additional equipment

- Accessories for degree of protection IP55
- Fixing bracket
- Coding set
- Fire barrier kit EI 90.

3.1 Type Codes

For better clarity about available system components, the type codes are summarized in Tab. 3/1 for trunking units, junction units, and feeding units, in Tab. 3/2 for ancillary equipment units, and in Tab. 3/3 and Tab. 3/4 for tap-off units. For the additional equipment, the type codes are specified in Chapter 3.3 with the corresponding dimensional drawings.

BD01 trunking units	**Order number**					
	BD01-	**...**	**-**	**...**	**-**	**...**
Rated current I_n						
40 A		40				
63 A		63				
100 A		100				
125 A		125				
160 A		160				
Length						
2 m				2		
3 m				3		
Intervals of tap-off points						
0.5 m (6 / 4 tap-off points for 3 m / 2 m busbar length)						0.5
1 m (3 / 2 tap-off points for 3 m / 2 m busbar length)						1

Flexible junction units for BD01	**Order number**	
	BD01-	**...**
up to 100 A; 0.5 m length		R1
up to 100 A; 1 m length		R2
up to 160 A; 0.5 m length		160-R1
up to 160 A; 1 m length		160-R2

Feeding units for BD01	**Order number**	
	BD01-	**...**
up to 100 A		E
up to 160 A		160-E

Tab. 3/1: **Type code structure for trunking units, junction units, and feeding units**

BD01 ancillary equipment units		**Order number**		
Material and size	**Version**	**BD01-**	**...**	**...**
Aluminum enclosure, size 1	For free arrangement of components (P_V maximum 13 W), 4 MW, with integrated DIN rail, U_e = 400 V		GK1X/	F
	With 4 Schuko socket outlets 16 A, U_e = 230 V, I_n = 16 A			4SD163
	With 3-pole CEE socket outlet 16 A, U_e = 230 V, I_n = 16 A			CEE163
	With 5-pole CEE socket outlet 16 A, U_e = 400 V, I_n = 16 A			CEE165
	With 5-pole CEE socket outlet 32 A, U_e = 400 V, I_n = 32 A			CEE325
Aluminum enclosure, size 1 with device installation unit	For free arrangement of components (P_V maximum 13 W), 4 MW, with integrated DIN rail, U_e = 400 V		GK1M/	F
Aluminum enclosure, size 2	For free arrangement of components (P_V maximum 16 W), 9 MW, with integrated DIN rail, U_e = 400 V		GK2X/	F
	With 2 Schuko socket outlets 16 A and 5-pole CEE socket outlet 16 A U_e = 230 / 400 V, I_n = 16 A			2SD163CEE165
	With 2 Schuko socket outlets 16 A and 5-pole CEE socket outlet 32 A U_e = 230 / 400 V, I_n = 16 / 32 A			2SD163CEE325
	With 3-pole CEE socket outlet 16 A and 5-pole CEE socket outlet 16 A U_e = 230 / 400 V, I_n = 16 A			CEE163CEE165
Aluminum enclosure, size 2 with device installation unit	For free arrangement of components (P_V maximum 16 W), 9 MW, with integrated DIN rail, U_e = 400 V		GK2M/2	F

P_V = heat loss; MW = modular width. In ancillary equipment units, the cable gland for the enclosure connection is included in the scope of supply; use further plastic cable glands with strain relief (not included in the scope of supply).

Tab. 3/2: **Type code structure for ancillary equipment units**

BD01 tap-off units		Order number		
Material and size	**Version**	**BD01-**	**...**	**...**
Molded-plastic enclosure, size AK01	With fuse base for 3 cylindrical fuses 10 mm × 38 mm, U_e = 400 V, I_n = 16 A	1)	AK01X/	ZS
Molded-plastic enclosure, size AK02	With fuse base for 3 cylindrical fuses 10 mm × 38 mm, U_e = 400 V, I_n = 32 A	1)	AK02X/	ZS3
Molded-plastic enclosure, size AK02 with device installation unit	With 2 Schuko socket outlets 16 A and 1-pole fuse base D01, U_e = 230 V, I_n = 16 A	1)	AK02M0/	2SD163S14
	With 3-pole CEE socket outlet 16 A and 1-pole fuse base D01, U_e = 230 V, I_n = 16 A	1)		CEE163S14
	With 3-pole miniature circuit breaker 16 A, characteristic B, U_e = 400 V, I_n = 16 A	1)		A163
	With 3-pole miniature circuit breaker 32 A, characteristic C, U_e = 400 V, I_n = 32 A	2)		A323
	With 5-pole CEE socket outlet 16 A and 3-pole miniature circuit breaker 16 A, characteristic B, U_e = 400 V, I_n = 16 A	2)		CEE165A163
	With 2 Schuko socket outlets and 1-pole miniature circuit breaker 16 A, characteristic B, U_e = 230 V, I_n = 16 A	2)		2SD163A161
	With 3-pole CEE socket outlet 16 A and 1-pole miniature circuit breaker 16 A, characteristic B, U_e = 230 V, I_n = 16 A	2)		CEE163A161
	With 2 Schuko socket outlets and 1-pole residual current operated circuit breaker 16 A / 30 mA, U_e = 230 V, I_n = 16 A	2)		2SD163FIA161
	For free arrangement of components (P_V maximum 13 W), 3 MW, with integrated DIN rail, U_e = 400 V, I_n = 32 A	2)		F
Aluminum enclosure, size AK1	With 2 Schuko socket outlets 16 A and 1-pole fuse base D01, U_e = 230 V, I_n = 16 A	2)	AK1X/	2SD163S14
	With 3-pole CEE socket outlet 16 A and 1-pole fuse base D01, U_e = 230 V, I_n = 16 A	2)		CEE163S14
	With 3-pole fuse base 3 × D01, U_e = 400 V, I_n = 16 A	2)		S14
	With 3-pole fuse base 3 × D02, U_e = 400 V, I_n = 32 A	2)		S18
	With 2 Schuko socket outlets and 1-pole miniature circuit breaker 16 A, characteristic B, U_e = 230 V, I_n = 16 A	2)		2SD163A161
	With 3-pole CEE socket outlet 16 A and 1-pole miniature circuit breaker 16 A, characteristic B, U_e = 230 V, I_n = 16 A	2)		CEE163A161
	For free arrangement of components (P_V maximum 13 W), 4 MW, with integrated DIN rail, U_e = 400 V, I_n = 35 A	2)		F
Aluminum enclosure, size AK1 with device installation unit	With 3 × 1-pole miniature circuit breaker 10 A, characteristic B, U_e = 230 V, I_n = 10 A		AK1M1/	A101
	With 3 × 1-pole miniature circuit breaker 16 A, characteristic B, U_e = 230 V, I_n = 16 A			A161
	With 3-pole miniature circuit breaker 32 A, characteristic C, U_e = 400 V, I_n = 32 A			A323
	For free arrangement of components (P_V maximum 13 W), 4 MW, with integrated DIN rail, U_e = 400 V, I_n = 35 A			F

P_V = heat loss; MW = modular width. Use plastic cable glands with strain relief (not included in the scope of supply).
1) Fuse links are not included in the scope of supply
2) Adapter ring / screw adapter, fuse links, and screw cap are not included in the scope of supply

Tab. 3/3: **Type code structure for tap-off units size 1 (AK01), size 2 (AK02), and size 1 (AK1)**

BD01 tap-off units		Order number		
Material and size	**Version**	**BD01-**	**...**	**...**
Aluminum enclosure, size AK2	With 3-pole fuse base S27, screw adapter system, U_e = 400 V, I_n = 25 A	1)	AK2X/	S27
	With 4 Schuko socket outlets and 2 × 1-pole fuse base D01, U_e = 230 V, I_n = 16 A	1)		4SD163S14
	With 5-pole CEE socket outlet 16 A and 3 × 1-pole fuse base D01, U_e = 400 V, I_n = 16 A	1)		CEE165S14
	With 5-pole CEE socket outlet 32 A and 3 × 1-pole fuse base D02, U_e = 400 V, I_n = 32 A	1)		CEE325S18
	With 4 Schuko socket outlets and 2 × 1-pole miniature circuit breaker 16 A, characteristic B, U_e = 230 V, I_n = 16 A	1)		4SD163A161
	For free arrangement of components (P_V maximum 16 W), 9 MW, with integrated DIN rail, U_e = 400 V, I_n = 35 A	1)		F
Aluminum enclosure, size AK2	With 3-pole fuse base S33, screw adapter system, U_e = 400 V, I_n = 63 A	1)	AK2HX/	S33
	For free arrangement of components (P_V maximum 22.5 W), 9 MW, with integrated DIN rail, U_e = 400 V, I_n = 63 A	1)		F
Aluminum enclosure, size AK2 with device installation unit	With 2 Schuko socket outlets, 1-pole miniature circuit breaker 16 A, characteristic B, and 2-pole residual current operated circuit breaker 25 A / 30 mA, U_e = 230 V, I_n = 16 A		AK2M1/	2SD163FIA161
	With 3-pole CEE socket outlet 16 A, 1-pole miniature circuit breaker 16 A, characteristic B, and 2-pole residual current operated circuit breaker 16 A / 30 mA, U_e = 230 V, I_n = 16 A			CEE163FIA161
	With 3-pole miniature circuit breaker 32 A, characteristic C, U_e = 400 V, I_n = 32 A			A323
	For free arrangement of components (P_V maximum 13 W), 4 MW, with integrated DIN rail, U_e = 400 V, I_n = 35 A			F
Aluminum enclosure, size AK2 with device installation unit	With 5-pole CEE socket outlet 16 A, 3-pole miniature circuit breaker 16 A, characteristic C, and 4-pole residual current operated circuit breaker 25 A / 30 mA, U_e = 400 V, I_n = 16 A		AK2M2/	CEE165FIA163
	For free arrangement of components (P_V maximum 16 W), 9 MW, with integrated DIN rail, U_e = 400 V, I_n = 35 A			F
Aluminum enclosure, size AK2 with device installation unit	For free arrangement of components (P_V maximum 22.5 W), 9 MW, with integrated DIN rail, U_e = 400 V, I_n = 63 A		AK2HM2/	F

P_V = heat loss; MW = modular width. Use plastic cable glands with strain relief (not included in the scope of supply).
1) Adapter ring / screw adapter, fuse links, and screw cap are not included in the scope of supply

Tab. 3/4: **Type code structure for tap-off units size 2 (AK2)**

3.2 Selection Tables

Tab. 3/5 up to Tab. 3/9 inform about the type, article number, and characteristic values of the individual system components.

Trunking units							
Type	**Article No.**	**Rated current I_n**	**Length**	**Weight**	**Tap-off points**		**Description**
					Number	**Interval**	
BD01-40-3-0,5	BVP: 034253	40 A	3 m	4.350 kg	6	0.5 m	Straight trunking unit with joint block, sheet-steel enclosure, color RAL 7035 (light gray), codable tap-off points
BD01-40-3-1	BVP: 233551	40 A	3 m	4.350 kg	3	1 m	
BD01-40-2-0,5	BVP: 034254	40 A	2 m	3.000 kg	4	0.5 m	
BD01-40-2-1	BVP: 233552	40 A	2 m	3.000 kg	2	1 m	
BD01-63-3-0,5	BVP: 034255	63 A	3 m	4.600 kg	6	0.5 m	
BD01-63-3-1	BVP: 233553	63 A	3 m	4.600 kg	3	1 m	
BD01-63-2-0,5	BVP: 034256	63 A	2 m	3.200 kg	4	0.5 m	
BD01-630-2-1	BVP: 233555	63 A	2 m	3.200 kg	2	1 m	
BD01-100-3-0,5	BVP: 034257	100 A	3 m	5.200 kg	6	0.5 m	
BD01-100-3-1	BVP: 233556	100 A	3 m	5.200 kg	3	1 m	
BD01-100-2-0,5	BVP: 034258	100 A	2 m	3.600 kg	4	0.5 m	
BD01-100-2-1	BVP: 233557	100 A	2 m	3.600 kg	2	1 m	
BD01-100-1-0,5	BVP: 201965	100 A	1 m	2.000 kg	2	0.5 m	
BD01-125-3-0,5	BVP: 090163	125 A	3 m	5.200 kg	6	0.5 m	
BD01-125-3-1	BVP: 233559	125 A	3 m	5.200 kg	3	1 m	
BD01-125-2-0,5	BVP: 090161	125 A	2 m	3.600 kg	4	0.5 m	
BD01-125-2-1	BVP: 233560	125 A	2 m	3.600 kg	2	1 m	
BD01-160-3-0,5	BVP: 090164	160 A	3 m	8.000 kg	6	0.5 m	
BD01-160-3-1	BVP: 233563	160 A	3 m	8.000 kg	3	1 m	
BD01-160-2-0,5	BVP: 090162	160 A	2 m	5.400 kg	4	0.5 m	
BD01-160-2-1	BVP: 233567	160 A	2 m	5.400 kg	2	1 m	

Junction units					
Type	**Article No.**	**Rated current I_n**	**Length**	**Weight**	**Description**
BD01-R1	BVP: 034260	100 A	0.5 m	1.200 kg	Flexible junction unit with joint block
BD01-R2	BVP: 034261	100 A	1 m	2.050 kg	
BD01-160-R1	BVP: 090166	160 A	0.5 m	1.700 kg	
BD01-160-R2	BVP: 090167	160 A	1 m	3.050 kg	

Feeding units						
Type	**Article No.**	**Rated current I_n**	**Conductor cross-section**	**Weight**	**Description**	
BD01-E	BVP: 034259	100 A	50 mm² [1)]	1.000 kg	6 cable entries from 4 sides	Molded-plastic enclosure with 2 end flanges, can be fitted at all connection terminals and busbar run ends, can be combined with BD01-GK ... ancillary equipment unit
BD01-160-E	BVP: 090165	160 A	95 mm² [2)]	1.400 kg	Cable entry from 2 sides	

Use plastic cable glands with strain relief (not included in the scope of supply).
[1)] Use M32, M40, or M50 plastic cable glands
[2)] Use M63 plastic cable glands

Tab. 3/5: **Selection data for trunking units, junction units, and feeding units**

Tap-off units							
Type	**Article No.**	**Rated current I_n**	**Rated operational voltage U_e**	**Weight**	**Material**	**Size / device installation unit**	**Description**
BD01-AK01X/ ZS	BVP: 087483	16 A	400 V	0.300 kg	Molded plastic	01 / without	Fuse base for 3 cylindrical fuses 10 mm × 38 mm
BD01-AK02X/ ZS3	BVP: 085090	32 A	400 V	0.400 kg	Molded plastic	02 / without	Fuse base for 3 cylindrical fuses 10 mm × 38 mm
BD01-AK02M2/ A163	BVP: 085089	16 A	400 V	0.800 kg	Molded plastic	02 / with	3-pole miniature circuit breaker 16 A, char. B
BD01-AK02M2/ CEE165A163	BVP: 085092	16 A	400 V	0.980 kg	Molded plastic	02 / with	3-pole miniature circuit breaker 16 A, char. B / 5-pole CEE socket outlet 16 A
BD01-AK02M2/ A323	BVP: 085094	32 A	400 V	0.800 kg	Molded plastic	02 / with	3-pole miniature circuit breaker 32 A, char. C
BD01-AK02M2/ 2SD163A161	BVP: 085096	16 A	230 V	0.700 kg	Molded plastic	02 / with	1-pole miniature circuit breaker 16 A, char. B / 2 Schuko socket outlets 16 A
BD01-AK02M2/ CEE163A161	BVP: 090170	16 A	230 V	0.700 kg	Molded plastic	02 / with	1-pole miniature circuit breaker 16 A, char. B / 3-pole CEE socket outlet 16 A
BD01-AK02M2/ 2SD163FIA161	BVP: 090168	16 A	230 V	0.950 kg	Molded plastic	02 / with	1-pole miniature circuit breaker 16 A, char. B / 2-pole RCCB 16 A, 30 mA / 2 Schuko socket outlets 16 A
BD01-AK02M2/ 2SD163S14	BVP: 085095	16 A	230 V	0.800 kg	Molded plastic	02 / with	1-pole fuse base D01 / 2 Schuko socket outlets 16 A
BD01-AK02M2/ CEE163S14	BVP: 090169	16 A	230 V	0.800 kg	Molded plastic	02 / with	1-pole fuse base D01 / 3-pole CEE socket outlet 16 A
BD01-AK02M2/ F	BVP: 085093	32 A	400 V	0.500 kg	Molded plastic	02 / with	For free arrangement of components (P_V = max. 13 W), 3 MW, with integrated DIN rail
BD01-AK1X/ 2SD163S14	BVP: 034268	16 A	230 V	1.400 kg	Aluminum	1 / without	1-pole fuse base D01 / 2 Schuko socket outlets 16 A
BD01-AK1X/ CEE163S14	BVP: 034270	16 A	230 V	1.380 kg	Aluminum	1 / without	1-pole fuse base D01 / 3-pole CEE socket outlet 16 A
BD01-AK1X/ S14	BVP: 034264	16 A	400 V	1.400 kg	Aluminum	1 / without	3-pole fuse base 3 × D01
BD01-AK1X/ S18	BVP: 034265	35 A	400 V	1.400 kg	Aluminum	1 / without	3-pole fuse base 3 × D02
BD01-AK1X/ 2SD163A161	BVP: 034269	16 A	230 V	1.470 kg	Aluminum	1 / without	1-pole miniature circuit breaker 16 A, char. B / 2 Schuko socket outlets 16 A
BD01-AK1X/ CEE163A161	BVP: 034271	16 A	230 V	1.435 kg	Aluminum	1 / without	1-pole miniature circuit breaker 16 A, char. B / 3-pole CEE socket outlet 16 A
BD01-AK1X/ F	BVP: 034272	35 A	400 V	1.000 kg	Aluminum	1 / without	For free arrangement of components (P_V = max. 13 W), 4 MW, with integrated DIN rail
BD01-AK1M1/ A101	BVP: 203098	10 A	400 V	1.600 kg	Aluminum	1 / with	3 × 1-pole miniature circuit breaker 10 A, char. B
BD01-AK1M1/ A161	BVP: 034266	16 A	400 V	1.600 kg	Aluminum	1 / with	3 × 1-pole miniature circuit breaker 16 A, char. B
BD01-AK1M1/ A323	BVP: 034267	32 A	400 V	1.600 kg	Aluminum	1 / with	3-pole miniature circuit breaker 32 A, char. C
BD01-AK1M1/ F	BVP: 034272	35 A	400 V	1.000 kg	Aluminum	1 / with	For free arrangement of components (P_V = max. 13 W), 4 MW, with integrated DIN rail

P_V = heat loss; MW = modular width. Use plastic cable glands with strain relief (not included in the scope of supply).
If required: Adapter ring / screw adapter, fuse links, and screw cap are not included in the scope of supply

Tab. 3/6: **Selection data for tap-off units, part 1**

Tap-off units							
Type	**Article No.**	**Rated current I_n**	**Rated operational voltage U_e**	**Weight**	**Material**	**Size / device installation unit**	**Description**
BD01-AK2X/ S27	BVP: 034274	25 A	400 V	1.700 kg	Aluminum	2 / without	3-pole fuse base S27, screw adapter system
BD01-AK2X/ S33	BVP: 233568	63 A	400 V	1.700 kg	Aluminum	2 / without	3-pole fuse base S33, screw adapter system
BD01-AK2X/ 4SD163S14	BVP: 034277	16 A	230 V	2.000 kg	Aluminum	2 / without	2 × 1-pole fuse base D01 / 4 Schuko socket outlets 16 A
BD01-AK2X/ CEE165S14	BVP: 034279	16 A	400 V	1.850 kg	Aluminum	2 / without	3 × 1-pole fuse base D01 / 5-pole CEE socket outlet 16 A
BD01-AK2X/ CEE325S18	BVP: 034281	32 A	400 V	2.000 kg	Aluminum	2 / without	3 × 1-pole fuse base D02 / 5-pole CEE socket outlet 32 A
BD01-AK2X/ 4SD163A161	BVP: 034278	16 A	230 V	2.100 kg	Aluminum	2 / without	2 × 1-pole miniature circuit breaker 16 A, char. B / 4 Schuko socket outlets 16 A
BD01-AK2X/ F	BVP: 034283	35 A	400 V	1.300 kg	Aluminum	2 / without	For free arrangement of components (P_V = max. 16 W), 2 × 9 MW, with integrated DIN rail
BD01-AK2HX/ F	BVP: 233570	63 A	400 V	1.300 kg	Aluminum	2 / without	For free arrangement of components (P_V = max. 22.5 W), 2 × 9 MW, with integrated DIN rail
BD01-AK2M1/ 2SD163FIA161	BVP: 034276	16 A	230 V	2.000 kg	Aluminum	2 / with	1-pole miniature circuit breaker 16 A, char. B / 2-pole RCCB 16 A, 30 mA / 2 Schuko socket outlets 16 A
BD01-AK2M1/ CEE163FIA161	BVP: 660867	16 A	400 V	2.000 kg	Aluminum	2 / with	1-pole miniature circuit breaker 16 A, char. C / 2-pole RCCB 16 A, 30 mA / 3-pole CEE socket outlet 16 A
BD01-AK2M2/ CEE165FIA163	BVP: 660866	16 A	400 V	3.500 kg	Aluminum	2 / with	3-pole miniature circuit breaker 16 A, char. C / 4-pole RCCB 25 A, 30 mA / 5-pole CEE socket outlet 16 A
BD01-AK2M1/ CEE165A163	BVP: 034280	16 A	400 V	2.000 kg	Aluminum	2 / with	3-pole miniature circuit breaker 16 A, char. C / 5-pole CEE socket outlet 16 A
BD01-AK2M1/ CEE325A323	BVP: 034282	32 A	400 V	2.100 kg	Aluminum	2 / with	3-pole miniature circuit breaker 32 A, char. C / 5-pole CEE socket outlet 32 A
BD01-AK2M2/ F	BVP: 034284	35 A	400 V	1.360 kg	Aluminum	2 / with	For free arrangement of components (P_V = max. 16 W), 2 × 9 MW, with integrated DIN rail
BD01-AK2HM2/ F	BVP: 233571	63 A	400 V	1.360 kg	Aluminum	2 / with	For free arrangement of components (P_V = max. 22.5 W), 2 × 9 MW, with integrated DIN rail

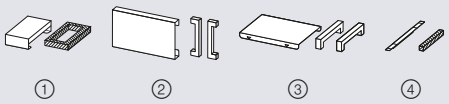
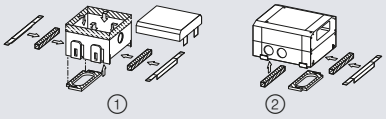
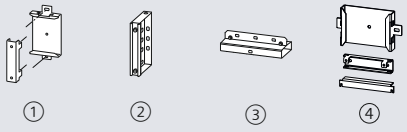
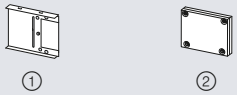
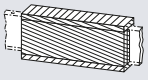
P_V = heat loss; MW = modular width. Use plastic cable glands with strain relief (not included in the scope of supply).
If required: Adapter ring / screw adapter, fuse links, and screw cap are not included in the scope of supply.

Tab. 3/7: **Selection data for tap-off units, part 2**

Ancillary equipment units						
Type	**Article No.**	**Rated operational voltage U_e**	**Weight**	**Material**	**Size / device installation unit**	**Description**
BD01-GK1X/F	BVP: 034285	400 V	0.800 kg	Aluminum	1 / without	For free arrangement of components (P_V = max. 13 W), 4 MW, with integrated DIN rail
BD01-GK1X/4SD163	BVP: 034287	400 V	1.200 kg	Aluminum	1 / without	4 Schuko socket outlets 16 A
BD01-GK1X/CEE163	BVP: 660808	400 V	0.950 kg	Aluminum	1 / without	3-pole CEE socket outlet 16 A
BD01-GK1X/CEE165	BVP: 660809	400 V	1.000 kg	Aluminum	1 / without	5-pole CEE socket outlet 16 A
BD01-GK1X/CEE323	BVP: 660810	400 V	1.040 kg	Aluminum	1 / without	5-pole CEE socket outlet 32 A
BD01-GK1M1/F	BVP: 034286	400 V	0.800 kg	Aluminum	1 / with	For free arrangement of components (P_V = max. 13 W), 4 MW, with integrated DIN rail
BD01-GK2X/F	BVP: 034288	400 V	1.100 kg	Aluminum	2 / without	For free arrangement of components (P_V = max. 16 W), 9 MW, with integrated DIN rail
BD01-GK2X/2SD163CEE165	BVP: 034291	400 V	1.600 kg	Aluminum	2 / without	2 Schuko socket outlets 16 A / 5-pole CEE socket outlet 16 A
BD01-GK2X/2SD163CEE325	BVP: 660811	400 V	1.800 kg	Aluminum	2 / without	2 Schuko socket outlets 16 A / 5-pole CEE socket outlet 32 A
BD01-GK2X/CEE163CEE165	BVP: 034290	400 V	1.500 kg	Aluminum	2 / without	3-pole CEE socket outlet 16 A / 5-pole CEE socket outlet 32 A
BD01-GK2M2/F	BVP: 034289	400 V	1.100 kg	Aluminum	2 / with	For free arrangement of components (P_V = max. 16 W), 9 MW, with integrated DIN rail

P_V = heat loss; MW = modular width. Use plastic cable glands with strain relief (not included in the scope of supply).
In ancillary equipment units, the cable gland for the enclosure connection is included in the scope of supply.
If required: Adapter ring / screw adapter, fuse links, and screw cap are not included in the scope of supply.

Tab. 3/8: **Selection data for ancillary equipment units**

Additional equipment for degree of protection IP55				
Type	**Article No.**	**Weight per unit (approx.)**		**Description**
BD01-FAS	BVP: 610363	0.100 kg		① For tap-off points
BD01-FS	BVP: 610362	0.150 kg		② For connection points
BD01-FES	BVP: 610364	0.150 kg		③ For feeding units, mounting position at the bottom
BD01-KS	BVP: 611057	0.030 kg		④ For feeding units, mounting position at the side or top
BD01-AK01X-IP55	BVP: 610365	0.050 kg		① For tap-off units size 01[1)]
BD01-AK02X-IP55	BVP: 610366	0.050 kg		① For tap-off units size 02[1)]
BD01-AK1X-IP55	BVP: 610367	0.050 kg		② For tap-off units size 1[1)]
BD01-AK2X-IP55	BVP: 610368	0.050 kg		② For tap-off units size 2[1)]
Fixing				
BD01-B	BVP: 034262	0.167 kg		① Universal fixing bracket, horizontal
BD01-BA	BVP: 081945	0.167 kg		② Suspension bracket, horizontal
BD01-BAP	BVP: 203522	0.576 kg		③ Hanger bracket for cable, pendant, or chain suspension at the connection point
BD01-BV	BVP: 662591	0.576 kg		④ Suspension bracket , vertical
Mounting parts				
BD01-EF	BVP: 611071	0.300 kg		① End flange
BD01-100-KB	BVP: 201966	0.350 kg		② Joint block (I_n = 100 A)
BD01-160-KB	BVP: 201967	0.350 kg		② Joint block (I_n = 160 A)
Coding				
BD01-K	BVP: 034263	0.010 kg		Coding set with 4 coding positions
Fire barrier				
BD01-S90	BVP: 611354	1.500 kg		Fire barrier kit for mounting by the customer with fire barrier plates and fixing screws
BD01-S90-ZUL-D	BVP: 611373	0.200 kg		Fire barrier approval kit (required for Germany only)

[1)] Not available for versions with device installation unit

Tab. 3/9: **Selection data for additional equipment**

3.3 Technical Specifications

General technical data		
Type		**BD01-...**
Standards and specifications		IEC/EN 61439-1 and -6
Climatic resistance		Damp heat, steady state, according to IEC 60068-2-78. Damp heat, cyclic, according to IEC 60068-2-30
Ambient temperature min./max./24-h mean	°C	–5/+40/+35
Degree of protection according to IEC/EN 60529 • Edgewise; tap-off points at the side • Flat, tap-off points at the bottom • Flat, tap-off points at the top		 IP54, increase to IP55 with additional equipment IP54, increase to IP55 with additional equipment IP50, increase to IP55 with additional equipment
Material • Trunking units • Busbars • Pick-up and connection contacts		 Galvanized, painted sheet steel Al or Cu Cu, silver-plated
Mounting position / installation location		Horizontal, vertical / indoors (outdoor installation on request)
Weights		See selection and ordering data
Tap-off units		
Type		**BD01-AK...**
Version		3-pole or 5-pole
Rated current I_n	A	63
Utilization category		AC-20B
Degree of protection		IP54, increase to IP55 with additional equipment

Tab. 3/10: **Technical specifications for trunking units of the BD01 system**

Trunking units							
Type			**BD01-40**	**BD01-63**	**BD01-100**	**BD01-125**	**BD01-160**
Conducting paths							
Rated insulation voltage U_i		V AC/DC	400/400	400/400	400/400	400/400	400/400
Rated operational voltage U_e		V AC	400	400	400	400	400
Frequency		Hz	50 ... 60	50 ... 60	50 ... 60	50 ... 60	50 ... 60
Rated current I_n		A	40	63	100	125	160
Impedance per unit length of conducting paths with 50 Hz and 20 °C busbar temperature							
R'_{20}		mΩ/m	3.960	1.936	0.938	0.910	0.578
X'_{20}		mΩ/m	0.280	0.324	0.286	0.300	0.273
Z'_{20}		mΩ/m	3.970	1.968	0.994	1.000	0.642
Impedance per unit length of conducting paths in the event of a fault							
R'_F		mΩ/m	5.991	4.128	2.841	2.420	2.189
X'_F		mΩ/m	1.396	1.248	1.186	0.940	0.973
Z'_F		mΩ/m	6.151	4.312	3.078	2.600	2.395
Zero-sequence impedance according to IEC/EN 60909 (VDE 0102)							
R'_0	Phase to N	mΩ/m	15.904	7.911	4.115	3.810	3.167
X'_0	Phase to N	mΩ/m	2.128	2.058	1.797	1.630	1.656
Z'_0	Phase to N	mΩ/m	16.045	8.175	4.490	4.140	3.574
R'_0	Phase to PE	mΩ/m	10.086	8.565	6.648	5.430	5.343
X'_0	Phase to PE	mΩ/m	2.909	3.338	3.067	2.320	2.355
Z'_0	Phase to PE	mΩ/m	10.498	9.183	7.322	5.910	5.839
Short-circuit withstand strength							
Rated peak withstand current I_{pk}		kA	2.55	6.30	15.30	15.30	15.30
Rated short-time withstand current I_{cw} (t = 1 s)		kA	0.58	1.15	2.50	2.50	2.50
Rated short-time withstand current I_{cw} (t = 0.1 s)		kA	1.70	4.20	9.00	9.00	9.00
Conductor							
Number of active conductors			4	4	4	4	4
Conductor cross-section							
L1, L2, L3		mm^2	7.9	15.7	34.1	34.1	34.1
N		mm^2	7.9	15.7	34.1	34.1	34.1
PE (enclosure) ≙ Cu		mm^2	20.0	20.0	20.0	20.0	20.0
Conductor material			Al	Al	Al	Al	Cu
Fire load		kWh/m	0.76	0.76	0.76	0.76	0.76
Max. thermal load, I^2t value		$A^2s \times 10^6$	0.29	1.76	8.10	8.10	8.10
Max. fixing distances							
at normal mechanical load							
Horizontal edgewise, vertical		m	3	3	3	3	3
Horizontal flat		m	1.5	1.5	1.5	1.5	1.5
Horizontal flat with BD01-BAP		m	3	3	3	3	3

Tab. 3/11: **Technical specifications for trunking units of the BD01 system**

Version	Type	L1, L2, L3 connection				N connection				PE connection			
		min. in mm²		max. in mm²		min. in mm²		max. in mm²		min. in mm²		max. in mm²	
Feeding units	BD01-E	6	(so, st)	50	(st)	6	(so, st)	50	(st)	6	(so, st)	50	(st)
	BD01-160-E	25	(st)	95	(st)	25	(st)	95	(st)	16	(st)	50	(st)
Tap-off units	BD01-AK01X/ZS	0.75	(f, st)	10	(so, f, st)	0.75	(f, st)	10	(so, f, st)	0.75	(f, st)	10	(so, f, st)
	BD01-AK02X/ZS3	0.75	(f, st)	10	(so, f, st)	0.75	(f, st)	10	(so, f, st)	0.75	(f, st)	10	(so, f, st)
	BD01-AK02M0/A163	0.75	(so, st)	16	(so)	0.75	(f, st)	10	(so, f, st)	0.75	(f, st)	10	(so, f, st)
	BD01-AK02M0/A323	0.75	(so, st)	16	(so)	0.75	(f, st)	10	(so, f, st)	0.75	(f, st)	10	(so, f, st)
	BD01-AK1M1/A101	0.75	(so, st)	16	(so)	0.75	(so, f)	2.5	(so, f)	0.75	(so, f)	2.5	(so, f)
	BD01-AK1M1/A161	0.75	(so, st)	16	(so)	0.75	(so, f)	2.5	(so, f)	0.75	(so, f)	2.5	(so, f)
	BD01-AK1M1/A323	0.75	(so, st)	16	(so)	0.75	(so, f)	2.5	(so, f)	0.75	(so, f)	2.5	(so, f)
	BD01-AK1X/S14	0.5	(f, st)	4	(so)	0.75	(f, st)	10	(so, f, st)	0.75	(so, st)	16	(so)
	BD01-AK1X/S18	0.5	(f, st)	16	(so, f, st)	0.75	(f, st)	10	(so, f, st)	0.75	(so, st)	16	(so)
	BD01-AK2X/S27	0.75	(f, st)	10	(so, f, st)	0.75	(f, st)	10	(so, f, st)	0.75	(so, st)	16	(so)
	BD01-AK2HX/S33	1.5	(f, st)	16	(f, st)	0.75	(f, st)	16	(so, f, st)	0.75	(so, st)	16	(so, st)

so = solid, f = finely stranded with end sleeve, st = stranded

Tab. 3/12: **Conductor cross-sections for feeding units and tap-off units of the BD01 system**

The expected short-circuit current of the network and the let-through characteristic of the switching devices must be taken into account in each case. Depending on the ambient temperature, a correction factor must be considered for the rated current of the busbar trunking system.

System	Overcurrent protection device	
	Root for order number	Rated conditional short-circuit current
BD01-40	5SY4 . 40-6 [1]	I_{cc} = 2.7 kA
BD01-63	5SY4 . 63-6 [1]	I_{cc} = 10 kA
BD01-100	3VA11 10	I_{cc} = 14 kA
BD01-125	3VA11 12	I_{cc} = 14 kA
BD01-160	3VA11 16	I_{cc} = 14 kA

[1] For 5SY miniature circuit breakers, the following can be selected alternatively:
"5SY4..." or "5SY6..." or "5SY7..." with I_{cu} = 10 kA, 6 kA, 15 kA
For ".", the number of poles (3 or 4) must be inserted
For characteristic B, "-6" must be inserted, and
for characteristic C, "-7" must be inserted

Tab. 3/13: **Possible overcurrent protection devices for the BD01 system**

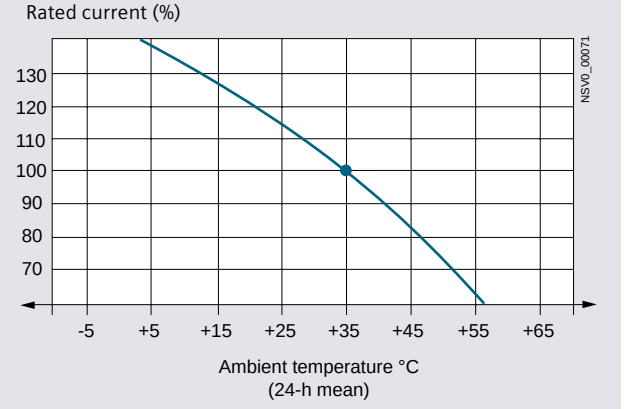


Fig. 3/3: **Temperature characteristic of BD01 systems**

3.4 Fire Barrier for BD01 System

General requirements

The state building authorities (Germany) or regional/ international requirements demand that buildings are designed so that "spreading of fire is prevented, and that effective fire fighting and rescue of persons is facilitated".

To this end, the BD01 system can be equipped by the customer with a fire barrier kit and then complies with classification EI 90 according to EN 13501-2.
Particularly for Germany:

- A general type approval (aBG: allgemeine Bauartgenehmigung) from the German Institute for Building Engineering in Berlin (DIBt: Deutsches Institut für Bautechnik in Berlin) is available: No. Z-19.53-2486
- The aBG shall be available at the point of use and can be ordered as a fire barrier approval kit BD01-S90-ZUL-D.

To ensure the fire barrier function EI 90, the following points must be observed when configuring and installing trunking units with fire barriers:

- The center of the fire barrier in the trunking unit must be positioned in the center of the fire wall (Fig. 3/4).
- There are no tap-off points in the area covered by the fire barrier
- The trunking units must be installed by an approved fire barrier installation specialist.

Observe the following when installing the trunking units:

- Installation of the fire barrier part at the busbar trunking element. The opening (1) between the busbar trunking element and the building element must be filled with mineral-based mortar or fire barrier sealant
- The mortar or fire barrier sealant must conform to the applicable regulations for establishing the fire resistance class or the construction of the wall or ceiling
- The installation must be carried out according to the specifications on the approval papers.
  The approval papers can be ordered separately.

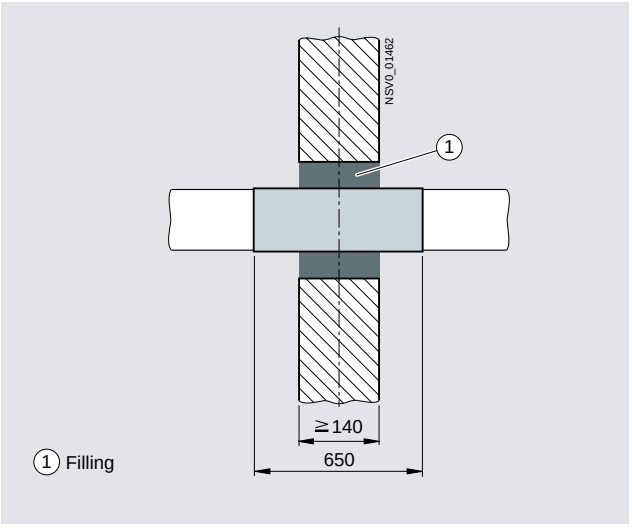


Fig. 3/4: **Positioning in the wall (wall cut-out)**

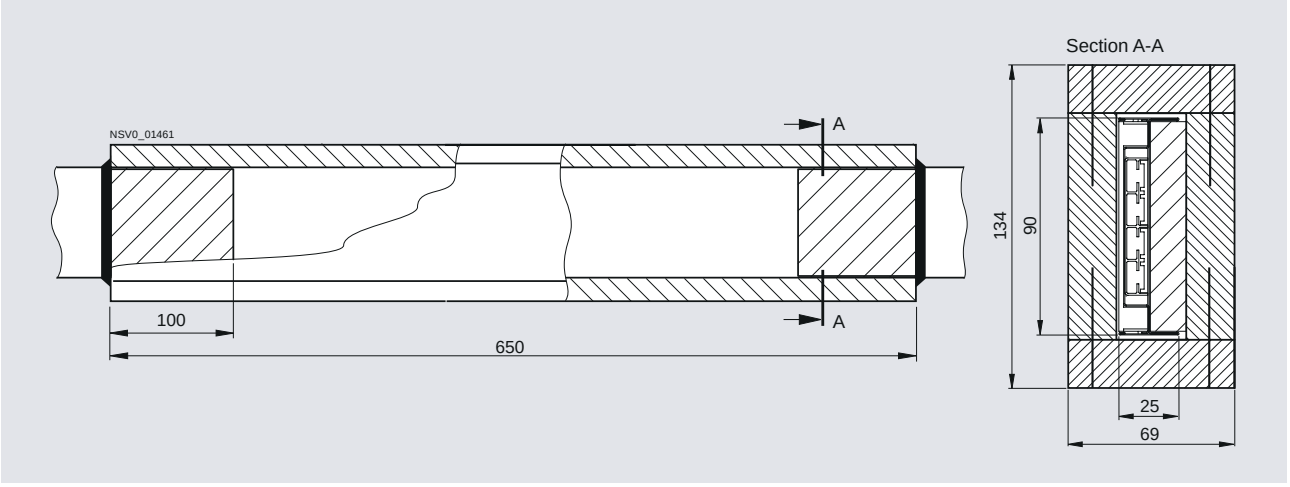
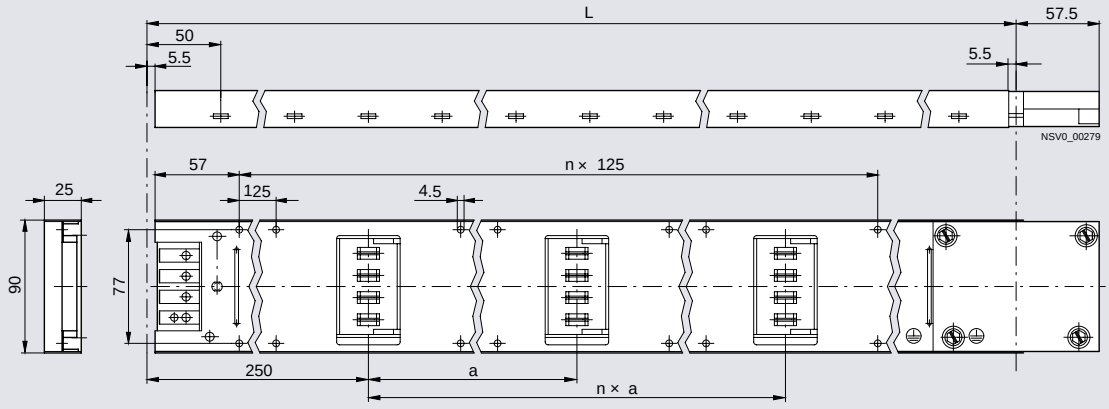


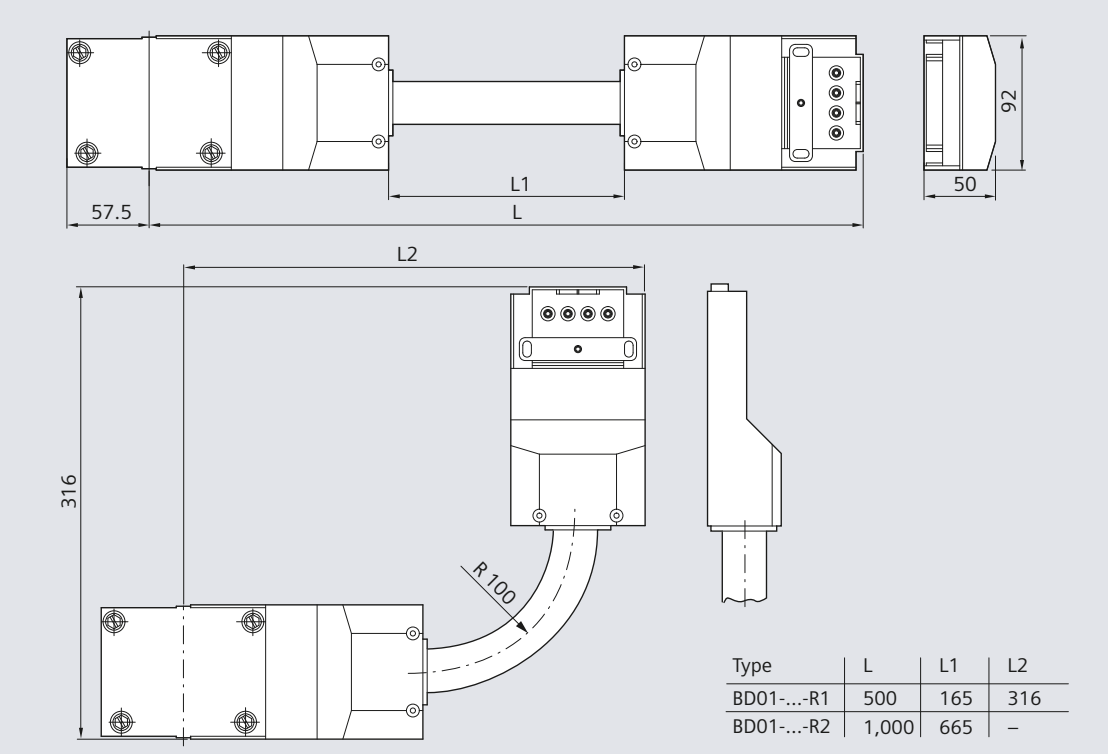
Fig. 3/5: **Positioning in the wall (side view, busbar cross-section)**

3.5 Dimensional Drawings and Dimensions



L	a	Number of tap-off points
2000	500	4
	1000	2
3000	500	6
	1000	3

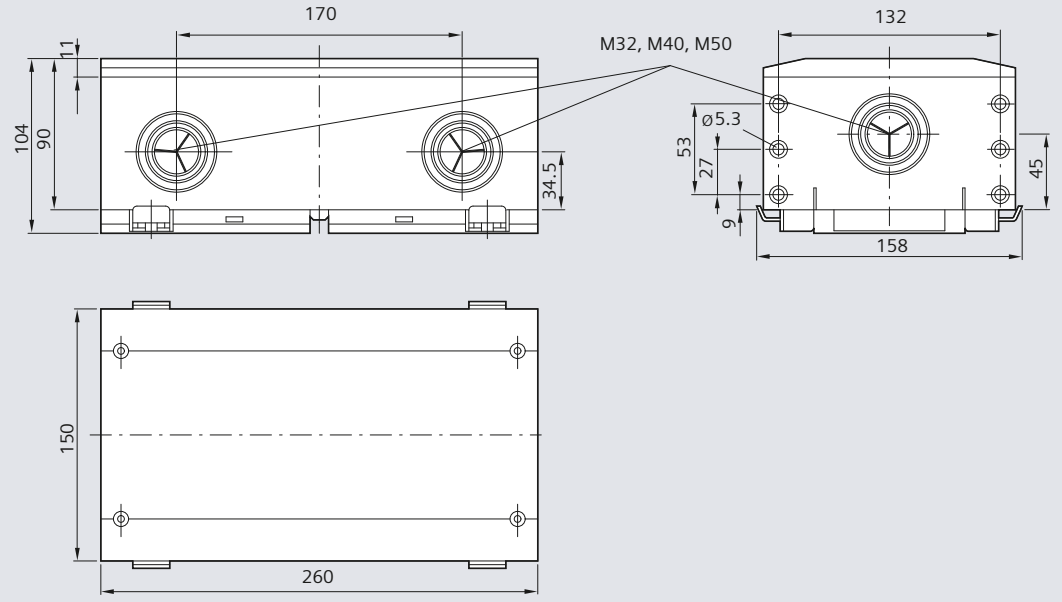
Fig. 3/6: **Dimensional drawings for BD01-... straight trunking units (dimensions in mm)**



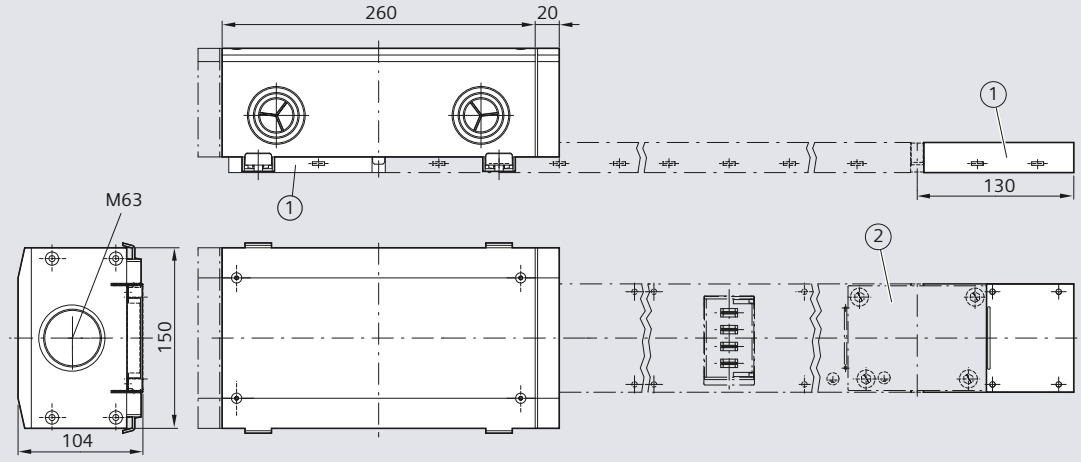
Type	L	L1	L2
BD01-...-R1	500	165	316
BD01-...-R2	1,000	665	–

Fig. 3/7: **Dimensional drawings for BD01-R1, BD01-160-R1, BD01-R2, and BD01-160-R2 junction units (dimensions in mm)**

BD01-E



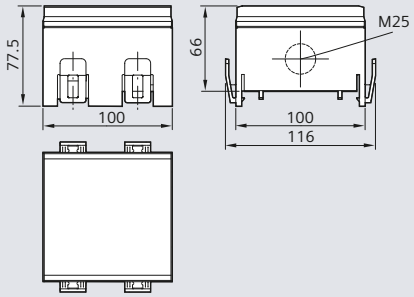
BD01-160-E



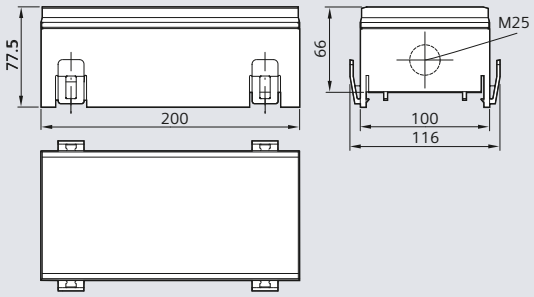
① End flange BD01-EF
② Joint block BD01-...-KB

Fig. 3/8: **Dimensional drawings for BD01-E and BD01-160-E feeding units (dimensions in mm)**

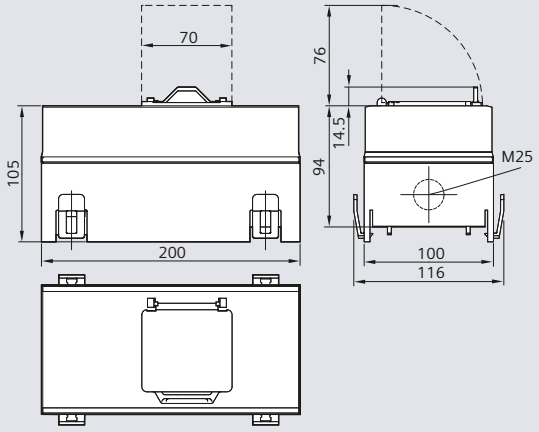
Tap-off unit size 01
BD01-AK01X/ZS



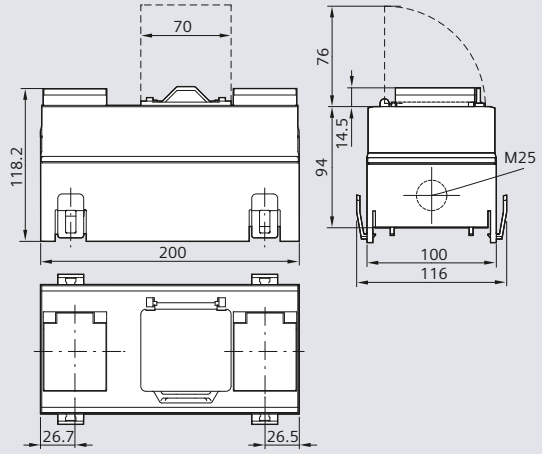
Tap-off unit size 02
BD01-AK02X/ZS3



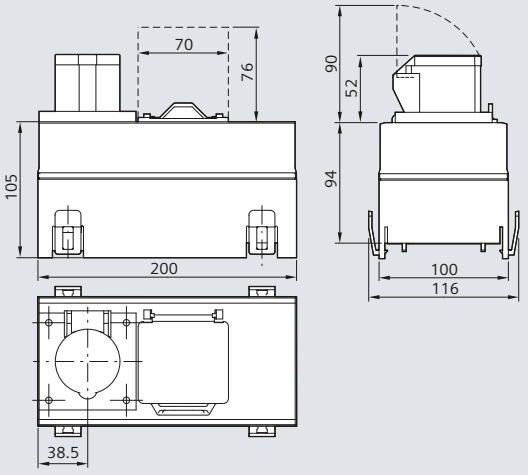
Tap-off units size 02, with device installation unit
BD01-AK02M0/A163
BD01-AK02M0/A323
BD01-AK02M0/F



BD01-AK02M0/2SD163S14
BD01-AK02M0/2SD163A161
BD01-AK02M0/2SD163FIA161



BD01-AK02M0/CEE163S14
BD01-AK02M0/CEE163A161



BD01-AK02M0/CEE165A163

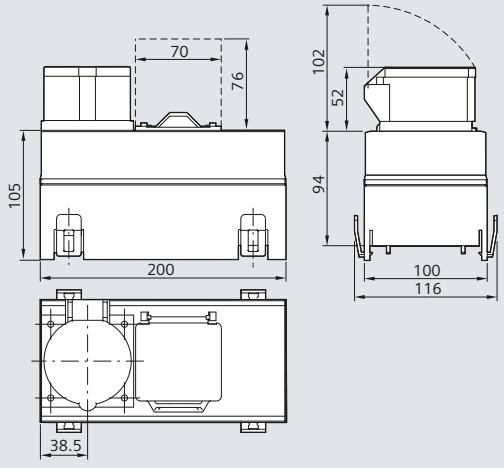
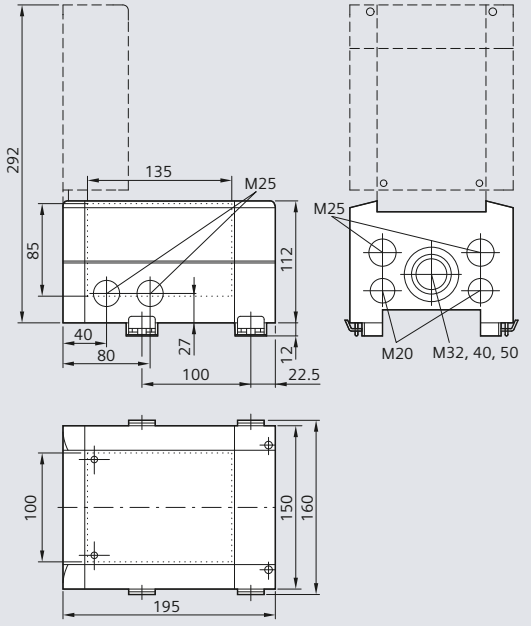
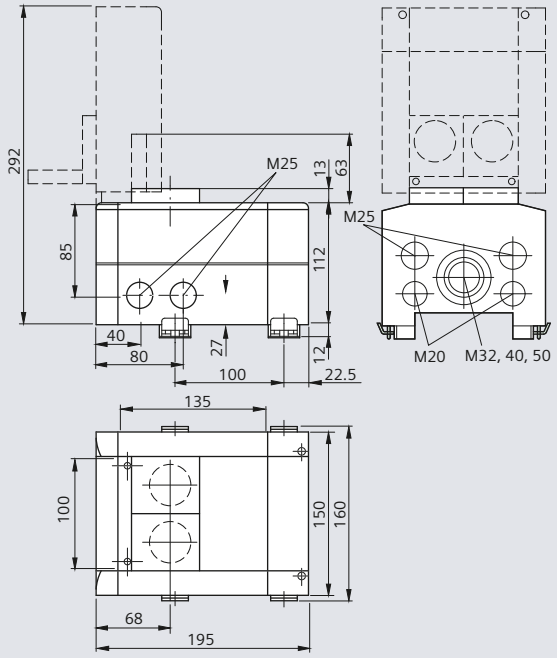


Fig. 3/9: **Dimensional drawings for tap-off units size 01 and size 02 (dimensions in mm; dashed lines: free space for opening the flap)**

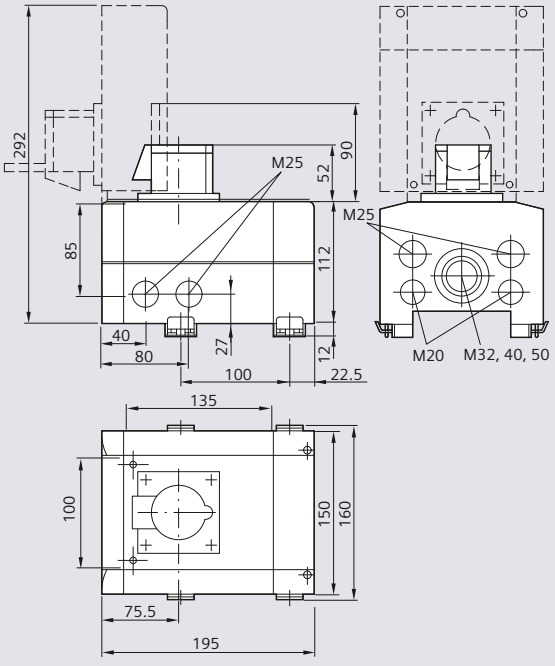
Tap-off units size 1
BD01-AK1X/S...
BD01-AK1X/F



Tap-off units size 1
BD01-AK1X/2SD...



Tap-off units size 1
BD01-AK1X/CEE163...



Tap-off unit size 1, with device installation unit
BD01-AK1M1/A...
BD01-AK1M1/F

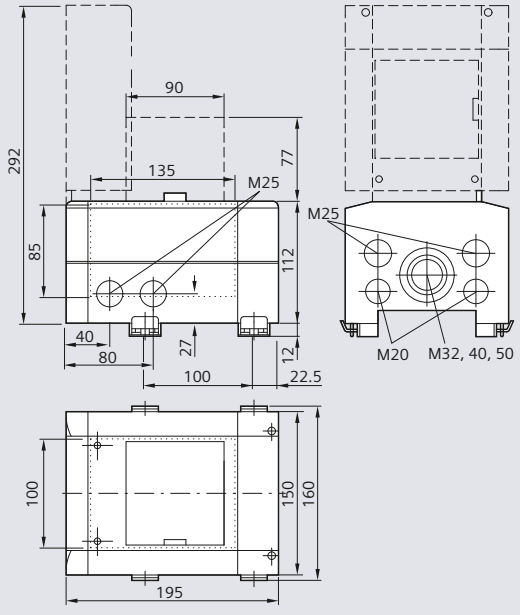
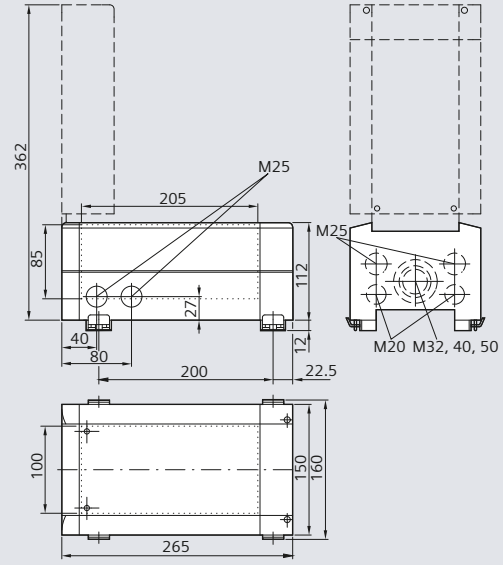


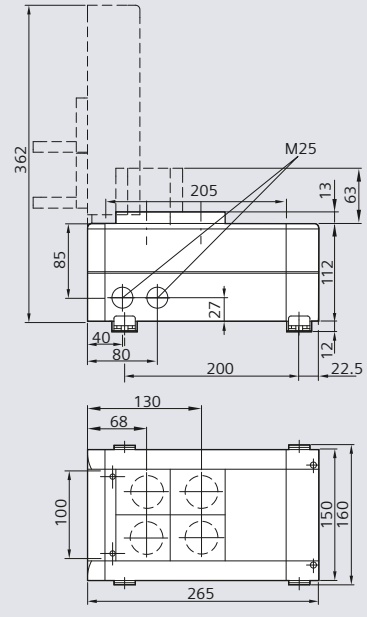
Fig. 3/10: **Dimensional drawings for tap-off units size 1 (dimensions in mm; dashed lines: free space for opening the flap; dotted lines: usable component fitting space)**

Tap-off units size 2, without device installation unit

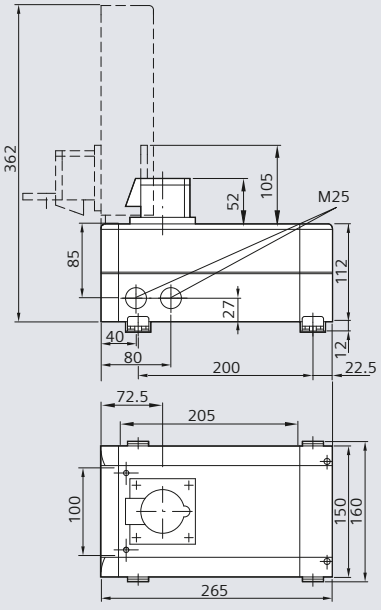
BD01-AK2X/F..., BD01-AK2HX/F...
BD01-AK2X/S..., BD01-AK2HX/S...



BD01-AK2X/4SD...



BD01-AK2X/CEE165...



BD01-AK2X/CEE325...

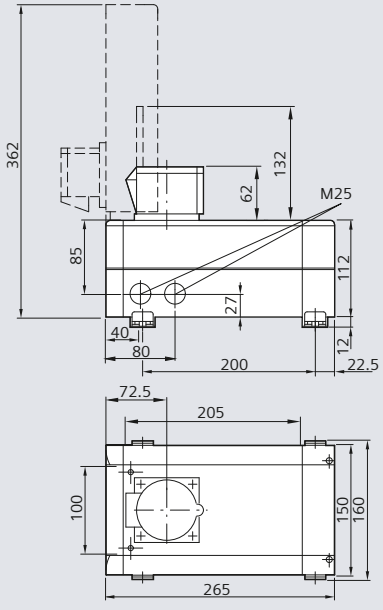
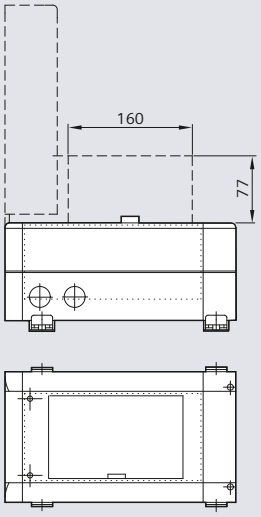


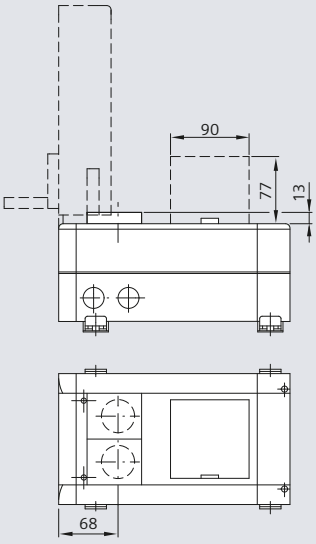
Fig. 3/11: **Dimensional drawings for tap-off units size 2, without device installation unit (dimensions in mm; dashed lines: free space for opening the flap; dotted lines: usable component fitting space)**

Tap-off units size 2, with device installation unit

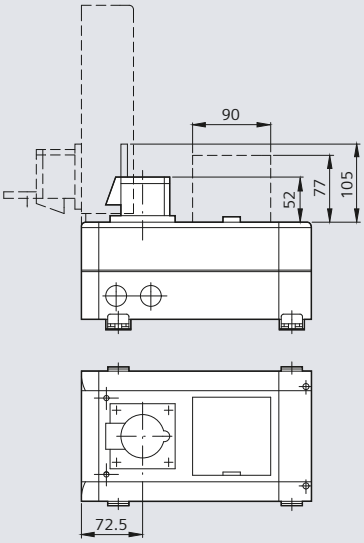
BD01-AK2M2/F,
BD01-AK2HM2/F



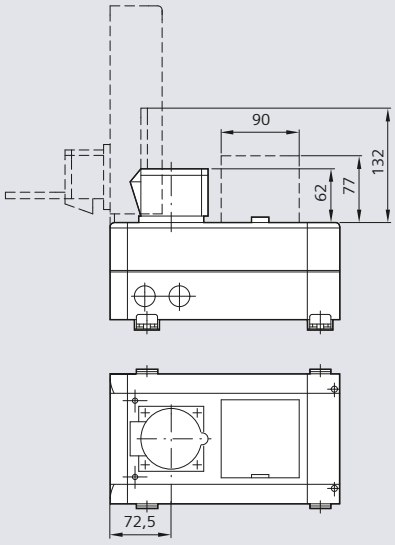
BD01-AK2M1/2SD...



BD01-AK2M1/CEE163...,
BD01-AK2M1/CEE165



BD01-AK2M1/CEE325...



BD01-AK2M2/CEE165...

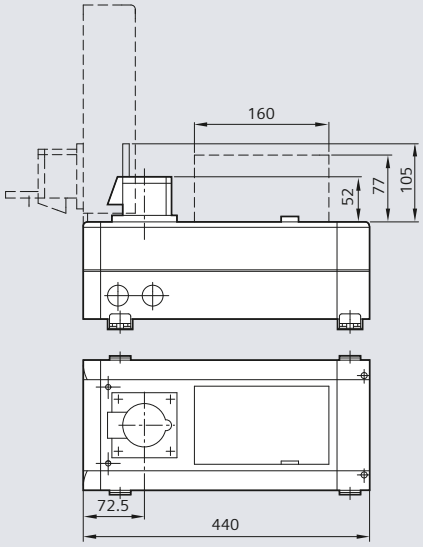
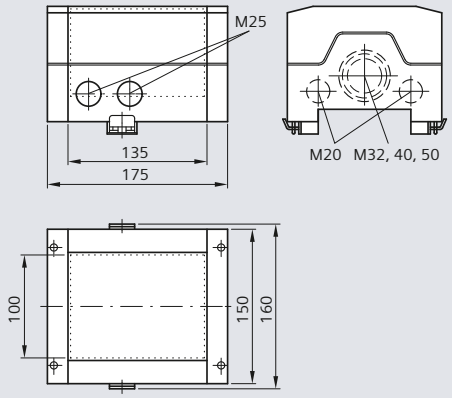


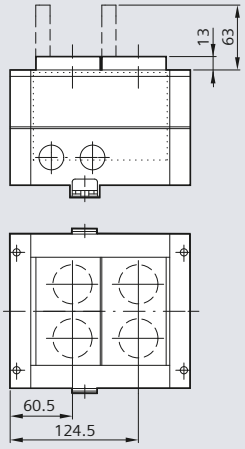
Fig. 3/12: **Dimensional drawings for tap-off units size 2, with device installation unit (dimensions in mm; dashed lines: free space for opening the flap; dotted lines: usable component fitting space)**

Ancillary equipment units size 1

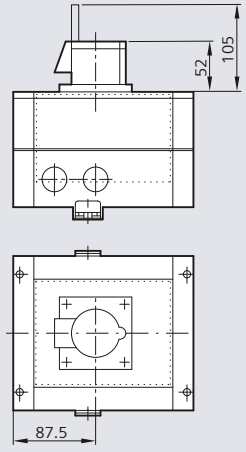
BD01-GK1X/F



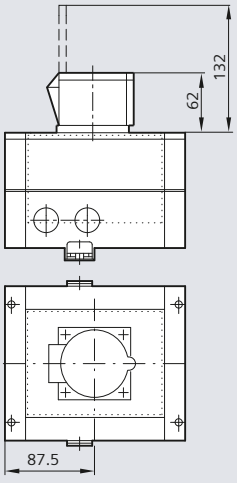
BD01-GK1X/4SD163



BD01-GK1X/CEE163
BD01-GK1X/CEE165



BD01-GK1X/CEE325



Ancillary equipment unit size 1, with device installation unit

BD01-GK1M1/F

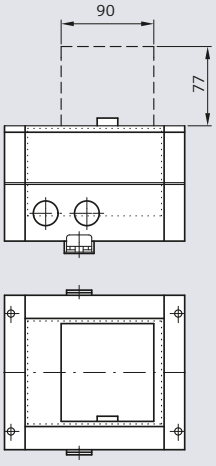
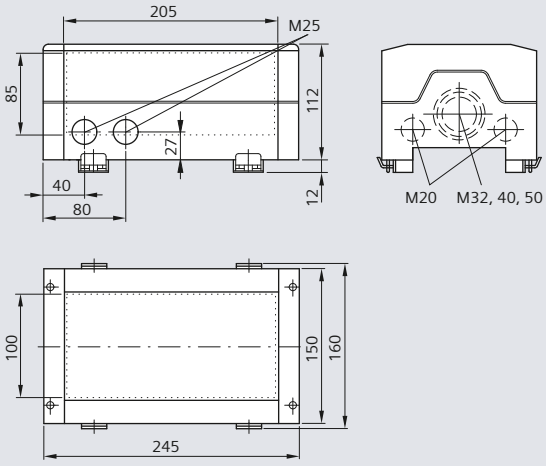


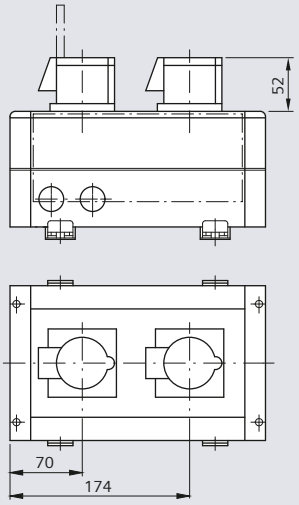
Fig. 3/13: **Dimensional drawings for ancillary equipment units size 1 (dimensions in mm; dashed lines: free space for opening the flap; dotted lines: usable component fitting space)**

Ancillary equipment units size 2

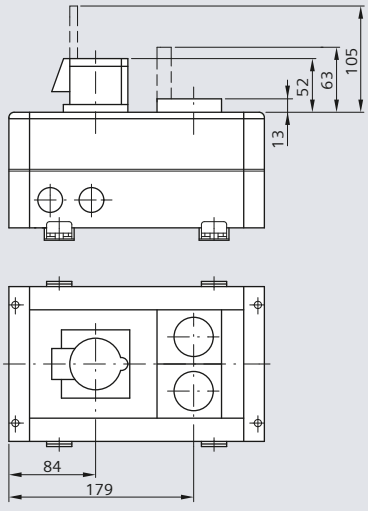
BD01-GK2X/F



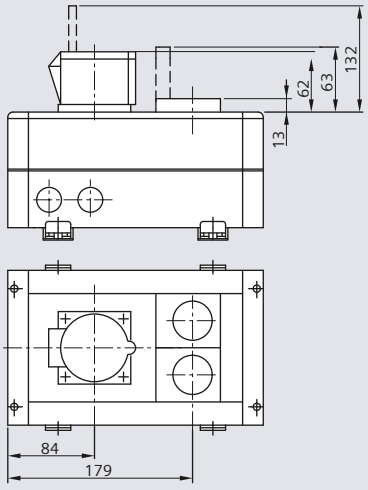
BD01-GK2X/CEE163CEE165



BD01-GK2X/2SD163CEE165



BD01-GK2X/2SD163CEE325



Ancillary equipment unit size 2, with device installation unit

BD01-GK2M2/F

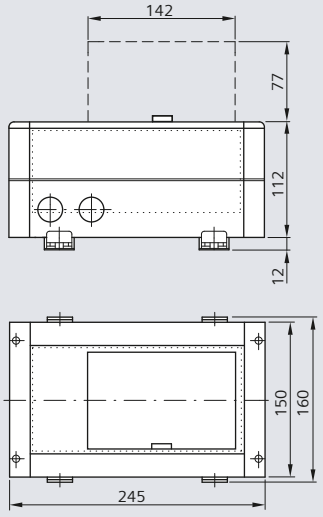
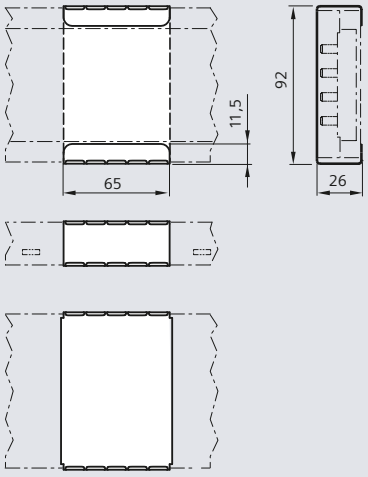
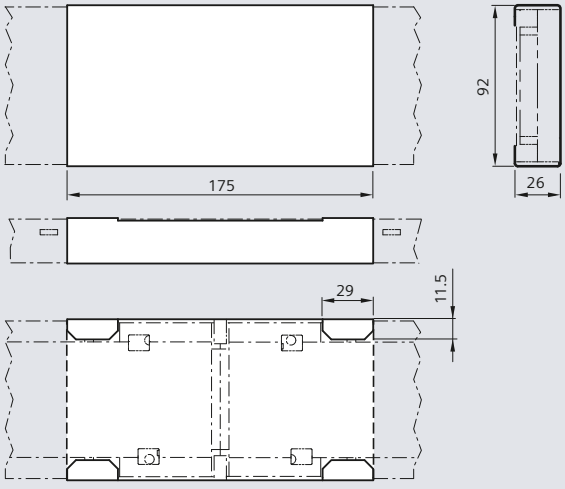


Fig. 3/14: **Dimensional drawings for ancillary equipment units size 2 (dimensions in mm; dashed lines: free space for opening the flap; dotted lines: usable component fitting space)**

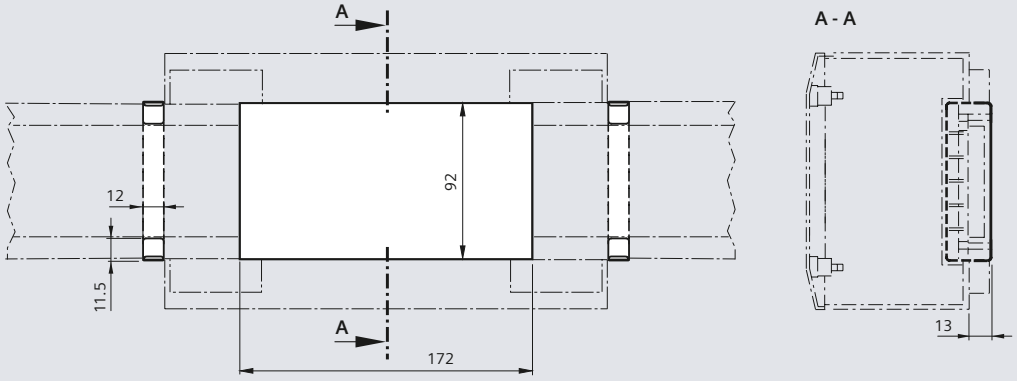
For tap-off point
BD01-FAS



For connection point
BD01-FS



For feeding point at bottom
BD01-FES



For feeding point at side, top
BD01-KS

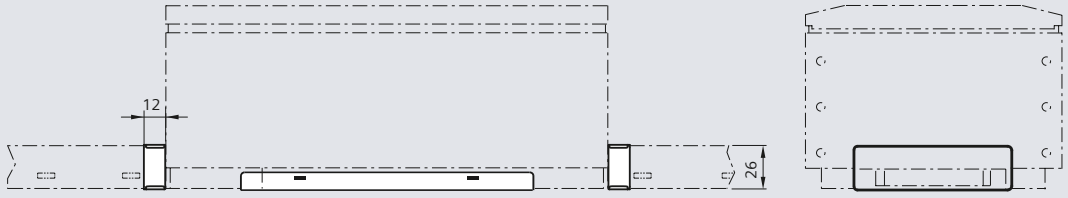
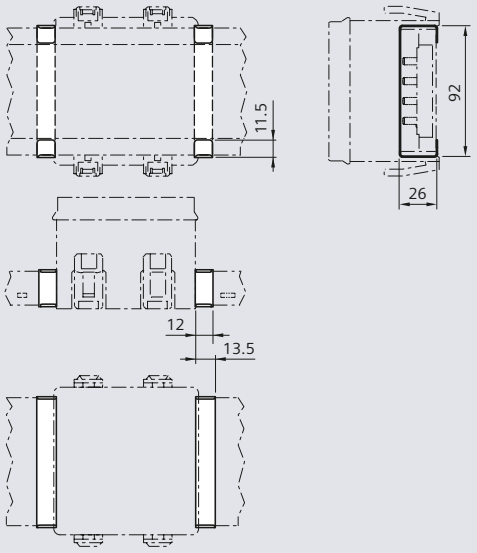


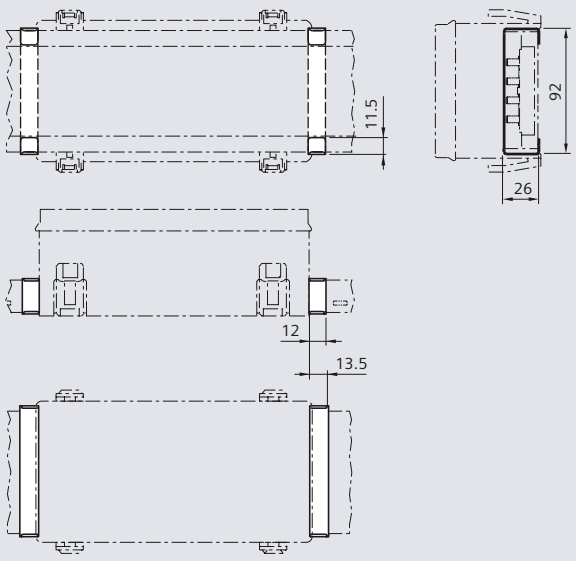
Fig. 3/15: **Dimensional drawings for protective covers IP55 for tap-off points, connection points, and feeding points (dimensions in mm)**

For tap-off units

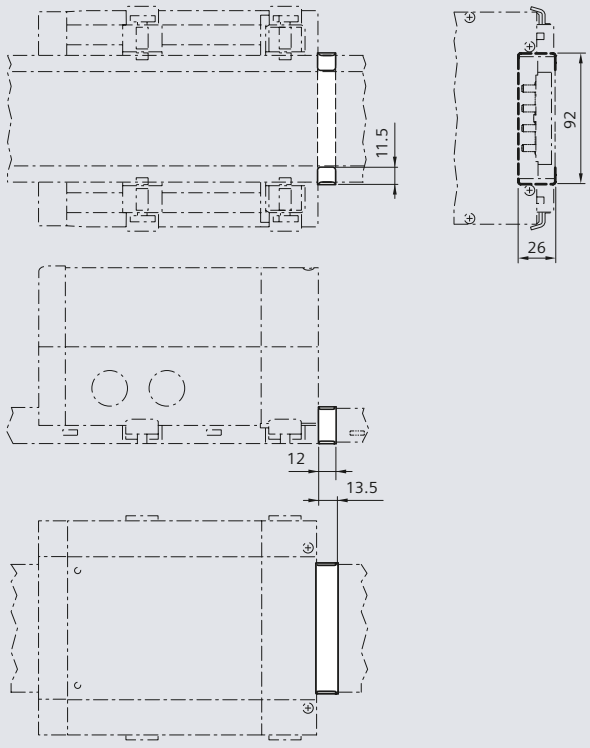
BD01-AK01X-IP55



BD01-AK02X-IP55



BD01-AK1X-IP55



BD01-AK2X-IP55

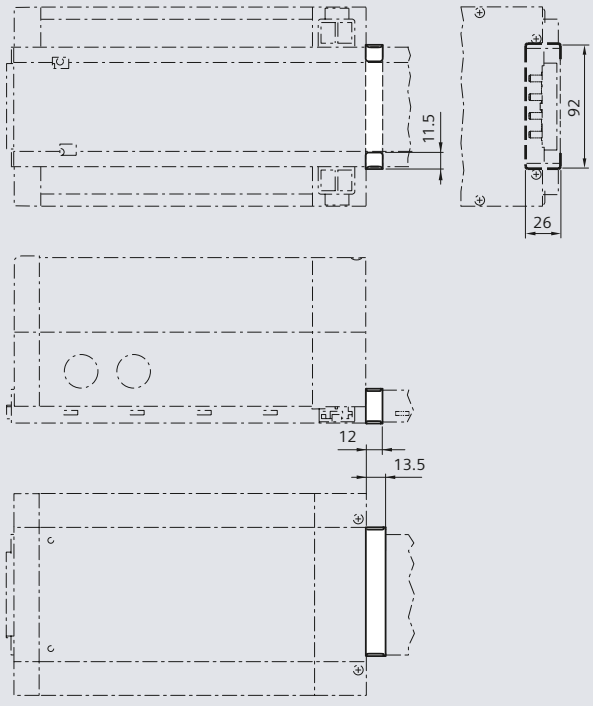
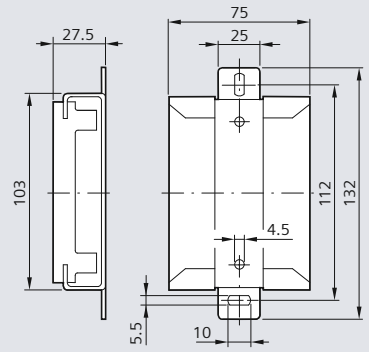
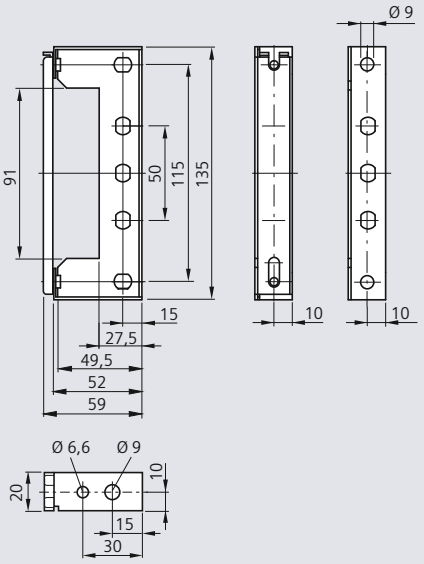


Fig. 3/16: **Dimensional drawings for protective covers IP55 for tap-off units (dimensions in mm)**

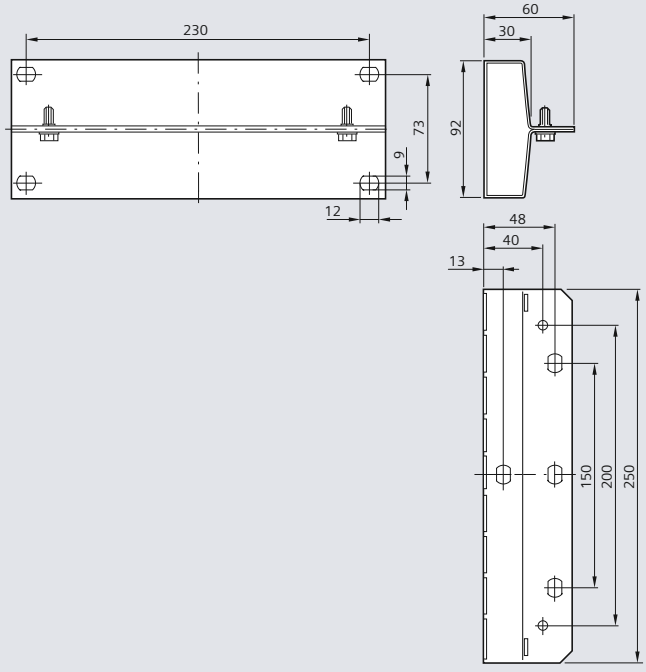
Universal fixing bracket
BD01-B



Suspension bracket
BD01-BA



Hanger bracket
BD01-BAP



Fixing bracket for vertical installation
BD01-BV

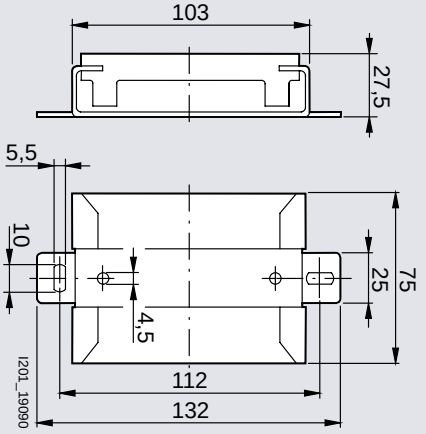


Fig. 3/17: **Dimensional drawings for fixing elements of the BD01 system (dimensions in mm)**

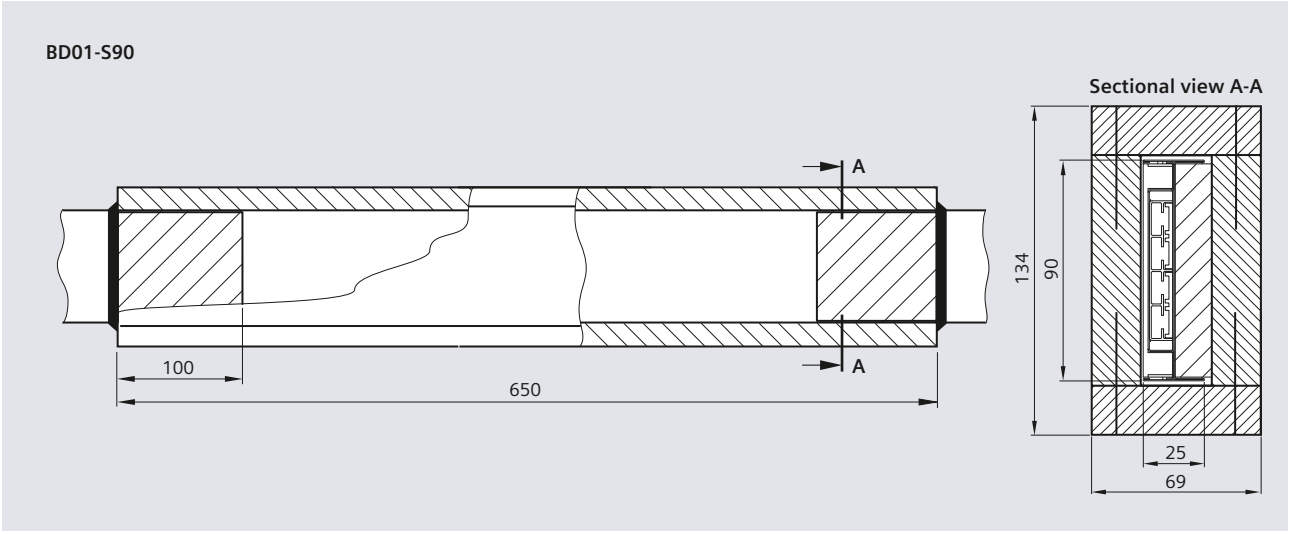


Fig. 3/18: **Dimensional drawing for BD01-S90 fire barrier kit (dimensions in mm; for dimensions of the cut-outs for the fire barrier, see Fig. 3/4)**

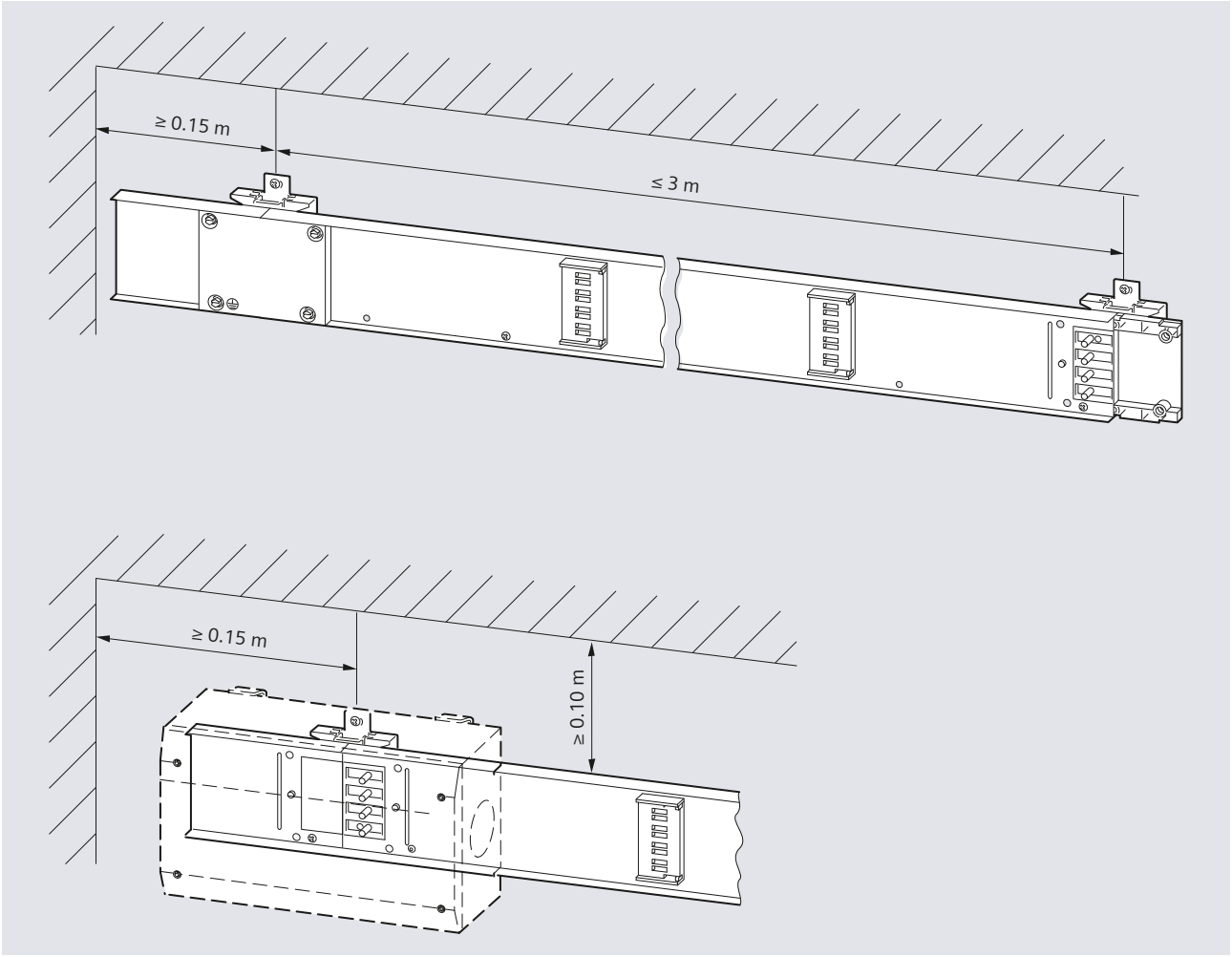


Fig. 3/19: **Wall or ceiling mounting with BD01-B**

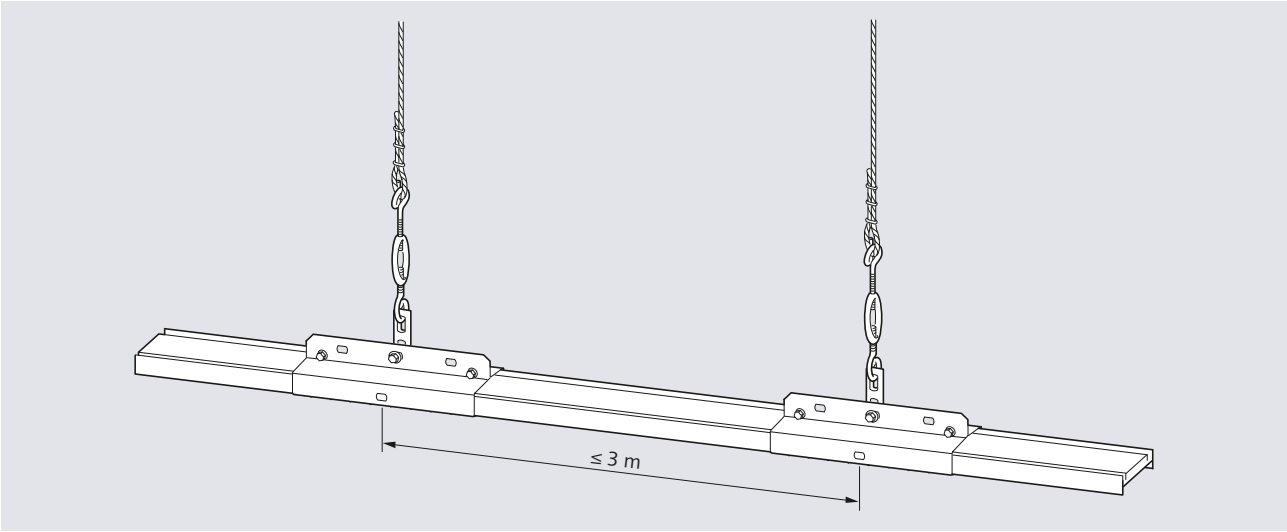


Fig. 3/20: **Pendant suspension with BD01-BAP**

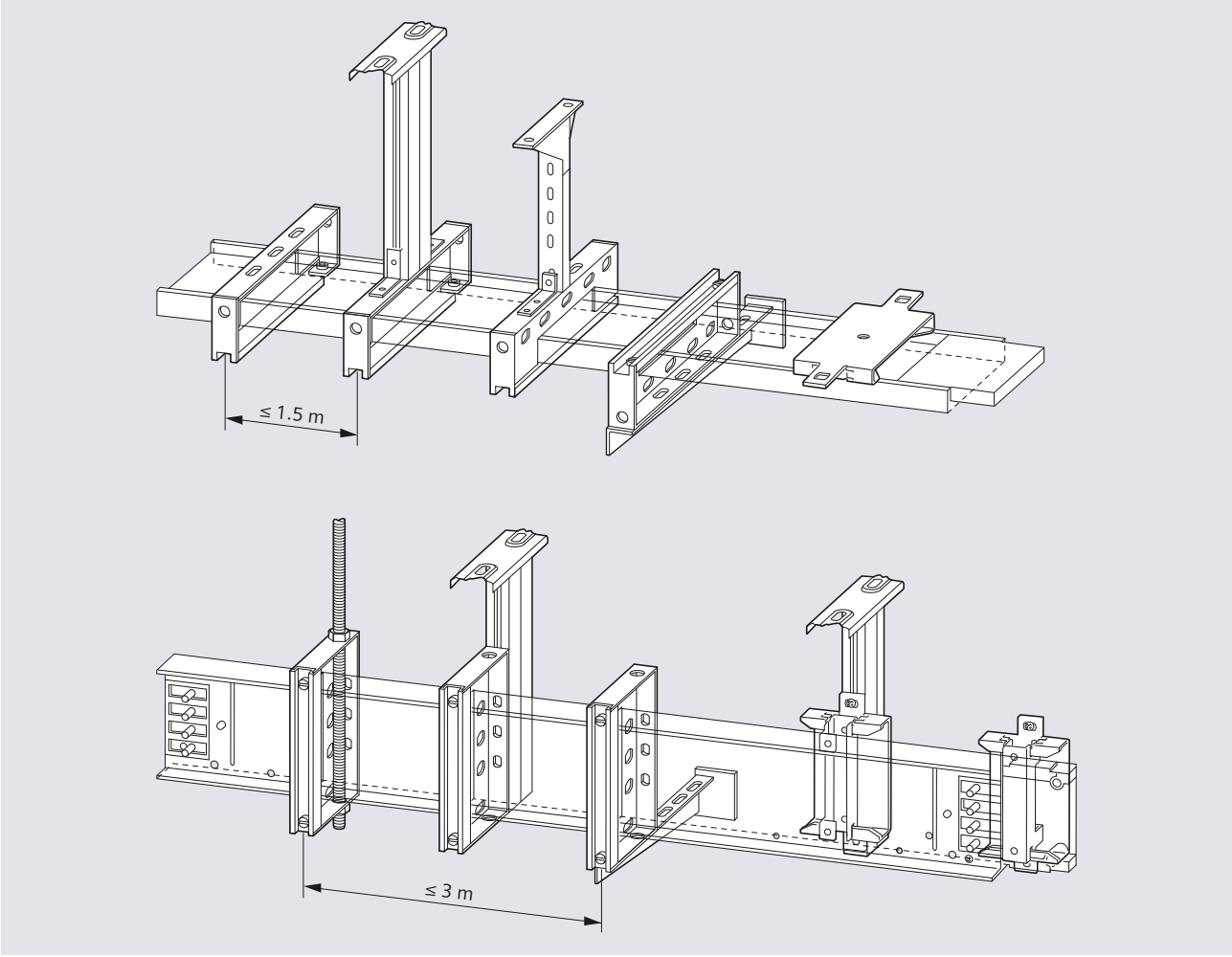


Fig. 3/21: **Mounting examples with BD01-B and BD01-BA**

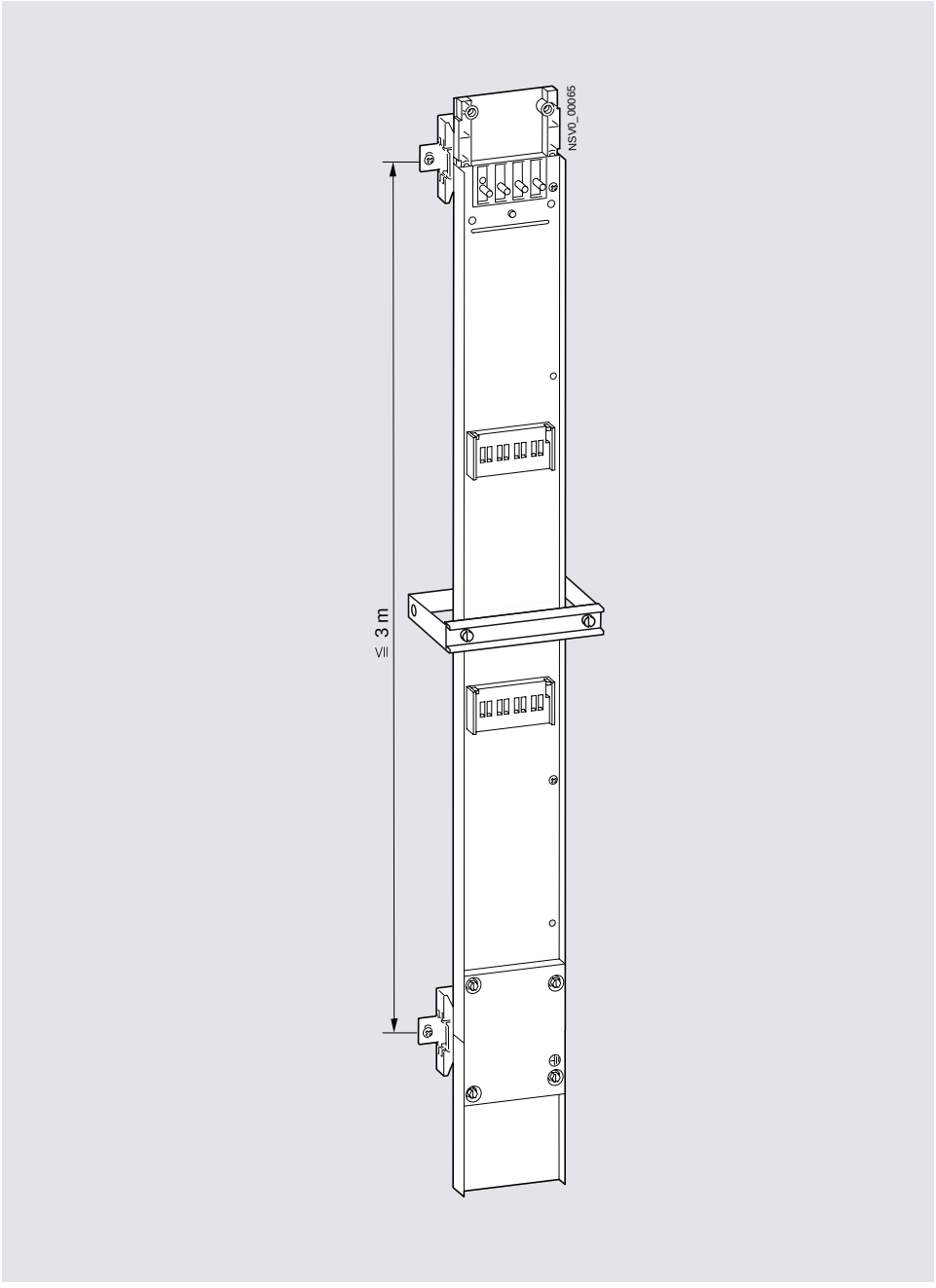
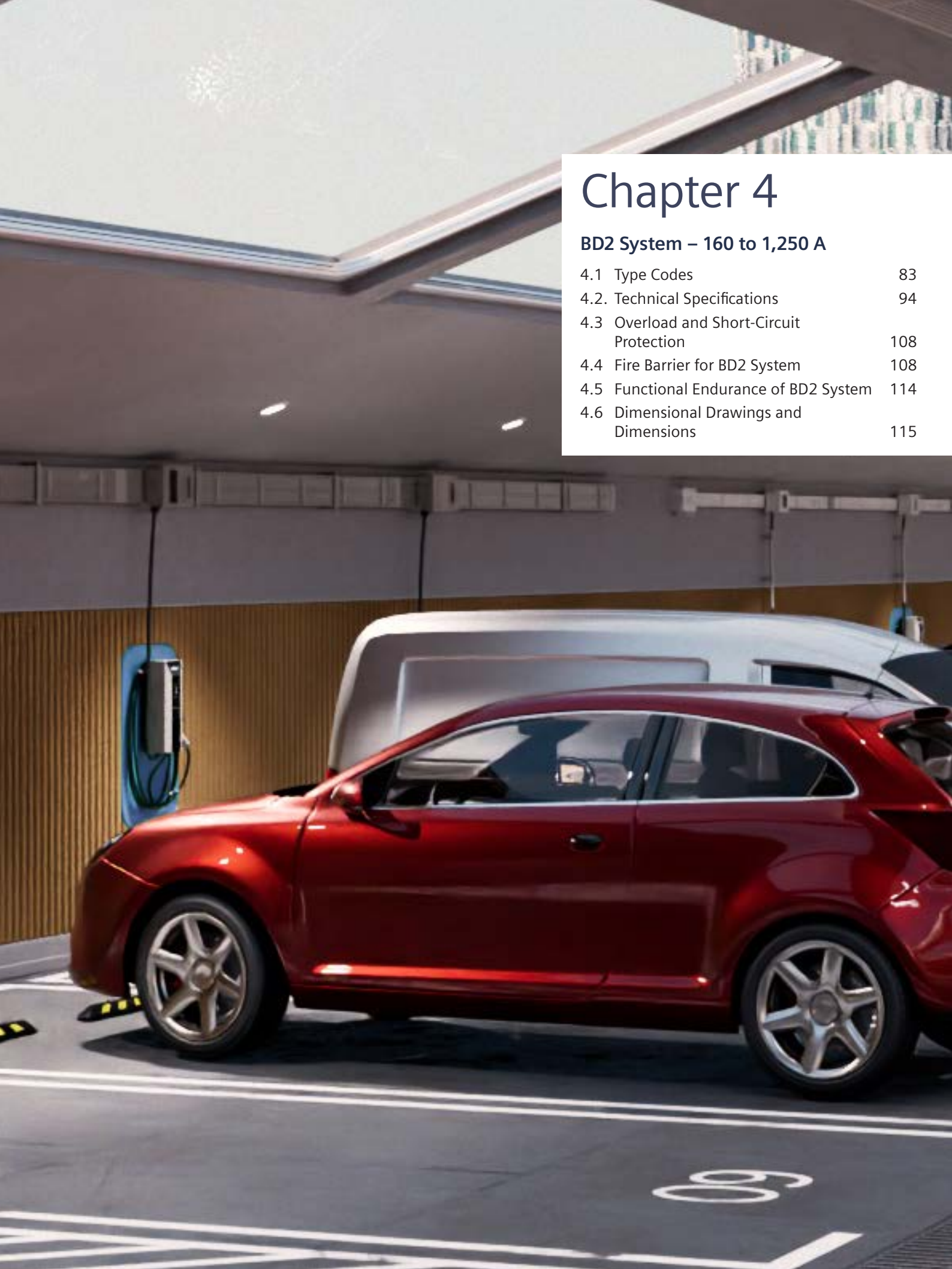


Fig. 3/22: **Mounting example with BD01-BV (central BD01-BA for stabilization)**



Chapter 4

BD2 System – 160 to 1,250 A

4.1 Type Codes 83
4.2. Technical Specifications 94
4.3 Overload and Short-Circuit Protection 108
4.4 Fire Barrier for BD2 System 108
4.5 Functional Endurance of BD2 System 114
4.6 Dimensional Drawings and Dimensions 115

4 BD2 System – 160 to 1,250 A

The compact BD2 busbar trunking system (Fig. 4/1) is designed to be used universally for power distribution applications in industry, trade, and infrastructure. It offers maximum flexibility with two sizes up to 1,250 A in seven current ratings. Prefabricated tap-off units with different equipment options as well as freely configurable tap-off units complete the system offering.

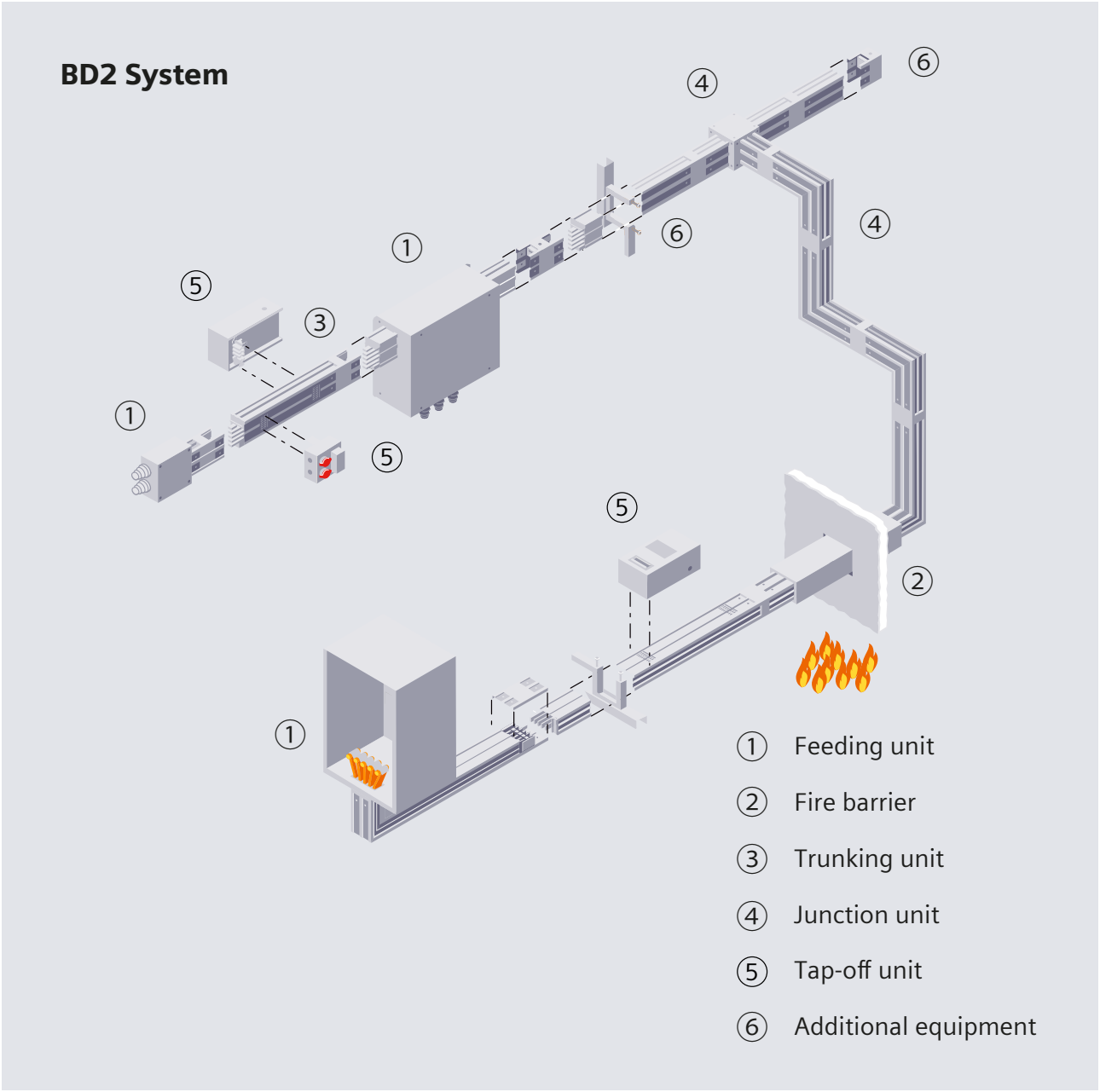


Fig. 4/1: **Overview of BD2 busbar trunking system**

Overview

- Design verified low-voltage switchgear and controlgear assembly in accordance with IEC 61439-1/-6
- Standard degree of protection IP55 for trunking units and junction units
- Degree of protection increase to IP55 with additional equipment for tap-off units
- Enclosure dimensions (Fig. 4/2):
  Only two enclosure dimensions (up to 400 A / up to 1,250 A) for the complete rated current range
- 5-conductor configuration; all conductors nickel-plated and tinned; conductor material copper or aluminum
- Connection of the system components with a single-bolt terminal. Each single-bolt terminal contains an expansion compensation for the conductors:
  Because of the Joule heat, the conductors expand in the enclosure; this movement is absorbed by the integrated expansion laminations. No special expansion compensation elements are therefore required.
- Horizontal and vertical installation possible
- Galvanized sheet-steel enclosure, powder-coated, standard color RAL 7035 (light gray)
- Suitable for operation in AC (alternating current) and DC (direct current) networks, (see Chapter 4.3).

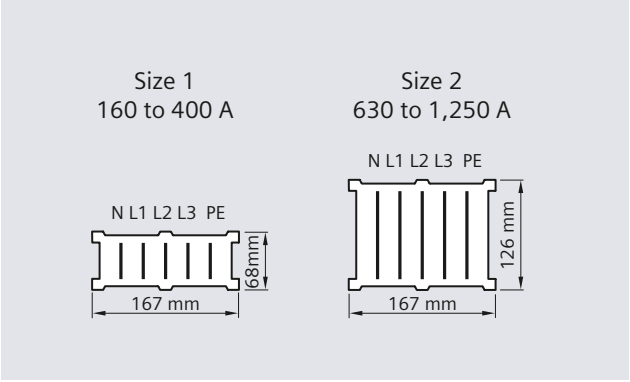


Fig. 4/2: **Overview of BD2 busbar trunking system**

Components

Straight trunking units

- Standard lengths of 3.25 m, 2.25 m, or 1.25 m
- Optional lengths of 0.5 m up to 3.24 m
- Tap-off points
  – Straight trunking units can be supplied with tap-off points on both sides. The distance between the tap-off points is 250 mm, these always being alternately on the front and rear sides. For currents from 400 A, trunking units without tap-off points are also available.
  – Sealable
  – Finger safety throughout the complete plugging process of the tap-off unit
  – Can be coded together with the tap-off unit at the factory on request
- Optionally with or without fire barrier.

Junction units

- Special trunking units for use in e-mobility applications with adapted length and reduced number of tap-off points
- L-units
  – Junction unit in the horizontal or vertical direction
  – 90° angle or optionally in the range of 85° – 175°
- Z-units
  – Double junction unit in the horizontal or vertical direction
  – 2 × 90° angle
  – Selectable limb lengths
- T-units
  – Straight trunking unit with an integrated 90° junction unit in the horizontal or vertical direction
  – Flexible junction unit with flexible copper cables.

Feeding units

- Entry / end feeding unit
  for multi-core and single-core cables, cable entry from the front, additional cabling box for cable entry from the side
- Center feeding unit
  for multi-core and single-core cables
  cable entry from 3 sides
- Distribution board feeding unit
  for connecting an enclosure (e.g., a switchboard) to a BD2 busbar trunking system.

Tap-off units (AK)

The BD2 system provides numerous tap-off units in different sizes, with different features and equipment.

The following features apply to all tap-off units:
- An anti-rotation feature prevents incorrect mounting of the tap-off unit
- Pluggable while energized (exception: tap-off units with fuse base BD2-AK0*-SNH*). National specifications/standards are to be observed
- The plugging process of the tap-off unit is finger-safe.

The tap-off units of size AK04/05/06 have a fitting tool for simple and safe mounting with an additional disconnected position.

Tap-off units of the BD2-AK2 and BD2-AK3 series are equipped with a cover-integrated switch disconnector: This ensures that the tap-off unit is de-energized when it is open, so that it can be removed from the BD2 system in no-load condition.

Moreover, there are various sizes of tap-off units with different equipment:
- Tap-off units with fuses
  Tap-off units for various fuse elements are provided in a current range from 16 A to 530 A. The customer connections are either implemented for direct cable connection or with socket outlets.
- Tap-off units with fuse disconnector
  Between 125 A and 320 A, tap-off units with fuse switch disconnectors or switch disconnectors with fuses are available. The customer connection is made directly at the switching device.
- Tap-off units with miniature circuit breakers
  There is a large selection of tap-off units with miniature circuit breakers in the rated current range from 16 A to 125 A, optionally with RCD, measuring device, and powerline transmission. The connection to the loads is made through socket outlets or direct connection.
- Tap-off units with molded case circuit breakers
  With 40 A to 550 A, the tap-off units with molded case circuit breakers cover a wide current range. Various trip units are available, and it is also possible to choose between 3-pole and 4-pole switching devices as well as between manual and motor operation. Some tap-off units also provide metering functions and powerline technology. The customer connection is made directly at the switching device.
- Tap-off units for customer equipment
  Between 25 A and 400 A, empty tap-off units are provided to be equipped by the customer. There are two options for this: In the empty tap-off units with free arrangement of components, the components are selected and installed by the customer. There are also prepared empty tap-off units for installation of predefined Siemens molded case circuit breakers. Those can be installed by following the instructions supplied.
- Tap-off units for e-mobility
  These units are adapted to a charging power of 11 kW or 22 kW and are equipped with different protection devices.

Ancillary equipment units (GK)
- For 9 modular widths (MW; 1 MW corresponds to 18 mm)
- Without or with device installation unit for external actuation, powder-coated cover
- Cable entry is possible from 4 sides
- Can be combined with tap-off units BD2-AK02, -AK2, -AK03, -AK3
- A DIN rail is integrated for device installation
- An ancillary equipment unit has no electrical connection to the busbar and can only be used in conjunction with a tap-off unit.

Additional equipment
- End flange
- For degree of protection IP55
- For fixing
- Universal fixing bracket (edgewise, flat)
- Fixing elements for vertical runs and for wall or ceiling mounting.

4.1 Type Codes

For better clarity about available system components, the type codes are summarized in this section for trunking units, junction units, feeding units, tap-off units, and ancillary equipment units. For the additional equipment, the type codes are specified in Chapter 9.1 with the corresponding dimensional drawings.

BD2 trunking units		**Order number**										
		Basic type						**Fire barrier**				
		BD2	**.**	**3**	**- ...**	**- ..**	**- ...**	**+ BD2**	**- ...**	**- BX**	**...**	**...**
Conductor material												
Aluminum Al			A									
Copper Cu			C									
Rated current I_n												
Al	Cu											
160 A	160 A				160							
250 A	250 A				250							
400 A	400 A				400							
630 A	630 A				630							
800 A	800 A				800							
1,000 A	1,000 A				1,000							
	1,250 A				1,250							
Type of length (see Fig. 4/4)												
Standard length, with tap-off points						SB						
Standard length, without tap-off points (≥ 400 A)						SO						
Optional length, with tap-off points						WB						
Optional length, without tap-off points (≥ 400 A)						WO						
Details of length												
Optional length, with one tap-off point (e-mobility length)							W1					
Optional length, with two tap-off points (e-mobility length)							W2					
1.25 m for SB (4 tap-off points) or SO							1					
0.5 - 1.24 m for WO							1W*					
2.25 m for SB or SO (8 tap-off points)							2					
1.26 to 2.24 m for WB (4-8 tap-off points [1]) or WO							2W*					
3.25 m for SB (12 tap-off points) or SO							3					
2.26 to 3.24 m for WB (8-12 tap-off points [1]) or WO							3W*					
Fire resistance class												
EI 90									EI			
EI 120									EI 120			
BX: Dimension in m from center of terminal block to center of fire wall or fire ceiling											SLBX**	
Documentation kit (certificate of approval, wall-mounted signs, and declaration of conformity) for Germany		**BD2-S90-ZUL-D**										
		BD2-S120-ZUL-D										

* Optional length in m
** Positioning in m
[1] On optional lengths, it may not be possible to fit tap-off units to all tap-off points

Tab. 4/1: **Type code structure for trunking units of the BD2 system**

BD2 junction units		Order number									
		Basic type							Fire barrier (L-unit only)		
		BD2	.	- ...	- .	.	- X.../Y...	- G...	+ BD2	- ...	- B...
Conductor material											
Aluminum Al			A								
Copper Cu			C								
Rated current I_n											
Al	Cu										
400 A	400 A			400							
1,000 A				1,000							
	1,250 A			1,250							
Type of junction unit (see Fig. 4/5)											
L-units					L						
Z-units					Z						
T-units [1]					T						
Direction description for junction unit											
Rear						H					
Front						V					
Left						L					
Right						R					
Standard/optional lengths for L-units											
Without: standard length X = 0.36 m and Y = 0.36 m							-				
Optional length X: X = 0.36 to 1.25 m, Y = 0.36 m							X*				
Optional length Y: X = 0.36 m, Y = 0.36 to 1.25 m							Y*				
Optional length X/Y: X = 0.36 to 1.25 m, Y = 0.36 to 1.25 m							X*/Y*				
Configurable angle for L-units											
G: with configurable angle 85° to 175°								G**			
Length options for Z-units											
Optional length Z: X = 0.36 m, Y = 0.36 m, Z = 0.36 to 1.25 m							Z*				
Optional lengths X/Y/Z: X/Y = 0.36 to 0.60 m, Z = Z_{min}-1.25 m [2]							X*/Y*/Z*				
Fire barrier for L-units (optionally, for Z-units on request) [3]											
EI 90 in the X limb										EI 90	BX*
EI 90 in the Y limb										EI 90	BY*
EI 120 in the X limb										EI 120	BX*
EI 120 in the Y limb										EI 120	BY*
Flexible junction units in direction X/Y/Z (upgradable to max. IP54, see Fig. 4/5)											
Up to 400 A (length 1.25 m)		BD2-400-R									
Up to 800 A (length 1.75 m)		BD2-800-R									

* Optional length in m
** Number of degrees in 5°steps
[1] T-unit with Cu and I_n = 1,250 A: only available rear (-TH) and front (-TV) (BD2C-1250-TH and BD2C-1250-TV)
[2] Z_{min}: front / rear and Al / Cu with 400 A = 0.14 m
front / rear and Al with 1,000 A / Cu with 1,250 A = 0.26 m
left/ right = 0.34 m
[3] BX*/BY*: Dimension from center of terminal block (for BX*, side without terminal block) to center of fire wall or fire ceiling

Tab. 4/2: **Type code structure for junction units of the BD2 system**

BD2 feeding units				Additions to the type code for root BD2 . - ... - ...						
	Rated current			250 A	315 A	400 A	630 A	800 A	1,000 A	1,250 A
End feeding units	Multi-core entry	without cabling box	Al	BD2A-250 -EE		BD2A-400 -EE			BD2A-1000 -EE	
			Cu	BD2C-250 -EE		BD2C-400 -EE			BD2C-1000 -EE	BD2C-1250 -EE
		with cabling box	Al			BD2A-400 -EE-KR			BD2A-1000 -EE-KR	
			Cu			BD2C-400 -EE-KR			BD2C-1000 -EE-KR	BD2C-1250 -EE-KR
	Single-core entry	without cabling box	Al	BD2A-250 -EE-EBAL		BD2A-400 -EE-EBAL			BD2A-1000 -EE-EBAL	
			Cu	BD2C-250 -EE-EBAL		BD2C-400 -EE-EBAL			BD2C-1000 -EE-EBAL	BD2C-1250 -EE-EBAL
		with cabling box	Al			BD2A-400 -EE-KR-EBAL			BD2A-1000 -EE-KR-EBAL	
			Cu			BD2C-400 -EE-KR-EBAL			BD2C-1000 -EE-KR-EBAL	BD2C-1250 -EE-KR-EBAL
End feeding units with switch disconnector	Single-core entry		Al							
			Cu	BD2C-250 -EESC	BD2C-315 -EESC	BD2C-400 -EESC	BD2C-630 -EESC	BD2C-800 -EESC		
Center feeding units	Multi-core entry		Al			BD2A-400 -ME			BD2A-1000 -ME	
			Cu			BD2C-400 -ME			BD2C-1000 -ME	
	Single-core entry		Al			BD2A-400 -ME-MBAL			BD2A-1000 -ME-MBAL	
			Cu			BD2C-400 -ME-MBAL			BD2C-1000 -ME-MBAL	
Distribution board feeding units	Bolt terminal		Al	BD2A-250 -VE		BD2A-400 -VE			BD2A-1000 -VE	
			Cu	BD2C-250 -VE		BD2C-400 -VE			BD2C-1000 -VE	BD2C-1250 -VE

Tab. 4/3: **Type code structure for feeding units of the BD2 system**

Tap-off units AK1 up to 25 A, molded-plastic enclosure, size 1				
Pre-engraved entry openings, cable grommet, and integrated strain relief as standard; transparent cover of the protection devices to be operated from outside; utilization category AC-22B. Cable entry is possible from 3 directions.				
	Type	I_n	U_e	**Version**
With fuse base	BD2-AK1/S14	16 A	400 V	3 × 1-pole fuse base D01 / without socket outlet
	BD2-AK1/S18	25 A	400 V	3 × 1-pole fuse base D02 / without socket outlet
	BD2-AK1/2CEE163S14	16 A	230 V	2 × 1-pole fuse base D01 / 2 × 3-pole CEE socket outlets 16 A
	BD2-AK1/CEE165S14	16 A	400 V	3 × 1-pole fuse base D01 / 5-pole CEE socket outlet 16 A
	BD2-AK1/3SSD163S14	16 A	230 V	3 × 1-pole fuse base D01 / 3 Schuko socket outlets 16 A
With miniature circuit breaker	BD2-AK1/A163	16 A	400 V	3-pole MCB 16 A, characteristic C / without socket outlet
	BD2-AK1/2CEE163A161	16 A	230 V	2 × 1-pole MCB 16 A, characteristic B / 2 × 3-pole CEE socket outlets 16 A
	BD2-AK1/CEE165A163	16 A	400 V	3-pole MCB 16 A, characteristic C / 5-pole CEE socket outlet 16 A
	BD2-AK1/CEE163FIA161	16 A	230 V	1-pole MCB 16 A, characteristic C / 2-pole RCCB 25 A, 30 mA / 5-pole CEE socket outlet 16 A
	BD2-AK1/3SD163A161	16 A	230 V	3 × 1-pole MCB 16 A, characteristic B / 3 Schuko socket outlets 16 A
	BD2-AK1/2SD163FIA161	16 A	230 V	1-pole MCB 16 A, characteristic B / 2-pole RCCB 25 A, 30 mA / 2 Schuko socket outlets 16 A
For free arrangement of components	BD2-AK1/F	25 A	400 V	For free arrangement of components (power loss Pv maximum 13 W), integrated DIN rail, mounting space 4 MW [1]
Tap-off units AK2 up to 63 A, sheet-steel enclosure, size 2, with cover-integrated switch disconnector				
The tap-off units can be mounted and removed only with their cover open. Switch disconnector integrated into the cover, switching capacity for 63 A: AC-22B up to 400 V. Cable entry is possible from 3 directions.				
	Type	I_n	U_e	**Version**
With fuse base	BD2-AK2X/S18	63 A	400 V	3-pole fuse base D02 / without socket outlet
	BD2-AK2X/S27	25 A	500 V	3-pole fuse base S27, screw adapter system / without socket outlet
	BD2-AK2X/S33	63 A	500 V	3-pole fuse base S33, screw adapter system / without socket outlet
	BD2-AK2X/CEE325S33	32 A	400 V	3-pole fuse base S33, screw adapter system / 5-pole CEE socket outlet 32 A
	BD2-AK2X/CEE635S33	63 A	400 V	3-pole fuse base S33, screw adapter system / 5-pole CEE socket outlet 63 A
	BD2-AK2X/2CEE165S14	16 A	400 V	2 × 3-pole fuse base D01 / 2 × 5-pole CEE socket outlets 16 A
	BD2-AK2X/2CEE165S27/ FORMP	16 A	400 V	2 × 3-pole fuse base S27, screw adapter system / 2 × 5-pole CEE socket outlets 16 A
For free arrangement of components	BD2-AK2X/F	63 A	690 V	For free arrangement of components (power loss P_v maximum 22.5 W), integrated DIN rail, mounting space 9 MW [1]
With miniature circuit breaker	BD2-AK2M2/A323	32 A	400 V	3-pole MCB 32 A, characteristic C / without socket outlet
	BD2-AK2M2/CEE325A323	32 A	400 V	3-pole MCB 32 A, characteristic C / 5-pole CEE socket outlet 32 A
	BD2-AK2M2/ CEE165FIA163	16 A	400 V	3-pole MCB 16 A, characteristic C / 4-pole RCCB 25 A, 30 mA / 5-pole CEE socket outlet 16 A
	BD2-AK2M2/ 2SD163CEE165A163	16 A	230 V	3-pole MCB 16 A, characteristic B / 2 × 1-pole MCB 16 A, characteristic B / 5-pole CEE socket outlet 16 A / 2 Schuko socket outlets 16 A
	BD2-K2M2/2CEE165A163	16 A	400 V	2 × 3-pole MCB 16 A, characteristic C / 2 × 5-pole CEE socket outlets 16 A
For free arrangement of components	BD2-AK2M2/F	63 A	690 V	For free arrangement of components (power loss P_v maximum 22.5 W), with device installation unit, mounting space 9 MW [1]
Tap-off units AK3 up to 125 A, sheet-steel enclosure, size 3, with cover-integrated switch disconnector				
The tap-off units can be mounted and removed only with their cover open. Switch disconnector integrated into the cover, switching capacity for 125 A: AC-21B up to 400 V. Note: For the version with fuse base, the load must be isolated before removing the cover.				
	Type	I_n	U_e	**Version**
With fuse base	BD2-AK3X/GS00	125 A	690 V	NH fuse base size 00, bolt terminal
With fuse switch disconnector	BD2-AK3X/GSTZ00	125 A	690 V	NH HRC fuse switch disconnector size 00, bolt terminal
For free arrangement of components	BD2-AK3M2/F	125 A	690 V	For free arrangement of components (power loss P_v maximum 40 W), with 2 device installation units, mounting space 2 × 9 MW [1]
[1] MW = modular width (1 MW corresponds to 18 mm)				

Tab. 4/4: **Type code structure for tap-off units type AK1, AK2, and AK3 of the BD2 system**

Tap-off units AK02 up to 63 A, sheet-steel enclosure, size 02, without cover-integrated switch disconnector				
The tap-off units can be mounted and removed with their cover open or closed. With the cover open, the voltage is still applied to the installed devices (test facility). Degree of protection IP20 (finger-safe) is assured. Note: Tap-off units must not be mounted or removed under load.				
	Type	I_n	U_e	**Version**
With fuse base	BD2-AK02X/S18	63 A	400 V	3-pole fuse base D02
	BD2-AK02X/S27	25 A	500 V	3-pole fuse base S27, screw adapter system
	BD2-AK02X/S33	63 A	500 V	3-pole fuse base S33, screw adapter system
	BD2-AK02X/F1038-3	25 A	400 V	3-pole fuse base SP38 for cylindrical fuses 10 × 38 mm
	BD2-AK02X/F1038-3N	25 A	400 V	4-pole fuse base SP38 for cylindrical fuses 10 × 38 mm
	BD2-AK02X/F1451-3	32 A	400 V	3-pole fuse base SP51 for cylindrical fuses 14 × 51 mm
	BD2-AK02X/F1451-3N	32 A	400 V	4-pole fuse base SP51 for cylindrical fuses 14 × 51 mm
	BD2-AK02X/F2258-3	63 A	400 V	3-pole fuse base SP58 for cylindrical fuses 22 × 58 mm
	BD2-AK02X/F2258-3N	63 A	400 V	4-pole fuse base SP58 for cylindrical fuses 22 × 58 mm
For free arrangement of components	BD2-AK02X/F	63 A	690 V	For free arrangement of components (power loss P_V maximum 22.5 W), integrated DIN rail, mounting space 9 MW [1]
With miniature circuit breaker	BD2-AK02M2/A323	32 A	400 V	3-pole MCB 32 A, characteristic C
	BD2-AK02M2/A323N	32 A	400 V	(3-pole + N) MCB 32 A, characteristic C
	BD2-AK02M2/A633	63 A	400 V	3-pole MCB 63 A, characteristic C
	BD2-AK02M2/A633N	63 A	400 V	(3-pole + N) MCB 63 A, characteristic C
For free arrangement of components	BD2-AK02M2/F	63 A	690 V	For free arrangement of components (power loss P_V maximum 22.5 W), with device installation unit, mounting space 9 MW [1]
Tap-off units AK023 up to 32 A				
	Type	I_n	U_e	**Version**
Non-fused technology	BD2-AK023/3RCBO-161NC-3CEE163	16 A	230 V	CEE socket outlet, 3 × 1-pole, with RCBO, 10 kA, 1P+N, type A, 30 mA, characteristic C, 16 A
	BD2-AK023/3A161C-3CEE163	16 A	230 V	CEE socket outlet, 3 × 1-pole, with RCBO, 15 kA, 1-pole, characteristic C, 16 A
	BD2-AK023/3A161C-RCCB-3CEE163	16 A	230 V	CEE socket outlet 3 × 1-pole, with MCB, 15 kA, 1-pole, characteristic C, 16 A and RCCB, 2-pole, type A, 16 A, 30 mA
	BD2-AK023/ 3A161NC-3CEE163	16 A	230 V	CEE socket outlet, 3 × 1-pole, with MCB, 15 kA, 1P+N, characteristic C, 16 A
	BD2-AK023/A163C-CEE165	16 A	400 V	CEE socket outlet, 1 × 3-pole, with MCB, 15 kA, 3-pole, characteristic C, 16 A
	BD2-AK023/A163C-RCCB-CEE165	16 A	400 V	CEE socket outlet 1 × 3-pole, with MCB, 15 kA, 3-pole, characteristic C, 16 A and RCCB, 4-pole, type A, 25 A, 30 mA
	BD2-AK023/ A163NC-CEE165	16 A	400 V	CEE socket outlet, 1 × 3-pole, with MCB, 15 kA, 3P+N, characteristic C, 16 A
	BD2-AK023/ A163NC-RCCB-CEE165	16 A	400 V	CEE socket outlet 1 × 3-pole, with MCB, 15 kA, 3P+N, characteristic C, 16 A and RCCB, 4-pole, type A, 25 A, 30 mA
	BD2-AK023/3RCBO-321NC-3CEE323	32 A	230 V	CEE socket outlet, 3 × 1-pole, with RCBO, 10 kA, 1P+N, type A, 30 mA, characteristic C, 32 A
	BD2-AK023/3A321C-3CEE323	32 A	230 V	CEE socket outlet, 3 × 1-pole, with MCB, 15 kA, 1-pole, characteristic C, 32 A
	BD2-AK023/3A321C-RCCB-3CEE323	32 A	230 V	CEE socket outlet 3 × 1-pole, with MCB, 15 kA, 1-pole, characteristic C, 32 A and RCCB, 2-pole, type A, 40 A, 30 mA
	BD2-AK023/3A321NC-3CEE323	32 A	230 V	CEE socket outlet, 3 × 1-pole, with MCB, 15 kA, 1P+N, characteristic C, 32 A
	BD2-AK023/A323C-CEE325	32 A	400 V	CEE socket outlet, 1 × 3-pole, with MCB, 15 kA, 3-pole, characteristic C, 32 A
	BD2-AK023/ A323C-RCCB-CEE325	32 A	400 V	CEE socket outlet 1 × 3-pole, with MCB, 15 kA, 3-pole, characteristic C, 32 A and RCCB, 4-pole, type A, 40 A, 30 mA
	BD2-AK023/A323NC-CEE325	32 A	400 V	CEE socket outlet, 1 × 3-pole, with MCB, 15 kA, 3P+N, characteristic C, 32 A
	BD2-AK023/A323NC-RCCB-CEE325	32 A	400 V	CEE socket outlet 1 × 3-pole, with MCB, 15 kA, 3P+N, characteristic C, 32 A and RCCB, 4-pole, type A, 40 A, 30 mA
[1] MW = modular width (1 MW corresponds to 18 mm)				

Tab. 4/5: **Type code structure for tap-off units type AK02 and AK023 of the BD2 system**

Tap-off units AK03 up to 125 A, sheet-steel enclosure, size 03, without cover-integrated switch disconnector				
The tap-off units can be mounted and removed with their cover open or closed. With the cover open, the voltage is still applied to the installed devices (test facility). Degree of protection IP20 (finger-safe) is assured. Note: Tap-off units must not be mounted or removed under load.				
	Type	I_n	U_e	**Version**
With fuse base	BD2-AK03X/F2258-3	100 A	690 V	3-pole fuse base SP58 for cylindrical fuses 22 × 58 mm
	BD2-AK03X/F2258-3N	100 A	690 V	4-pole fuse base SP58 for cylindrical fuses 22 × 58 mm
With fuse switch disconnector	BD2-AK03X/GSTA00	125 A	690 V	NH fuse switch disconnector size 00, bolt terminal
With fuse switch disconnector	BD2-AK03X/FS125IEC-3	125 A	400 V	3-pole IEC fuse switch disconnector, bolt terminal
	BD2-AK03X/FS125IEC-4	125 A	400 V	4-pole IEC fuse switch disconnector, bolt terminal
	BD2-AK03X/FS125BS-3	125 A	400 V	3-pole BS fuse switch disconnector, bolt terminal
	BD2-AK03X/FS125BS-4	125 A	400 V	4-pole BS fuse switch disconnector, bolt terminal
For free arrangement of components	BD2-AK03X/F	125 A	690 V	For free arrangement of components (power loss P_v maximum 40 W), with mounting plate, mounting space 9 MW [1)]
With miniature circuit breaker	BD2-AK03M2/A1253	125 A	400 V	3-pole MCB 125 A, characteristic C
	BD2-AK03M2/A1253N	125 A	400 V	(3-pole + N) MCB 125 A, characteristic C
For free arrangement of components	BD2-AK03M2/F	125 A	690 V	For free arrangement of components (power loss P_v maximum 40 W), with device installation unit, mounting space 9 MW [1)]
[1)] MW = modular width (1 MW corresponds to 18 mm)				

Tab. 4/6: **Type code structure for tap-off units type AK03 of the BD2 system**

Tap-off units AK04 up to 250 A size 04, AK05 up to 400 A size 05, and AK06 up to 530 A size 06, sheet-steel enclosure, without cover-integrated switch disconnector				
The tap-off units can be mounted and removed with their cover open or closed. With the cover open, the voltage is still applied to the installed devices (test facility). Degree of protection IP20 (finger-safe) is assured. Note: Tap-off units must not be mounted or removed under load.				
	Type	I_n	U_e	**Version**
With fuse base	BD2-AK04/SNH1	250 A	690 V	3-pole fuse base NH1, bolt terminal
	BD2-AK05/SNH2	400 A	690 V	3-pole fuse base NH2, bolt terminal
	BD2-AK06/SNH3	530 A	690 V	3-pole fuse base NH3, bolt terminal
With fuse switch disconnector	BD2-AK04/FS250IEC-3	225 A	400 V	3-pole IEC fuse switch disconnector NH1, bolt terminal
	BD2-AK04/FS250IEC-4	225 A	400 V	4-pole IEC fuse switch disconnector NH1, bolt terminal
	BD2-AK04/FS250BS-3	225 A	400 V	3-pole BS fuse switch disconnector NH1, bolt terminal
	BD2-AK04/FS250BS-4	225 A	400 V	4-pole BS fuse switch disconnector NH1, bolt terminal
	BD2-AK05/FS400IEC-3	320 A	400 V	3-pole IEC fuse switch disconnector NH2, bolt terminal
	BD2-AK05/FS400IEC-4	320 A	400 V	4-pole IEC fuse switch disconnector NH2, bolt terminal
	BD2-AK05/FS400BS-3	320 A	400 V	3-pole BS fuse switch disconnector NH2, bolt terminal
	BD2-AK05/FS400BS-4	320 A	400 V	4-pole BS fuse switch disconnector NH2, bolt terminal
Ancillary equipment unit GK, steel-sheet enclosure				
A DIN rail is integrated for device installation. Can be combined with tap-off units AK02, AK2, AK03, and AK3. Installation of devices (e.g., miniature circuit breakers) based on DIN 43871 possible up to and including 63 A				
	Type	I_n	U_e	**Version**
For free arrangement of components, without device installation unit	BD2-GKX/F		400 V	For free arrangement of components (power loss P_v maximum 30 W), with mounting plate, mounting space 9 MW [1)]
For free arrangement of components, with device installation unit	BD2-GKM2/F		400 V	For free arrangement of components (power loss P_v maximum 30 W), with device installation unit, mounting space 9 MW [1)]
[1)] MW = modular width (1 MW corresponds to 18 mm)				

Tab. 4/7: **Type codes for tap-off units AK04, AK05, and AK06 without circuit-breaker design, as well as for ancillary equipment units**

Tap-off units BD2 with molded case circuit breaker	BD2	-AK . .	/LS .	-3VA . .	- .	- ...	- .	- ...
Size of the tap-off units								
Size 03 up to 125 A		AK03						
Size 04 up to 250 A		AK04						
Size 05 up to 400 A		AK05						
Size 06 up to 630 A		AK06						
Circuit breaker operation								
Rotary operating mechanism			LSD					
Motor operating mechanism			LSM					
Root for circuit breaker type								
3VA11 rated operational current I_n = 32 - 160 A				3VA11				
3VA12 rated operational current I_n = 160 - 200 A				3VA12				
3VA13 rated operational current I_n = 250 A				3VA13				
3VA14 rated operational current I_n = 400 - 500 A				3VA14				
3VA21 rated operational current I_n = 25 - 100 A				3VA21				
3VA22 rated operational current I_n = 160 - 200 A				3VA22				
3VA24 rated operational current I_n = 400 - 500 A				3VA24				
3VA25 rated operational current I_n = 630 - 800 A				3VA25				
Prepared for installation of a circuit breaker 3VA11 or 3VA21 (size AK03 only)				3VAXX				
Switching capacity of the circuit breaker								
I_{cu} = 36 kA					S			
I_{cu} = 55 kA					M			
Rated current of the circuit breaker (rated operational current of the tap-off unit combination)								
I_n = 40 A (I_{nC} = 40 A)						040		
I_n = 63 A (I_{nC} = 63 A)						063		
I_n = 80 A (I_{nC} = 80 A)						080		
I_n = 100 A (I_{nC} = 100 A)						100		
I_n = 125 A (I_{nC} = 125 A)						125		
I_n = 160 A (I_{nC} = 160 A)						160		
I_n = 200 A (I_{nC} = 200 A)						200		
I_n = 250 A (I_{nC} = 215, 225 A, depending on the release)						250		
I_n = 400 A (I_{nC} = 380 A)						400		
I_n = 630 A (I_{nC} = 520 A)						630		
Number of switchpoles								
3-pole							3	
4-pole							4	
Trip units / empty tap-off units								
Thermal-magnetic: TM240 (3VA11 - 3VA14 only)								TM240
Electronic: ETU350 (3VA21 - 3VA25 only)								ET350
Empty tap-off units, prepared for 3VA installation (sizes AK03, AK04, or A05 only)								F

Tab. 4/8: **Type code structure for BD2 tap-off units with molded case circuit breaker SENTRON 3VA and empty tap-off units (not all combinations are possible; for available combinations, see Tab. 4/8 and Tab. 4/9)**

Tap-off units with molded case circuit breaker, rated operational voltage 400 V, terminal connection AK03 up to 125 A size 03 and AK04 up to 250 A size 04, sheet-steel enclosure						
The tap-off units can be mounted and removed with their cover open or closed. With the cover open, the voltage is still applied to the installed devices (test facility). Degree of protection IP20 (finger-safe) is assured. Note: Tap-off units must not be mounted or removed under load.						
Type code	I_{nC}	I_{cu}	Number of poles	Trip unit	D / M [1]	I_r range
BD2-AK03/LSD-3VA11-S-40-3-TM240	40 A	36 kA	3-pole	TM240	D	28 ... 40 A
BD2-AK03/LSD-3VA11-S-63-3-TM240	63 A	36 kA	3-pole	TM240	D	44 ... 63 A
BD2-AK03/LSD-3VA11-S-80-3-TM240	80 A	36 kA	3-pole	TM240	D	56 ... 80 A
BD2-AK03/LSD-3VA11-S-100-3-TM240	100 A	36 kA	3-pole	TM240	D	70 ... 100 A
BD2-AK03/LSD-3VA11-S-125-3-TM240	125 A	36 kA	3-pole	TM240	D	88 ... 125 A
BD2-AK03/LSD-3VA11-M-40-3-TM240	40 A	55 kA	3-pole	TM240	D	28 ... 40 A
BD2-AK03/LSD-3VA11-M-63-3-TM240	63 A	55 kA	3-pole	TM240	D	44 ... 63 A
BD2-AK03/LSD-3VA11-M-80-3-TM240	80 A	55 kA	3-pole	TM240	D	56 ... 80 A
BD2-AK03/LSD-3VA11-M-100-3-TM240	100 A	55 kA	3-pole	TM240	D	70 ... 100 A
BD2-AK03/LSD-3VA11-M-125-3-TM240	125 A	55 kA	3-pole	TM240	D	88 ... 125 A
BD2-AK03/LSD-3VA21-M-40-3-ET350	40 A	55 kA	3-pole	ETU350	D	16 ... 40 A
BD2-AK03/LSD-3VA21-M-63-3-ET350	63 A	55 kA	3-pole	ETU350	D	25 ... 63 A
BD2-AK03/LSD-3VA21-M-100-3-ET350	100 A	55 kA	3-pole	ETU350	D	40 ... 100 A
BD2-AK03/LSD-3VA21-M-125-3-ET350	125 A	55 kA	3-pole	ETU350	D	63 ... 125 A
BD2-AK03/LSD-3VA21-M-40-4-ET350	40 A	55 kA	4-pole	ETU350	D	16 ... 40 A
BD2-AK03/LSD-3VA21-M-63-4-ET350	63 A	55 kA	4-pole	ETU350	D	25 ... 63 A
BD2-AK03/LSD-3VA21-M-100-4-ET350	100 A	55 kA	4-pole	ETU350	D	40 ... 100 A
BD2-AK03/LSD-3VA21-M-125-4-ET350	125 A	55 kA	4-pole	ETU350	D	63 ... 125 A
BD2-AK04/LSD-3VA12-S-160-3-TM240	160 A	36 kA	3-pole	TM240	D	112 ... 160 A
BD2-AK04/LSD-3VA12-S-200-3-TM240	200 A	36 kA	3-pole	TM240	D	140 ... 200 A
BD2-AK04/LSD-3VA12-S-250-3-TM240	225 A	36 kA	3-pole	TM240	D	175 ... 250 A
BD2-AK04/LSM-3VA12-S-160-3-TM240	160 A	36 kA	3-pole	TM240	M	112 ... 160 A
BD2-AK04/LSM-3VA12-S-200-3-TM240	200 A	36 kA	3-pole	TM240	M	140 ... 200 A
BD2-AK04/LSM-3VA12-S-250-3-TM240	225 A	36 kA	3-pole	TM240	M	175 ... 150 A
BD2-AK04/LSD-3VA12-M-160-3-TM240	160 A	55 kA	3-pole	TM240	D	112 ... 160 A
BD2-AK04/LSD-3VA12-M-200-3-TM240	200 A	55 kA	3-pole	TM240	D	140 ... 200 A
BD2-AK04/LSD-3VA12-M-250-3-TM240	225 A	55 kA	3-pole	TM240	D	175 ... 250 A
BD2-AK04/LSM-3VA12-M-160-3-TM240	160 A	55 kA	3-pole	TM240	M	112 ... 160 A
BD2-AK04/LSM-3VA12-M-200-3-TM240	200 A	55 kA	3-pole	TM240	M	140 ... 200 A
BD2-AK04/LSM-3VA12-M-250-3-TM240	225 A	55 kA	3-pole	TM240	M	175 ... 250 A
BD2-AK04/LSD-3VA22-M-160-3-ET350	160 A	55 kA	3-pole	ETU350	D	63 ... 160 A
BD2-AK04/LSD-3VA22-M-250-3-ET350	215 A	55 kA	3-pole	ETU350	D	100 ... 250 A
BD2-AK04/LSM-3VA22-M-160-3-ET350	160 A	55 kA	3-pole	ETU350	M	63 ... 160 A
BD2-AK04/LSM-3VA22-M-250-3-ET350	215 A	55 kA	3-pole	ETU350	M	100 ... 250 A
BD2-AK04/LSD-3VA22-M-160-4-ET350	160 A	55 kA	4-pole	ETU350	D	63 ... 160 A
BD2-AK04/LSD-3VA22-M-250-4-ET350	215 A	55 kA	4-pole	ETU350	D	100 ... 250 A
BD2-AK04/LSM-3VA22-M-160-4-ET350	160 A	55 kA	4-pole	ETU350	M	63 ... 160 A
BD2-AK04/LSM-3VA22-M-250-4-ET350	215 A	55 kA	4-pole	ETU350	M	100 ... 250 A
[1] D: rotary operating mechanism, M: motor operating mechanism						

Tab. 4/9: **Type code structure for tap-off units type AK03 and AK04 with molded case circuit breaker SENTRON 3VA**

Tap-off units with molded case circuit breaker, rated operational voltage 400 V, terminal connection AK05 up to 380 A size 05 and AK06 up to 520 A size 06, sheet-steel enclosure						
The tap-off units can be mounted and removed with their cover open or closed. With the cover open, the voltage is still applied to the installed devices (test facility). Degree of protection IP20 (finger-safe) is assured. The tap-off units AK05 and AK06 are only suitable for BD2 busbar trunking systems from 630 A to 1,250 A. Note: Tap-off units must not be mounted or removed under load.						
Type code	I_{nC}	I_{cu}	Number of poles	Trip unit	D / M [1]	I_r range
BD2-AK05/LSD-3VA13-S-400-3-TM240	355 A	36 kA	3-pole	TM240	D	280 ... 400 A
BD2-AK05/LSD-3VA13-S-400-4-TM240	355 A	36 kA	4-pole	TM240	D	280 ... 400 A
BD2-AK05/LSM-3VA13-S-400-3-TM240	355 A	36 kA	3-pole	TM240	M	280 ... 400 A
BD2-AK05/LSM-3VA13-S-400-4-TM240	355 A	36 kA	4-pole	TM240	M	280 ... 400 A
BD2-AK05/LSD-3VA13-M-400-3-TM240	355 A	55 kA	3-pole	TM240	D	280 ... 400 A
BD2-AK05/LSD-3VA13-M-400-4-TM240	355 A	55 kA	4-pole	TM240	D	280 ... 400 A
BD2-AK05/LSM-3VA13-M-400-3-TM240	355 A	55 kA	3-pole	TM240	M	280 ... 400 A
BD2-AK05/LSM-3VA13-M-400-4-TM240	355 A	55 kA	4-pole	TM240	M	280 ... 400 A
BD2-AK05/LSD-3VA24-M-400-3-ET350	380 A	55 kA	3-pole	ETU350	D	160 ... 400 A
BD2-AK05/LSD-3VA24-M-400-4-ET350	380 A	55 kA	4-pole	ETU350	D	160 ... 400 A
BD2-AK05/LSM-3VA24-M-400-3-ET350	380 A	55 kA	3-pole	ETU350	M	160 ... 400 A
BD2-AK05/LSM-3VA24-M-400-4-ET350	380 A	55 kA	4-pole	ETU350	M	160 ... 400 A
BD2-AK06/LSD-3VA14-S-630-3-TM240	430 A	36 kA	3-pole	TM240	D	440 ... 630 A
BD2-AK06/LSD-3VA14-S-630-4-TM240	430 A	36 kA	4-pole	TM240	D	440 ... 630 A
BD2-AK06/LSM-3VA14-S-630-3-TM240	430 A	36 kA	3-pole	TM240	M	440 ... 630 A
BD2-AK06/LSM-3VA14-S-630-4-TM240	430 A	36 kA	4-pole	TM240	M	440 ... 630 A
BD2-AK06/LSD-3VA14-M-630-3-TM240	430 A	55 kA	3-pole	TM240	D	440 ... 630 A
BD2-AK06/LSD-3VA14-M-630-4-TM240	430 A	55 kA	4-pole	TM240	D	440 ... 630 A
BD2-AK06/LSM-3VA14-M-630-3-TM240	430 A	55 kA	3-pole	TM240	M	440 ... 630 A
BD2-AK06/LSM-3VA14-M-630-4-TM240	430 A	55 kA	4-pole	TM240	M	440 ... 630 A
BD2-AK06/LSD-3VA15-M-630-3-TM240	530 A	55 kA	3-pole	TM240	D	440 ... 630 A
BD2-AK06/LSD-3VA15-M-630-4-TM240	530 A	55 kA	4-pole	TM240	D	440 ... 630 A
BD2-AK06/LSD-3VA25-M-630-3-ET350	520 A	55 kA	3-pole	ETU350	D	250 ... 630 A
BD2-AK06/LSD-3VA25-M-630-4-ET350	520 A	55 kA	4-pole	ETU350	D	250 ... 630 A
Empty tap-off units for the installation of molded case circuit breakers SENTRON 3VA, steel-sheet enclosure						
The tap-off units can be mounted and removed with their cover open or closed. With the cover open, the voltage is still applied to the installed devices (test facility). Degree of protection IP20 (finger-safe) is assured. The tap-off units AK05 are only suitable for BD2 busbar trunking systems from 630 A to 1,250 A. Note: Tap-off units must not be mounted or removed under load.						
Type code	I_n	I_{cu}	Number of poles		D [2]	
BD2-AK03/LSD-3VAXX-M-125-3-F	125 A	M	3-pole		D	
BD2-AK03/LSD-3VAXX-M-125-4-F	125 A	M	4-pole		D	
BD2-AK04/LSD-3VA12-M-250-3-F	250 A	M	3-pole		D	
BD2-AK04/LSD-3VA12-M-250-4-F	250 A	M	4-pole		D	
BD2-AK04/LSD-3VA22-M-250-3-F	250 A	M	3-pole		D	
BD2-AK04/LSD-3VA22-M-250-4-F	250 A	M	4-pole		D	
BD2-AK05/LSD-3VA13-M-400-3-F	400 A	M	3-pole		D	
BD2-AK05/LSD-3VA13-M-400-4-F	400 A	M	4-pole		D	
BD2-AK05/LSD-3VA24-M-400-3-F	400 A	M	3-pole		D	
BD2-AK05/LSD-3VA24-M-400-4-F	400 A	M	4-pole		D	

[1] D: rotary operating mechanism, M: motor operating mechanism
[2] D: opening prepared for rotary operating mechanism

Tab. 4/10: **Type code structure for tap-off units type AK05 and AK06 with molded case circuit breaker SENTRON 3VA and empty tap-off units AK03, AK04, and AK05, prepared for installation of circuit breakers SENTRON 3VA**

Tap-off units AK1 and AK02 as feeding units for e-mobility wallboxes				
Rated power of wallbox	**Tap-off unit**	**I_{nC}**	**U_e**	**Component**
11 kW	BD2-AK1-A163NC	16 A	400 V	MCB, 15 kA, 3+N-pole, characteristic C, 16 A
	BD2-AK02X-A163NC-RCU	16 A	400 V	MCB, 15 kA, 3+N-pole, characteristic C, 16 A/RCCB unit 30 mA, type A
	BD2-AK1-A203NC	19 A	400 V	MCB, 15 kA, 3+N-pole, characteristic C, 20 A
	BD2-AK02XA203NC-RCU	20 A	400 V	MCB, 15 kA, 3+N-pole, characteristic C, 20 A/RCCB unit 30 mA, type A
	BD2-AK02X-D02-RCCB20	20 A	400 V	Minized switch disconnector D02 up to 25 A/RCCB 30 mA, type A
22 kW	BD2-AK02X-A323NC	32 A	400 V	MCB, 15 kA, 3+N-pole, characteristic C, 32 A
	BD2-AK02X-A323NC-RCU	31 A	400 V	MCB, 15 kA, 3+N-pole, characteristic C, 32 A/RCCB unit 30 mA, type A
	BD2-AK02X-A403NC	39 A	400 V	MCB, 15 kA, 3+N-pole, characteristic C, 40 A
	BD2-AK02X-A403NC-RCU	36 A	400 V	MCB, 10 kA, 3+N-pole, characteristic C, 40 A/RCCB unit 30 mA, type A
	BD2-AK02X-D02-RCCB40	34 A	400 V	Minized switch disconnector D02 up to 40 A/RCCB 30 mA, type A

Tab. 4/11: **Type code structure for tap-off units type AK1 and AK02 as feeding units for e-mobility wallboxes**

4.2 Technical Specifications

Besides the general technical specifications for the BD2 system in Tab. 4/12, further specifications are given especially for trunking units (with Al conductors in Tab. 4/13 and with Cu conductors in Tab. 4/12), feeding units (Tab. 4/17), tap-off units (Tab. 4/18 and Tab. 4/19), for the temperature characteristic of the system (Tab. 4/20), as well as for fire loads and weights of the trunking units (Tab. 4/21) and further important system components (Tab. 4/22).

General system data		
Type		**BD2-...**
Standards and specifications		IEC 61439-1 and -6
Rated insulation voltage U_i	V AC/DC	690/800
Rated operational voltage for power transmission	V DC	800
Rated operating voltage U_e	V AC	690
Frequency	Hz	0 ... 60[1)]
Rated current $I_{nA\ AC}$ / $I_{nA\ DC}$ (three-phase current / direct current) • Aluminum busbars • Copper busbars	 A A	 160 ... 1,000/277 ... 1,732 160 ... 1,250/277 ... 2,165
Climatic resistance Damp heat, steady state, acc. to IEC 60068-2-78 Damp heat, cyclic, acc. to IEC 60068-2-30 Cold acc. to IEC 60068-2-1 Temperature cycle acc. to IEC 60068-2-14 Salt spray test acc. to IEC 60068-2-52 Ice formation acc. to IEC 60068-2-61		 40 °C/93%/RH/56d 56 x (25 ... 40 °C/3 h; 40 °C/9 h; 40 ... 25 °C/3_..._6 h; 25 °C/6 h) 95% RH –45 °C, 16 h –45 ... 55 °C; 5 cycles (1 °C/min); holding time min. 30 min Severity grade 3 Composite test of damp heat, cyclic [56x (25-40°C/3h; 40°C/9h; 40-25°C/3-6h; 25°C/6h)/95%RH] + cold [–45°C, 16h]
Ambient temperature min. / max. / 24-h mean	°C	–5/+40/+35
Environmental class		IEC 60721-3-3, derived from climatic resistance tests
Climatic environmental conditions		3K24 for installation environment with weather protection
Degree of protection acc. to IEC/EN 60529 (installation type 2) Trunking unit, without tap-off points Trunking unit, with tap-off points, size 1 Trunking unit, with tap-off points, size 2 Feeding unit Tap-off unit Junction unit (L-, Z-elbow) Junction unit (T-, flexible)		 IP55 IP55 IP52, increase to IP55 with additional equipment BD2-FAS IP54 IP54, increase to IP55 with additional equipment BD2-AK ... IP55[2)] IP55 IP52
Material Trunking unit, feeding unit, tap-off unit (without BD2-AK1/...) Tap-off unit BD2-AK1/... Busbars BD2A BD2C		 Sheet steel, galvanized and powder-coated (RAL 7035) Molded-plastic enclosure, light gray (RAL 7035) Al busbars, nickel-plated and tinned Cu busbars, nickel-plated and tinned
Mounting position / installation location		Horizontal, vertical / indoors (outdoor installation on request)
Weights		See selection and ordering data

[1)] Tap-off units 50 to 60 Hz
[2)] Cannot be combined with tap-off units with device installation unit

Tab. 4/12: **General system data of the BD2 system**

Busbar trunking units with aluminum conductors						
Type				**BD2A-.-160**	**BD2A-.-250**	**BD2A-.-400**
Rated insulation voltage U_i			V AC/DC	690/800	690/800	690/800
Rated operational voltage U_e			V AC/DC	690/800	690/800	690/800
Frequency			Hz	0 ... 60	0 ... 60	0 ... 60
Rated current $I_{nA\,AC}$ three-phase current Rated current $I_{nA\,DC}$ direct current			A A	160 277	250 433	400 693
Impedance per unit length of conducting paths with 50 Hz and 20 °C ambient temperature (cold busbar)		R'_{20} X'_{20} Z'_{20}	mΩ/m mΩ/m mΩ/m	0.527 0.151 0.548	0.315 0.112 0.335	0.176 0.089 0.197
Impedance per unit length of conducting paths with 50 Hz and 20 °C ambient temperature (busbar in operationally warm condition)		R'_1 X'_1 Z'_1	mΩ/m mΩ/m mΩ/m	0.780 0.151 0.794	0.467 0.112 0.480	0.260 0.089 0.275
Impedance per unit length of conducting paths in the event of a fault		R'_F X'_F Z'_F	mΩ/m mΩ/m mΩ/m	1.058 0.299 1.099	0.634 0.220 0.671	0.341 0.193 0.392
Zero-sequence impedance according to IEC/EN 60909 (VDE 0102)	Phase to N	R'_0 X'_0 Z'_0	mΩ/m mΩ/m mΩ/m	2.166 0.918 2.353	1.329 0.753 1.527	0.789 0.639 1.015
	Phase to PE	R'_0 X'_0 Z'_0	mΩ/m mΩ/m mΩ/m	2.166 0.897 2.344	1.329 0.735 1.519	0.786 0.624 1.004
Warm resistance / direct current per pole						
Resistance per unit length of conducting paths with 0 Hz and 20 °C busbar temperature		$R'_{+/-\,20}$	mΩ/m	0.255	0.148	0.080
Resistance per unit length of conducting paths with 0 Hz and busbar in operationally warm condition		$R'_{+/-_warm}$	mΩ/m	0.377	0.219	0.118
Resistance per unit length of conducting paths with 0 Hz and 20 °C busbar temperature		R'_{PE_20}	mΩ/m	0.527	0.315	0.176
Resistance per unit length of conducting paths with 0 Hz and busbar in operationally warm condition		R'_{PE_warm}	mΩ/m	0.780	0.467	0.260
Short-circuit withstand strength						
Rated peak withstand current I_{pk}			kA	17	32	40
Rated short-time withstand current I_{cw}		t = 1 s	kA	5.5	10	16
		t = 0.1 s	kA	12	22	28
Max. thermal load I^2t			$A^2s\ 10^6$	30	100	256

Tab. 4/13: **Technical specifications for trunking units of the BD2 system with aluminum conductors, 160 ... 400 A**

Busbar trunking units with aluminum conductors					
Type			**BD2A-.-160**	**BD2A-.-250**	**BD2A-.-400**
Number of conductors			5	5	5
Conductor material			Al	Al	Al
Conductor cross-section	L1, L2, L3	mm²	63	108	205
	N	mm²	63	108	205
	PE	mm²	63	108	205
Busbar distribution for DC			+ / – / + / – / PE	+ / – / + / – / PE	+ / – / + / – / PE
Conductor cross-section	L+	mm²	126	216	410
	L–	mm²	126	216	410
	PE	mm²	63	108	205
Max. fixing distances of trunking units at normal mechanical load					
Conductor flat (enclosure: edgewise position)		m	4	4	4
Conductor flat (enclosure: edgewise position) with BD2-BD [1)]		m	4	4	4
Conductor edgewise (enclosure: flat position)		m	3.5	3.5	3.5
Fire load[2)]		kWh/m	1.32	1.32	1.32

[1)] When using BD2-BD spacer bracket
[2)] Values for trunking units with tap-off points

The equivalent copper cross-section of the exterior profile of the enclosure is:
- 64 mm² for size 1 up to 400 A
- 77 mm² for size 2 from 630 A to 1,250 A.

The following must be noted in this context:
1. This enclosure cross-section does not apply to the two flange covers at the connection point.
2. The complete enclosure comprises two enclosure halves and flange covers at the connection point. These items form part of the protective measures. The impact of the enclosure is taken into account in the measurements of the fault loops for the impedance in the event of a fault (Z_f) and for the impedance (Z_{20}) according to the currently valid technical specifications.

Tab. 4/13: **Technical specifications for trunking units of the BD2 system with aluminum conductors, 160 ... 400 A** (continued)

Busbar trunking units with aluminum conductors						
Type				**BD2A-.-630**	**BD2A-.-800**	**BD2A-.-1000**
Rated insulation voltage U_i			V AC/DC	690/800	690/800	690/800
Rated operational voltage U_e			V AC/DC	690/800	690/800	690/800
Frequency			Hz	0 ... 60	0 ... 60	0 ... 60
Rated current $I_{nA\,AC}$ three-phase current Rated current $I_{nA\,DC}$ direct current			A A	630 1,091	800 1,386	1,000 1,732
Impedance per unit length of conducting paths with 50 Hz and 20 °C ambient temperature (cold busbar)		R'_{20} X'_{20} Z'_{20}	mΩ/m mΩ/m mΩ/m	0.093 0.041 0.101	0.076 0.039 0.085	0.052 0.036 0.063
Warm resistance / direct current per pole						
Resistance per unit length of conducting paths with 0 Hz and 20 °C busbar temperature		$R'_{+/-\,20}$	mΩ/m	0.042	0.034	0.023
Resistance per unit length of conducting paths with 0 Hz and busbar in operationally warm condition		$R'_{+/-_warm}$	mΩ/m	0.062	0.050	0.034
Resistance per unit length of conducting paths with 0 Hz and 20 °C busbar temperature		R'_{PE_20}	mΩ/m	0.093	0.076	0.148
Resistance per unit length of conducting paths with 0 Hz and busbar in operationally warm condition		R'_{PE_warm}	mΩ/m	0.137	0.112	0.072
Impedance per unit length of conducting paths with 50 Hz and 20 °C ambient temperature (busbar in operationally warm condition)		R'_1 X'_1 Z'_1 R'_{dc_warm}	mΩ/m mΩ/m mΩ/m mΩ/m	0.137 0.041 0.143 0.062	0.112 0.039 0.119 0.050	0.077 0.036 0.085 0.034
Impedance per unit length of conducting paths in the event of a fault		R'_F X'_F Z'_F	mΩ/m mΩ/m mΩ/m	0.187 0.079 0.203	0.153 0.076 0.171	0.105 0.069 0.125
Zero-sequence impedance according to IEC/EN 60909 (VDE 0102)	Phase to N	R'_0 X'_0 Z'_0	mΩ/m mΩ/m mΩ/m	0.414 0.321 0.524	0.348 0.300 0.459	0.252 0.276 0.374
	Phase to PE	R'_0 X'_0 Z'_0	mΩ/m mΩ/m mΩ/m	0.411 0.315 0.518	0.345 0.297 0.455	0.252 0.276 0.374
Short-circuit withstand strength						
Rated peak withstand current I_{pk}			kA	64	84	90
Rated short-time withstand current I_{cw}		t = 1 s	kA	26	32	34
		t = 0.1 s	kA	45	59	63
Max. thermal load I^2t			$A^2s\ 10^6$	676	1024	1156

Tab. 4/14: **Technical specifications for trunking units of the BD2 system with aluminum conductors, 630 ... 1,000 A**

Busbar trunking units with aluminum conductors					
Type			**BD2A-.-630**	**BD2A-.-800**	**BD2A-.-1000**
Number of conductors			5	5	5
Conductor material			Al	Al	Al
Conductor cross-section	L1, L2, L3	mm²	381	446	699
	N	mm²	381	446	699
	PE	mm²	381	446	699
Busbar distribution for DC			+ / – / + / – / PE	+ / – / + / – / PE	+ / – / + / – / PE
Conductor cross-section	L+	mm²	762	892	1398
	L–	mm²	762	892	1398
	PE	mm²	381	446	699
Max. fixing distances of trunking units at normal mechanical load					
Conductor flat (enclosure: edgewise position)		m	3.5	3.5	3
Conductor flat (enclosure: edgewise position) with BD2-BD [1)]		m	1.75	1.75	1.5
Conductor edgewise (enclosure: flat position)		m	3	3	2.5
Fire load[2)]		kWh/m	2	2	2

[1)] When using BD2-BD spacer bracket
[2)] Values for trunking units with tap-off points

Tab. 4/14: **Technical specifications for trunking units of the BD2 system with aluminum conductors, 630 ... 1000 A** (continued)

Busbar trunking units with copper conductors						
Type				**BD2C-.-160**	**BD2C-.-250**	**BD2C-.-400**
Rated insulation voltage U_i			V AC/DC	690/800	690/800	690/800
Rated operational voltage U_e			V AC/DC	690/800	690/800	690/800
Frequency			Hz	0 ... 60	0 ... 60	0 ... 60
Rated current $I_{nA\ AC}$ three-phase current Rated current $I_{nA\ DC}$ direct current			A A	160 277	250 433	400 693
Impedance per unit length of conducting paths with 50 Hz and 20 °C ambient temperature (cold busbar)		R'_{20} X'_{20} Z'_{20}	mΩ/m mΩ/m mΩ/m	0.311 0.143 0.342	0.311 0.143 0.342	0.139 0.088 0.164
Warm resistance / direct current per pole						
Resistance per unit length of conducting paths with 0 Hz and 20 °C busbar temperature		$R'_{+/-\ 20}$	mΩ/m	0.147	0.147	0.063
Resistance per unit length of conducting paths with 0 Hz and busbar in operationally warm condition		$R'_{+/-_warm}$	mΩ/m	0.218	0.218	0.093
Resistance per unit length of conducting paths with 0 Hz and 20 °C busbar temperature		R'_{PE_20}	mΩ/m	0.311	0.311	0.139
Resistance per unit length of conducting paths with 0 Hz and busbar in operationally warm condition		R'_{PE_warm}	mΩ/m	0.460	0.460	0.206
Impedance per unit length of conducting paths with 50 Hz and 20 °C ambient temperature (busbar in operationally warm condition)		R'_1 X'_1 Z'_1 R'_{dc_warm}	mΩ/m mΩ/m mΩ/m mΩ/m	0.460 0.143 0.482 0.218	0.460 0.143 0.482 0.218	0.206 0.088 0.224 0.093
Impedance per unit length of conducting paths in the event of a fault		R'_F X'_F Z'_F	mΩ/m mΩ/m mΩ/m	0.625 0.281 0.685	0.625 0.281 0.685	0.281 0.169 0.327
Zero-sequence impedance according to IEC/EN 60909 (VDE 0102)	Phase to N	R'_0 X'_0 Z'_0	mΩ/m mΩ/m mΩ/m	1.308 0.879 1.576	1.311 0.882 1.580	0.642 0.621 0.893
	Phase to PE	R'_0 X'_0 Z'_0	mΩ/m mΩ/m mΩ/m	1.308 0.855 1.563	1.311 0.861 1.568	0.639 0.612 0.885
Short-circuit withstand strength						
Rated peak withstand current I_{pk}			kA	17	32	40
Rated short-time withstand current I_{cw}		t = 1 s	kA	5.5	10	16
		t = 0.1 s	kA	12	22	28
Max. thermal load I^2t			$A^2s\ 10^6$	30.25	100	256

Tab. 4/15: **Technical specifications for trunking units of the BD2 system with copper conductors, 160 ... 400 A**

Busbar trunking units with copper conductors					
Type			**BD2C-.-160**	**BD2C-.-250**	**BD2C-.-400**
Number of conductors			5	5	5
Conductor material			Cu	Cu	Cu
Conductor cross-section	L1, L2, L3	mm²	63	63	146
	N	mm²	63	63	146
	PE	mm²	63	63	146
Busbar distribution for DC			+ / – / + / – / PE	+ / – / + / – / PE	+ / – / + / – / PE
Conductor cross-section	L+	mm²	126	126	292
	L–	mm²	126	126	292
	PE	mm²	63	63	146
Max. fixing distances of trunking units at normal mechanical load					
Conductor flat (enclosure: edgewise position)		m	4	4	4
Conductor flat (enclosure: edgewise position) with BD2-BD [1)]		m	4	4	4
Conductor edgewise (enclosure: flat position)		m	3.5	3.5	3.5
Fire load [2)]		kWh/m	1.32	1.32	1.32

[1)] When using BD2-BD spacer bracket
[2)] Values for trunking units with tap-off points

Tab. 4/15: **Technical specifications for trunking units of the BD2 system with copper conductors, 160 ... 400 A** (continued)

Busbar trunking units with copper conductors							
Type				**BD2C-.-630**	**BD2C-.-800**	**BD2C-.-1000**	**BD2C-.-1250**
Rated insulation voltage U_i			V AC/DC	690/800	690/800	690/800	690/800
Rated operational voltage U_e			V AC/DC	690/800	690/800	690/800	690/800
Frequency			Hz	0 ... 60	0 ... 60	0 ... 60	0 ... 60
Rated current $I_{nA\,AC}$ three-phase current Rated current $I_{nA\,DC}$ direct current			A A	630 1,091	800 1,386	1,000 1,732	1,250 2,165
Impedance per unit length of conducting paths with 50 Hz and 20 °C ambient temperature (cold busbar)		R'_{20} X'_{20} Z'_{20}	mΩ/m mΩ/m mΩ/m	0.050 0.038 0.063	0.050 0.038 0.063	0.044 0.038 0.058	0.030 0.035 0.046
Warm resistance / direct current per pole							
Resistance per unit length of conducting paths with 0 Hz and 20 °C busbar temperature		$R'_{+/-\,20}$	mΩ/m	0.022	0.022	0.020	0.013
Resistance per unit length of conducting paths with 0 Hz and busbar in operationally warm condition		$R'_{+/-_warm}$	mΩ/m	0.033	0.033	0.030	0.019
Resistance per unit length of conducting paths with 0 Hz and 20 °C busbar temperature		R'_{PE_20}	mΩ/m	0.050	0.050	0.044	0.030
Resistance per unit length of conducting paths with 0 Hz and busbar in operationally warm condition		R'_{PE_warm}	mΩ/m	0.066	0.074	0.066	0.045
Impedance per unit length of conducting paths with 50 Hz and 20 °C ambient temperature (busbar in operationally warm condition)		R'_1 X'_1 Z'_1 R'_{dc_warm}	mΩ/m mΩ/m mΩ/m mΩ/m	0.066 0.038 0.076 0.033	0.074 0.038 0.083 0.033	0.066 0.038 0.076 0.030	0.045 0.035 0.057 0.019
Impedance per unit length of conducting paths in the event of a fault		R'_F X'_F Z'_F	mΩ/m mΩ/m mΩ/m	0.101 0.073 0.125	0.101 0.073 0.125	0.090 0.071 0.114	0.062 0.065 0.090
Zero-sequence impedance according to IEC/EN 60909 (VDE 0102)	Phase to N	R'_0 X'_0 Z'_0	mΩ/m mΩ/m mΩ/m	0.243 0.279 0.370	0.243 0.279 0.370	0.219 0.279 0.355	0.165 0.258 0.306
	Phase to PE	R'_0 X'_0 Z'_0	mΩ/m mΩ/m mΩ/m	0.243 0.279 0.370	0.243 0.279 0.370	0.219 0.276 0.352	0.162 0.252 0.300
Short-circuit withstand strength							
Rated peak withstand current I_{pk}			kA	64	84	90	90
Rated short-time withstand current I_{cw}		t = 1 s	kA	26	32	34	34
		t = 0.1 s	kA	45	59	63	63
Max. thermal load I^2t			$A^2s\ 10^6$	676	1024	1156	1156

Tab. 4/16: **Technical specifications for trunking units of the BD2 system with copper conductors, 630 ... 1,250 A**

Busbar trunking units with copper conductors						
Type			**BD2C-.-630**	**BD2C-.-800**	**BD2C-.-1000**	**BD2C-.-1250**
Number of conductors			5	5	5	5
Conductor material			Cu	Cu	Cu	Cu
Conductor cross-section	L1, L2, L3	mm²	415	415	468	699
	N	mm²	415	415	468	699
	PE	mm²	415	415	468	699
Busbar distribution for DC			+ / – / + / – / PE	+ / – / + / – / PE	+ / – / + / – / PE	+ / – / + / – / PE
Conductor cross-section	L+	mm²	830	830	936	1,398
	L–	mm²	830	830	936	1,398
	PE	mm²	415	415	468	699
Max. fixing distances of trunking units at normal mechanical load						
Conductor flat (enclosure: edgewise position)		m	4	3.5	3	2
Conductor flat (enclosure: edgewise position) with BD2-BD [1)]		m	2	1.75	1.5	1
Conductor edgewise (enclosure: flat position)		m	3.5	3	2.5	1.5
Fire load[2)]		kWh/m	2	2	2	2

[1)] When using BD2-BD spacer bracket
[2)] Values for trunking units with tap-off points.

Tab. 4/16: **Technical specifications for trunking units of the BD2 system with copper conductors, 630 ... 1,250 A** (continued)

Feeding units						
Conductor cross-sections for Cu cables [1] (geometric)						
Version	**Type**	**L1, L2, L3, N**		**PE**		**Size of terminal screws, bolts L1, L2, L3, N, PE**
		minimum	**maximum**	**minimum**	**maximum**	
End feeding units with bolt terminal	BD2.-250-EE	(1-3) × 6 mm²	1 × 150 mm², 2 × 70 mm²	(1-3) × 6	1 × 150 mm², 2 × 70 mm²	M10
	BD2.-400-EE	(1-3) × 10 mm² [2]	1 × 240 mm², 2 × 120 mm²	(1-3) × 10 mm² [2]	1 × 240 mm², 2 × 120 mm²	M12
	BD2.-1000-EE	(1-3) × 10 mm² [2]	1 × 240 mm², 2 × 120 mm²	(1-3) × 10 mm² [2]	1 × 240 mm², 2 × 120 mm²	M12
	BD2C-1250-EE	(1-3) × 10 mm² [2]	1 × 240 mm², 2 × 120 mm²	(1-3) × 10 mm² [2]	1 × 240 mm², 2 × 120 mm²	M12
End feeding units with switch disconnector	BD2C-250-EESC	1 × 10 mm² [2]	1 × 240 mm²	Armoring		M10
	BD2C-315-EESC	1 × 10 mm² [2]	1 × 240 mm²	Armoring		M10
	BD2C-400-EESC	1 × 10 mm² [2]	1 × 240 mm², 2 × 120 mm²	Armoring		M12
	BD2C-630-EESC	1 × 10 mm² [2]	2 × 240 mm²	Armoring		M12
	BD2C-800-EESC	1 × 10 mm² [2]	2 × 240 mm²	Armoring		M12
Center feeding units with bolt terminal	BD2.-400-ME	(1-3) × 10 mm² [2]	1 × 240 mm², 3 × 185 mm²	(1-3) × 10 mm² [2]	1 × 240 mm², 3 × 185 mm²	M12
	BD2.-1000-ME	(1-5) × 10 mm² [2]	(1-5) × 300 mm²	(1-5) × 10 mm² [2]	(1-5) × 300 mm²	M12

[1] Cross-sections and diameters for Al cables on request
[2] Minimum possible cable cross-section for cable lugs

Cable and wiring entries						
Type	**BD2.-250-EE**	**BD2.-400-EE**	**BD2.-1000-EE**	**BD2C-1250-EE**	**BD2.-400-ME**	**BD2.-1000-ME**
Cable grommets with strain relief for cable diameter	1 × KT3	2 × KT4	3 × KT4	6 × KT4	3 × KT4	4 × KT4
	14 ... 54 mm	14 ... 68 mm	14 ... 68 mm	14 ... 68 mm	14 ... 68 mm	14 ... 68 mm

Cable entry plates (undrilled)						
Type	**BD2.-250-EE**	**BD2.-400-EE**	**BD2.-1000-EE**	**BD2C-1250-EE**	**BD2.-400-ME**	**BD2.-1000-ME**
Cable entry plate	BD2-250-EBAL	BD2-400-EBAL	BD2-1000-EBAL	BD2-1250-EBAL	BD2-400-MBAL	BD2-1000-MBAL
Number of cable entries (maximum)	10 × M32, 5 × M40	10 × M40	15 × M40, 6 × M50 and 4 × M40	20 × M40	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 scope of supply).						

Tab. 4/17: **Connection data for feeding units of the BD2 system**

Conductor cross-sections for Cu cables (geometric; cross-sections and diameters for Al cables on request)								
Rated current I_n	Type	L1, L2, L3		N		PE		Size of terminal screws, bolts
		minimum in mm²	maximum in mm²	minimum in mm²	maximum in mm²	minimum in mm²	maximum in mm²	
up to 25 A	BD2-AK1/S14	0.5 (f, st)	4 (so)	1 (so, f, st)	6 (so, st)	1 (so, f, st)	6 (so, st)	-
	BD2-AK1/S18	0.5 (f, st)	16 (so, f, st)	1 (so, f, st)	6 (so, st)	1 (so, f, st)	6 (so, st)	-
	BD2-AK1/A ...	0.75 (so, st)	16 (so)	1 (so, f, st)	6 (so, st)	1 (so, f, st)	6 (so, st)	-
	BD2-AK1/A ... N	0.75 (so, st)	16 (so)	0.75 (so, st)	16 (so)	1 (so, f, st)	6 (so, st)	-
	BD2-AK1/F ...	0.75 (so, st)	16 (so)	1 (so, st)	6 (so)	1 (so, f, st)	6 (so, st)	-
	BD2-AK1/A ... N	0.75 (so, st)	16 (so)	0.75 (so, st)	16 (so)	1 (so, f, st)	6 (so, st)	-
up to 63 A	BD2-AK.2X/S18	0.5 (f, st)	25 (f, st)	1 (so, f, st)	16 (so, st)	1 (so, f, st)	16 (so, st)	-
	BD2-AK.2X/S27	0.75 (f, st)	10 (so, f, st)	1 (so, f, st)	6 (so, st)	1 (so, f, st)	6 (so, st)	-
	BD2-AK.2X/S33	1.5 (f, st)	25 (f, st)	2.5 (so, f, st)	16 (so, st)	2.5 (so, f, st)	6 (so, st)	-
	BD2-AK.2M2/A ...	0.75 (so, st)	25 (st)	2.5 (so, f, st)	25 (st)	2.5 (so, f, st)	6 (so, st)	-
	BD2-AK.2M2/A ... N	0.75 (so, st)	25 (st)	0.75 (so, f, st)	25 (st)	2.5 (so, f, st)	6 (so, st)	-
	BD2-AK.2X/S18	0.75 (so, st)	25 (st)	2.5 (so, f, st)	25 (st)	2.5 (so, f, st)	6 (so, st)	-
	BD2-AK.2X/S18	0.75 (so, st)	16 (so, st)	0.75 (so, st)	16 (so, st)	Armoring		-
	BD2-AK.2X/S18	0.75 (so, st)	50 (st)	0.75 (so, st)	50 (st)	Armoring		-
up to 125 A	BD2-AK03X/F ... /FS ...	2.5 (so, st)	4 (so)	1 (so, f, st)	6 (so, st)	1 (so, f, st)	6 (so, st)	-
	BD2-AK03/LSD ...	2.5 (so, st)	4 (so)	1 (so, f, st)	6 (so, st)	1 (so, f, st)	6 (so, st)	-
	BD2-AK3X/GS00	16	70	16	70	10	70	M8
	BD2-AK.3X/GSTZ(A)00	16	70	16	70	10	70	M8
	BD2-AK.3X/GB100 ...	6 (so, st)	70 (st)	6 (so, st)	70 (st)	Armoring		-
up to 250 A	BD2-AK04/SNH1	6	150	6	150	6	150	M10
	BD2-AK04/FS ...	6	150	6	150	6	150	M10
	BD2-AK04/LS ...	6	120 (st)	6 (so, st)	150	6	150	M8
up to 400 A	BD2-AK05/SNH2	10	2 × 120	10	2 × 120	10	2 × 120	M10
	BD2-AK05/FS ...	10	2 × 120	10	2 × 120	10	2 × 120	M10
	BD2-AK05/LS ...	10	2 × 120	10	2 × 120	10	2 × 120	M10
up to 530 A	BD2-AK06/SNH3	10	2 × 240	10	2 × 240	10	2 × 240	M12
	BD2-AK06/LS ...	10	2 × 240	10	2 × 240	10	2 × 240	M12

so = solid, f = finely stranded with end sleeve, st = stranded

Cable and wiring entries						
Type	BD2-AK1/ ...	BD2-AK . 2/ ...	BD2-AK . 3/ ...	BD2-AK04/ ...	BD2-AK05/ ...	BD2-AK06/ ...
Cable grommets	M25 [1]	-	-	KT3 [2]	2 × KT4 [2]	2 × KT4 [2]
Cable glands [3]	-	M25, M32, M40	M25, M40, M63	-	-	-
Cable diameter [4] in mm	11 ... 16	11 ... 27	11 ... 42	14 ... 54	14 ... 68	14 ... 68
Minimum and maximum cable entry capacity for cable cross-sections [4] in case of multi-core cables for						
- NYY ... in mm²	5 × 1.5 to 5 × 4	5 × 1.5 to 5 × 16	5 × 1.5 to 5 × 25	-	-	-
- NYCWY ... [5] in mm²	4 × 1.5 to 4 × 2.5	4 × 1.5 to 4 × 16	4 × 1.5 to 4 × 70	5 × 1.5 to 4 × 150	2 × 5 × 1.5 to 2 × 4 × 150	2 × 5 × 10 to 2 × 4 × 240
Max. number of cable entries for cable entry plate in case of single-core cables (mounted plates, undrilled)	-	-	-	10 × M40	10 × M32, 5 × M40	10 × M40

[1] Valid for strain relief in BD2-AK1/ ...
[2] With strain relief
[3] Use plastic cable glands with strain relief (not included in the scope of supply)
[4] Specifications for Cu cables (cross-sections and diameters for Al cables on request)
[5] Fifth conductor: concentric

Tab. 4/18: **Connection specifications for tap-off units of the BD2 system**

Tap-off units						
Type BD2-AK ...	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 integrated switch disconnector according to IEC 60947-3 for 400 V	-	AC-22B	AC-21B	-	-	-
Max. admissible rated prospective short-circuit current when tap-off units with miniature circuit breakers are used:	10 $kA_{r.m.s.}$: For higher prospective short-circuit currents, the "back-up protection" for the miniature circuit breakers must be observed 25 $kA_{r.m.s.}$: For higher rated prospective short-circuit currents, the upstream protection device must be limited to: – max. let-through energy $I^2t = 12 \times 10^4\ A^2s$; – max. let-through current $I_D = 9.5$ kA					
Important configuring note: Not every tap-off unit has a rated voltage of 690 V and a short-circuit withstand strength according to the system value. The short-circuit withstand strength and rated voltage of the tap-off units used in a system must be appropriate for it. If the rated voltage of a tap-off unit does not match, choose a tap-off unit equipped with the appropriate components. Higher short-circuit currents must be limited by upstream switching and protection devices (e.g., circuit breakers).						

Tab. 4/19: **Switching capacity for tap-off units of the BD2 system**

Temperature characteristic								
Ambient temperature (24-h mean)	–5 °C	5 °C	15 °C	25 °C	35 °C	45 °C	55 °C	65 °C
Conversion factor for the rated current	1.18	1.14	1.09	1.05	1.00	0.94	0.885	0.825

Tab. 4/20: **Temperature characteristic of the BD2 system**

Fire loads and weights for trunking units of the BD2 system					
Type (without joint block)	Fire load in kWh/m	Weight (approx.)	Type (without joint block)	Fire load in kWh/m	Weight (approx.)
Trunking units, Al			Trunking units, Cu		
BD2A-.-160-.B	1.32	5.0 kg/m	BD2C-.-160-.B	1.32	7.0 kg/m
BD2A-.-250-.B	1.32	5.5 kg/m	BD2C-.-250-.B	1.32	7.0 kg/m
BD2A-3-400-.B	1.32	6.8 kg/m	BD2C-.-400-.B	1.32	14.5 kg/m
BD2A-3-400-.O	0.60	6.8 kg/m	BD2C-.-400-.O	0.60	14.5 kg/m
BD2A-3-630-.B	2.00	10.0 kg/m	BD2C-3-630-.B	2.00	23.5 kg/m
BD2A-3-800-.B	2.00	11.0 kg/m	BD2C-.-800-.B	2.00	23.5 kg/m
BD2A-3-1000-.B	2.00	15.0 kg/m	BD2C-.-1000-.B	2.00	26.0 kg/m
BD2A-3-630-.O	0.67	10.0 kg/m	BD2C-.-1250-.B	2.00	36.3 kg/m
BD2A-3-800-.O	0.67	11.0 kg/m	BD2C-.-630-.O	0.67	23.5 kg/m
BD2A-3-1000-.O	0.67	15.0 kg/m	BD2C-.-800-.O	0.67	23.5 kg/m
			BD2C-.-1000-.O	0.67	26.0 kg/m
			BD2C-.-1250-.O	0.67	36.3 kg/m

Tab. 4/21: **Fire loads and weights for trunking units of the BD2 system (for weights for joint blocks BD2-400-EK and BD2-1250-EK, see Tab. 4/22)**

Note: During the planning, the values of the corresponding trunking units can be used approximately for junction units, taking the added limb lengths into account.

Type	Fire load kWh	Weight in kg
Feeding units, Al		
BD2A-250-EE	3.20	6.6
BD2A-250-EE-EBAL	3.20	6.6
BD2A-400-EE	3.50	13.3
BD2A-400-EE-EBAL	3.50	13.3
BD2A-400-EE-KR	3.50	16.5
BD2A-400-EE-KR-EBAL	3.50	16.5
BD2A-1000-EE	3.80	14.9
BD2A-1000-EE-EBAL	3.80	14.9
BD2A-1000-EE-KR	3.80	19.9
BD2A-1000-EE-KR-EBAL	3.80	19.9
BD2A-250-VE	3.00	2.1
BD2A-400-VE	3.20	3.5
BD2A-1000-VE	3.60	4.7
BD2A-400-ME	3.90	28.0
BD2A-400-ME-MBAL	3.90	28.0
BD2A-1000-ME	8.10	47.0
BD2A-1000-ME-MBAL	8.10	47.0
Feeding units, Cu		
BD2C-250-EE	3.20	8.9
BD2C-250-EE-EBAL	3.20	8.9
BD2C-400-EE	3.50	16.3
BD2C-400-EE-EBAL	3.50	16.3
BD2C-400-EE-KR	3.50	19.5
BD2C-400-EE-KR-EBAL	3.50	19.5
BD2C-1000-EE	3.80	22.1
BD2C-1000-EE-EBAL	3.80	22.1
BD2C-1000-EE-KR	3.80	27.1
BD2C-1000-EE-KR-EBAL	3.80	27.1
BD2C-1250-EE	4.10	27.1
BD2C-1250-EE-EBAL	4.10	27.1
BD2C-1250-EE-KR	4.10	32.1
BD2C-1250-EE-KR-EBAL	4.10	32.1
BD2C-250-VE	3.00	4.4
BD2C-400-VE	3.20	6.5
BD2C-1000-VE	3.60	11.8
BD2C-1250-VE	3.60	16.3
BD2C-400-ME	3.90	36.6
BD2C-400-ME-MBAL	3.90	36.6
BD2C-1000-ME	8.10	75.5
BD2C-1000-ME-MBAL	8.10	75.5
BD2C-250-EESC	3.20	28.0
BD2C-400-EESC	3.50	33.0
BD2C-630-EESC	3.80	39.0
BD2C-800-EESC	3.80	39.0
Additional equipment		
BD2-400-EK	1.64	3.50
BD2-400-FE	–	0.98
BD2-400-BB	–	0.44
BD2-400-HF	–	0.30
BD2-400-HFE	–	0.18
BD2-400-VF	–	0.20
BD2-1250-EK	2.46	6.48
BD2-1250-FE	–	1.28
BD2-1250-BB	–	0.54
BD2-1250-HF	–	0.52
BD2-1250-HFE	–	0.26
BD2-1250-VF	–	0.50
BD2-FFE	–	0.32
BD2-FF	–	0.60
BD2-FAS	–	0.22
BD2-AK...-IP55	–	0.03 - 0.07
BD2-400-FS	–	1.70
BD2-400-FSE	–	1.90
BD2-1250-FS	–	2.10
BD2-1250-FSE	–	2.60
BD2-SD163	0.1	0.28
BD2-CEE163	0.2	0.26
BD2-CEE165	0.2	0.31
BD2-CEE325	0.3	0.35
BD2-AG	–	0.15
BD2-APO	–	0.09
BD2-APM	–	0.06
Ancillary equipment units		
BD2-GKX/F	0.4	2.80
BD2-GKM2/F	1.5	2.50
Tap-off units		
BD2-AK1/S14	6.9	1.10
BD2-AK1/S18	6.9	1.15
BD2-AK1/A163	5.83	1.40
BD2-AK1/CEE165S14	8.5	1.20
BD2-AK1/CEE165A163	8.7	1.50
BD2-AK1/2CEE163S14	9.5	1.20
BD2-AK1/2CEE163A161	7.5	1.40
BD2-AK1/3SD163S14	8	1.40
BD2-AK1/3SD163A161	8.3	1.30
BD2-AK.2X/S18	4.8	4.14
BD2-AK.2X/S27	2.94	3.94
BD2-AK.2X/S33	2.94	4.20
BD2-AK2X/CEE325S33	4.57	5.10
BD2-AK.2M2/A323	5.1	4.38
BD2-AK2M2/CEE325A323	6.7	4.90
BD2-AK2X/CEE635S33	5.8	5.68
BD2-AK2X/2CEE165S14	7.9	4.80
BD2-AK2X/ 2CEE165S27/FORMP	6.1	4.90
BD2-AK2M2/ 2SD163CEE165A163	6.9	5.60

Tab. 4/22: **Fire loads and weights for feeding units, ancillary equipment units, and tap-off units, as well as for additional equipment of the BD2 system**

Type	Fire load kWh	Weight in kg
Tap-off units		
BD2-AK2M2/2CEE165A163	9.4	5.40
BD2-AK.2M2/A323N	5.1	4.80
BD2-AK.2M2/A633	5	5.10
BD2-AK.2M2/A633N	5.3	5.20
BD2-AK.2X/F1451-3(N)	5.9	5.50
BD2-AK.2X/F2258-3(N)	6.1	5.70
BD2-AK.3X/LSD ... -TM240	9.8	9.00
BD2-AK.3X/LSD... -ET350	12.8	11.00
BD2-AK.3X/GS00	8.07	5.40
BD2-AK.3X/GST.00	9.07	6.96
BD2-AK03X/FS125...-3	10.0	7.94
BD2-AK03X/FS125...-4	13.0	8.28
BD2-AK03X/F2258...-3(N)	6.1	7.50
BD2-AK03M2/A1253	5.7	5.80
BD2-AK03M2/A1253N	5.7	6.00
BD2-AK04/SNH1	10.12	30.00
BD2-AK04/FS...-3	16.65	30.00
BD2-AK04/FS...-4	20.0	30.00
BD2-AK05/SNH2	12.16	35.00
BD2-AK05/FS...-3	18.6	35.00
BD2-AK05/FS...-4	22.0	35.00
BD2-AK06/SNH3	14.2	40.00

Type	Fire load kWh	Weight in kg
BD2-AK04/LSD-...-TM240	17.0	27.50
BD2-AK04/LSM-...-TM240	17.0	27.5
BD2-AK04/LSD-...-3-ETU350	20.0	28.0
BD2-AK04/LSM-...-3-ETU350	20.0	28.5
BD2-AK04/LSD-...-4-ETU350	20.0	29.0
BD2-AK04/LSM-...-4-ETU350	20.0	29.5
BD2-AK05/LS.-...-TM240	on request	45.0
BD2-AK05/LSD-...-3-ETU350	23.0	45.0
BD2-AK05/LSD-...-4-ETU350	23.0	46.0
BD2-AK05/LSM-...-3-ETU350	23.0	45.5
BD2-AK05/LSM-...-4-ETU350	23.0	46.5
BS2-AK06/LSD-...-S-...-3-TM240	on request	45.0
BS2-AK06/LSD-...-S-...-4-TM240	on request	47.5
BS2-AK06/LSM-...-S-...-3-TM240	on request	41.0
BS2-AK06/LSM-...-S-...-4-TM240	on request	43.5
BS2-AK06/LSD-...-M-...-3-TM240	on request	45.8
BS2-AK06/LSD-...-M-...-4-TM240	on request	47.8
BS2-AK06/LSM-...-M-...-3-TM240	on request	37.9
BS2-AK06/LSM-...-M-...-4-TM240	on request	40.4
BS2-AK06/LSD-3VA15-...-3-TM240	on request	56.0
BS2-AK06/LSD-.-3VA15-...-4-TM240	on request	59.0
BD2-AK06/LSD-...-3-ETU350	26.0	56.0
BD2-AK06/LSD-...-4-ETU350	26.0	59.0

Tab. 4/22: **Fire loads and weights for feeding units, ancillary equipment units, and tap-off units, as well as for additional equipment of the BD2 system** (continued)

4.3 Fire Barrier for BD2 System

The state building authorities (Germany) or regional/international requirements demand that buildings are designed so that "spreading of fire is prevented, and that effective fire fighting and rescue of persons is facilitated".

To this end, all BD2A-... and BD2C-... busbar trunking systems can be designed with a fire barrier, and comply with classification EI 90 and EI 120 according to EN 13501-2.

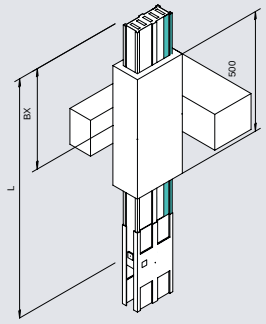
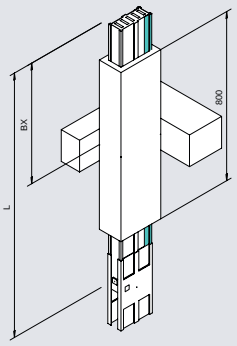
The trunking units are supplied from the factory with a fire barrier comprising an internal bulkhead and an external fire barrier block.

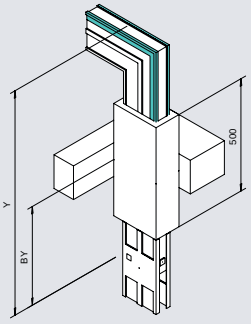
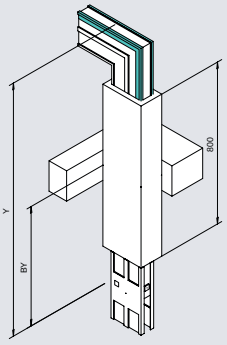
Specifically in Germany:
- A general type approval is available: aBG No. Z-19.53-2484.
- According to the aBG, the fire resistance abilities depend on the type of building elements (walls/ceilings) and space closure: fire-retardant for 90 minutes and fire resistance duration of 120 minutes
- The aBG must be available at the point of use and can be ordered as a fire barrier approval kit BD2-S90-ZUL-D or BD2-S120-ZUL-D.

To ensure the fire barrier function EI 90 and EI 120, the following points must be observed when configuring and installing trunking units and junction units with fire barrier:
- Central positioning of the external fire barrier block in the fire wall or fire ceiling
- There are no tap-off points in the area covered by the fire barrier
- A fire barrier installation over a joint block is not permitted
- Detailed installation instructions, e.g., for fixing and closing the wall or ceiling openings, are provided in the corresponding installation instructions
- Trunking units with fire barrier must be installed by an approved fire barrier installation specialist.

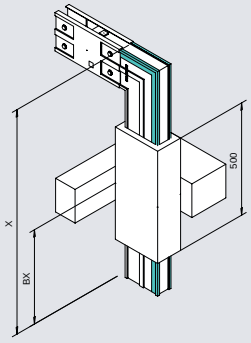
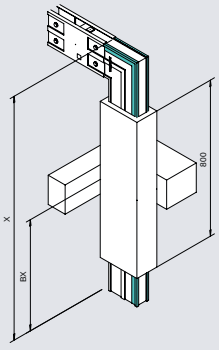
Download of installation instructions:
https://support.industry.siemens.com/cs/de/en/view/109805424

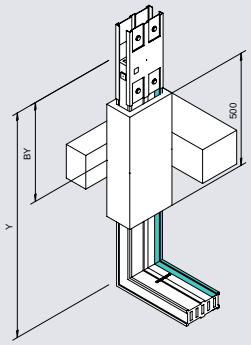
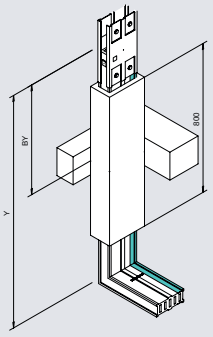
Further information:
See Chapter 9.2 "Fire Barrier"

Positioning rules		
Straight lengths BD2.-160 (-250, -400)-... (size 1) BD2.-630 (-800, -1000, -1250)-... (size 2)	**BD2A** **Length of fire barrier block = 500 mm**	**BD2C** **Length of fire barrier block = 800 mm**
		
L min. L max. BX* min.[1)] BX* max.[1)]	860 mm 3,250 mm 420 mm 2,810 mm	1,160 mm 3,250 mm 570 mm 2,660 mm

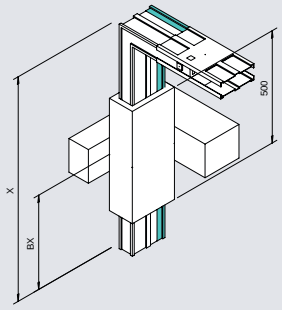
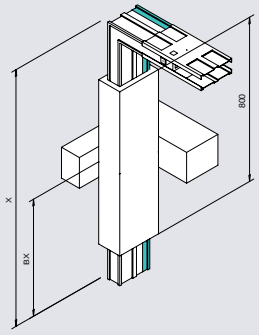
Elbow LL... / LR... BD2.-160 (-250, -400)-... (size 1) BD2.-630 (-800, -1000, -1250)-... (size 2)	**BD2A** **Length of fire barrier block = 500 mm**	**BD2C** **Length of fire barrier block = 800 mm**
		
Y min. Y max. BY* min.[1)] BY* max.[1)]	860 mm 1,250 mm 440 mm 830 mm	1,160 mm 1,250 mm 590 mm 680 mm
[1)] BX* and BY* are configuration dimensions (reference point is center of joint block)		

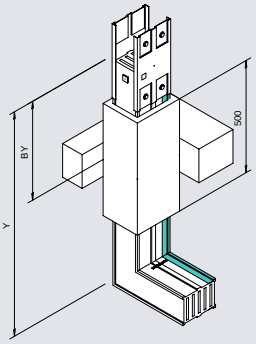
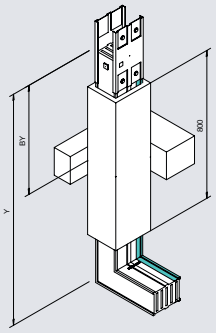
Tab. 4/23: **Positioning rules in the BD2 system for straight lengths and elbow units**

Positioning rules		
Elbow LL... / LR... BD2.-160 (-250, -400)-... (size 1) BD2.-630 (-800, -1000, -1250)-... (size 2)	**BD2A** **Length of fire barrier block = 500 mm**	**BD2C** **Length of fire barrier block = 800 mm**
		
X min. X max. BX* min.[1)] BX* max.[1)]	860 mm 1,250 mm 420 mm 810 mm	1,160 mm 1,250 mm 570 mm 660 mm

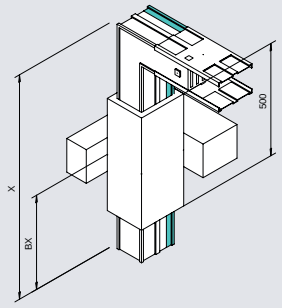
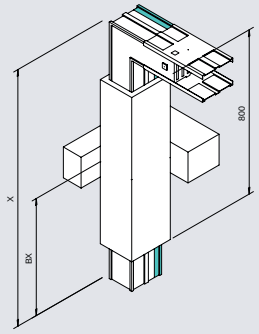
Elbow LV... / LH... BD2.-160 (-250, -400)-... (size 1)	**BD2A** **Length of fire barrier block = 500 mm**	**BD2C** **Length of fire barrier block = 800 mm**
		
Y min. Y max. BY* min.[1)] BY* max.[1)]	760 mm 1,250 mm 440 mm 930 mm	1,060 mm 1,250 mm 590 mm 780 mm
[1)] BX* and BY* are configuration dimensions (reference point is center of joint block)		

Tab. 4/23: **Positioning rules in the BD2 system for straight lengths and elbow units** (continued)

Positioning rules		
Elbow LV... / LH... BD2.-160 (-250, -400)-... (size 1)	**BD2A** **Length of fire barrier block = 500 mm**	**BD2C** **Length of fire barrier block = 800 mm**
		
X min. X max. BX* min.[1)] BX* max.[1)]	760 mm 1,250 mm 420 mm 910 mm	1,060 mm 1,250 mm 570 mm 760 mm

Elbow LV... / LH... BD2.-630 (-800, -1000, -1250)-... (size 2)	BD2A Length of fire barrier block = 500 mm	BD2C Length of fire barrier block = 800 mm
		
Y min. Y max. BY* min.[1)] BY* max.[1)]	810 mm 1,250 mm 440 mm 870 mm	1,110 mm 1,250 mm 590 mm 720 mm
[1)] BX* and BY* are configuration dimensions (reference point is center of joint block)		

Tab. 4/23: **Positioning rules in the BD2 system for straight lengths and elbow units** (continued)

Positioning rules		
Elbow LV... / LH... BD2.-630 (-800, -1000, -1250)-... (size 2)	**BD2A** **Length of fire barrier block = 500 mm**	**BD2C** **Length of fire barrier block = 800 mm**
		
X min. X max. BX* min.[1)] BX* max.[1)]	810 mm 1,250 mm 420 mm 880 mm	1,110 mm 1,250 mm 570 mm 710 mm
[1)] BX* and BY* are configuration dimensions (reference point is center of joint block)		

Tab. 4/23: **Positioning rules in the BD2 system for straight lengths and elbow units** (continued)

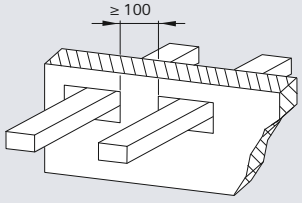
In this context, the following has to be observed:

The distance from the wall or ceiling opening to be closed to other openings or fittings must be at least 200 mm.

As an exception to this, the distance between adjacent BD2 systems can be reduced down to 100 mm (Fig. 4/3)

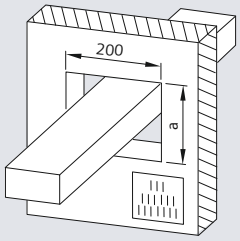
- Distance from the wall towards the busbar height: 28 to 82 mm
- Distance from the wall towards the busbar width: 125 mm for tap-off units BD2-AK1, 2, 3, 02, and 03, 200 mm for tap-off units BD2-AK04, 05, 06, for end feeding units BD2 ... EE, and for fixing elements BD2-BWV and BD2-BDV.

Positioning in the fire wall for 2 adjacent BD2 systems



Positioning in the fire wall

I_n up to 400 A: a = 90 mm
I_n 500-1,250 A: a = 150 mm



Positioning in the fire ceiling

c = 125 mm (BD2-AK1, 2, 3, 02, 03)
c = 200 mm (BD2-AK04, 05, 06, BD2 ... EE, BD2-BWV, BDV)

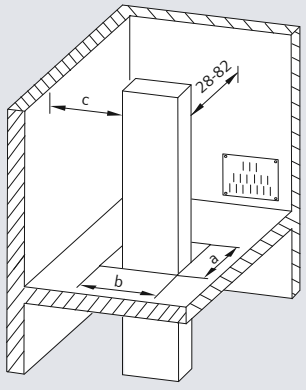


Fig. 4/3: **Marginal conditions for the positioning of the fire barriers (dimensions in mm)**

4.4 Functional Endurance of BD2 system

Fire barrier equipment and fire barrier precautions for electrical installations are required especially with building structures of a particular type of utilization. Buildings of this nature include hospitals and places where people gather.
Electrical systems according to DIN VDE 0100-710 "Medical locations" must remain operational for certain periods of time in the event of a fire.
This applies in particular to:

- Fire alarm systems
- Systems for alerting and providing instructions to visitors and employees
- Emergency lighting
- Passenger elevators with evacuation circuit which must remain serviceable in the incoming feeder area for at least 30 minutes under post-flashover fire conditions
- Water pressure boosting systems for the supply of extinguishing water
- Ventilation systems of enclosed stairwells, elevator shafts and drive equipment rooms for fire service elevators must remain operational for at least 90 minutes.

The BD2 busbar trunking system can be upgraded with a functional endurance in accordance with the requirements of DIN 4102-12 (see Chapter 9.3). Promat plate types, dimensions, and derating factors for the rated currents in designs with 4 barriers can be found in Tab. 4/24.

Busbar trunking system		Functional endurance	PROMATECT® plates		External dimensions of Promat duct		Derating factors [1] according to mounting position		
Type		Class	Thickness	Plate type	Width	Height	Horizontal edgewise	Horizontal flat	Vertical
BD2A	160 ... 400	E 60	40 mm	L500	288 mm	190 mm	0.75	0.7	0.7
		E 90	50 mm	LS	308 mm	210 mm	0.7	0.65	0.65
	630 ... 1000	E 90	40 mm	L500	250 mm	300 mm	0.75	0.7	0.7
BD2C	160 ... 400	E 30 ... E 90	45 mm	LS	300 mm	200 mm	0.75	0.65	0.65
	630 ... 1250	E 30 ... E 90	45 mm	LS	300 mm	260 mm	0.75	0.65	0.65

[1] The derating factors are based on the rated current and an ambient temperature of 35 °C in the 24-h mean

Tab. 4/24: **Dimensions and derating factors for the functional endurance of the BD2 system**

For further information, see Chapter 9.3 "Functional Endurance"

4.5 Dimensional Drawings and Dimensions

For a better overview, the figure captions of all following dimensional drawings from Fig. 4/4 to Fig. 4/20 are summarized in Tab. 4/25.

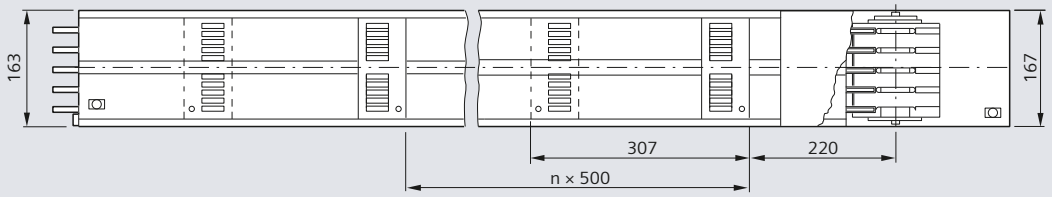
Numbering	Page	Table caption
Fig. 4/4	116	Dimensional drawings (dimensions in mm) for straight trunking units
Fig. 4/5	117	Dimensional drawings (dimensions in mm) for fixed junction units
Fig. 4/6	118	Dimensional drawings (dimensions in mm) for flexible junction units
Fig. 4/7	119	Dimensional drawings (dimensions in mm) for distribution board feeding units and end feeding units BD2.-250-EE
Fig. 4/8	120	Dimensional drawings (dimensions in mm) for end feeding units 400 A up to 1,250 A and corresponding cabling boxes
Fig. 4/9	121	Dimensional drawings (dimensions in mm) for end feeding units with switch disconnector
Fig. 4/10	122	Dimensional drawings (dimensions in mm) for center feeding units
Fig. 4/11	123	Dimensional drawings (dimensions in mm) for tap-off units size 1 and 02
Fig. 4/12	124	Dimensional drawings (dimensions in mm) for tap-off units size 2
Fig. 4/13	125	Dimensional drawings (dimensions in mm) for tap-off units size 03
Fig. 4/14	126	Dimensional drawings (dimensions in mm) for tap-off units size 3
Fig. 4/15	127	Dimensional drawings (dimensions in mm) for tap-off units size 04
Fig. 4/16	128	Dimensional drawings (dimensions in mm) for tap-off units size 05 and size 06
Fig. 4/17	129	Dimensional drawings (dimensions in mm) for ancillary equipment units and additional equipment
Fig. 4/18	130	Dimensional drawings (dimensions in mm) for fixing elements
Fig. 4/19	131	Dimensional drawings (dimensions in mm) for protective covers IP55
Fig. 4/20	132	Dimensional drawings (dimensions in mm) for socket outlets of the BD2 system including accessories

Tab. 4/25: **Overview table for the following dimensional drawings**

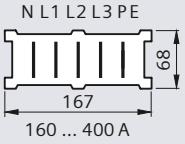
Straight trunking units
BD2.-3-...-

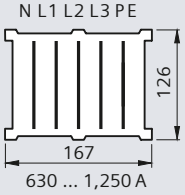


Standard lengths type BD2.-.-...-SB-.



Type BD2.-3-...-	Length in m	Number of tap-off points on both sides	
SB-1	1.25	4	(n = 1)
SB-2	2.25	8	(n = 3)
SB-3	3.25	12	(n = 5)

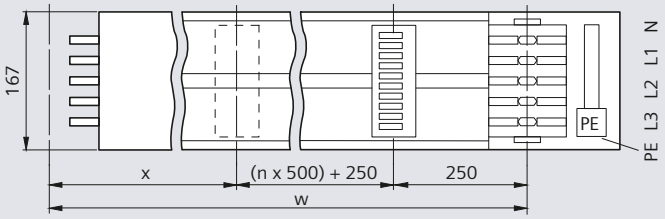




Optional lengths type BD2.-.-...-WB-.

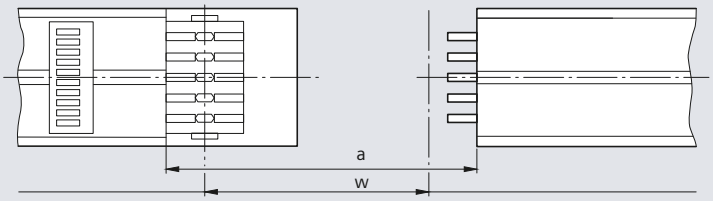
The open busbar end is used as the reference edge.
x = distance between the center of the joint block at the open end and the next tap-off point at the trunking unit.
Standard length x = 250 mm; for optional lengths, the following applies: 240 mm ≤ x ≤ 490 mm (varies depending on the optional length w)

Type BD2.-3-...-	Length w in m	Number of tap-off points on both sides	
WB-2	1.26 ... 2.24	4 to 8	(n = 1 to 3)
WB-3	2.26 ... 3.24	8 to 12	(n = 3 to 5)

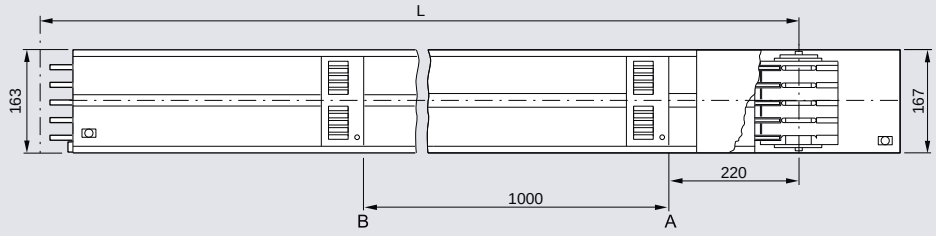


Determine optional lengths on site

Distance a is measured in meters on site.
The optional length w in meters results from:
w = a - 0.14 m



BD2.3-W ... (e-mobility length)

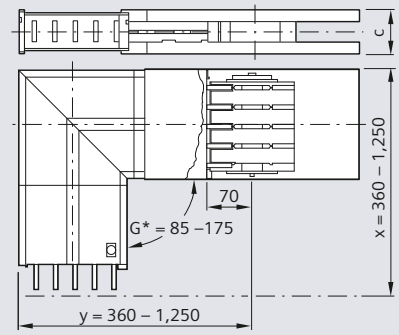


Type	Length L in m	Number of tap-off points	Position of tap-off points
BD2.-3-W1...	2.26 ... 3.24	1	A
BD2.-3-W2...	2.26 ... 3.24	2	A + B

Fig. 4/4: **Dimensional drawings (dimensions in mm) for straight trunking units**

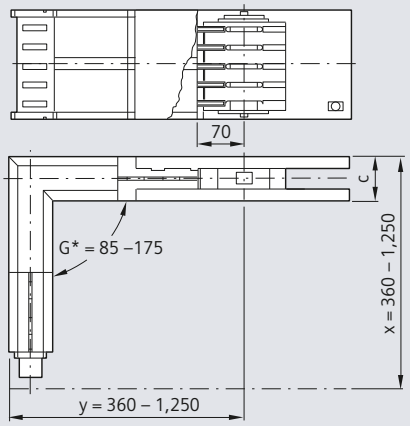
Junction units

L-units • BD2.-...-LR-...(-G*) • BD2.-...-LL-...(-G*)

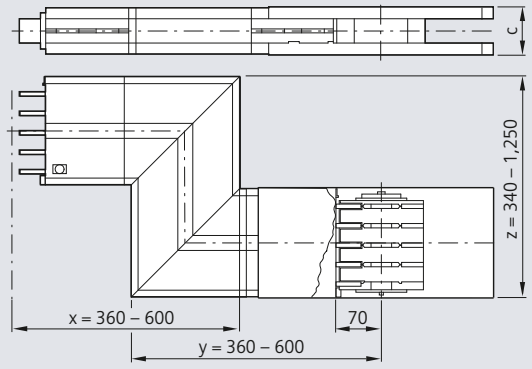


Rated current in A	c in mm
160 ... 400	68
630 ... 1,250	126

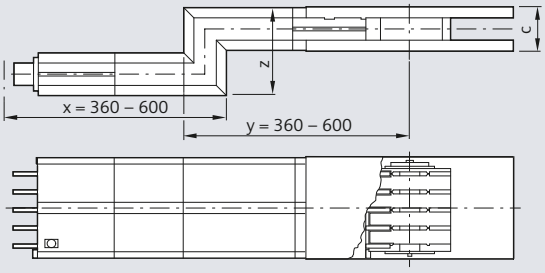
• BD2.-...-LV-...(-G*) • BD2.-...-LH-...(G*)



Z-units • BD2.-...-ZR-... • BD2.-...-ZL-...

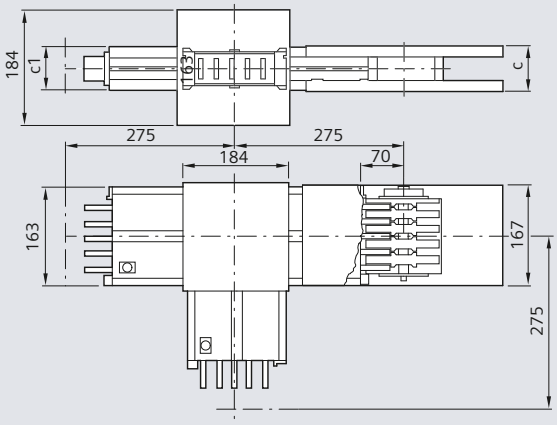


• BD2.-...-ZV-... • BD2.-...-ZH-...



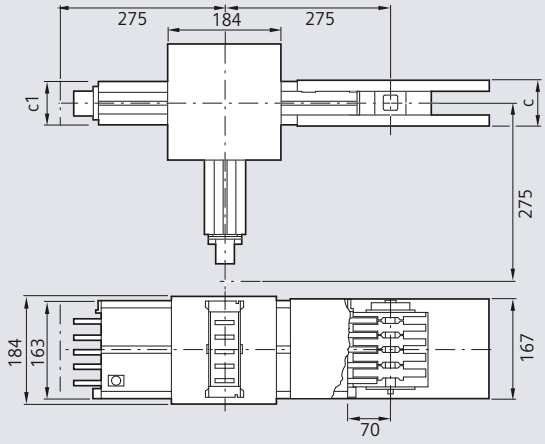
Rated current in A	z in mm
160 ... 400	140 ... 1,250
630 ... 1,250	260 ... 1,250

T-units • BD2.-...-TR • BD2.-...-TL



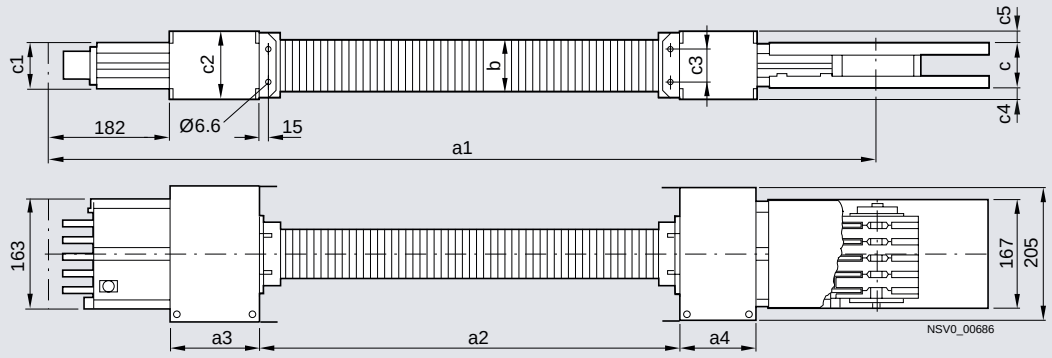
Rated current in A	c in mm	c1 in mm
160 ... 400	68	64
630 ... 1,250	126	122

• BD2.-...-TV • BD2.-...-TH

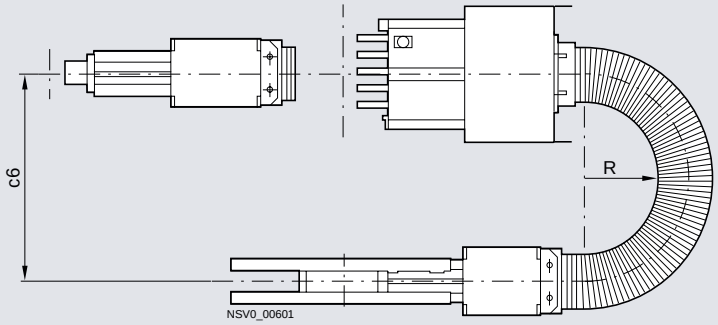


Rated current in A	c in mm	c1 in mm
160 ... 400	68	64
630 ... 1,250	126	122

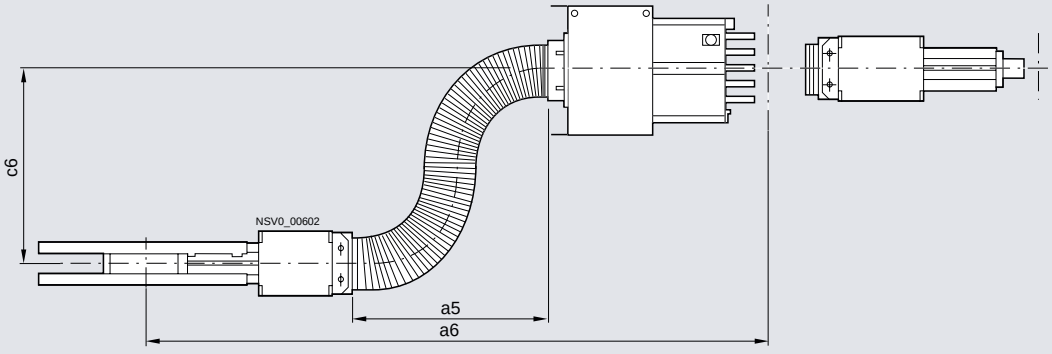
Fig. 4/5: **Dimensional drawings (dimensions in mm) for fixed junction units**



Type	a1	a2	a3	a4	b	c	c1	c2	c3	c4	c5
BD2-400-R	1250	512	187	187	79	68	64	101	50	11.5	21.5
BD2-800-R	1750	786	350	250	146.5	126	122	195	145	11.5	57.5



Type	c6	R_{min}
BD2-400-R	220	110
BD2-800-R	340	110

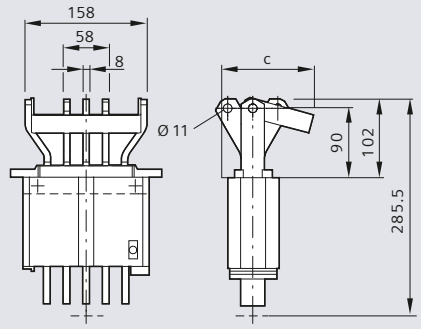


Type	a5	a6	c	R_{min}
BD2-400-R	175	1000	355	110
BD2-800-R	530	1590	400	110

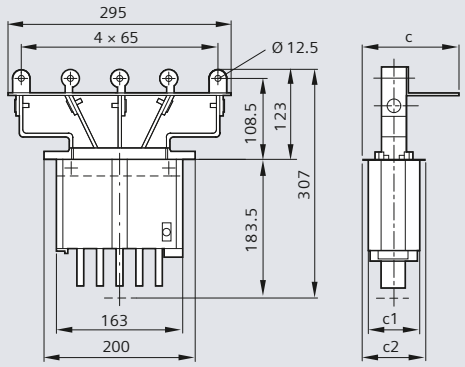
Fig. 4/6: **Dimensional drawings (dimensions in mm) for flexible junction units**

Distribution board feeding units

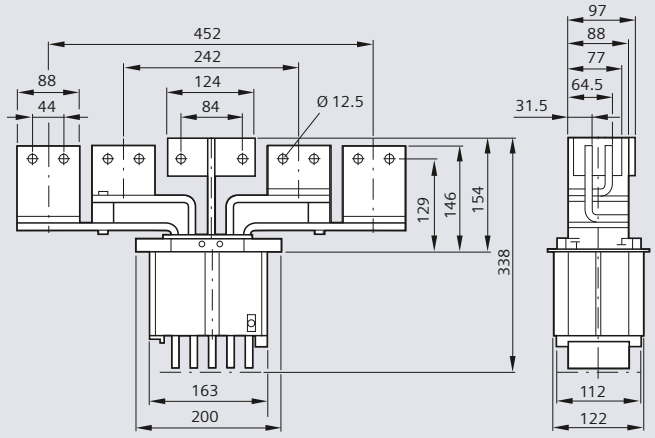
• BD2.-250-VE



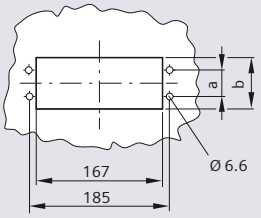
• BD2.-400-VE • BD2.-1000-VE



• BD2.-1250-VE



Enclosure cut-out



Type	a	b	c	c1	c2
BD2.-250-VE BD2.-400-VE	34	68	121	64	84
BD2.-1000-VE BD2.-1250-VE	92	126	155.5	122	142

(a, b, c, c1 and c2 in mm)

End feeding units

• BD2.-250-EE

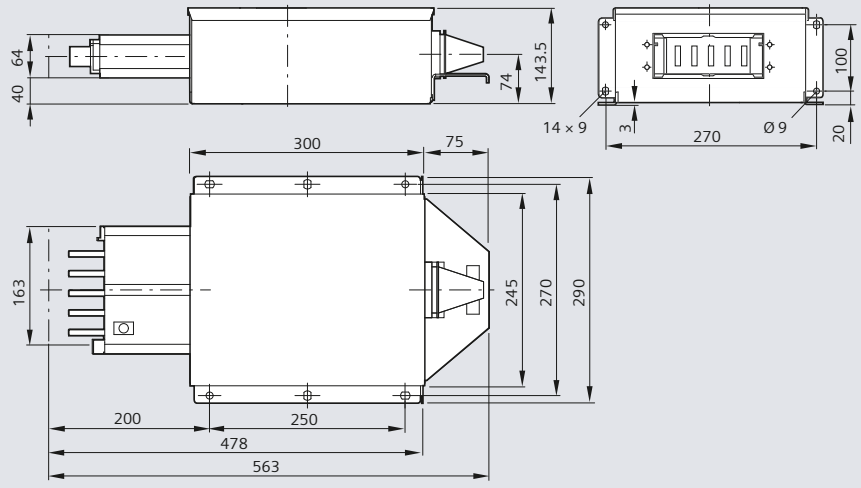
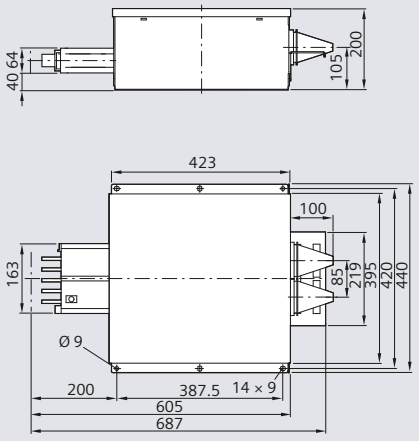
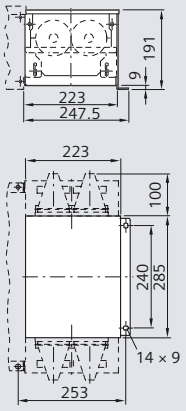


Fig. 4/7: **Dimensional drawings (dimensions in mm) for distribution board feeding units and end feeding units BD2.-250-EE**

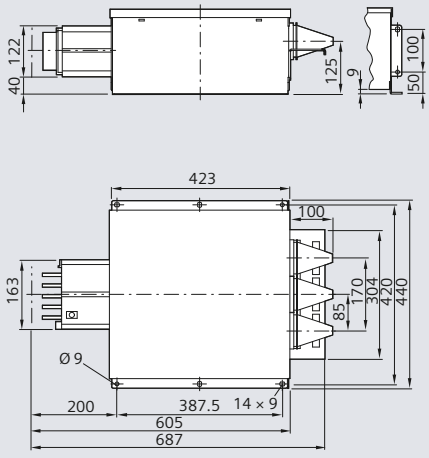
End feeding units
BD2.-400-EE



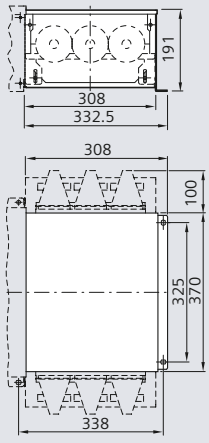
Cabling boxes
BD2-400-KR (BD2.-400-EE)



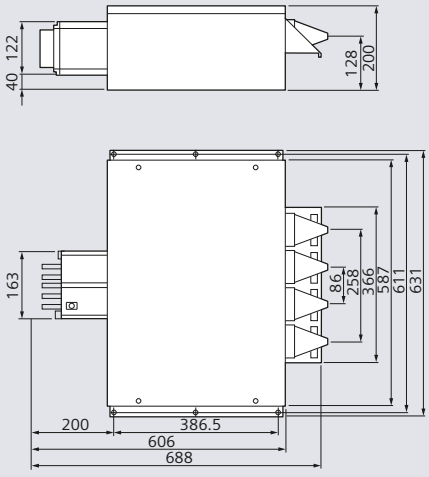
BD2.-1000-EE



BD2-1000-KR (BD2.-1000-EE)



BD2.-1250-EE



BD2-1250-KR (BD2.-1250-EE)

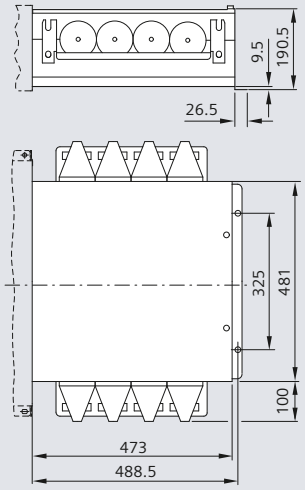
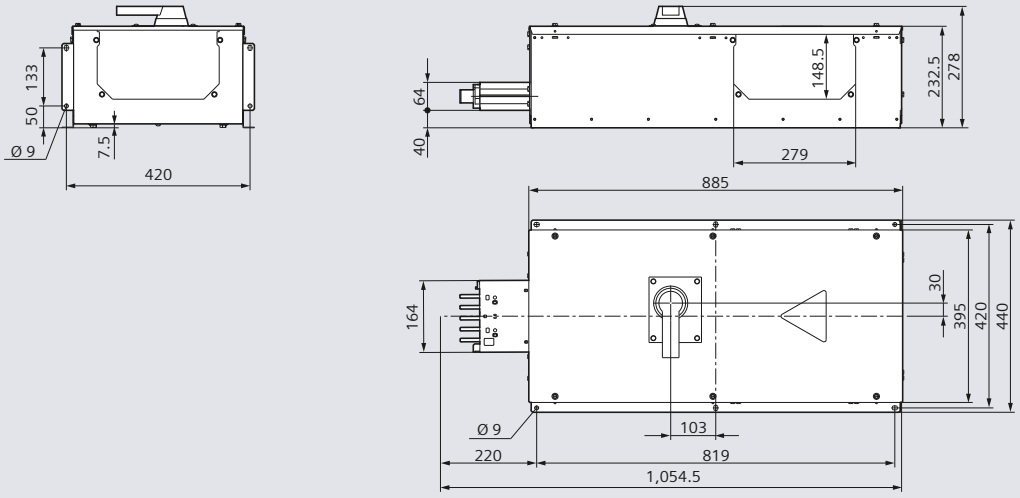
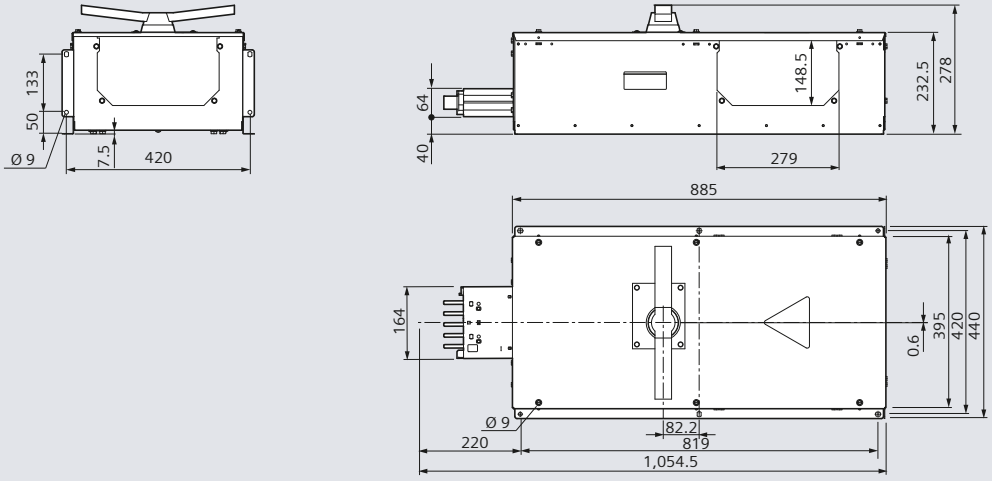


Fig. 4/8: **Dimensional drawings (dimensions in mm) for end feeding units 400 A up to 1,250 A and corresponding cabling boxes**

End feeding units with switch disconnector
BD2C-250-EESC. BD2C-315-EESC



BD2C-400-EESC



BD2C-630-EESC. BD2C-800-EESC

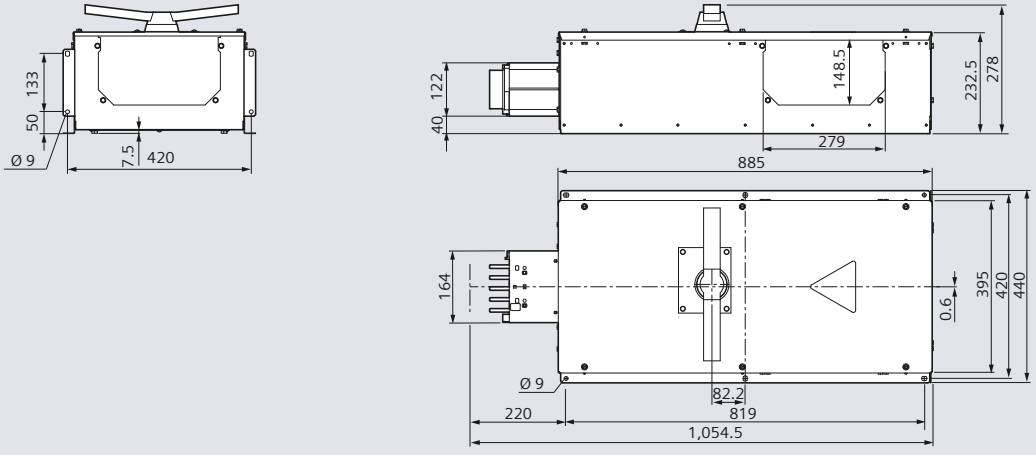
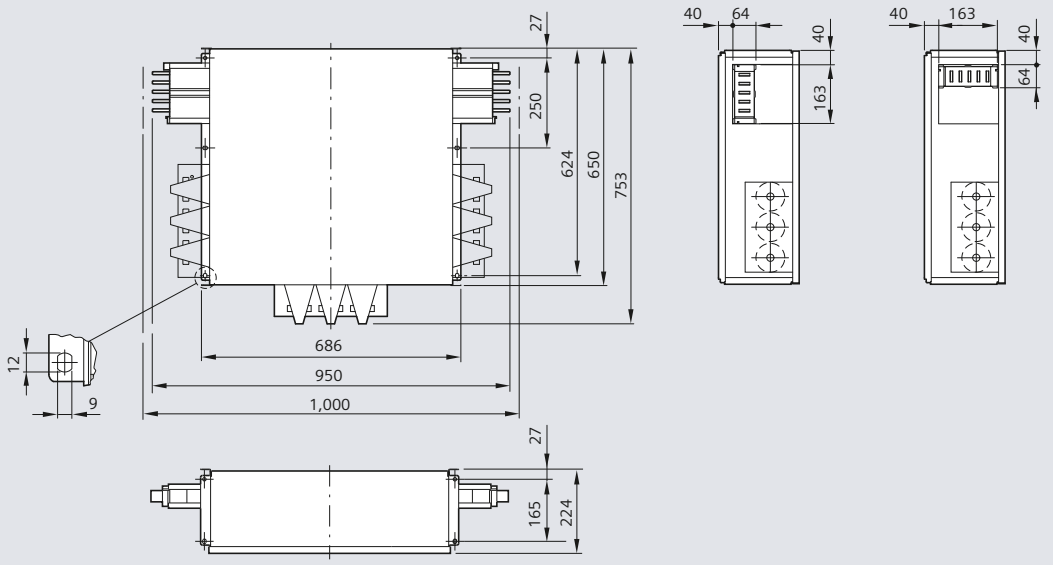


Fig. 4/9: **Dimensional drawings (dimensions in mm) for end feeding units with switch disconnector**

Center feeding units
BD2.-400-ME



BD2.-1000-ME

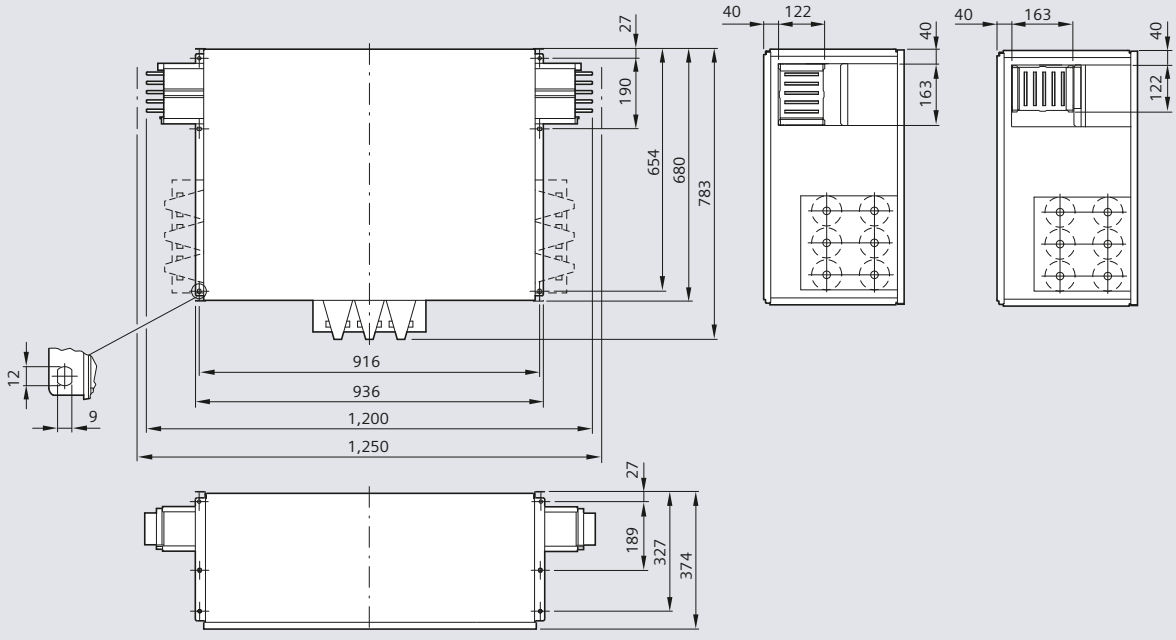
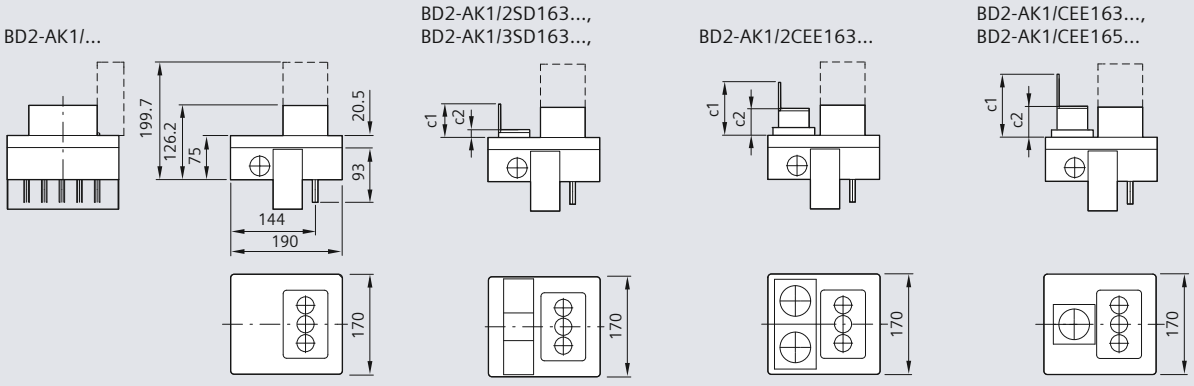


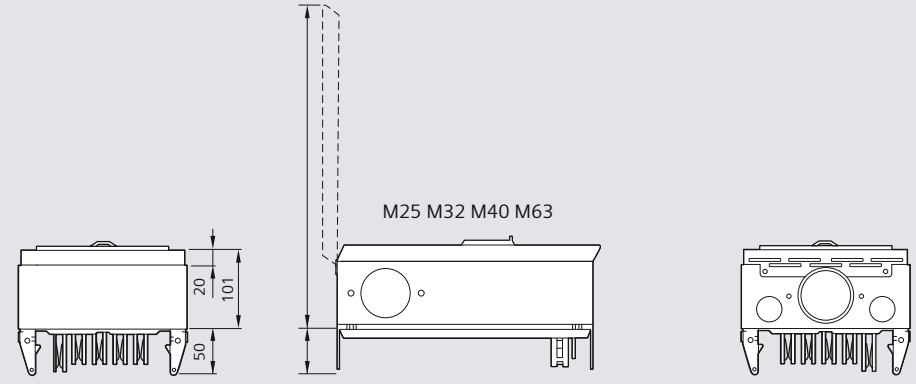
Fig. 4/10: **Dimensional drawings (dimensions in mm) for center feeding units**

Tap-off units
Size 1 (up to 25 A)



Type	c1 in mm	c2 in mm
BD2-AK1/2SD163..., 3SD163...	71	13
BD2-AK1/2CEE163..., CEE163...	88	44
BD2AK1/CEE165...	106	52

Size 02 (up to 63 A)



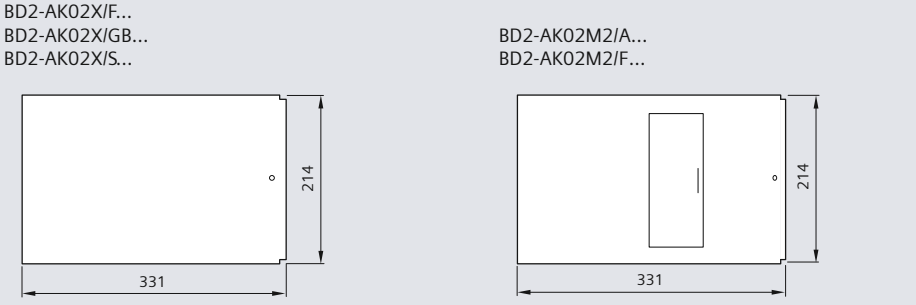
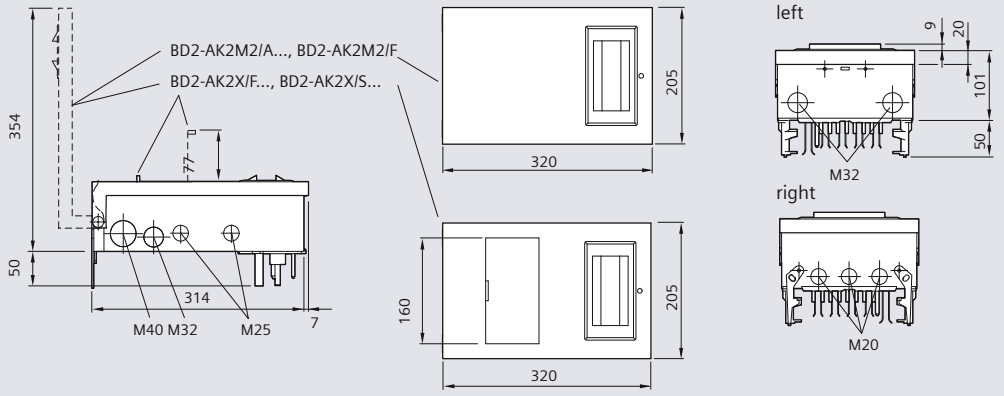
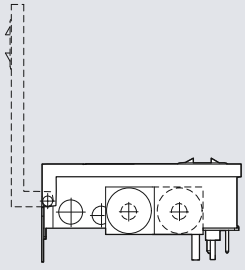


Fig. 4/11: **Dimensional drawings (dimensions in mm) for tap-off units size 1 and 02**

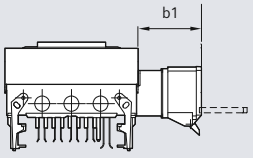
Tap-off units
Size 2 (up to 63 A)



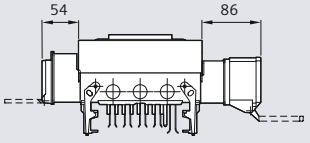
Size 2 (up to 63 A, with CEE and Schuko socket outlets)



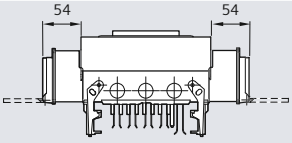
BD2-AK2M2/CEE165FIA163	b1 = 86 mm
BD2-AK2M2/CEE325A323	b1 = 98 mm
BD2-AK2M2/2CEE165A163	b1 = 86 mm
BD2-AK2X/CEE325S33	b1 = 98 mm
BD2-AK2X/2CEE165S14	b1 = 86 mm
BD2-AK2X/2CEE165S27	b1 = 86 mm

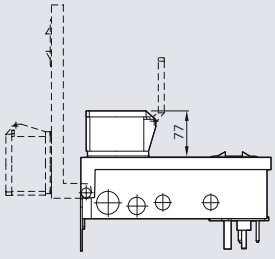


BD2-AK2M2/2SD163CEE165A163



BD2-AK2X/3BS133 ...





BD2-AK2X/CEE635S33

Type	a	Socket outlet
BD2-AK023...-PAC-3CEE163	148	3 x CEE, 3-pole, 16 A
BD2-AK023...-PAC-3CEE323	161	3 x CEE, 3-pole, 32 A
BD2-AK023...-PAC-CEE165	152	1 x CEE, 5-pole, 16 A
BD2-AK023...-PAC-CEE325	161	1 x CEE, 5-pole, 32 A
BD2-AK023...-3CEE163	148	3 x CEE, 3-pole, 16 A
BD2-AK023...-3CEE323	161	3 x CEE, 3-pole, 32 A
BD2-AK023...-CEE165	152	1 x CEE, 5-pole, 16 A
BD2-AK023...-CEE325	161	1 x CEE, 5-pole, 32 A
BD2-AK023...-PAC	137	--

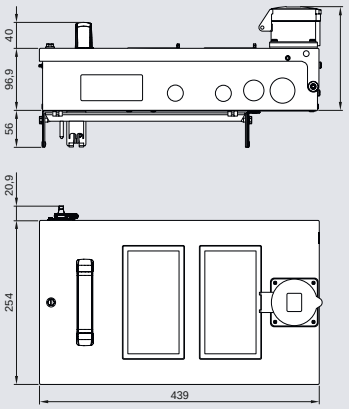
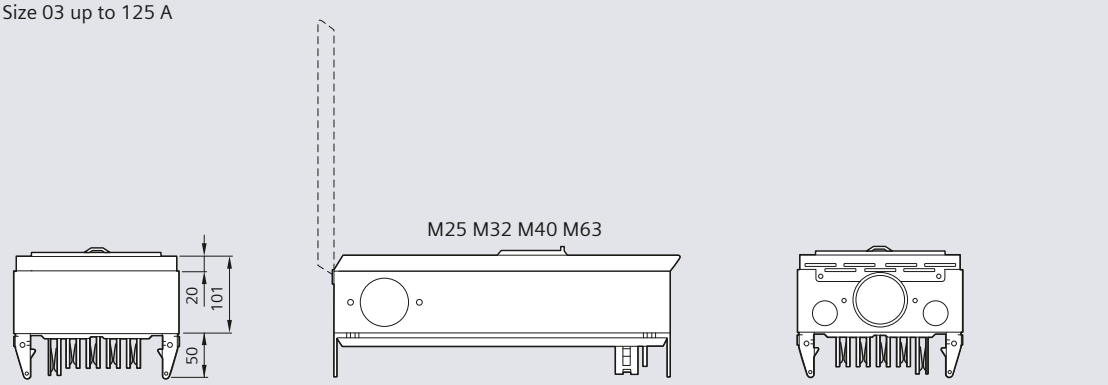
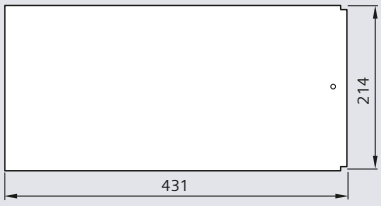


Fig. 4/12: **Dimensional drawings (dimensions in mm) for tap-off units size 2**

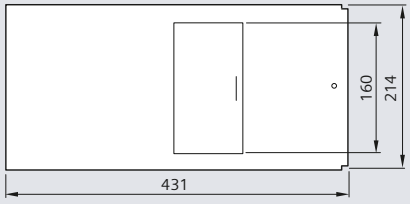
Tap-off units
Size 03 up to 125 A



BD2-AK03X/F...



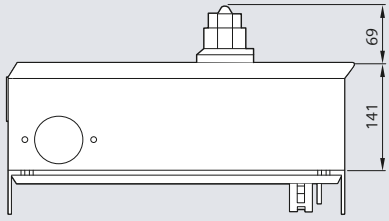
BD2-AK03M2/A...



with fuse switch disconnector and circuit breaker
BD2-AK03X/GSTA00



BD2-AK03X/FS...



BD2-AK03/LSD...

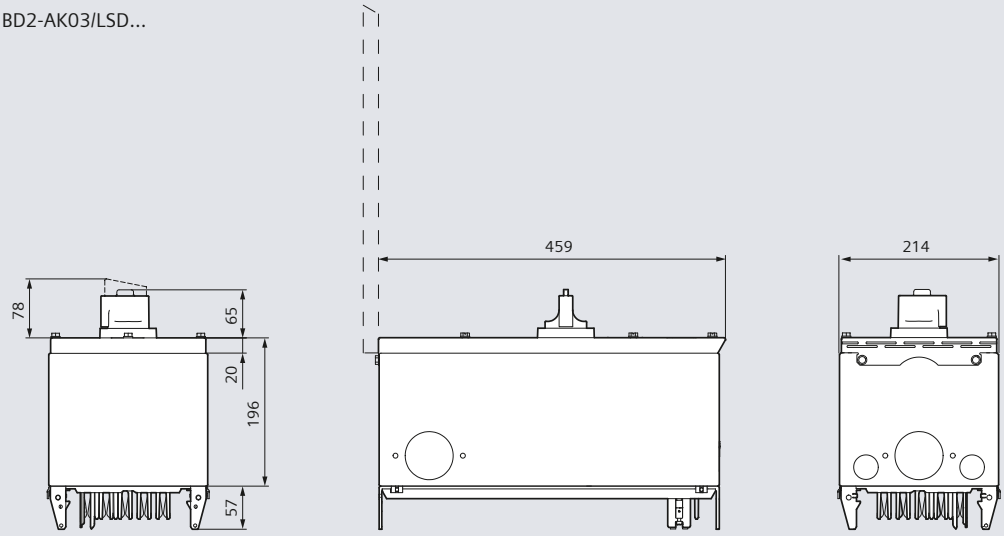
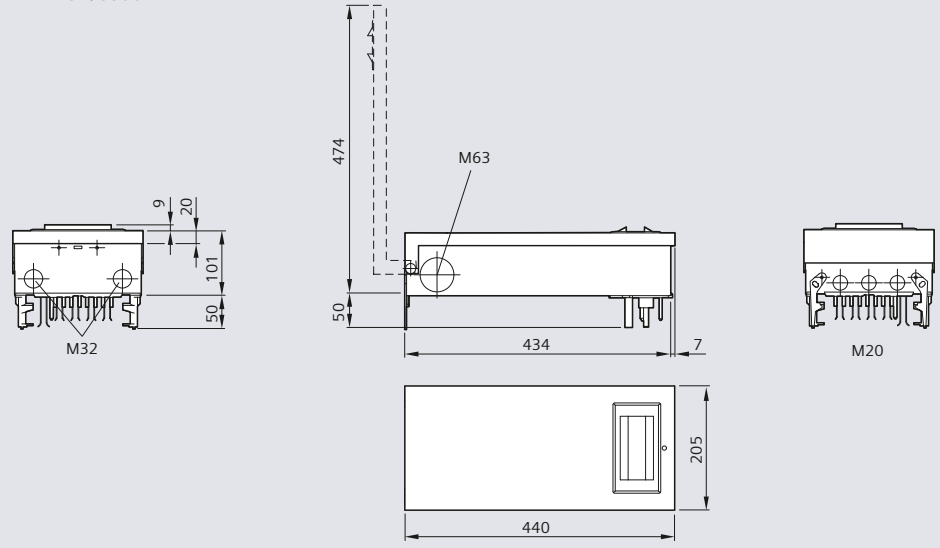


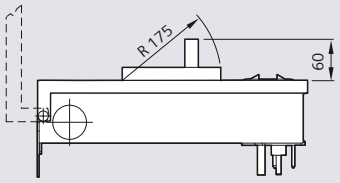
Fig. 4/13: **Dimensional drawings (dimensions in mm) for tap-off units size 03**

Tap-off units
Size 3 up to 125 A

BD2-AK3X/GS00



with fuse switch disconnector
BD2-AK3X/GSTZ00



for free arrangement of components
BD2-AK3M2/F

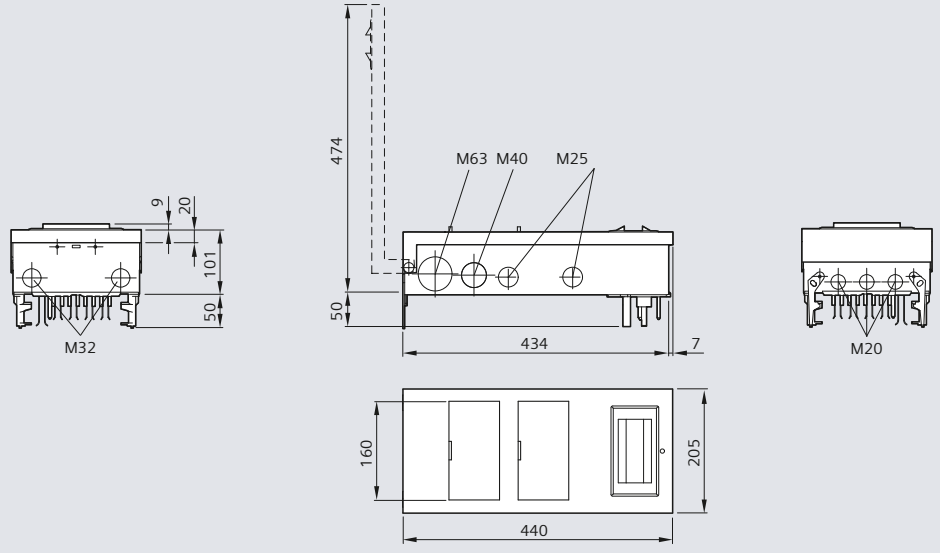
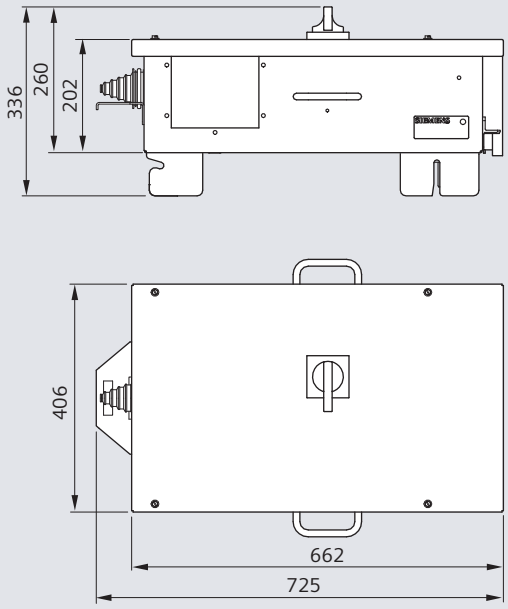


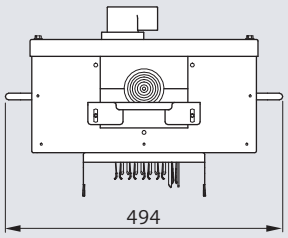
Fig. 4/14: **Dimensional drawings (dimensions in mm) for tap-off units size 3**

Tap-off units

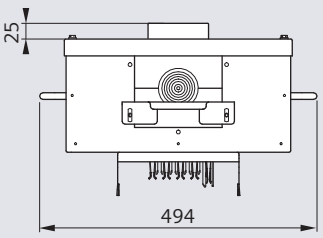
Size 04 up to 250 A
BD2-AK04/LSD... , /LSM...

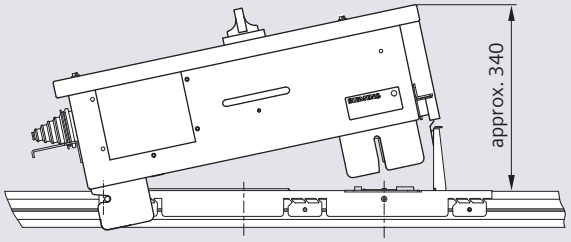


BD2-AK04/LSD...

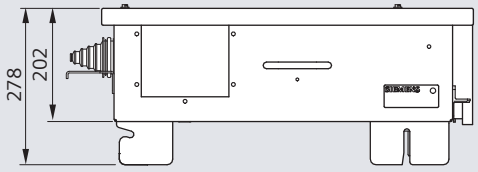


BD2-AK04/LSM...





BD2-AK04/SNH1, BD2-AK04/GB250J-...



BD2-AK04/FS...

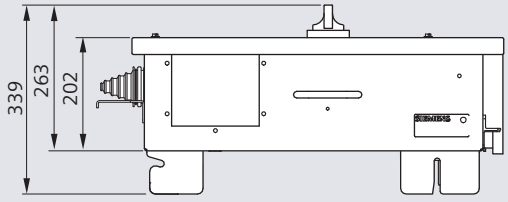
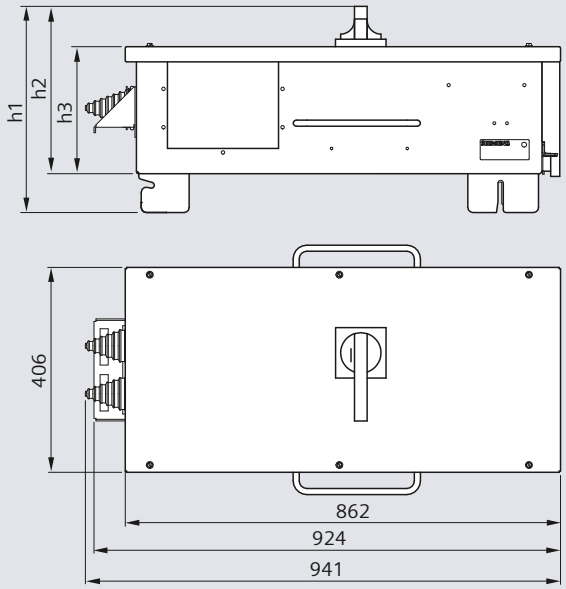


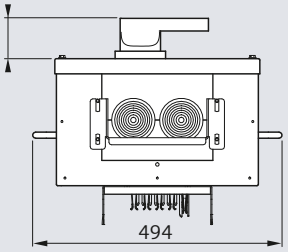
Fig. 4/15: **Dimensional drawings (dimensions in mm) for tap-off units size 04**

Tap-off units

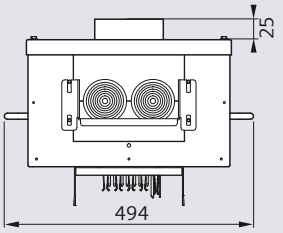
Size 05 up to 400 A and size 06 up to 530 A
BD2-AK05/LSD... , /LSM... and BD2-AK06/LSD... , /LSM ...

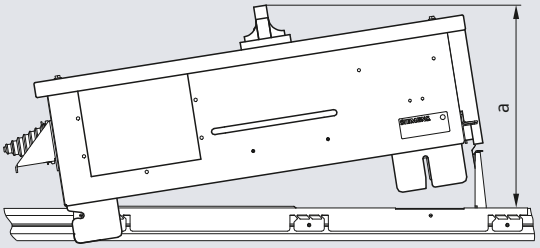


BD2-AK05/LSD... , AK06/LSD...



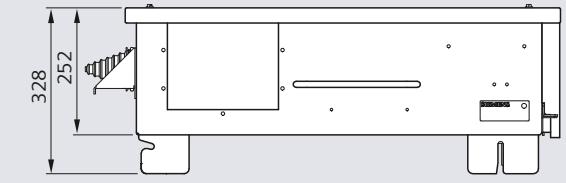
BD2-AK05/LSM... , AK06/LSM...





Type	h1 in mm	h2 in mm	h3 in mm	a in mm
BD2-AK05...	392	307	252	approx. 400
BD2-AK06...	512	427	352	approx. 520

BD2-AK05/SNH2, BD2-AK06/SNH3



BD2-AK05/FS...

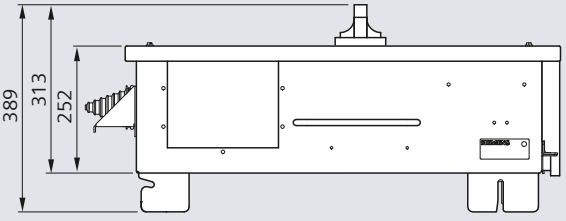
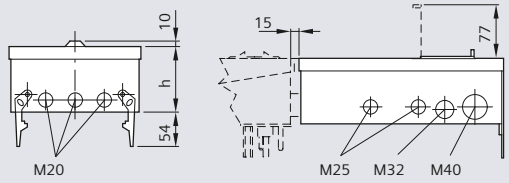


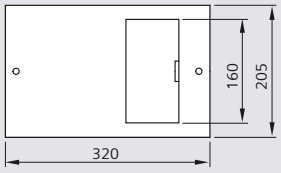
Fig. 4/16: **Dimensional drawings (dimensions in mm) for tap-off units size 05 and size 06**

Ancillary equipment units

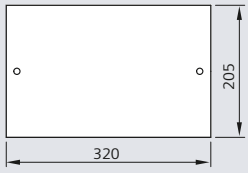


Type	h in mm
BD2-GKM2/F	101
BD2-GKX/F	151

BD2-GKM2/F

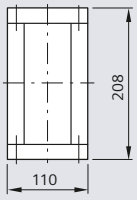


BD2-GKX/F

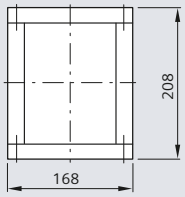


Protective sleeve

BD2-400-D

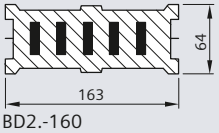


BD2-1250-D

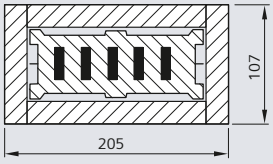


Fire barrier

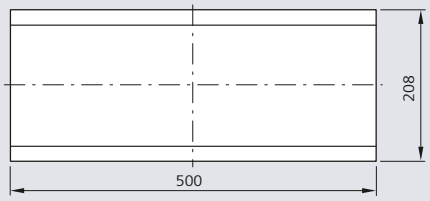
+BD2-S90 (S120)-...

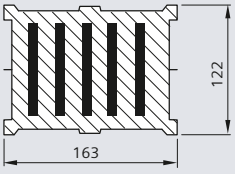


BD2.-160
(-250, -400) -...

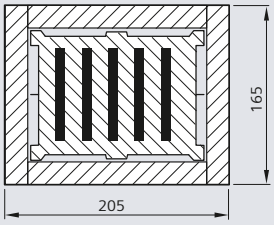


BD2-...-D



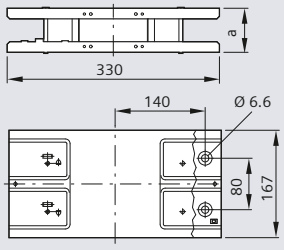


BD2.-630
(-800, -1000, -1250) -...



Joint block

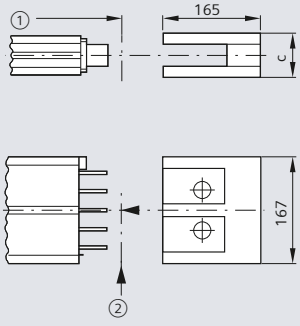
BD2-400-EK, BD2-1250-EK



Type	a in mm
BD2-400-EK	68
BD2-1250-EK	126

End flange

BD2-400-FE, BD2-1250-FE



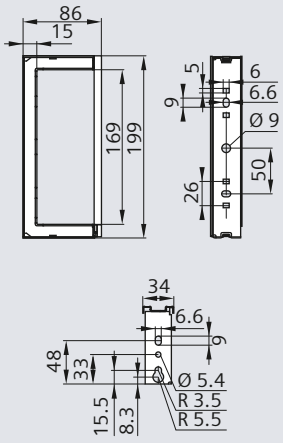
Type	c in mm
BD2-400-FE	68
BD2-1250-FE	126

① Length of trunking unit
② End of end flange = center of joint block

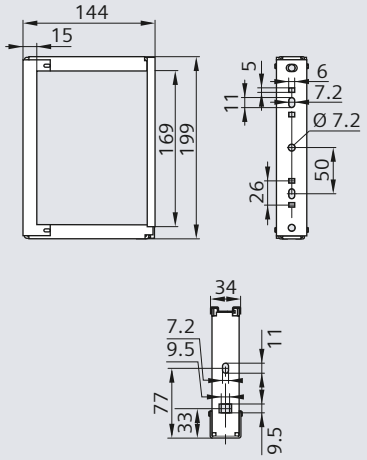
Fig. 4/17: **Dimensional drawings (dimensions in mm) for ancillary equipment units and additional equipment**

Fixing

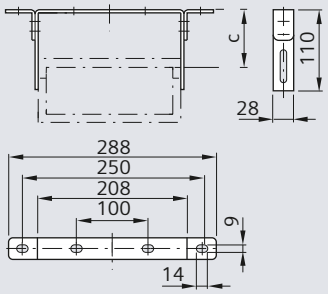
Fixing brackets, flat and edgewise
BD2-400-BB



BD2-1250-BB



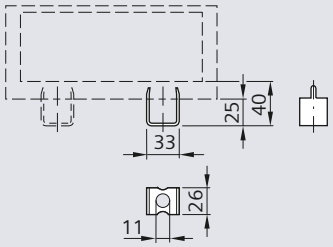
Spacer bracket
BD2-BD



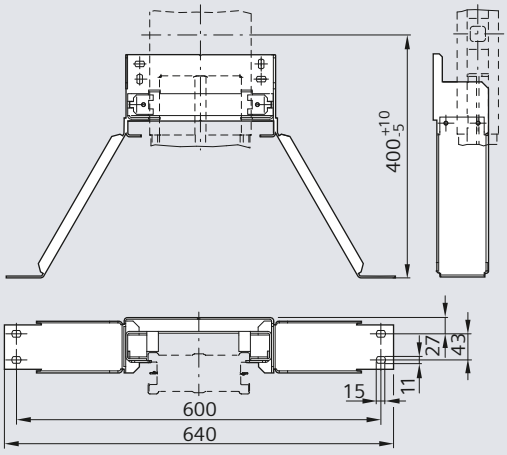
Type	c in mm
BD2-400-BD	30 ... 82
BD2-1250-BD	50 ... 82

To secure systems directly to concrete walls, always use steel expansion bolts approved by the local building inspectorate! For example:
- RICO Article No. 15J1-A08/40
- Fischerwerke SLM8N Art. No. 50521

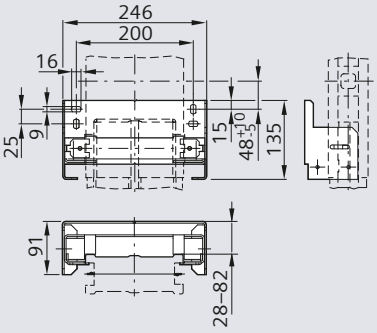
Spacer
BD2-DSB



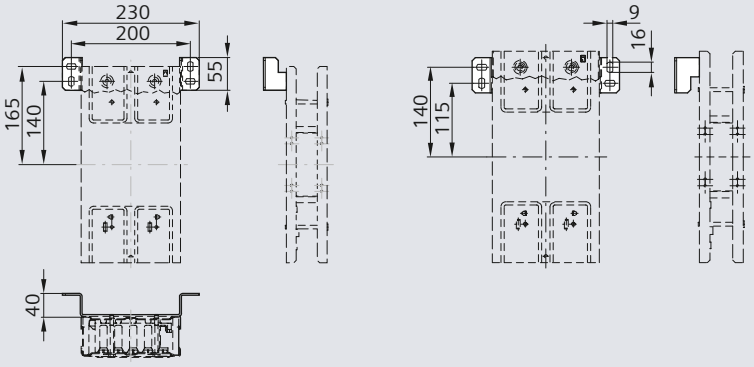
Vertical fixing element
BD2-BDV



Vertical fixing element
BD2-BWV



Vertical fixing bracket
BD2-BVF



Fixing for mounting rails
BD2-BVC

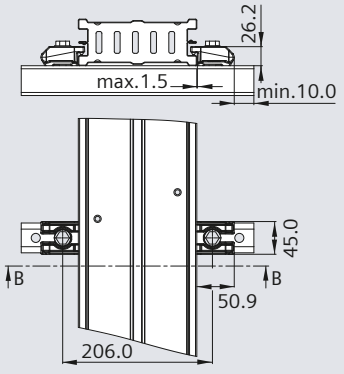
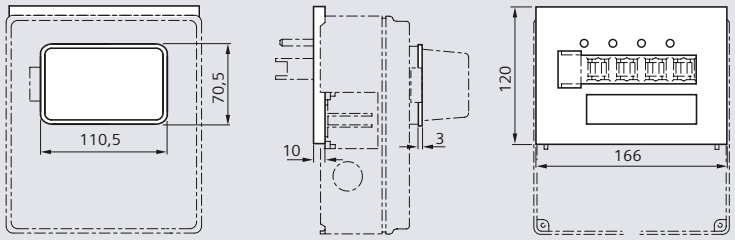
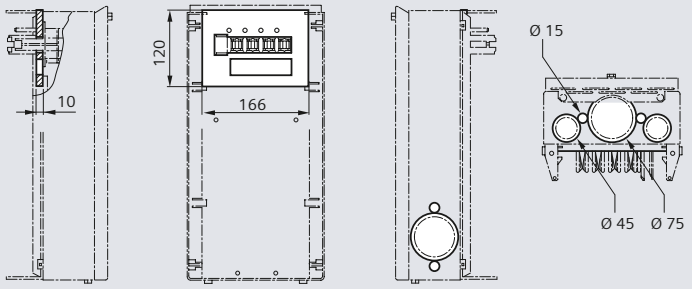


Fig. 4/18: **Dimensional drawings (dimensions in mm) for fixing elements**

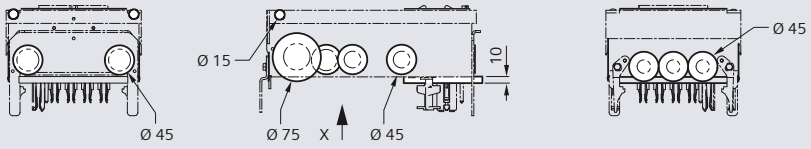
For tap-off units
BD2-AK1-IP55



BD2-AK02-IP55, BD2-AK03-IP55



BD2-AK2X-IP55, BD2-AK3X-IP55



Type	a in mm
BD2-AK2X-IP55	130
BD2-AK3X-IP55	190

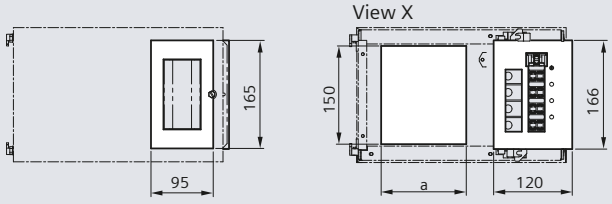
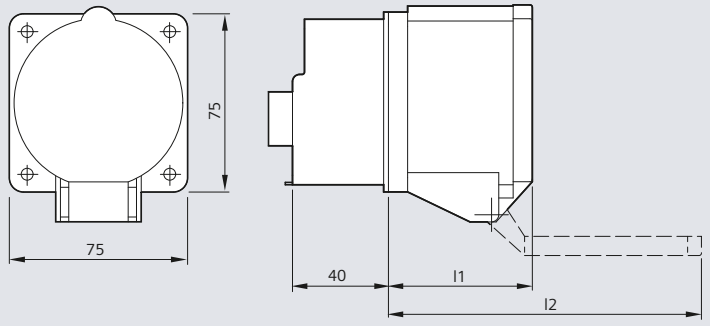


Fig. 4/19: **Dimensional drawings (dimensions in mm) for protective covers IP55**

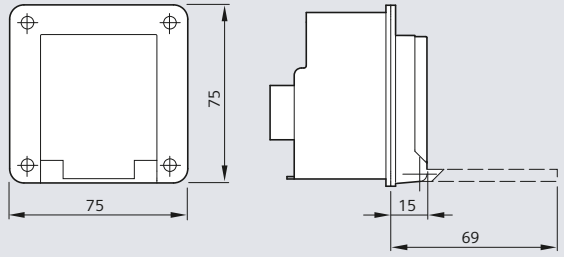
Socket outlets incl. accessories
Socket outlet with adapter enclosure

BD2-CEE

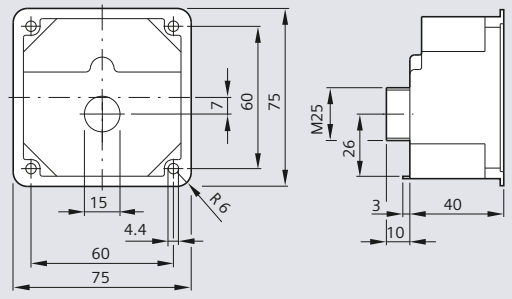


	I1	I2
BD2-CEE163	53	110
BD2-CEE165	54	110
BD2-CEE325	60	130

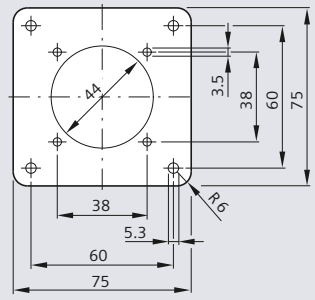
BD2-SD163



Adapter enclosure
BD2-AG



Adapter plate
BD2-APM



BD2-APO

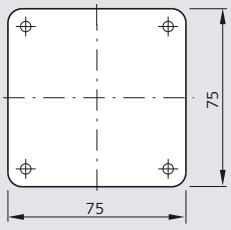
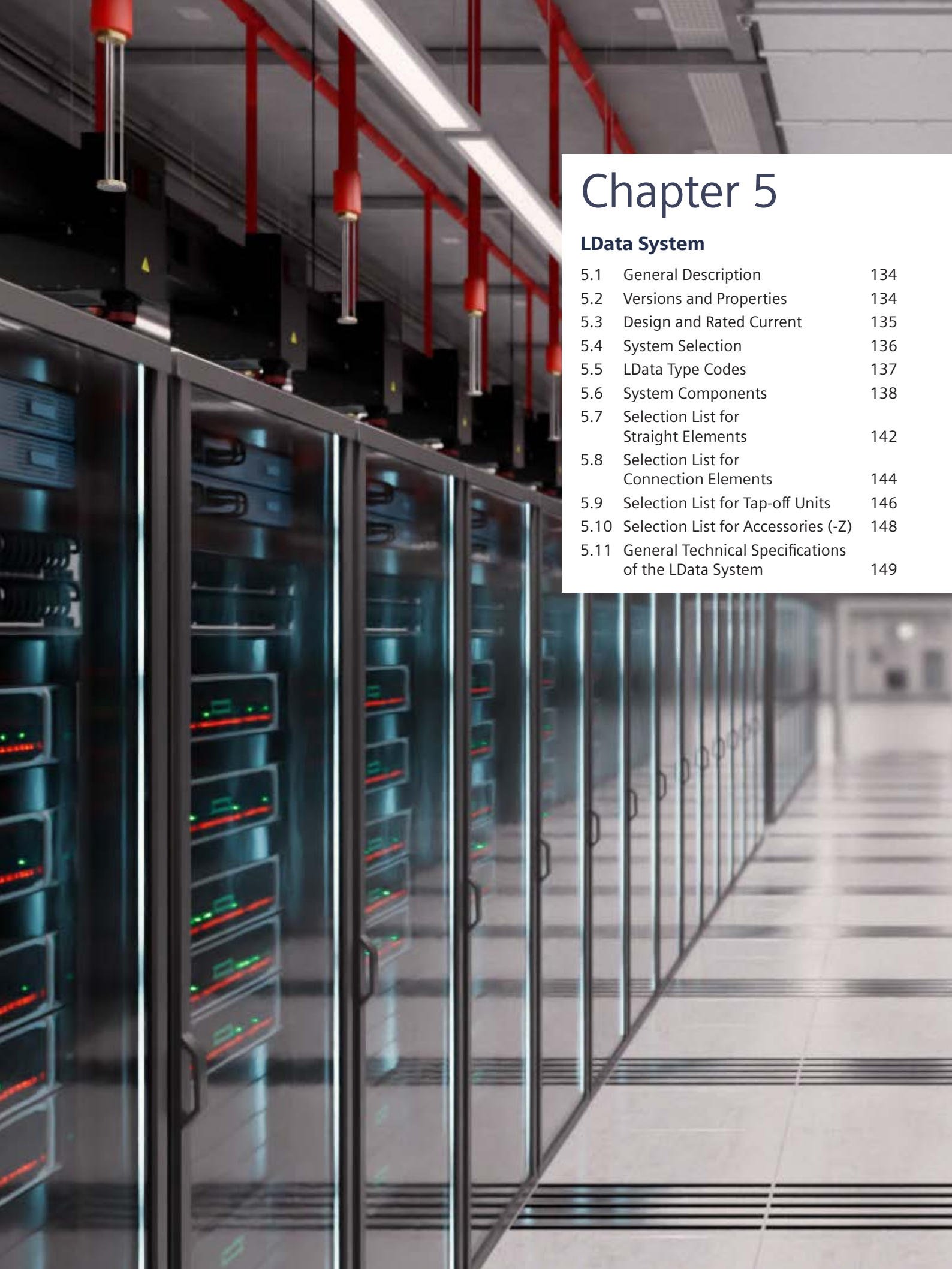


Fig. 4/20: **Dimensional drawings (dimensions in mm) for socket outlets of the BD2 system including accessories**



Chapter 5

LData System

5.1	General Description	134
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5.8	Selection List for Connection Elements	144
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5 LData System

5.1 General Description

The LData system opens up new possibilities within the SIVACON 8PS system family: A system specifically designed for use in data centers that meets these needs by enabling a high energy density on minimum space.
The tap-off units, in particular, are optimized for this application: LData is characterized by a compact design, easy operability, and a maximum level of flexibility.
This relies in part on proven technology from the SIVACON 8PS system family, combined with new developments.
LData expands the possibilities in the data center market, enabling solutions to be created for data centers of today and tomorrow.

5.2 Versions and Properties

LData is designed for power distribution in data centers above the data cabinets. Accordingly, the number of available components is limited to:
- Incoming cable connection units
- Straight lengths with tap-off possibilities
- Tap-off units
- Accessories such as end caps, fixing elements, etc.

If more complex busbar runs or additional components such as fire barriers or similar are required, the LD system or the LI system can be connected via adapters, and the corresponding components from this portfolio can be used.

The LData system is characterized by its optimal adaptation to applications in data centers. The following features should be pointed out:
- Modular system from a clear portfolio
- Power pick-up at almost any point of the busbar trunking system through a special tap-off point grid
- High rated currents of the system
- Tap-off units especially developed for data centers
- Classical cubic design or innovative L-design
- Optionally: safe operation of the tap-off units by separating the mechanical and electrical contacts using mobile contacts
- Optionally with powerline technology to provide data transparency
- Reduction of power loss through possible overdimensioning of the system
- Visually appealing system in black enclosure color.

5.3 Design and Rated Current

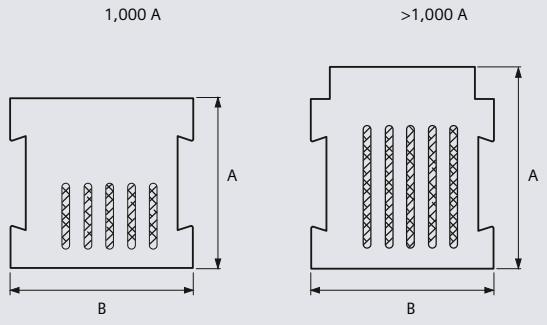
Size

The LData system is available in two external sizes, with only the system height being different: For currents of 1,000 A, the system is delivered with a flat top cover, while systems of 1,250 A and above are delivered with a raised top cover.

The height of the aluminum conductors varies within the enclosure.
The arrangement of conductors is always identical; the mounting position is always horizontal with the inner conductors edgewise.

The sizes are defined as follows:

LData system	Rated current I_{na}	mm		Dimensional drawing
	A	A	B	
LDATA-1000...	1,000	180	220	
LDATA-1250...	1,250	220		
LDATA-1600...	1,600			
LDATA-2000...	2,000			
LDATA-2250...	2,250			
LDATA-2500	2,500 on request			



Tab. 5/1: **Overview of LData busbar trunking system**

Conductor material

The LData system uses only aluminum conductors. They are nickel-plated and tinned. The clearance in air between the systems, which is ~17 mm, serves as insulation.

Connection technology

The trunking units of the LData system are connected via a hook-bolt connection.
It is screwed tight at 80 Nm through a single bolt. This ensures a permanently maintenance-free connection.

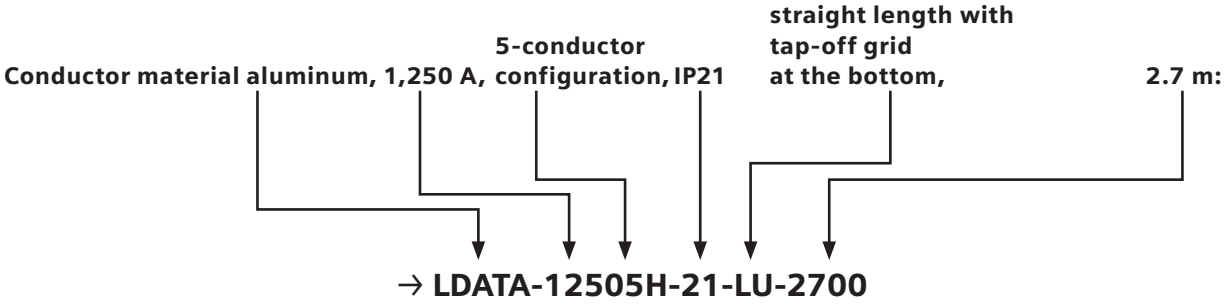
The connection point is closed with a top cover and base plate. No power pick-up is possible at this point over a length of 320 mm.

5.4 System Selection

In the system selection, only the following technical property of the system must be determined:
- Rated current 1,000 A to 2,500 A

The other properties of the LData system are predefined and cannot be freely selected:
- Conductor material aluminum
- Standard power pick-up option via a tap-off point grid on the bottom side
- 5-conductor configuration (L1-L3, N, PE) → identifier 5H
- Degree of protection IP21 → identifier 21

Example



5.5 LData Type Codes

The illustrated type code serves to determine the order types of the system elements:

Examples of type designations

To clarify examples of LData type designations:

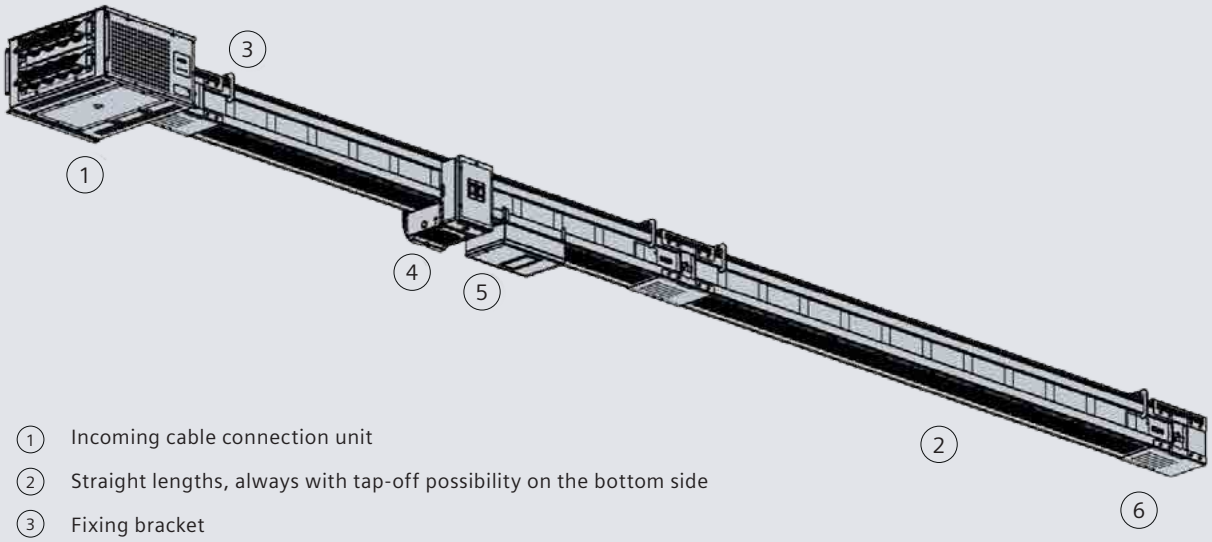
- Straight length with 1,250 A, 3,000 mm
  LDATA-12505H-21-LU-3000
- Incoming cable connection unit 1,000 A
  LDATA-10005H-21-C-1
- Fixing bracket
  LDATA-ZB-1
- Tap-off unit, L-shape, 63 A, IP21
  LDATA-T-0635H-21-LP-012
- Tap-off unit, cubic shape, 125 A, IP41
  LDATA-T-1255H-41-CB-148

LData type code structure			NNN(N)	NA		NN		B	B(B)		N(NNN)
			...	5H	-	..	-	.	.	-	....
For tap-off unit (optional)		T									
Current in A											
For L/F	Four-digit										
For Z	Optional										
For T	Three-digit (largest element)										
Configuration of the conductors											
For L/F/T	TN-S system			5							
	100% N/100% PE			H							
For Z	Optional										
Degree of protection											
For L/F/T	Degree of protection, dust, IP2X					2					
For T	Degree of protection, dust, IP4X					4					
	Degree of protection, water, IPX1					1					
For Z	Optional										
Type identifier (optional, not for tap-off units)											
	Lengths							L			
	Expansion length							E			
	Incoming cable connection unit							C			
	Accessories							Z			
Specification for type identifier (optional)											
For L/E	Tap-off points downwards								U		
	Fixed point								F		
For Z	End cap Fixing bracket								E B		
For T	L-unit								L		
	Cubic unit								C		
	Basic version								B		
	Premium version								P		
Specification for length											
For L/E	Four-digit in mm										
For C	Variant number (single-digit increment)										
For Z	Variant number (single-digit increment)										
For T	Variant number (three-digit increment)										

Tab. 5/2: **Type code structure of the LData system**

5.6 System Components

LData is characterized by few components, which however fully meet the requirements for power distribution above the server racks:

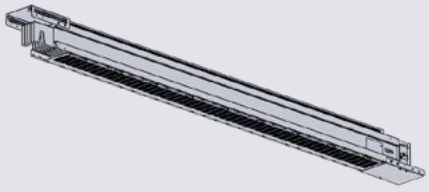
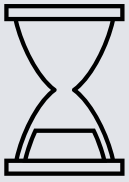


1. Incoming cable connection unit
2. Straight lengths, always with tap-off possibility on the bottom side
3. Fixing bracket
4. Tap-off units, L-shape
5. Tap-off units, cubic shape
6. End cap (included in scope of supply of the incoming cable connection unit)

Fig. 5/1: **Overview of LData components**

5.6.1 Straight Elements

The following components are grouped under the designation “straight elements”:
- Straight trunking units with tap-off point grid on the bottom side
- Straight trunking units with tap-off point grid on the bottom side and expansion compensation
- Adapter lengths.

LData		
Power distribution over straight distances	Compensation of thermal length expansion of the system elements	Transition from LData system to other SIVACON 8PS systems
Straight length with tap-off point grid (LDATA-XXXX5H-21-LU-YYYY)	**Expansion compensation (LDATA-XXXX5H-21-EUF-3000)**	**LData adapter element**
		
Selection key XXXX: Rated current in A Selection key YYYY: Length in mm	XXXX: Rated current in A	Currently only available on a project-specific basis

Tab. 5/3: **Straight busbar elements of the LData system**

Straight elements

Generally, all trunking units have a tap-off point grid on the bottom side of the trunking unit and thus serve for distributing the electrical energy:
Here, a continuous perforated plate is mounted, which enables the plugging of a tap-off unit at every position. In the area of the clamped connection, there is no perforated plate and thus no tap-off possibility.

The straight trunking unit with expansion compensation additionally compensates for the thermal expansion of the conductors. Observe the relevant configuration specifications.

An adapter length connects the LData system with another busbar trunking system of the SIVACON 8PS family. These elements are currently only available on a customer-specific basis. Adapter lengths also allow more complex busbar runs to be designed for the LData system.

Components such as
- Fire barriers
- Junction units
- Distribution board connection pieces
- ...

from the existing SIVACON 8PS busbar trunking systems can be used.

5.6.2 Connection Elements

The following components are grouped under the term "connection elements":
- Incoming cable connection units

If other connection elements are required, these can be used from another busbar trunking system of the SIVACON 8PS family and connected via an adapter.

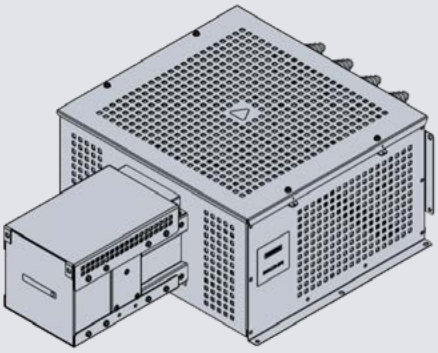
LData
The incoming cable connection units serve to supply electrical energy to the busbar run: Incoming cables are connected via bolts, and thus connect the LData busbar trunking system with the upstream power supply.
Incoming cable connection unit


Fig. 5/2: **Feeding element of the LData system**

5.6.3 Tap-off Units

The following components are grouped under the term "tap-off units":
- Tap-off unit in cubic shape
- Tap-off unit in L-shape.

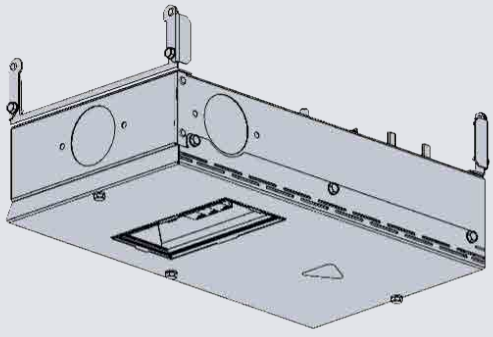
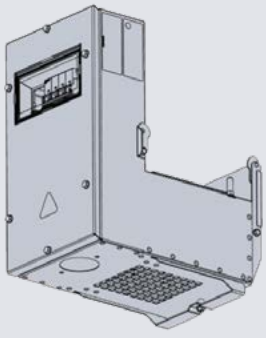
LData	
Electrical energy is drawn from the LData system via the tap-off unit, and the downstream circuits are protected via protection devices. The user can connect the electrical loads to these tap-off units.	
Tap-off unit, cubic shape	**Tap-off unit, L-shape**
	

Fig. 5/3: **Tap-off units of the LData system**

5.6.4 System Accessories

The following components are grouped under the term "accessories"
- Fixing elements
- End flange.

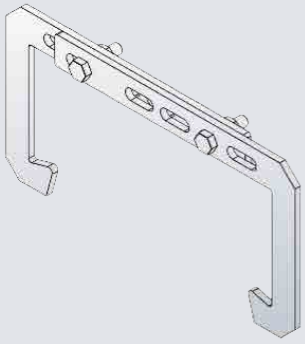
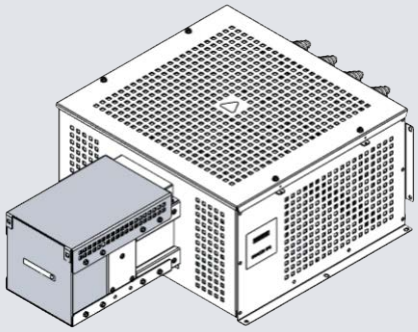
LData	
Fixing of the LData system	Termination of the busbar run
Fixing bracket	**End flange**
	 (The end flange shown is part of the incoming cable connection unit and does not need to be ordered separately)

Fig. 5/4: **System accessories of the LData system**

5.7 Selection List for Straight Elements

The following selection lists serve to determine the order designations for straight elements.

Note
The LData system has individual joint blocks, which are mounted to the system at the factory. Ordering these joint blocks is therefore only necessary in the case of spare parts.

5.7.1 Straight Length with Tap-off Point Grid (-LU)

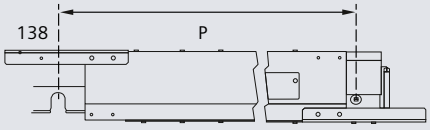
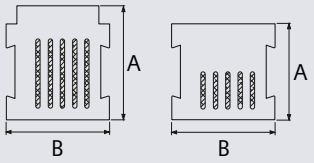
Straight length	Dimensional drawing	Size
	 P: Configuration length	

Fig. 5/5: **Straight length with tap-off points, LData system**

The dimensions stated above are defined as follows:

LData system	A	B	P[1)]	
	mm	mm	mm	
			min.	max.
LDATA-****5H-21-LU1000	180	220	1,000	
LDATA-****5H-21-LU2000	220		2,000	
LDATA-****5H-21-LU3000			3,000	
LDATA-****5H-21-LU1000			1,050	2,950

[1)] Can be ordered in 50 mm increments

Tab. 5/4: **Straight lengths: configuration dimensions, LData system**

The straight lengths are always equipped with tap-off point grid on the bottom side. Therefore, the type designation is always LDATA-...-LU...

The number (N) of tap-off openings is calculated for a length with dimension L using the following formula:

$N=(L-350)/50$

Order example
Straight length with tap-off point grid,
rated current 1,250 A,
5-conductor, IP21, length 1.7 m:

Type designation: LDATA-12505H-21-LU-1700

If an expansion compensation should be necessary according to the configuration rules (see Chapter 3.1), this must be ordered as a separate component.

5.7.2 Straight Length with Expansion Compensation (-EUF)

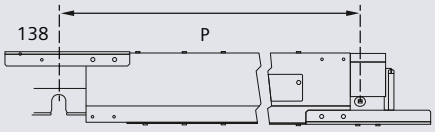
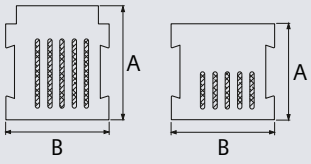
Expansion compensation	Dimensional drawing	Size
	 P: Configuration length 3,000 mm	

Fig. 5/6: **Straight length with expansion compensation, LData system**

An expansion compensation can only be ordered in a length of 3,000 mm and must always contain a fixed point. The need for an expansion compensation and fixed points must be clarified in the detailed design. The expansion length features an area of 260 mm in which no tap-off units can be plugged.

LData system	A	B	P	Order designation
	mm	mm	mm	
LDATA****5H-21-EUF...	180/220	220	3,000	...-3000
In the expansion area, the lower top cover is closed, so that there is no tap-off point grid at this location. Thus, the available length for tap-off units is reduced by 260 mm.				

Tab. 5/5: **Straight length with expansion compensation: length dimensions**

Order example
Straight length with tap-off point grid, expansion compensation, and fixed point, rated current 1,000 A, 5-conductor, IP21, length 3.0 m:

Type designation: LDATA-10005H-21-EUF-3000

5.7.3 Adapter Element (-LD)

An adapter element from LData to other SIVACON 8PS systems can currently only be implemented on a project-specific basis. Please get in touch with your Siemens sales partner for further information.

5.8 Selection List for Connection Elements

The LData system has components for the connection of cables. Should other connection possibilities (for example, distribution board connection) be required, an adapter element to other SIVACON 8PS systems is to be used.

5.8.1 Incoming Cable Connection Unit (-C)

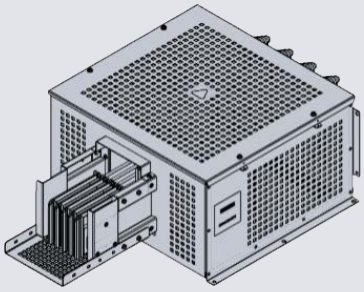
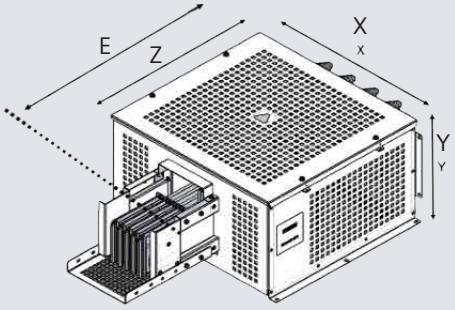
Incoming cable connection unit -C	Dimensional drawing
	

Fig. 5/7: **Incoming cable connection unit, LData system**

The dimensions stated above are defined as follows:

LData system	X	Y	Z	E	Order designation
	mm	mm	mm	mm	
LDATA-10005H-21-C-1	640	290	560	Z + 165	8PS2230-0AA00-0AA0
LDATA-12505H-21-C-1		340			8PS2230-0AA00-0AA1
LDATA-16005H-21-C-1					8PS2230-0AA00-0AA3
LDATA-20005H-21-C-1					8PS2230-0AA00-0AA4
LDATA-25005H-21-C-1					8PS2230-0AA00-0AA2

E: Configuration length
Note: The incoming cable connection unit can be opened and connected from both sides (top and bottom).

Tab. 5/6: **Incoming cable connection units; dimension table**

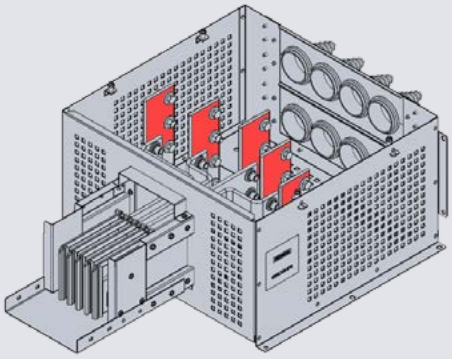
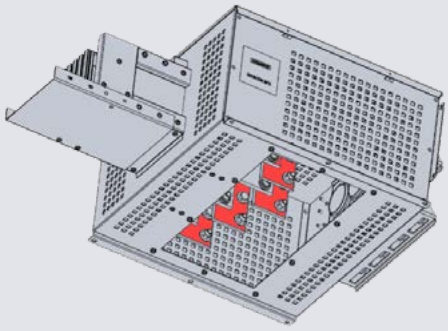
Connection	
Connection from above	**Connection from below**
	

Fig. 5/8: **Incoming cable connection unit, connection elements, LData system**

The connectable cable cross-sections are:

	Entry			Connection				
	Number of cable grommets	Diameter mm		Number of connection points			Conductor cross-section mm²	
		min.	max.	L1...3	N	PE	min.	max.
LDATA-10005H-21-C-1	4	14	68	2	2	2	25	240
LDATA-12505H-21-C-1	8			4	4	4		
LDATA-16005H-21-C-1								
LDATA-20005H-21-C-1								
LDATA-25005H-21-C-1								
Note: The incoming cable connection unit contains a terminal and an integrated fixed point. The next trunking unit to be connected must begin with a side hook.								

Tab. 5/7: **Incoming cable connection unit: conductor cross-sections, LData system**

5.9 Selection List for Tap-off Units

The LData system has a clear portfolio of tap-off units in different designs. Usually, these are not sufficient to meet the requirements of customer projects. Therefore, the SOND (customer-specific) process is generally used to create suitable tap-off units.

5.9.1 Cubic Tap-off Unit

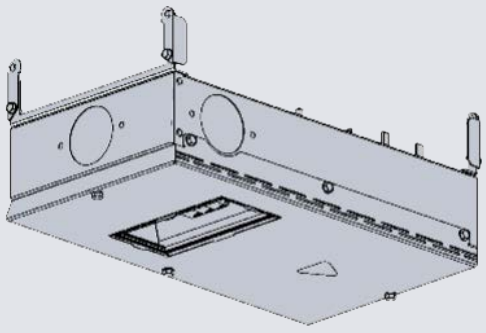
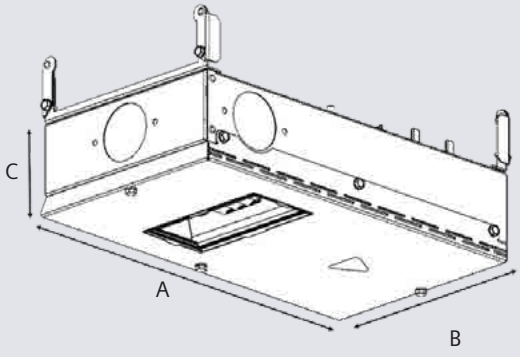
Connection	
Tap-off unit -C	**Dimensional drawing**
	

Fig. 5/9: **Cubic tap-off unit, LData system**

The dimensions stated above are defined as follows:

LData system	I_{nC}	**A**	**B**	**C**	**Order designation**
	A	**mm**	**mm**	**mm**	
LDATA-T-0325H-21-CB-001	32	450	250	110	8PS2040-0AA00-1AA8
LDATA-T-0325H-21-CB-002	32				8PS2040-0AA00-2AA0
LDATA-T-0325H-21-CB-003	2 x 32				8PS2040-0AA00-2AA1
LDATA-T-0805H-21-CB-001	80	490	250	150	8PS2040-0AA00-2AA4
LDATA-T-1255H-21-CB-001	125				8PS2040-0AA00-2AA5

Tab. 5/8: **Cubic tap-off units: dimension table, LData system**

5.9.2 L-Shaped Tap-off Unit

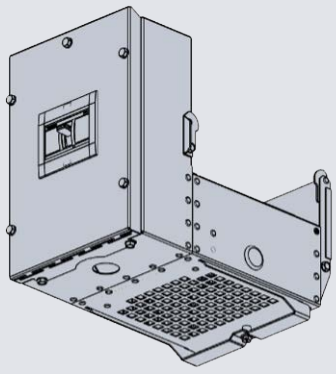
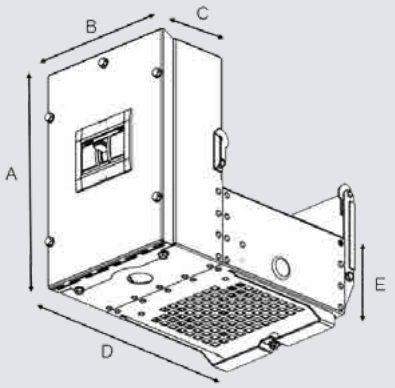
Tap-off unit -L	Dimensional drawing
	
The switching device unit can be located in front of or behind the busbar unit (see configuration).	

Fig. 5/10: **L-shaped tap-off unit, LData system**

The dimensions stated above are defined as follows:

LData system	I_{nC}	Position of switching-device unit	A	B	C	D	E	Order designation
	A		mm	mm	mm	mm	mm	
LDATA-T-0325H-21-LP-001	32	front	400	220	120	350	170	8PS2040-0AA00-1AA2
LDATA-T-0325H-21-LP-901	32	rear						8PS2040-0AA00-1AA5
LDATA-T-0325H-21-LP-002	32	front						8PS2040-0AA00-1AA4
LDATA-T-0325H-21-LP-902	32	rear						8PS2040-0AA00-1AA6
LDATA-T-0325H-21-LP-003	2 x 32	front						8PS2040-0AA00-1AA3
LDATA-T-0325H-21-LP-903	2 x 32	rear						8PS2040-0AA00-1AA7
LDATA-T-0805H-21-LP-001	80	front						8PS2040-0AA00-2AA2
LDATA-T-0805H-21-LP-901	80	rear						8PS2040-0AA00-2AA6
LDATA-T-1255H-21-LP-001	125	front						8PS2040-0AA00-2AA3
LDATA-T-1255H-21-LP-901	125	rear						8PS2040-0AA00-2AA7
Note: The dimensions refer to the tap-off units in the premium version (with mobile contact system). The basic version has different dimensions.								

Tab. 5/9: **L-shaped tap-off units: dimension table, LData system**

5.10 Selection List for Accessories (-Z)

To complete the LData system, the corresponding accessories are offered:

5.10.1 Fixing Bracket (-B)

The LData system can be fixed to the building element by means of the following components and with the help of threaded rods or similar:

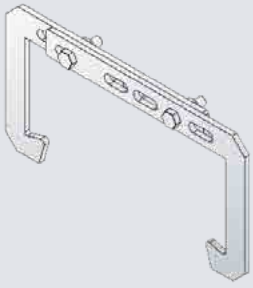
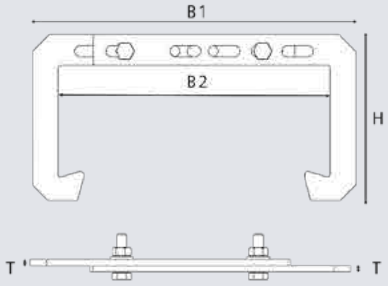
Fixing bracket	Dimensional drawing	Order designation
LDATA-ZB-1	B1: 255 mm / B2: 215 mm / H: 130 mm / T: 5 mm	8PS2071-0AA00-0AA1
		
Note: The fixing bracket can be used for LData systems of both heights (180 / 220 mm).		

Fig. 5/11: **Fixing bracket: dimension table, LData system**

5.10.2 End Cap

To close the LData system at the run end, an end cap is required. This is always attached on the side with the side hook. An end cap is always part of an incoming cable connection unit and therefore does not need to be ordered separately.

Note
An end cap can be ordered as a spare part.

5.11 General Technical Specifications of the LData System

General technical data							
System designation			**LDATA-10005H...**	**LDATA-12005H...**	**LDATA-16005H...**	**LDATA-20005H...**	**LDATA-22505H...**
Rated operational voltage		V	600				
Rated frequency		Hz	50				
Ambient temperature min./max./24-h mean		°C	-5/40/35				
Standards and specifications			IEC 61439-1 /-6				
Color			RAL 9005 (black)				
Degree of protection			IP21				
Rated current I_e horizontal edgewise		A	1000	1250	1600	2000	2250
Conductor material			Al				
Conductor cross-section (phases, N, PE)		mm²	524	524	698	1014	1203
Weight		kg/m	20.0	20.0	22.4	26.9	30.4
Rated short-time withstand current	I_{cw} (1s)	kA	40	40	40	40	40
Rated peak withstand current	I_{pk}	kA	84	84	84	84	84
Maximum fixing distances		m	3	3	3	3	3
Fire load		kWh/m	3.65	3.60	3.79	4.12	4.38
Enclosure dimensions	H x W	mm	180 x 220	220 x 220	220 x 220	220 x 220	220 x 220

Tab. 5/10: **General technical specifications of the LData system**

Impedances of the LData tap-off units								
System designation				**LDATA-10005H...**	**LDATA-12005H...**	**LDATA-16005H...**	**LDATA-20005H...**	**LDATA-22505H...**
Rated current I_e horizontal edgewise	IP21	I_e	A	1000	1250	1600	2000	2250
Impedance per unit length of conducting paths with 50 Hz and 20 °C busbar temperature	R'_{20}		mΩ/m	0.06	0.061	0.046	0.032	0.027
	X'_{20}		mΩ/m	0.059	0.059	0.048	0.037	0.032
	Z'_{20}		mΩ/m	0.084	0.085	0.067	0.049	0.042
Impedance per unit length of conducting paths with 50 Hz and 140 °C busbar temperature	R'_{140}		mΩ/m	0.089	0.089	0.067	0.046	0.039
	X'_{140}		mΩ/m	0.059	0.059	0.049	0.037	0.032
	Z'_{140}		mΩ/m	0.106	0.106	0.083	0.060	0.051
Fault loop impedance phase - PE(N) with 20 °C busbar temperature	$R'_{b20phPE(N)}$		mΩ/m	0.121	0.122	0.098	0.073	0.061
	$X'_{bphPE(N)}$		mΩ/m	0.207	0.195	0.168	0.143	0.121
	$Z'_{b20phPE(N)}$		mΩ/m	0.239	0.230	0.194	0.161	0.136
Fault loop impedance phase - N with 20 °C busbar temperature	R'_{b20phN}		mΩ/m	0.131	0.131	0.100	0.071	0.060
	X'_{bphN}		mΩ/m	0.158	0.158	0.132	0.104	0.090
	Z'_{b20phN}		mΩ/m	0.205	0.205	0.166	0.126	0.108
Zero-sequence impedance phases - PE(N) with 50 Hz and 20 °C busbar temperature	$R'_{(0)b20phPE(N)}$		mΩ/m	0.084	0.084	0.069	0.053	0.076
	$X'_{(0)bphPE(N)}$		mΩ/m	0.147	0.147	0.126	0.103	0.090
	$Z'_{(0)b20phPE(N)}$		mΩ/m	0.170	0.169	0.144	0.116	0.118
Zero-sequence impedance phases - N with 50 Hz and 20 °C busbar temperature	$R'_{(0)b20phN}$		mΩ/m	0.098	0.081	0.076	0.055	0.046
	$X'_{(0)bphN}$		mΩ/m	0.098	0.008	0.080	0.061	0.052
	$Z'_{(0)b20phN}$		mΩ/m	0.139	0.082	0.111	0.082	0.070
2,500 A on request								

Tab. 5/11: **Impedance values of the LData system**

General data			
Standards and specifications	IEC 61439-1 and -6		
Climatic resistance	Damp heat, steady state, according to IEC 60068-2-78 Damp heat, cyclic, according to IEC 60068-2-30		
Degree of protection	IP21		
Ambient temperature	min. –5 °C / max. +40 °C / 24-h mean +35 °C		
Overvoltage category / pollution degree	III / 3		
Rated insulation voltage U_i according to IEC 61439-1	400 V AC		
Rated operational voltage U_e	400 V AC3B		
Rated frequency	50 Hz / 60 Hz		
Color	RAL 9005		
Material	Sheet steel, galvanized, painted		
System-dependent data			
Type of tap-off unit	LDATA-T-0325H-21-CB-001 LDATA-T-0325H-21-LP-001 LDATA-T-0325H-21-LP-901	LDATA-T-0325H-21-CB-002 LDATA-T-0325H-21-LP-002 LDATA-T-0325H-21-LP-902	LDATA-T-0325H-21-CB-003 LDATA-T-0325H-21-LP-003 LDATA-T-0325H-21-LP-903
Type of miniature circuit breaker / molded case circuit breaker	MCB 1 x 32 A, 4p (5SY4432-6)	MCB 3 x 32 A, 1p (5SY4332-6)	MCB 2 x 32 A, 4p (5SY4432-6)
Design of tap-off unit	Cubic / L-shape	Cubic / L-shape	Cubic / L-shape
Current size I_{size}	32 A	32 A	32 A
Maximum permissible operational current I_{nC}	32 A	32 A	1 x 32 A 2 x 30.5 A (cubic) 2 x 28 A (L-shape)
Rated conditional short-circuit current I_{cc}	20 kA @ 415 V	20 kA @ 415 V	20 kA @ 415 V
Weights	9 kg	9 kg	9 kg
Type of tap-off unit	LDATA-T-0805H-21-CB-001 LDATA-T-0805H-21-LP-001 LDATA-T-0805H-21-LP-901	LDATA-T-1255H-21-CB-001 LDATA-T-1255H-21-LP-001 LDATA-T-1255H-21-LP-901	
Type of miniature circuit breaker / molded case circuit breaker	MCCB 3VA1 80 A (3VA1180-3EF32-0AA0)	MCCB 3VA1 125 A (3VA1112-3EF32-0AA0)	
Design of tap-off unit	Cubic / L-shape	Cubic / L-shape	
Current size I_{size}	80 A	125 A	
Maximum permissible operational current I_{nC}	80 A	125 A (cubic) 119 A (L-shape)	
Rated conditional short-circuit current I_{cc}	25 kA @ 415 V	25 kA @ 415 V	
Weights	10 kg	10 kg	

Tab. 5/12: **Technical specifications for tap-off unit, LData system**



Chapter 6

LD System – 1,100 to 5,000 A

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6 LD System – 1,100 to 5,000 A

The LD busbar trunking system (Fig. 6/1) is used for both power transmission and power distribution. It offers a high short-circuit withstand strength and is particularly suited for the connection from the transformer to the low-voltage main distribution board, and then to the sub-distribution boards.

In applications with high energy requirements, conventional power circuits frequently require the use of parallel cables. Here, the LD system offers optimum power distribution for both horizontal and vertical busbar runs. Coded pluggable tap-off units up to 1,600 A that meet extremely high safety standards are available for this purpose.

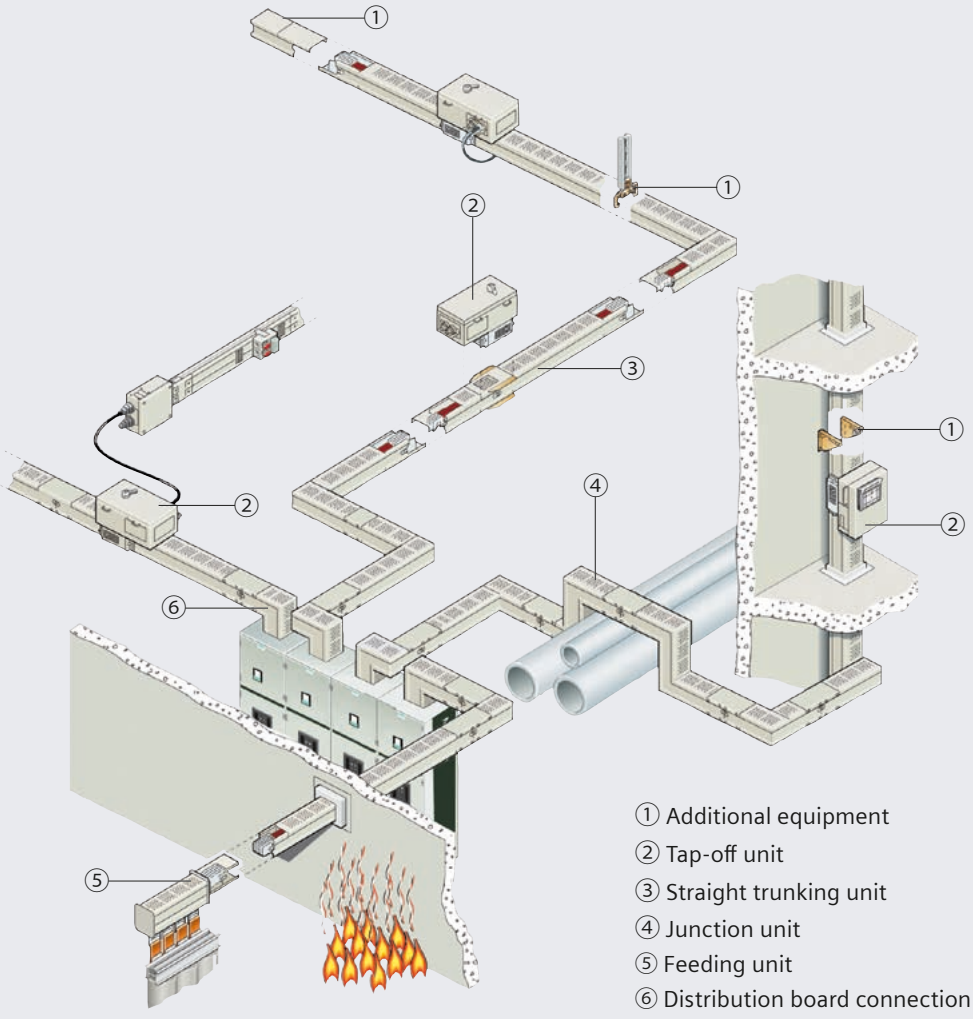


Fig. 6/1: **Overview of LD busbar trunking system**

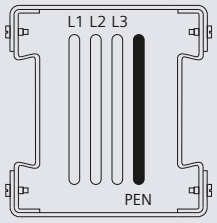
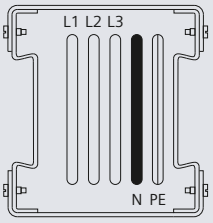
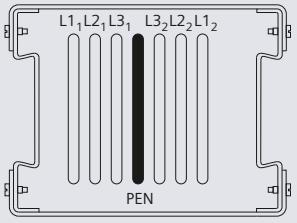
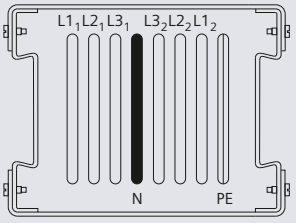
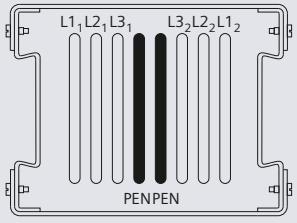
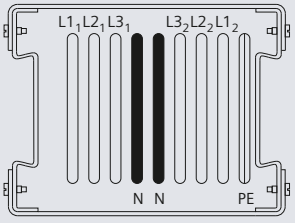
6.1 Versions and Properties

- Design verified low-voltage switchgear and controlgear assembly in accordance with IEC 61439-1/-6
- Busbar trunking system for applications from 1,100 to 5,000 A
- Galvanized enclosure, painted in light gray (RAL color 7035)
- 2 sizes and a total of 6 conductor configurations, each with copper (Cu) or aluminum (Al) as conductor material
- The aluminum conductors are nickel-plated and tinned; the copper conductors are tinned
- Due to the special surface treatment of the conductors, trunking units with different conductor materials can be combined
- Highly heat-resistant epoxy coating of the current conductors for insulation and for protection against water (verification of sprinkler test)
- Installed busbar supports ensure high short-circuit withstand strength values
- Hook-bolt connection with maintenance-free clamped bolt connection
- Standard degree of protection with closed top covers up to IP54; ventilated IP34
- Climatic resistance according to IEC 60068-2-1/-14/-30/-52/-61 and /-78
- Fire barriers tested to the fire resistance classes up to EI 120 according to EN 13501-2 are possible in order to fulfill the building regulations of the European standards
- Suitable for horizontal (edgewise or flat busbar position) and vertical mounting position
- Standardized system components such as:
  - Straight trunking units with or without tap-off points as optional lengths or for fixed standard lengths
  - Junction units with elbow, knee, offset knee, Z-units, and T-units
  - Special components, such as phase alteration units, transition units, or expansion compensation units
  - Feeding units for transformer, distribution board, and incoming cable connections
  - Coupling units
  - Tap-off units made of sheet steel, which can be modified while energized, with anti-rotation feature and coding
  - Accessories such as suspension brackets, end flanges, and fixing brackets.

Note
The LD system can also be used for operation with direct voltage: Particular components have been developed for this special case. However, this is not described in this document. If necessary, please get in touch with your Siemens contact partner for further information.

6.2 Design and Rated Current

The LD busbar trunking system is designed in two enclosure sizes. A total of 6 different conductor configurations are used according to the different rated currents, conductor materials, network configurations (4- or 5-pole), and the size of N, PE, or PEN conductors (Tab. 6/1).

Conductor configuration	4-pole	5-pole
180 mm × 180 mm	PEN = L	PE = N = L
LDA1.2. to LDA3.2. LDC2.2. to LDC3.2. [1)]		
240 mm × 180 mm	PEN = 1/2 L	PE = N = 1/2 L
LDA4.1. to LDA8.1. LDC6.1. to LDC8.1. [1)]		
240 mm × 180 mm	PEN = L	PE = 1/2 L, N = L
LDA4.2. to LDA8.2. LDC6.2. to LDC8.2. [1)]		

[1)] For description of the type codes, see Chapter 6.3

Tab. 6/1: **Conductor configurations of the LD system**

Three mounting positions of the busbars are distinguished (Fig. 6/2):
- Horizontal edgewise
- Horizontal flat
- Vertical.

The rated current of the respective busbar trunking system depends on the mounting position of the busbars inside the trunking unit. The highest rated current is reached with the horizontal edgewise mounting position and degree of protection IP34 with perforated top covers. In case of flat position, vertical installation, and height offsets greater than 1.3 m, the rated current is lower for thermal reasons.

In the case of degree of protection IP54 with closed top covers, a derating of the rated current must likewise be taken into account. However, no distinction between the horizontal/edgewise and vertical mounting position is necessary here. The permissible rated currents are given in the technical specifications. For details concerning configuration, positioning, fire barrier, expansion compensation, fixed points, anti-rotation feature of tap-off units, parallel connection of LD runs, and many more, please ask your Siemens contact partner.

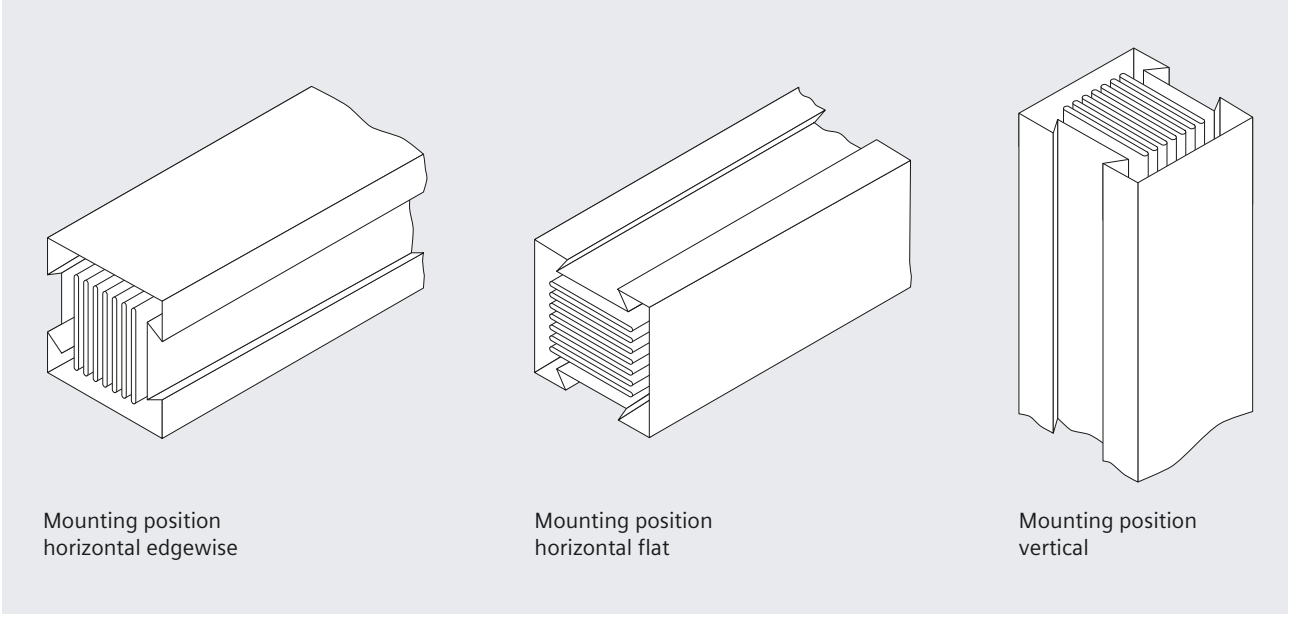


Fig. 6/2: **Schematic representation of the busbar mounting positions for the LD system**

6.3 Type Codes

For the LD busbar trunking system, the type code for trunking units, junction units, feeding units, and connections is composed of three parts as a maximum:

- The basic key that identifies the trunking system
- The selection key that characterizes the desired trunking unit, feeding unit, or the connection, and is added to the basic key
- The type suffix that defines (partly alternative) additional specifications such as fixed point, fire barrier, flange plate, or phase sequence for a more detailed specification of the selected system component, and is attached to the type code.

For tap-off units, accessories, fire barrier elements, as well as transport and installation equipment, separate type codes are specified in Chapter 6.3.3 and Chapter 6.3.4.

For the type codes, it has to be observed that the dimensions * and ** must be added in Tab. 6/3 to Tab. 6/5. These dimensions are to be specified in meters (m). For optional dimensions, whose range limits are determined in the following, a grid of 0.01 m applies, if not stated otherwise.

LD								A	N	N	N	N
Conductor material												
Aluminum (Al)								A				
Copper (Cu)								C				
Rated current I_n												
Degree of protection IP34				Degree of protection IP54		Degree of protection IP31 / IP54						
Horizontal edgewise incl. vertical height offsets smaller than 1.3 m		Vertical with height offsets greater than 1.3 m		Horizontal edgewise and vertical		Horizontal flat						
Al	Cu	Al	Cu	Al	Cu	Al	Cu					
1,100 A		950 A		900 A		700 A		1				
1,250 A	2,000 A	1,100 A	1,650 A	1,000 A	1,600 A	750 A	1,200 A	2				
1,600 A	2,600 A	1,250 A	2,100 A	1,200 A	2,000 A	1,000 A	1,550 A	3				
2,000 A		1,700 A		1,500 A		1,200 A		4				
2,500 A		2,100 A		1,800 A		1,700 A		5				
3,000 A	3,400 A	2,300 A	2,700 A	2,000 A	2,600 A	1,800 A	2,000 A	6				
3,700 A	4,400 A	2,800 A	3,500 A	2,400 A	3,200 A	2,200 A	2,600 A	7				
4,000 A	5,000 A	3,400 A	4,250 A	2,700 A	3,600 A	2,350 A	3,000 A	8				
Version												
4-conductor									4			
5-conductor									6			
Conductor configuration for N / PEN												
1/2 L										1		
L										2		
Degree of protection												
IP34 (IP31 for horizontal flat)												3
IP54												5
Selection example: In a project, a rated current of 2,400 A is determined. Aluminum is to be used as conductor material. The routing is executed in a horizontal edgewise way without height offsets. A 4-pole system is mandatory. The cross-section of the protective earth conductor must be equal to the phase conductor cross-section. The necessary degree of protection is IP34. This results in the basic key: LDA5423												

Tab. 6/2: **Basic keys for the type code structure of the LD system**

6.3.1 Basic Key

The system size is determined by the required rated current (Tab. 6/2). Among other things, the rated current depends on the position of the busbars and the trunking unit (for the mounting position, see Fig. 6/2 and illustration of the viewing direction in Fig. 6/3). For the basic key, the conductor configuration and the degree of protection must also be observed.

6.3.2 Selection Keys and Type Suffixes

The type codes for the different available trunking units, feeding units, connections, and tap-off units are summarized in several overviews (the type suffixes required must be added):

- Tab. 6/3 and Fig. 6/4 for straight trunking units plus the complete type code for transition units
- Tab. 6/4 for junction units and T-type trunking units
- Tab. 6/5 for distribution board connection units (non-Siemens distribution boards and SIVACON S8 power distribution boards) and complete type codes for distribution board connection flanges
- Tab. 6/6 for universal connection units, with the following applying to the basic key (see Tab. 6/2):
  - LD.3... for trunking systems with rated current key 1, 2, and 3
  - LD.6... for trunking systems with rated current key 4, 5, and 6
  - LD.7... and LD.8... according to Tab. 6/2.

Note: The connection to a SIVACON S8 power distribution board provides a low-voltage switchgear and controlgear assembly, design verified according to IEC 61439-1 and -6.

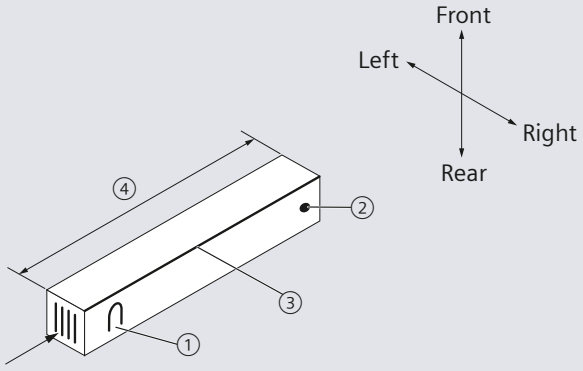
The length specifications given in the tables describing the type codes as well as in the corresponding graphics and dimensional drawings are summarized in the following:

- A Length of add-on unit (straight)
- AD. Distance between center of tap-off point and unit end (hook side)
- ADmin Minimum distance between center of tap-off point and unit end
- AX Add-on unit: limb length X
- AY Add-on unit: limb length Y
- D Length of expansion compensation unit
- DX Distance between center of expansion compensation unit and unit end (hook side)
- S Standard length
- T For T-units: length of basic unit
- TX Dimension from center of T-tap-off to unit end (hook side)
- TY Dimension from center of T-tap-off to unit end (bolt side)
- W Optional length
- X Limb length X
- Y Limb length Y
- Z Limb length Z

As the components depend on the system size, the complete type codes are specified for incoming cable connection units and for distribution board connection pieces:

Tab. 6/7 for incoming cable connection units with three enclosures of different sizes (with the respective adjustments for the basic key)

Tab. 6/8 for distribution board connection pieces to non-Siemens distribution boards and to SIVACON S8 power distribution boards.



① Hook side (opening direction of the hook ∩ or ∪)
② Bolt side (nut of the clamped bolt connection – is always on the side of the PE, PEN, or $L1_2$ – see Tab. 6/1)
③ Position of the PE, PEN, or $L1_2$
④ Length (sheet dimension without flange cover)

Fig. 6/3: **Schematic representation of an LD trunking unit and determination of the viewing direction**

Straight trunking units, horizontal (Fig. 6/4)					
Without tap-off points	Basis	Selection key			
Standard length (3 lengths: 1.6 m; 2.4 m; 3.2 m) [1), 3)]	LD.....	-1.6	-2.4	-3.2	
Optional length, single bolt (4 lengths: 0.5 m ... 0.89 m; 0.9 m ... 1.59 m; 1.61 m ... 2.39 m; 2.41 ... 3.19 m) [1), 2), 3)]	LD.....	-1W*	-2W*	-3W*	-4W*
Optional length, double bolt (4 lengths: 0.5 m ... 0.89 m; 0.9 m ... 1.59 m; 1.60 m ... 2.39 m; 2.40 ... 3.20 m) [1), 2), 3)]	LD.....	-J-1W*	-J-2W*	-J-3W*	-J-4W*
Expansion compensation (1.2 m long)	LD.....	-D			
With tap-off points	Basis	Selection key			
Standard length 3.2 m with 3 tap-off points AD (0.6 m + 1.6 m + 2.6 m) top; bottom; top + bottom [3)]	LD.....	-K-3,2-3AD	-K-3,2-3ADU	-K-3,2-3ADO+U	
Standard length 3.2 m with 2 tap-off points AD (0.8 m + 2.4 m) top + bottom [3)]	LD.....			-K-3,2-2ADO+U	
Standard length 3.2 m with 1 tap-off point AD (2.4 m) top; bottom; top + bottom [3)]	LD.....	-K-3,2-AD2,4	-K-3,2-ADU2,4	-K-3,2-ADO+U2,4	
Standard length 3.2 m with 1 tap-off point AD (0.8 m) top; bottom; top + bottom [3)]	LD.....	-K-3,2-AD0,8	-K-3,2-ADU0,8	-K-3,2-ADO+U0,8	
Optional length 2.2 m ... 2.4 m with 2 tap-off points (0.6 m + 1.4 ... 1.8 m: 0.2-m-grid) top + bottom [3)]	LD.....			-K-2W*-2ADO+U**	
Optional length 2.41 m ... 3.2 m with 2 tap-off points (0.6 m + 1.4 ... 2.6 m: 0.2-m-grid) top + bottom [3)]	LD.....			-K-3W*-2ADO+U**	
Optional length 1.2 m ... 1.6 m with 1 tap-off point (0.6 m ... 1.0 m: 0.2-m-grid) top; bottom; top + bottom [3)]	LD.....	-K-1W*-AD**	-K-1W*-ADU**	-K-1W*-ADO+U**	
Optional length 1.61 m ... 2.4 m with 1 tap-off point (0.6 m ... 1.8 m: 0.2-m-grid) top; bottom; top + bottom [3)]	LD.....	-K-2W*-AD**	-K-2W*-ADU**	-K-2W*-ADO+U**	
Optional length 2.41 m ... 3.2 m with 1 tap-off point (0.6 m ... 2.6 m: 0.2-m-grid) top; bottom; top + bottom [3)]	LD.....	-K-3W*-AD**	-K-3W*-ADU**	-K-3W*-ADO+U**	
Straight trunking unit, vertical (always with expansion compensation and fixed point) (Fig. 6/4)					
Without tap-off points	Basis	Selection key			
Standard length (2 lengths: 2.4 m; 3.2 m) [1)]	LD.....		-V-2,4	-V-3,2	
Optional length (3 lengths: 2.29 m ... 2.8 m; 2.81 m ... 3.0 m; 3.01 m ... 3.19 m) [1)]	LD.....	-V-1W*	-V-2W*	-V-3W*	
With 1 tap-off point	Basis	Selection key			
Standard length 3.2 m with 1 tap-off point AD (1.4 m; 1.8 m) top [1), 4)]	LD.....	-K-V-3,2-AD1,4	-K-V-3,2-AD1,8		
Standard length 2.4 m with 1 tap-off point AD (1.4 m) top	LD.....	-K-V-2,4-AD1,4			
Optional length 2.29 m ... 2.8 m with 1 tap-off point (1.4 m; 1.8 m) top [1), 4)]	LD.....	-K-1W*-AD1,4	-K-1W*-AD1,8		
Optional length 2.81 m ... 3.0 m with 1 tap-off point (1.4 m; 1.8 m) top [1), 4)]	LD.....	-K-2W*-AD1,4	-K-2W*-AD1,8		
Optional length 3.01 m ... 3.19 m with 1 tap-off point (1.4 m; 1.8 m) top [1), 4)]	LD.....	-K-3W*-AD1,4	-K-3W*-AD1,8		
Transition units for horizontal and vertical installation (Fig. 6/4)					
Conductor material Al, rated current max. 1,600 A; length 1.2 m	LDA5.../LDA3...				
Conductor material Cu, rated current max. 2,600 A; length 1.2 m	LDC7.../LDC3...				
Phase alteration units for power transmission over long distances (Fig. 6/4)[5)]					
	LD...-PT				

* Length of the trunking unit in m

** Positioning of the tap-off point in m

1) Type suffix for fire barrier: +LD-L....-X* or +LD-L....-Y* (L120A for basis LD.1... to LD.3... and L120B for LD.4... to LD.8...; * positioning in m)

2) Fire barrier possible for LD.1... to LD.7... from optional length 0.92 m or 0.96 m (double bolt) and for LD.8... from optional length 1.12 m or 1.16 m (double bolt)

3) Type suffix for fixed point: LD-FP; also for specification ...-ADO+U (tap-off point top and bottom), only one tap-off point can be mounted

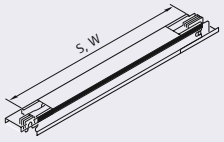
4) Minimum distance 1.1 m for fire barrier (X1.10); for trunking units with AD1,4 or AD1,8 only possible from 2.05 m (X2.05) or 2.45 m (X2.45)

5) The phase alteration units are available in size LD.3... (for systems LD.1... to LD.3...) and LD.8 (for systems LD.4... to LD.8...) respectively for all conductor configurations, degrees of protection, and conductor materials

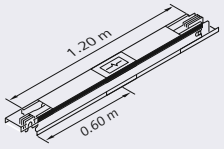
Tab. 6/3: **Type code structure for straight trunking units, transition units, and phase alteration units of the LD system**

Straight trunking units, horizontal

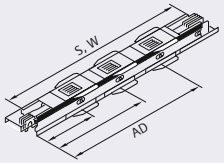
without tap-off points
and without expansion compensation
LD.....-1,6/-2,4/-3,2
LD.....-1W.../-2W.../-3W.../-4W...
LD.....-J-1W.../-J-2W.../-J-3W.../-J-4W...



with expansion compensation
LD.....-D



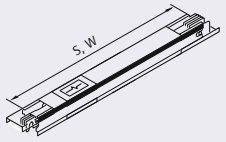
with tap-off points
LD.....-K-3,2-...
LD.....-K-1W.../-K-2W.../-K-3W...



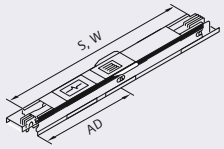
Straight trunking units, vertical with expansion compensation and fixed point

without tap-off points

LD.....-V-2,4/-3,2
LD.....-V-1W.../-2W.../-3W...
LD.....-J-1W/-J-2W/-J-3W/-J-4W

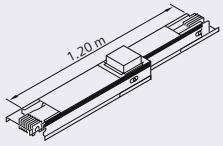


with one tap-off point
LD.....-K-V-3,2-.../-K-V-2,4-...
LD.....-K-V-1W.../-K-V-2W.../-K-V-3W...



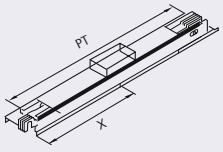
Transition units

LDA5.../LDA3...
LDC7.../LDC3...



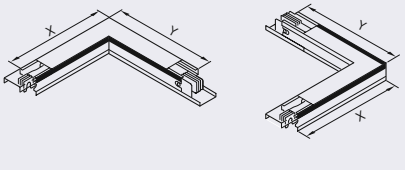
Phase alteration units for power transmission over long distances

LD...-PT



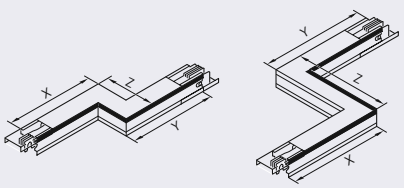
Angled trunking units, horizontal

Elbow:
LD.....-LR...
LD.....-LL...



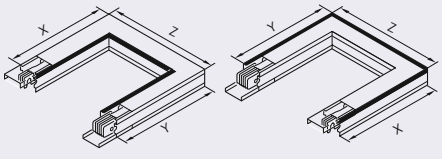
right left

Z-unit, flat:
LD.....-ZR...
LD.....-ZL...



right left

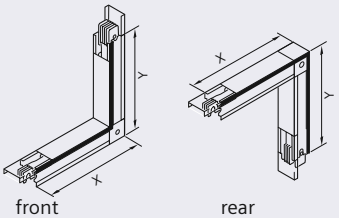
U-unit, flat:
LD.....-UR...
LD.....-UL...



right left

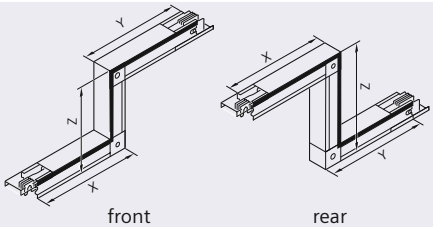
Angled trunking units, horizontal and vertical

Knee:
LD.....-LV...
LD.....-LH...



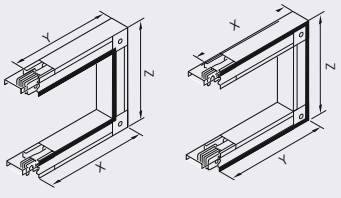
front rear

Z-unit, edgewise:
LD.....-ZV...
LD.....-ZH...



front rear

U-unit, edgewise:
LD.....-UV...
LD.....-UH...



front rear

Fig. 6/4: **Illustration of straight trunking unit types, transition units (for Fig. 6/3), and junction units (for Fig. 6/4)** (see page 204)

Leveled junction units (Fig. 6/4)					
Horizontal installation	Basis	Selection key			
Elbow, right: X0.5/Y0.5 or X0.51 ... 1.24/Y0.5 or X0.5/Y0.51 ... 1.24 or X0.51 ... 1.24/Y0.51 ... 1.24 [1), 2)]	LD.....	-LR	-LR-X*	-LR-Y*	-LR-X*/Y*
Elbow, left: X0.5/Y0.5 or X0.51 ... 1.24/Y0.5 or X0.5/Y0.51 ... 1.24 or X0.51 ... 1.24/Y0.51 ... 1.24 [1), 2)]	LD.....	-LL	-LL-X*	-LL-Y*	-LL-X*/Y*
Z-unit flat, right or left: X0.5/Y0.5 and Z0.36 ... 0.99 (LD.1... to LD.3...) or Z0.48 ... 0.99 (LD.4... to LD.8...)	LD.....	-ZR-Z*	-ZL-Z*		
U-unit flat, right or left: X0.5/Y0.5 and Z0.46 ... 0.99 (LD.1... to LD.3...) or Z0.58 ... 0.99 (LD.4... to LD.8...)	LD.....	-UR-Z*	-UL-Z*		
Horizontal and vertical installation	Basis	Selection key			
Knee, front: X0.5/Y0.5 or X0.51 ... 1.24/Y0.5 or X0.5/Y0.51 ... 1.24 or X0.51 ... 1.24/Y0.51 ... 1.24 [1), 3)]	LD.....	-LV	-LV-X*	-LV-Y*	-LV-X*/Y*
Knee, rear: X0.5/Y0.5 or X0.51 ... 1.24/Y0.5 or X0.5/Y0.51 ... 1.24 or X0.51 ... 1.24/Y0.51 ... 1.24 [1), 3)]	LD.....	-LH	-LH-X*	-LH-Y*	-LH-X*/Y*
Z-unit edgewise, front or rear: X0.5/Y0.5 and Z0.36 ... 0.99	LD.....	-ZV-Z*	-ZH-Z*		
U-unit edgewise, front or rear: X0.5/Y0.5 and Z0.5 ... 0.99	LD....	-UV-Z*	-UH-Z*		
Junction units with offset (Fig. 6/5)					
Z-offset, Z fixed (LD.1... to LD.3...: Z = 0.36 m; LD.4... to LD.8...: Z = 0.42 m)	Basis	Selection key			
Elbow offset, right-front: X0.5/Y0.5 or X0.51 ... 1.24/Y0.5 or X0.5/Y0.51 ... 1.24 or X0.51 ... 1.24/Y0.51 ... 1.24 [1), 4)]	LD.....	-LRV	-LRV-X*	-LRV-Y*	-LRV-X*/Y*
Elbow offset, right-rear: X0.5/Y0.5 or X0.51 ... 1.24/Y0.5 or X0.5/Y0.51 ... 1.24 or X0.51 ... 1.24/Y0.51 ... 1.24 [1), 4)]	LD.....	-LRH	-LRH-X*	-LRH-Y*	-LRH-X*/Y*
Elbow offset, left-front: X0.5/Y0.5 or X0.51 ... 1.24/Y0.5 or X0.5/Y0.51 ... 1.24 or X0.51 ... 1.24/Y0.51 ... 1.24 [1), 4)]	LD.....	-LLV	-LLV-X*	-LLV-Y*	-LLV-X*/Y*
Elbow offset, left-rear: X0.5/Y0.5 or X0.51 ... 1.24/Y0.5 or X0.5/Y0.51 ... 1.24 or X0.51 ... 1.24/Y0.51 ... 1.24 [1), 4)]	LD.....	-LLH	-LLH-X*	-LLH-Y*	-LLH-X*/Y*
Knee offset, front-right: X0.5/Y0.5 or X0.51 ... 1.24/Y0.5 or X0.5/Y0.51 ... 1.24 or X0.51 ... 1.24/Y0.51 ... 1.24 [1), 5)]	LD.....	-LVR	-LVR-X*	-LVR-Y*	-LVR-X*/Y*
Knee offset, rear-right: X0.5/Y0.5 or X0.51 ... 1.24/Y0.5 or X0.5/Y0.51 ... 1.24 or X0.51 ... 1.24/Y0.51 ... 1.24 [1), 5)]	LD.....	-LHR	-LHR-X*	-LHR-Y*	-LHR-X*/Y*
Knee offset, front-left: X0.5/Y0.5 or X0.51 ... 1.24/Y0.5 or X0.5/Y0.51 ... 1.24 or X0.51 ... 1.24/Y0.51 ... 1.24 [1), 5)]	LD.....	-LVL	-LVL-X*	-LVL-Y*	-LVL-X*/Y*
Knee offset, rear-left: X0.5/Y0.5 or X0.51 ... 1.24/Y0.5 or X0.5/Y0.51 ... 1.24 or X0.51 ... 1.24/Y0.51 ... 1.24 [1), 5)]	LD.....	-LHL	-LHL-X*	-LHL-Y*	-LHL-X*/Y*
Optional Z-offset: Z = 0.36 ... 1.30 m for LD.1... to LD.3... (X = Y = 0.5 m fixed) Z = 0.42 ... 1.30 m for LD.4... to LD.8... (X = Y = 0.5 m fixed)	Basis	Selection key			
Elbow offset, right or left, each front or rear [1), 5)]	LD.....	-LRV-Z*	-LRH-Z*	-LLV-Z*	-LLH-Z*
Knee offset, front or rear, each right or left [1), 5)]	LD.....	-LVR-Z*	-LHR-Z*	-LVL-Z*	-LHL-Z*
T-shaped trunking units (Fig. 6/5)					
Add-on units without offset	Basis	Selection key			
Basic unit: length T = 1.2 m; limb: TX = 0.58 m; TY = 0.62 m; add-on unit at the top (AD) or bottom (ADU): height A = 0.5 m	LD.....	-T-AD-T	-T-ADU-T		
Add-on units with offset (height AY = 0.3 m; elbow AX = 0.5 m)	Basis	Selection key			
Basic unit as above; add-on unit at the top (AD) Offset: front-right or front-left, or rear-right or rear-left	LD.....	-T-AD-TVR	-T-AD-TVL	-T-AD-THR	-T-AD-THL
Basic unit as above; add-on unit at the bottom (ADU) Offset: front-right or front-left, or rear-right or rear-left	LD.....	-T-ADU-TVR	-T-ADU-TVL	-T-ADU-THR	-T-ADU-THL

* Length of the limb or for the offset in m

[1)] Type suffix for fire barrier: +LD-L....-X*, +LD-L....-Y* or +LD-L....-Z* (L120A for basis LD.1... to LD.3... and L120B for LD.4... to LD.8...; * positioning in m)

[2)] Fire barrier from optional length: X0,86 or Y0,90 for LD.1... to LD.3...; X0,92 or Y0,96 for LD.4... to LD.7...; X1,12 or Y1,16 for LD.8...

[3)] Fire barrier from optional length: X0,86 or Y0,90 for LD.1... to LD.7...; X1,06 or Y1,10 for LD.8...

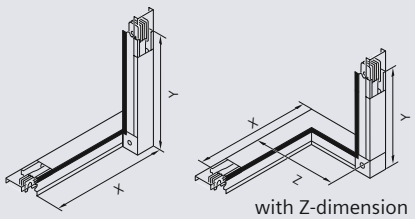
[4)] Fire barrier from optional length: X0,86 or Y0,90 or Z0,84 for LD.1... to LD.3...; X0,86 or Y0,96 or Z0,90 for LD.4... to LD.7...; X1,06 or Y1,16 or Z1,10 for LD.8...

[5)] Fire barrier from optional length: X0.86 or Y0.90 or Z0.84 for LD.1... to LD.3...; X0.92 or Y0.90 or Z0.90 for LD.4... to LD.7...; X1.12 or Y1.10 or Z1.10 for LD.8...

Tab. 6/4: **Type code structure for junction units and T-shaped trunking units of the LD system**

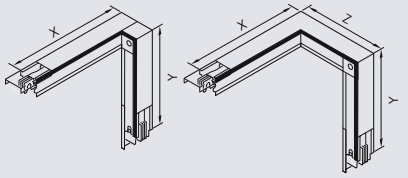
Angled, offset trunking units, horizontal and vertical

Knee offset
front-right:
LD.....-LVR...
LD.....-LVR-Z...



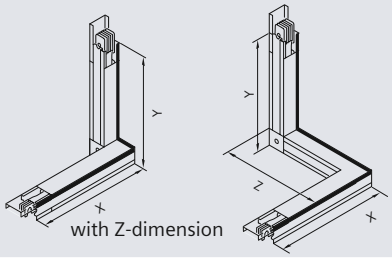
with Z-dimension

Knee offset
rear-right:
LD.....-LHR...
LD.....-LHR-Z...



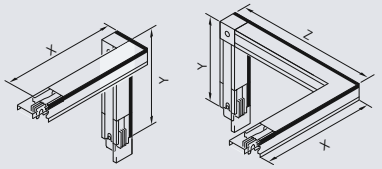
with Z-dimension

Knee offset
front-left:
LD.....-LVL...
LD.....-LVL-Z...



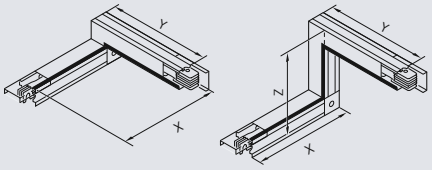
with Z-dimension

Knee offset
rear-left:
LD.....-LHL...
LD.....-LHL-Z...



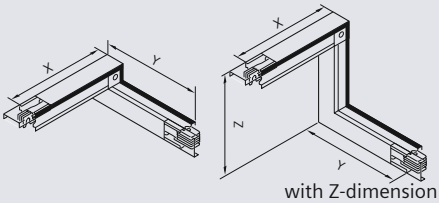
with Z-dimension

Elbow offset
right-front:
LD.....-LRV...
LD.....-LRV-Z...



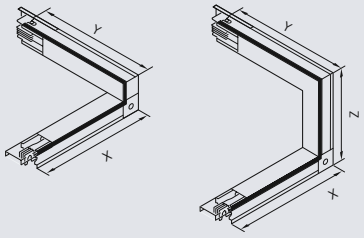
with Z-dimension

Elbow offset
right-rear:
LD.....-LRH...
LD.....-LRH-Z...



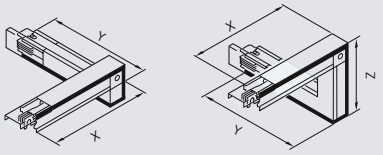
with Z-dimension

Elbow offset
left-front:
LD.....-LLV...
LD.....-LLV-Z...



with Z-dimension

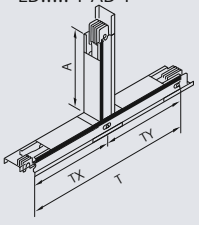
Elbow offset
left-rear:
LD.....-LLH...
LD.....-LLH-Z...



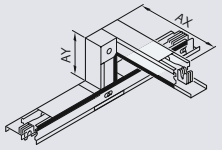
with Z-dimension

T-units with add-on unit at the top

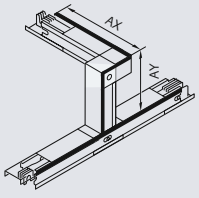
straight:
LD.....-T-AD-T



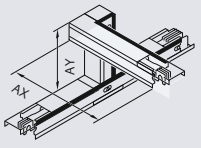
offset front-right:
LD.....-T-AD-TVR



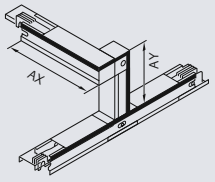
offset front-left:
LD.....-T-AD-TVL



offset rear-right:
LD.....-T-AD-THR

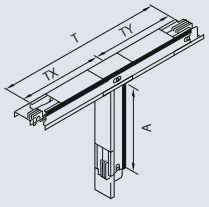


offset rear-left:
LD.....-T-AD-THL

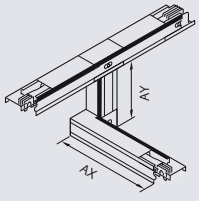


T-units with add-on unit at the bottom

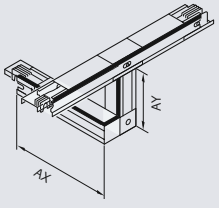
straight:
LD.....-T-ADU-T



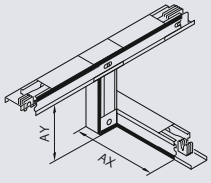
offset front-right:
LD.....-T-ADU-TVR



offset front-left:
LD.....-T-ADU-TVL



offset rear-right:
LD.....-T-ADU-THR



offset rear-left:
LD.....-T-ADU-THL

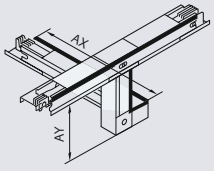


Fig. 6/5: **Illustration of junction units with offset and T-shaped trunking units (for Tab. 6/4)**

Distribution board connection units to SIVACON S8 power distribution boards					
Straight trunking units*)	Basis	Selection key			
3 optional lengths: W0.50 ... 1.60 or W1.61 ... 2.40 or W2.41 ... 3.20 1)	LD.....	-VEU-1W*	-VEU-2W*	-VEU-3W*	
Knee without offset	Basis	Selection key			
Knee, front: X0.5/Y0.5 or X0.51 ... 1.24/Y0.5 or X0.5/Y0.51 ... 1.24 or X0.51 ... 1.24/Y0.51 ... 1.24 1), 2)	LD.....	-VEU-LV	-VEU-LV-X*	--VEU-LV-Y*	-VEU-LV-X*/Y*
Knee, rear: X0.5/Y0.5 or X0.51 ... 1.24/Y0.5 or X0.5/Y0.51 ... 1.24 or X0.51 ... 1.24/Y0.51 ... 1.24 1), 2)	LD.....	-VEU-LH	-VEU-LH-X*	-VEU-LH-Y*	-VEU-LH-X*/Y*
Knee with offset, Z fixed: LD.1... to LD.3...: Z = 0.36 m; LD.4... to LD.8...: Z = 0.42 m)	Basis	Selection key			
Knee offset, front-right: X0.5/Y0.5 or X0.51 ... 1.24/Y0.5 or X0.5/Y0.51 ... 1.24 or X0.51 ... 1.24/Y0.51 ... 1.24 1), 3)	LD.....	-VEU-LVR	-VEU-LVR-X*	-VEU-LVR-Y*	-VEU-LVR-X*/Y*
Knee offset, rear-right: X0.5/Y0.5 or X0.51 ... 1.24/Y0.5 or X0.5/Y0.51 ... 1.24 or X0.51 ... 1.24/Y0.51 ... 1.24 1), 3)	LD.....	-VEU-LHR	-VEU-LHR-X*	-VEU-LHR-Y*	-VEU-LHR-X*/Y*
Knee offset, front-left: X0.5/Y0.5 or X0.51 ... 1.24/Y0.5 or X0.5/Y0.51 ... 1.24 or X0.51 ... 1.24/Y0.51 ... 1.24 1), 3)	LD.....	-VEU-LVL	-VEU-LVL-X*	-VEU-LVL-Y*	-VEU-LVL-X*/Y*
Knee offset, rear-left: X0.5/Y0.5 or X0.51 ... 1.24/Y0.5 or X0.5/Y0.51 ... 1.24 or X0.51 ... 1.24/Y0.51 ... 1.24 1), 3)	LD.....	-VEU-LHL	-VEU-LHL-X*	-VEU-LHL-Y*	-VEU-LHL-X*/Y*
Knee with offset, Z optional (X = Y = 0.5 m fixed) LD.1... to LD.3...: Z = 0.36 ... 1.30 m LD.4... to LD.8...: Z = 0.42 ... 1.30 m	Basis	Selection key			
Knee offset, front or rear, each right or left 1), 3)	LD.....	-VEU-LVR-Z*	-LVR-LHR-Z*	-LVR-LVL-Z*	-LVR-LHL-Z*
Distribution board connection units for distribution board connection, incoming cable connection, and transformer connection					
Knee without offset**)	Basis***)	Selection key			
Knee, front: X0.5/Y0.3 or X0.51 ... 1.24/Y0.3 1), 4)	LD.....	-VEV	-VEV-X*		
Knee, rear: X0.5/Y0.3 or X0.51 ... 1.24/Y0.3 1), 4)	LD.....	-VEH	-VEH-X*		
Knee with offset, Z fixed: LD.1... to LD.3...: Z = 0.36 m LD.4... to LD.8...: Z = 0.42 m)	Basis	Selection key			
Knee offset, front-right: X0.5/Y0.3 or X0.51 ... 1.24/Y0.3 1), 5)	LD.....	-VEVR	-VEVR-X*		
Knee offset, front-left: X0.5/Y0.3 or X0.51 ... 1.24/Y0.3 1), 5)	LD.....	-VEVL	-VEVL-X*		
Knee offset, rear-right: X0.5/Y0.3 or X0.51 ... 1.24/Y0.3 1), 5)	LD.....	-VEHR	-VEHR-X*		
Knee offset, rear-left: X0.5/Y0.3 or X0.51 ... 1.24/Y0.3 1), 5)	LD.....	-VEHL	-VEHL-X*		
Knee with offset, Z optional (X = 0.5 m and Y = 0.3 m fixed) LD.1... to LD.3...: Z = 0.36 ... 1.30 m LD.4... to LD.8...: Z = 0.42 ... 1.30 m	Basis	Selection key			
Knee offset, front or rear, each right or left 1), 5)	LD.....	-VEVR-Z*	-VEHR-Z*	-VEVL-Z*	-VEHL-Z*
Distribution board connection flanges (sheet-steel cover; attention: complete type code, as no basic key required)					
Length S = 0.185 m for connection to LD.1... to LD.3...	LD-VEG1				
Length S = 0.185 m for connection to LD.4... to LD.8...	LD-VEG2				

* Length of the limb or for the offset in m

1) Type suffix for fire barrier: +LD-L....-X*, +LD-L....-Y* or +LD-L....-Z* (L120A for basis LD.1... to LD.3... and L120B for LD.4... to LD.8...; * positioning in m)

2) Fire barrier from optional length: X0.86 for LD.1... to LD.7...; X1.06 for LD.8...

3) Fire barrier from optional length: X0.86 or Z0.84 for LD.1... to LD.3...; X0.92 or Z0.90 for LD.4... to LD.7...; X1.12 or Z1.10 for LD.8..

4) Fire barrier from optional length: X0.86 for LD.1... to LD.7...; X1.06 for LD.8...

5) Fire barrier from optional length: X0.86 for LD.1... to LD.3...; X0.92 for LD.4... to LD.7...; X1.12 for LD.8..

6) Also to be used for distribution board connection pieces LD...-FA3(4)A(B)

7) To be used for distribution board connection piece LD...-FA1

8) Only to be used for universal connection units with T-tap-off (LD...-AS...-T)

Tab. 6/5: **Type code structure for distribution board connection units and type code structure for distribution board connection flanges of the LD system**

Distribution board connection units

Straight trunking unit for

SIVACON S8
LD.....-VEU-1W...
LD.....-VEU-2W...
LD.....-VEU-3W...



Distribution board connection flange [1] (sheet-steel cover) for

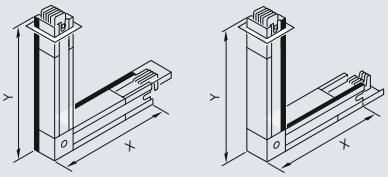
Distribution board connection [2]
LD-VEG1
LD-VEG2



Knee for

SIVACON S8
LD.....-VEU-LV...
LD.....-VEU-LH...

Distribution board connection [2]
LD.....-VEV...
LD.....-VEH...

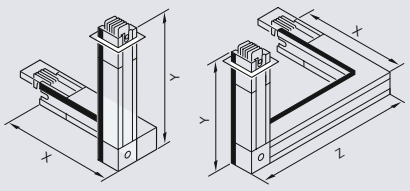


front rear

Knee offset front-right for

SIVACON S8
LD.....-VEU-LVR...
LD.....-VEU-LVR-Z...

Distribution board connection [2]
LD.....-VEVR...
LD.....-VEVR-Z...

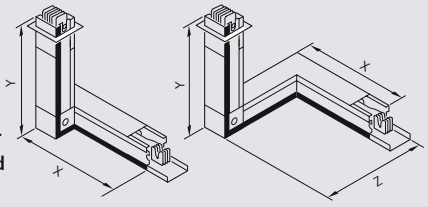


with Z-dimension

Knee offset rear-right for

SIVACON S8
LD.....-VEU-LHR...
LD.....-VEU-LHR-Z...

Distribution board connection [2]
LD.....-VEHR...
LD.....-VEHR-Z...

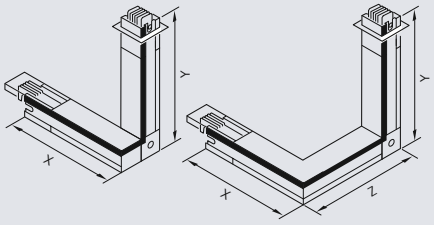


with Z-dimension

Knee offset front-left for

SIVACON S8
LD.....-VEU-LVL...
LD.....-VEU-LVL-Z...

Distribution board connection [2]
LD.....-VEVL...
LD.....-VEVL-Z...

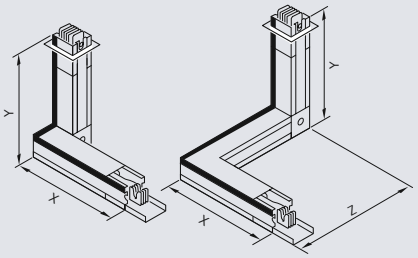


with Z-dimension

Knee offset rear-left for

SIVACON S8
LD.....-VEU-LHL...
LD.....-VEU-LHL-Z...

Distribution board connection [2]
LD.....-VEHL...
LD.....-VEHL-Z...



with Z-dimension

[1] Complete type codes
[2] For distribution board connection units, transformer connection units, incoming cable connection units

Fig. 6/6: **Illustration of the distribution board connection units described in Tab. 6/5**

Straight universal connection units										
Selection key		**AS1**	**AS2**	**AS3**	**AS4**	**Phase sequence of the tags**				**View**
Length in mm		725	1,085	1,430	1,930					
Setting range of tag distance in mm	As-delivered condition	150 ... 160	165 ... 180	450 ... 600 (200 ... 300) [1]	450 ... 600 (150 ... 250) [1]					
	Rotatable on site to 180°	165 ... 180	265 ... 280	605 ... 750 (200 ... 300) [1]	605 ... 750 (250 ... 350) [1]	①	②	③	④	
Selection key + type suffix +LD-.. for offset 1 or 2 and for phase sequence A to H [2]		AS1+LD-1A	AS2+LD-1A		AS4+LD-1A	L1	L2	L3	PEN(N)	1
		AS1+LD-1B	AS2+LD-1B		AS4+LD-1B	PEN(N)	L3	L2	L1	
		AS1+LD-1C	AS2+LD-1C		AS4+LD-1C	L3	L2	L1	PEN(N)	
		AS1+LD-1D	AS2+LD-1D		AS4+LD-1D	PEN(N)	L1	L2	L3	
				AS3+LD-1E		L1	L2	PEN(N)	L3	
				AS3+LD-1F		L3	PEN(N)	L2	L1	
				AS3+LD-1G		L3	L2	PEN(N)	L1	
				AS3+LD-1H		L1	PEN(N)	L2	L3	
		AS1+LD-2A	AS2+LD-2A		AS4+LD-2A	L1	L2	L3	PEN(N)	2
		AS1+LD-2B	AS2+LD-2B		AS4+LD-2B	PEN(N)	L3	L2	L1	
		AS1+LD-2C	AS2+LD-2C		AS4+LD-2C	L3	L2	L1	PEN(N)	
		AS1+LD-2D	AS2+LD-2D		AS4+LD-2D	PEN(N)	L1	L2	L3	
				AS3+LD-2E		L1	L2	PEN(N)	L3	
				AS3+LD-2F		L3	PEN(N)	L2	L1	
				AS3+LD-2G		L3	L2	PEN(N)	L1	
				AS3+LD-2H		L1	PEN(N)	L2	L3	
Type suffix for Al flange plate		+LD-FLP								
Universal connection units with T-tap-off										
Selection key		**AS1-T**	**AS2-T**	**AS3-T**	**AS4-T**	**Phase sequence of the tags**				**View**
Length in mm		725	1,085	1,430	1,930					
Setting range of tag distance in mm	As-delivered condition	150 ... 160	165 ... 180	450 ... 600 (200 ... 300) [1]	450 ... 600 (150 ... 250) [1]					
	Rotatable on site to 180°	165 ... 180	265 ... 280	605 ... 750 (200 ... 300) [1]	605 ... 750 (250 ... 350) [1]	①	②	③	④	
Selection key + type suffix +LD-.. for offset 1 or 2 and for phase sequence A to H [2]		AS1-T+LD-1A	AS2-T+LD-1A			L1	L2	L3	PEN(N)	3
		AS1-T+LD-1B	AS2-T+LD-1B			PEN(N)	L3	L2	L1	
		AS1-T+LD-1C	AS2-T+LD-1C			L3	L2	L1	PEN(N)	
		AS1-T+LD-1D	AS2-T+LD-1D			PEN(N)	L1	L2	L3	
				AS3-T+LD-1E		L1	L2	PEN(N)	L3	4
				AS3-T+LD-1G		L3	L2	PEN(N)	L1	
				AS3-T+LD-1F		L3	PEN(N)	L2	L1	5
				AS3-T+LD-1H		L1	PEN(N)	L2	L3	
					AS4-1T+LD-1A	L1	L2	L3	PEN(N)	6
					AS4-1T+LD-1C	L3	L2	L1	PEN(N)	
					AS4-2T+LD-1B	PEN(N)	L3	L2	L1	7
					AS4-2T+LD-1D	PEN(N)	L1	L2	L3	
					AS4-1T+LD-1B	PEN(N)	L3	L2	L1	8
					AS4-1T+LD-1D	PEN(N)	L1	L2	L3	
					AS4-2T+LD-1A	L1	L2	L3	PEN(N)	9
					AS4-2T+LD-1C	L3	L2	L1	PEN(N)	
Type suffix for Al flange plate		+LD-FLP								

[1] In brackets: setting range for the tag distance between PEN(N) and L3 or L1
[2] The type suffix for offset (see Fig. 6/14) and phase sequence of the connection tags is required for a complete type code

Tab. 6/6: **Selection keys for universal connection units "AS" of the LD system (for type code structure LD ..., see Tab. 6/2)**

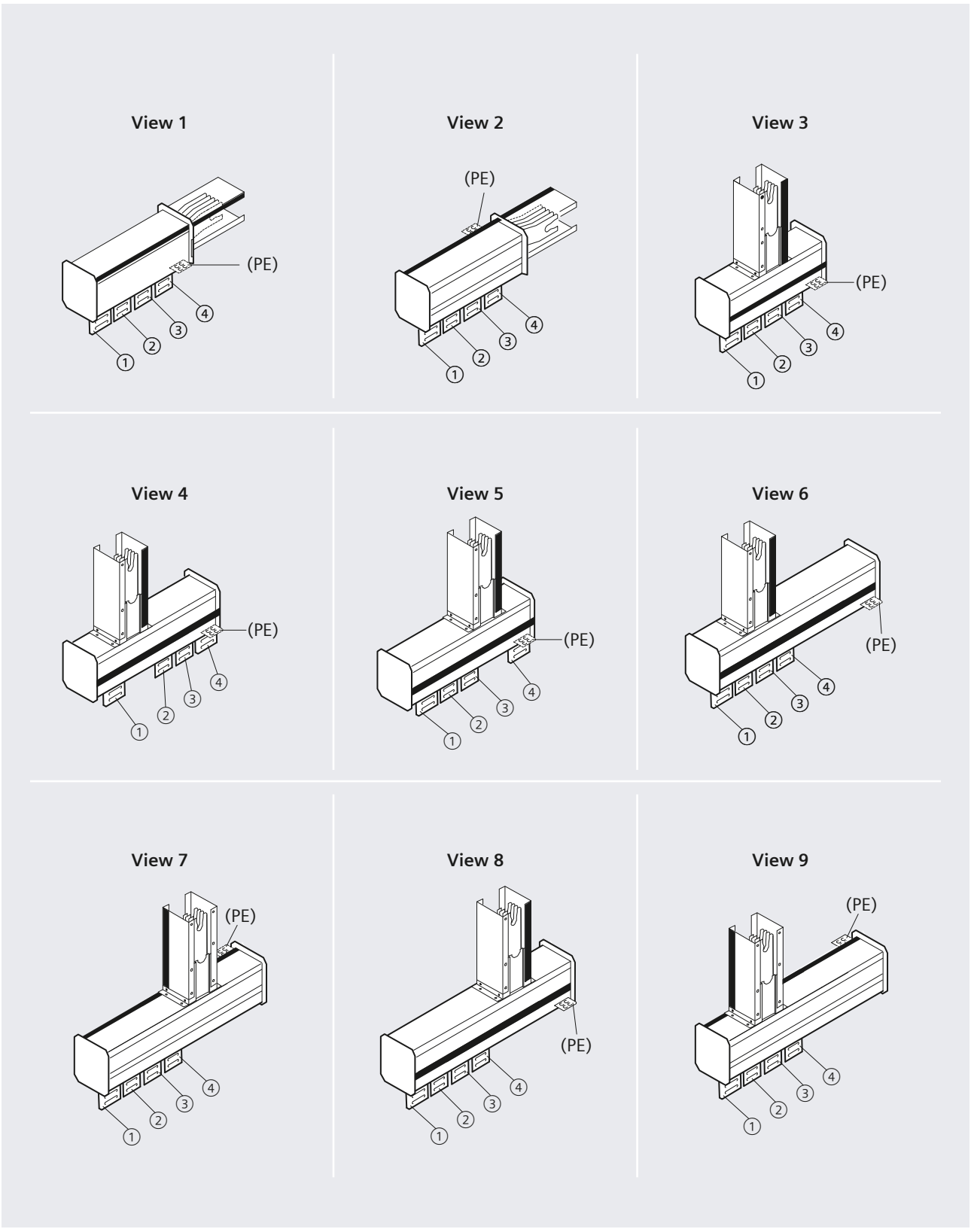
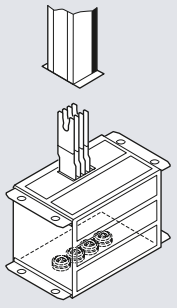
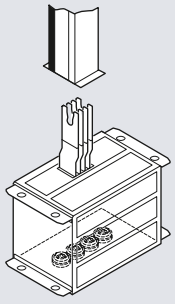
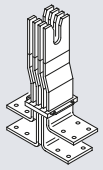
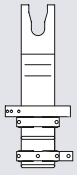
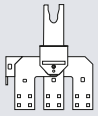
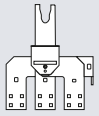
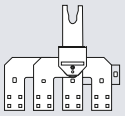
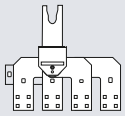
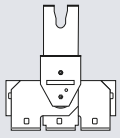


Fig. 6/7: **LD system; dimensional drawing views for straight universal connection unit / T-tap-off (see Tab. 6/6)**

Incoming cable connection units									
Basic key: LD			**A**	**N**	**N**	**N**	**Selection key: phase sequence "-KE ." for transformer and LD connection**		**Type suffix "+LD-" [2]: aluminum base plate**
Conductor material									
Aluminum (Al)			A						
Copper (Cu)			C						
Rated current I_n							-KE1		+LD-BPAL
for degree of protection IP31		for degree of protection IP54							
Al	Cu	Al	Cu						
1,100 A		900 A		1					
1,250 A	2,000 A	1,000 A	1,600 A	2					
1,600 A	2,600 A	1,200 A	2,100 A	3					
2,000 A		1,600 A		4					
2,500 A		2,000 A		5					
Version									
4-conductor				4					
5-conductor				6					
Conductor configuration for N / PEN							-KE2		
1/2 L					1 [1]				
L					2				
Degree of protection									
IP31						3			
IP54						5			
Maximum cable entry diameter for system									
LDA1..., LDA2...				4 × 300 mm²					
LDC2..., LDA3..., LDA4...				6 × 300 mm²					
LDC3..., LDA5...				8 × 300 mm²					

[1] N / PEN = 1/2 L is possible for basic keys LDA4.1. and LDA5.1.
[2] Attention: For single-core cable entries, the type suffix "aluminum base plate" must always be specified

Tab. 6/7: **Type code structure for incoming cable connection units "-KE" of the LD system**

Connection pieces for non-Siemens distribution boards											
Basic key: LD			**A**	**N**	**N**	**N**	**N**	**Selection key:**			
Conductor material											
Aluminum (Al)			A								
Copper (Cu)			C								
Rated current I_n								-FA1			
for LDA system		Key	for LDC system		Key						
1,100 A	LDA1	2									
1,250 A	LDA2		2,000 A	LDC2	2						
1,600 A	LDA3	3	2,600 A	LDC3	3						
2,000 A	LDA4	5									
2,500 A	LDA5										
3,000 A	LDA6	7	3,400 A	LDC6	6						
3,700 A	LDA7		4,000 A	LDC7	7						
4,000 A	LDA8	8	5,000 A	LDC8	8						
Rated current I_n								-FA3	A	 LDC3420-FA3A	 LDC3420-FA3B
for LDA system		Key	for LDC system		Key				B		
1,100 A	LDA1	3									
1,250 A	LDA2		2,000 A	LDC2	2						
1,600 A	LDA3		2,600 A	LDC3	3						
2,000 A	LDA4	6						-FA4	A	 LDC3620-FA4A	 LDC3620-FA4B
2,500 A	LDA5										
3,000 A	LDA6		3,400 A	LDC6	6				B		
3,700 A	LDA7	7	4,000 A	LDC7	8						
4,000 A	LDA8	8	5,000 A	LDC8							
Distribution board connection pieces ... -FA8PQ for SIVACON S8 power distribution boards											
Rated current I_n								-FA8PQ			
for LDA system		Key	for LDC system		Key						
1,100 A	LDA1	3									
1,250 A	LDA2		2,000 A	LDC2	2						
1,600 A	LDA3		2,600 A	LDC3	3						
2,000 A	LDA4	6									
2,500 A	LDA5										
3,000 A	LDA6		3,400 A	LDC6	6						
3,700 A	LDA7	8	4,000 A	LDC7	8						
4,000 A	LDA8		5,000 A	LDC8							
Version											
4-conductor						4					
5-conductor						6					
Conductor configuration for N / PEN											
1/2 L							1 [1)]				
L							2				
Degree of protection											
IP00							0				

[1)] N / PEN = 1/2 L is possible for basic keys LDA5.1., LDA7.1., LDA8.1., LDC6.1., LDC7.1., and LDC8.1.

Note for short-circuit withstand strength:

The short-circuit withstand strength of the connection pieces for non-Siemens distribution boards depends on the further copper connections (busbars, connecting bars, cables) in the distribution board.

Note for limit temperature:

When using connection pieces for non-Siemens distribution boards, verify that the permissible limit temperature of 100 °C for the busbars is not exceeded at an ambient temperature of 35 °C in the 24-h mean. The rated currents given in the table are valid for a limit temperature of 100 °C.

Tab. 6/8: **Type code structure for distribution board connection pieces "FA" of the LD system**

6.3.3 Type Codes for LD Tap-Off Units

The tap-off units of the LD system are equipped with fuse switch disconnectors or circuit breakers.
Characteristic features are:

- Sheet-steel enclosure, galvanized or painted
- Door or removable cover
- Guide and fixing elements for mounting on the busbar trunking system
- Can be mounted and removed without the necessity of de-energizing the whole system
- Leading PE/PEN connection contact during mounting (lagging during removal)
- Protection against electric shock IP20 of the contact system during installation and removal
- Coding brackets at the tap-off unit and at the tap-off point of the trunking unit prevent incorrect mounting (both anti-rotation feature and the correct assignment to 4- or 5-pole systems)
- Versions available with
  – 3NP fuse switch disconnector (Tab. 6/9)
  – LTL fuse switch disconnector (Tab. 6/10)
  – Arc-resistant fuse switch disconnector (Tab. 6/11)
  – 3VA circuit breaker (Tab. 6/12) and (Tab. 6/13)
  – Empty tap-off units (Tab. 6/14)

Tap-off units with 3NP fuse switch disconnector

The nominal rated currents for tap-off units with 3NP fuse switch disconnector range from 125 A (size NH00) to 630 A (size NH3). A double fuse switch disconnector (2 × NH00) is also available for the 125 A version.
The maximum rated currents depend on the mounting position and the degree of protection.

The degrees of protection IP30 and IP54 are available as standard. The degree of protection IP54 can be retrofitted with an upgrade kit. The bolt terminal is dimensioned for cables up to 2 × 300 mm². The standard version has a cable entry at the front. In case of cable entry from the side, a cabling box can be mounted, which can be ordered as a single part. The cabling box is available in two lengths. An undrilled cable entry plate made of aluminum can be equipped with customer-side cable glands (15 × M32). All 3NP1 devices can be sealed and terminated with accessories.

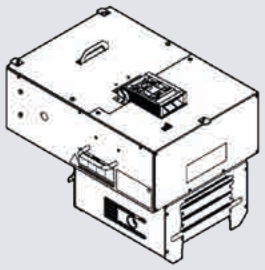
Tap-off units with LTL fuse switch disconnector

The nominal rated current is 1,000 A (size NH4).
The maximum rated current depends on the mounting position and the degree of protection.
The degrees of protection IP20 and IP54 are available as standard. The tap-off unit has two cable entries at the side. One side is equipped with a closed aluminum plate. The other side has four cable grommets.

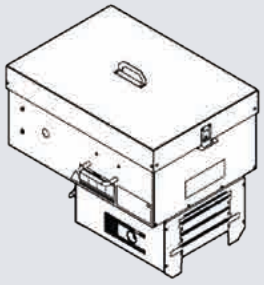
Tap-off units with fuse switch disconnector

In the arc-resistant tap-off units with fuse switch disconnector (arc fault test according to IEC/TR 61641), NH fuses are used depending on the rated current (250, 400, and 540 A available). The fuse links of size NH2 (250 A) and NH3 (400 A and 540 A) are activated or deactivated via operation at the door operating mechanism. Standard degree of protection is IP54. For tap-off units with multi-core entry and cable clamp (selection key "-KS" for 400 A and 630 A), the degree of protection changes to IP40.
A bolt terminal enables the connection of cables with conductor cross-sections up to 2 × 240 mm². The cable entry can be provided on both sides. A single-core cable entry is supplied with an aluminum plate equipped with metric glands.

Tap-off units with 3NP fuse switch disconnector								
LD-K-	**N**	**AK**	**N**	**-3NP**	**NNN**	**-N**	**-N**	
LD system								
LDA1... to LDA3 LDC2... to LDC3	1							
LDA4.1. to LDA8.1. LD6.1. to LDC8.1.	2							
LDA4.2. to LDA8.2. LD6.2. to LDC8.2.	3							
Version								
4-conductor			4					
5-conductor			5					
Size of tap-off unit								
125					125			
125-125					2×125			
250					250			
400					400			
630					630			
No. of poles of switching device								
3-pole						3		
4-pole						4		
Degree of protection								
IP30							(empty)	
IP54							IP54	



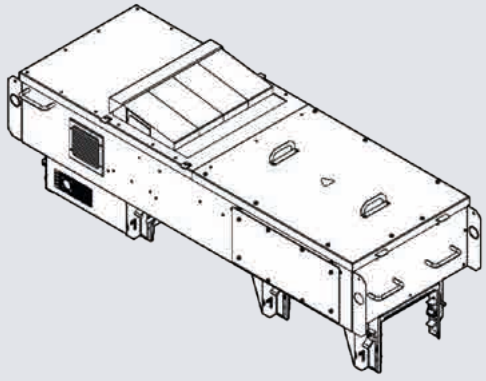
Degree of protection IP30



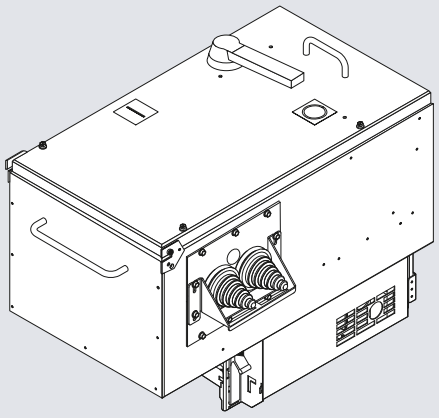
Degree of protection IP54

Tab. 6/9: **Type code structure for tap-off units with 3NP fuse switch disconnector**

Tap-off units with LTL fuse switch disconnector									
LD-K-	**N**	**AK**	**N**	**-LTL-**	**1000**	**-N**	**-N**	**-P**	
LD system									
LDA1... to LDA3 LDC2... to LDC3	1								
LDA4.1. to LDA8.1. LD6.1. to LDC8.1.	2								
LDA4.2. to LDA8.2. LD6.2. to LDC8.2.	3								
Version									
4-conductor			4						
5-conductor			5						
No. of poles of switching device									
3-pole						3			
4-pole						4			
Degree of protection									
IP20							(empty)		
IP54							IP54		



Tab. 6/10: **Type code structure for tap-off units with LTL fuse switch disconnector**

Arc-resistant tap-off units with fuse switch disconnector							
LD-K-	**N**	**AK**	**N**	**/FSAM-**	**NNN**	**-AA***	
LD system							
LDA4.1. to LDA8.1. LDC6.1. to LDC8.1.	2						
LDA4.2. to LDA8.2. LDC6.2. to LDC8.2.	3						
Version							
4-conductor			4				
5-conductor			5				
Rated current of switching device I_e at U_e = 400 V							
250 A					250		
400 A					400		
630 A					630		
Cable entry for 400 and 630 A							
Single-core cable entry [1]						-EL	
Multi-core cable entry with built-on cabling box for lateral cable entry [2]						-ML	
Multi-core cable entry with cable clamps: one cable clamp for 400 A; two cable clamps for 630 A [3]						-KS	

* Specification "cable entry" only required for 400 and 630 A. For 250 A: undrilled aluminum plate, cable glands by the customer

1) Aluminum plate with 5 × M50 cable glands for cable diameters from 21 to 35 mm

2) 2 cable grommets (KT 4) for cable diameters from 14 to 68 mm

3) For cable diameters from 30 to 65 mm, respectively

Attention: When cable clamps (-KS) are used, the degree of protection changes from IP54 to IP40.

Tab. 6/11: **Type code structure for arc-resistant tap-off units with fuse switch disconnector**

Tap-off units with 3VA circuit breaker

The tap-off units can be equipped with the SENTRON 3VA circuit breaker series and mounted while energized. (Please observe the country-specific standards. It may not be permissible to plug on while energized).

Depending on the rated current, two equipment versions are distinguished. Only for circuit breakers 3VA2 with 400 A, both basic and premium versions are available.

Basic version (Fig. 6/8):
- Tap-off units with 3-pole molded case circuit breakers 3VA1 up to 250 A, and 3VA2 with 400 A
- Medium switching capacity M (55 kA at 415 V)
- Degree of protection IP34
- Cable entry for multi-core cables at the front (undrilled steel plate)
- Toggle lever operating mechanism
- No cover interlocking
- Painted in RAL 7035
- As additional equipment, cable entry plates can be ordered as single parts for retrofitting.

Premium version (Fig. 6/8).
- Tap-off units with 3- or 4-pole molded case circuit breakers 3VA2 from 100 to 1,600 A
- High switching capacity H (85 kA at 415 V) or C (110 kA at 415 V), partly on request
- Degree of protection IP54, sprinkler-tested
- Cable entry for multi-core or single-core cables at the side (one undrilled aluminum plate and one plate with two cable grommets each)
- Rotary operating mechanism with I/O adhesive labels
- Remote control as customer-specific special solution
- Auxiliary switch and accessories orderable as customer-specific special solution
- Cover interlocking
- Unit completely painted in RAL 7035.

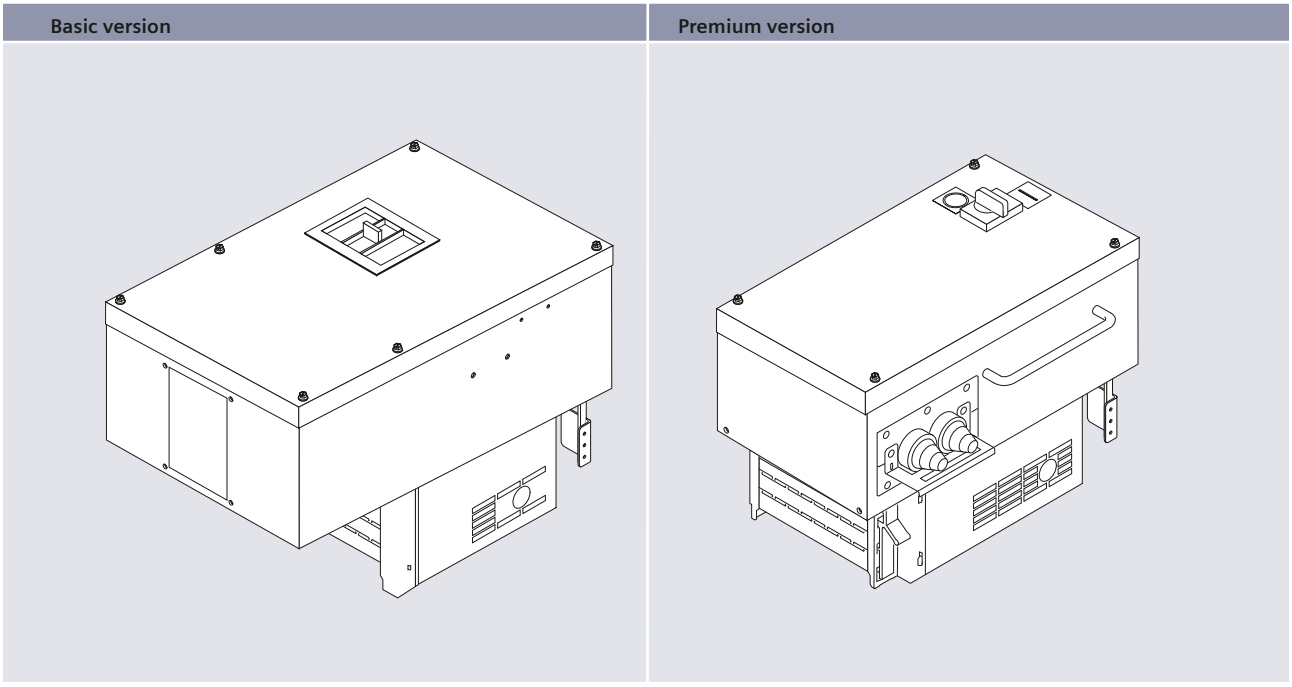


Fig. 6/8: **Schematic representation for tap-off units with 3VA circuit breaker (basic and premium versions)**

The sizes and available trip unit types of the 3VA circuit breakers are summarized in Tab. 6/10. Regarding the type codes (Tab. 6/13), the specification "-P" must be added for the premium version, particularly in order to distinguish both versions (basic and premium) for the 3VA2 circuit breaker with rated current 400 A.

Basic version of tap-off unit with 3VA circuit breaker								
Rated current I_n	Basic type of circuit breaker	Size of tap-off unit	Available trip units					
			TM210	TM220	TM240	ETU320	ETU330	
80 A	3VA1180	1B	×	×	×			
100 A	3VA1110							
125 A	3VA1112							
160 A	3VA1116							
200 A	3VA1220	2B			×			
250 A	3VA1225							
400 A	3VA2340	3B				×	×	

Available versions for 3VA circuit breaker													
Rated current I_n	Basic type of circuit breaker	Size of tap-off unit	Switching capacity of circuit breaker	Available trip unit types										
				ETU 320	**ETU 330**	**ETU 340**	**ETU 350**	**ETU 360**	**ETU 550**	**ETU 560**	**ETU 650**	**ETU 660**	**ETU 850**	**ETU 860**
100 A	3VA2010	Size 1	H (85 kA)	×	×	×	×		×	×			×	×
160 A	3VA2116	Size 1	H (85 kA)	×	×	×	×		×	×			×	×
250 A	3VA2225	Size 1	H (85 kA)	×	×		×		×	×			×	×
	3VA2325 (only ETU 340)	Size 2	H (85 kA)			×								
400 A	3VA2340	Size 2	H (85 kA)	×	×		×		×	×			×	×
	3VA2440 (only ETU 340)	Size 2	H (85 kA)			×								
630 A	3VA2463	Size 2	H (85 kA)	×	×	×	×		×	×			×	×
630 A	3VA2563	Size 2*)	H (85 kA)	×	×	×	×		×	×			×	×
800 A	3VA2580	Size 3	H (85 kA)	×	×	×	×		×					×
1,000 A	3VA2510	Size 3	H (85 kA)	×	×	×	×		×					×
1,600 A	3VA2716	Size 4	H (85 kA)	×			×	×			×	×		

*) Changed overall height

Tab. 6/12: **Available sizes and trip unit types for tap-off units with 3VA circuit breaker**

Basic version									Premium version								
LD-K-	**N**	**AK**	**N**	**/3VA**	**N-**	**NNNN-**	**3-**	**Z**	**LD-K-**	**N**	**AK**	**N**	**/3VA**	**2-**	**NNNN-**	**N-**	**Z**	**-P**
LD system									LD system									
LDA1... to LDA3... LDC2... to LDC3...	1								LDA1... to LDA3... LDC2... to LDC3...	1								
LDA4.1. to LDA8.1. LDC6.1. to LDC8.1.	2								LDA4.1. to LDA8.1. LDC6.1. to LDC8.1.	2								
LDA4.2. to LDA8.2. LDC6.2. to LDC8.2.	3								LDA4.2. to LDA8.2. LDC6.2. to LDC8.2.	3								
Version									Version									
4-conductor			4						4-conductor			4						
5-conductor			5						5-conductor			5						
Circuit breaker versions									Circuit breaker versions									
3VA1: 80 to 250 A					1				3VA2					2				
3VA2: 400 A					2				H (85 kA) (specification only for 1,600 A)					2H				
									C (110 kA) (selected versions)					2C				
									3VA25 (only possible for 630 A)					25				
Rated current I_n of the circuit breaker									Rated current I_n of the circuit breaker									
80 A						0080												
100 A						0100			100 A						0100			
125 A						0125												
160 A						0160			160 A						0160			
200 A						0200												
250 A						0250			250 A						0250			
400 A (only 3VA2)						0400			400 A						0400			
									630 A						0630			
									800 A						0800			
									1,000 A						1000			
									1,600 A						1600			
Number of poles of the circuit breaker									Number of poles of the circuit breaker									
3-pole							3		3-pole							3		
									4-pole							4		
Trip unit for circuit breaker									Trip unit for circuit breaker									
TM210 (only 80 to 160 A)								TM210										
TM220 (only 80 to 160 A)								TM220										
TM240 (only 80 to 250 A)								TM240										
ETU320 (only 400 A)								ETU320	ETU320								ETU320	
ETU330 (only 400 A)								ETU330	ETU330								ETU330	
									ETU340								ETU340	
									ETU350								ETU350	
									ETU550								ETU550	
									ETU560								ETU560	
									ETU650								ETU650	
									ETU660								ETU660	
									ETU850								ETU850	
									ETU860								ETU860	
									Version of tap-off unit									
									Premium version									-P

Tab. 6/13: **Type code structure for tap-off units of the LD system with 3VA circuit breaker**

Empty tap-off units

The empty tap-off units are based on the premium version of the tap-off units for 3VA circuit breakers (Fig. 6/8 right) in the following version:

- Degree of protection IP54
- Rated current: 160, 250, or 400 A
- 2 sizes (size 1 for 160 and 250 A; size 2 for 400 A; see Fig. 6/18)
- Control via rotary operating mechanism (not included in the scope of supply of the empty tap-off unit)
- Cover interlocking
- Unit completely painted in RAL 7035
- Cable connection via connection lugs
- Cable entry for multi-core or single-core cables at the side (one undrilled aluminum plate and one plate with two cable grommets each)
- Indication of the switch position with I/O adhesive labels
- Can be mounted while energized. (Please observe the country-specific standards. It may not be permissible to plug on while energized).

These tap-off units are prepared for the installation of particular 3- and 4-pole molded case circuit breakers:

- Siemens 3VA2 (switching capacity 85 kA)
- Schneider NSX (switching capacity 70 kA).

The permissible rated currents are given in the technical specifications for the premium version of the circuit breaker tap-off units (Tab. 6/31).

The order numbers of the possible molded case circuit breakers are attached to the type codes in Tab. 6/14. Those are not included in the scope of supply.

Design verification tests have been executed for the empty tap-off units in which these circuit breaker types are installed. For the design verification, the notes and specifications of Siemens AG as manufacturer of the empty tap-off unit are to be observed. Further notes are given in the annexes in Chapter 9.

Selection example: Empty tap-off unit for LDC2 system with 5 conductors, prepared for 3-pole molded case circuit breaker 3VA2, 160 A: LD-K-1AK5/E004-0160-3.

Empty tap-off units							
LD-K-	**N**	**AK**	**N**	**/E**	**NNN-**	**NNNN-**	**N-**
LD system							
LDA1... to LDA3... LDC2... to LDC3...	1						
LDA4.1. to LDA8.1. LDC6.1. to LDC8.1.	2						
LDA4.2. to LDA8.2. LDC6.2. to LDC8.2.	3						
Version							
4-conductor			4				
5-conductor			5				
Prepared for circuit breaker							
Schneider Electric NSX					003		
Siemens 3VA2					004		
Suitable for rated current of circuit breaker							
160 A						0160	
250 A						0250	
400 A						0400	
Number of poles of the circuit breaker							
3-pole							3
4-pole							4

Molded case circuit breaker types[1)]			
Siemens	3-pole	160 A 250 A 400 A	3VA2116-6HL36-0AA0 3VA2225-6HL32-0AA0 3VA2340-6HL32-0AA0
	4-pole	160 A 250 A 400 A	3VA2116-6HL46-0AA0 3VA2225-6HL42-0AA0 3VA2340-6HL42-0AA0
Schneider Electric	3-pole	160 A 250 A 400 A	NSX160-LV430790 NSX250-LV431790 NSX400-LV432695
	4-pole	160 A 250 A 400 A	NSX160-LV430800 NSX250-LV431800 NSX400-LV432696

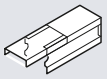
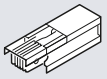
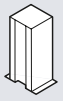
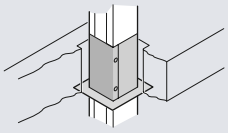
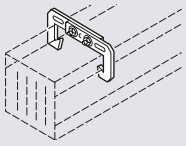
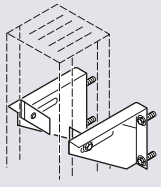
[1)] The molded case circuit breakers are not included in the scope of supply

Tab. 6/14: **Type code structure for empty tap-off units of the LD system**

6.3.4 Type Codes for Additional Equipment of the LD System

In order to perform the connection, fixing, as well as wall and ceiling opening for the busbar trunking systems in the spaces of use, suitable additional equipment components (Tab. 6/15) can be offered, such as:

- End flanges:
  At the end of a busbar run, an end flange with hook or with bolt is to be installed depending on the version of the trunking unit
- Suspension brackets:
  For fixing the busbar trunking system in horizontal installation
- Fixing brackets:
  For vertical installation of the busbar trunking system.

End flanges					
LD-	**N-**	**EF**	**N**	**-A**	
LD system					 
4-conductor: LD.142. to LD.342. (*4)	1		4		
5-conductor: LD.162. to LD.362. (*5)			6		
4-conductor: LD.441. to LD.841. (*7)	2		4		
5-conductor: LD.461. to LD.861. (*8)			6		
4-conductor: LD.442. to LD.842. (*8)	3		4		
5-conductor: LD.462. to LD.862. (*9)			6		
Busbar trunking unit connections					
Hook				H	
Bolt				B	
Distribution board blanking flanges					
LD-VE-BF	**N**				
LD system					
LD.1... to LD.3...	1				
LD.4... to LD.8...	2				
Protective sleeves					
LD-DF	**N**				
LD system					
LD.1... to LD.3...	1B				
LD.4... to LD.8...	2B				
Suspension brackets					
LD-B	**N**				
LD system					
LD.1... to LD.3...	1				
LD.4... to LD.8...	2				
Fixing brackets					
for LD system	**LD-BV**				
(*...) Number of spacers delivered with the end flange					

Tab. 6/15: **Type code structure for additional equipment components**

6.4 Technical Specifications

Besides the general technical specifications in Tab. 6/16, the system-dependent data for trunking units, feeding units, and tap-off units are listed:

- Aluminum, 4- or 5-pole:
  System-dependent data for trunking units
- LDA.4. or LDA.6.
  (Tab. 6/17 to Tab. 6/22)
- Copper, 4- or 5-pole:
  System-dependent data for trunking units
  LDC.4. or LDC.6. (Tab. 6/23 to Tab. 6/25)
- Recommended conductor cross-sections for the connection pieces for non-Siemens distribution boards (Tab. 6/26)
- Temperature-dependency of the rated currents (Tab. 6/27)
- Weights for busbar runs and feeding units (Tab. 6/28)
- Technical specifications for tap-off units with fused technology (Tab. 6/27 to Tab. 6/31).
- Technical specifications for tap-off units with 3VA circuit breaker (Tab. 6/32 and Tab. 6/33).

General system data	
Standards and specifications	IEC 61439-1 and -6
Rated insulation voltage U_i	1,000 V AC / DC
Rated operational voltage U_e • Power transmission (at overvoltage category) • Power distribution (at overvoltage category)	 1,000 V AC (at III/3) or 690 V AC (at IV/3) 400 / 690 V AC (at III/3) [1]
Frequency	50 ... 60 Hz [2]
Rated current I_n • Al busbars • Cu busbars	 700 ... 4,000 A 1,200 ... 5,000 A
Climatic resistance • Steady state temperature/humidity, acc. to IEC 60068-2-78 • Cyclic temperature/humidity, acc. to IEC 60068-2-30 • Cold acc. to IEC 60068-2-1 • Temperature change acc. to IEC 60068-2-14 • Salt spray test acc. to IEC 60068-2-52 • Ice formation acc. to IEC 60068-2-61	40 °C at 93% RH over 56 days 56 times (25 ... 40 °C in 3 h; 40 °C for 9 h; 40 ... 25 °C in 3 ... 6 h; 25 °C for 6 h) / 95% RH –45 °C for 16 h 5 cycles (1 °C / min) –45 ... 55 °C, holding time min. 30 min Severity grade 3 Composite test: cyclic temperature/humidity [56 times (25 ... 40 °C in 3 h; 40 ... 25 °C in 3 ... 6 h; 25 °C for 6 h) / 95% RH] and cold [–45 °C for 16 h]
Ambient temperature min. / max. / 24-h mean	–5 °C / +40 °C / +35 °C
Environmental class according to IEC 60721-3-3 • Climatic environmental conditions	 3K24 for installation environment with weather protection
Degree of protection acc. to IEC 60529	IP31 ventilated (for horizontal flat busbar position) IP34 ventilated (for horizontal edgewise busbar position) IP54 closed [3]
Standard mounting position	Position of busbars edgewise in the trunking unit for horizontal routing
Torque for single-bolt terminal	80 Nm
Material of trunking units Surface treatment of the busbars	Sheet steel powder-coated, light gray (RAL 7035) Insulation-coated over the whole length LDA: aluminum conductor nickel-plated and tinned LDC: copper conductor tinned
Mounting position	• Horizontal, edgewise or flat • Vertical
Material of tap-off units	Sheet steel powder-coated, light gray (RAL 7035)

[1] Specifications for tap-off units on request
[2] At a frequency of 60 Hz, a derating factor of 0.95 is to be observed for rated currents > 800 A according to IEC 61439-1; for tap-off units with arc-resistant fuse switch disconnector, only 50 Hz
[3] Exceptions: IP40 for arc-resistant tap-off units with fuse switch disconnector for multi-core cable entry (selection key "-KS") and IP34 for basic version of tap-off units with circuit breaker

Tab. 6/16: **General system data of the LD system**

System LDA.4. (aluminum, 4-pole)			LDA142	LDA242	LDA342	LDA441	LDA442	LDA541	LDA542
Number of busbars			**4**	**4**	**4**	**7**	**8**	**7**	**8**
Rated current I_e [1]	Degree of protection								
Horizontal edgewise busbar position [2]	IP34	A	1,100	1,250	1,600	2,000	2,000	2,500	2,500
	IP54	A	900	1,000	1,200	1,500	1,500	1,800	1,800
Vertical busbar position	IP34	A	950	1,100	1,250	1,700	1,700	2,100	2,100
	IP54	A	900	1,000	1,200	1,500	1,500	1,800	1,800
Horizontal flat busbar position	IP31 / IP54	A	700	750	1,000	1,200	1,200	1,700	1,700
Impedance per unit length									
of conducting paths with 50 Hz and +20 °C busbar temperature	R'_{20}	mΩ/m	0.060	0.045	0.045	0.030	0.030	0.026	0.026
	X'_{20}	mΩ/m	0.046	0.038	0.038	0.024	0.024	0.022	0.021
	Z'_{20}	mΩ/m	0.075	0.059	0.059	0.038	0.038	0.034	0.034
of conducting paths with 50 Hz and +140 °C busbar temperature	R'_{140}	mΩ/m	0.088	0.067	0.067	0.044	0.044	0.038	0.038
	X'_{140}	mΩ/m	0.046	0.038	0.038	0.024	0.024	0.022	0.021
	Z'_{140}	mΩ/m	0.100	0.077	0.077	0.050	0.050	0.044	0.044
of conducting paths for 4-pole systems in the event of a fault	R'_F	mΩ/m	0.108	0.086	0.087	0.074	0.058	0.066	0.052
	X'_F	mΩ/m	0.097	0.082	0.082	0.061	0.052	0.042	0.048
	Z'_F	mΩ/m	0.145	0.119	0.120	0.096	0.078	0.079	0.071
Zero-sequence impedance									
for 4-pole systems according to IEC 60909-0 (VDE 0102)	R'_0	mΩ/m	0.246	0.195	0.201	0.213	0.126	0.193	0.117
	X'_0	mΩ/m	0.315	0.264	0.258	0.192	0.177	0.171	0.159
	Z'_0	mΩ/m	0.400	0.328	0.327	0.287	0.217	0.257	0.197
Short-circuit withstand strength									
Rated short-time withstand current	R.m.s. value (t = 0.1 s) I_{cw}	kA	55	70	80	110	110	125	125
	R.m.s. value [1] (t = 1 s) I_{cw}	kA	40	55	58	80	80	110	110
Rated peak withstand current	Peak value I_{pk}	kA	121	154	176	242	242	275	275
Maximum thermal load	Quantity of heat I^2t	10^6A^2s	1,600	3,025	3,364	6,400	6,400	12,100	12,100
Conductor cross-section									
L1, L2, L3	Cross-section A	mm^2	530	706	706	1,060	1,060	1,232	1,232
PEN	Cross-section A	mm^2	530	706	706	530	1,060	616	1,232
Fire load									
Trunking unit without tap-off point		kWh/m	7.08	7.09	7.09	10.87	11.99	10.87	11.99
Per tap-off point		kWh	8.32	8.32	8.32	12.04	12.96	12.04	12.96
Maximum fixing distance									
At normal mechanical load		m	6	6	6	5	5	5	5

[1] Depending on the degree of protection and type of routing
[2] Including height offsets ≤ 1.3 m

Tab. 6/17: **Technical specifications for trunking units LDA14. to LDA54. (aluminum, 4-pole)**

System LDA.4. (aluminum, 4-pole)			LDA641	LDA642	LDA741	LDA742	LDA8412	LDA842
Number of busbars			**7**	**8**	**7**	**8**	**7**	**8**
Rated current I_e [1]	Degree of protection							
Horizontal edgewise busbar position [2]	IP34	A	3,000	3,000	3,700	3,700	4,000	4,000
	IP54	A	2,000	2,000	2,400	2,400	2,700	2,700
Vertical busbar position	IP34	A	2,300	2,300	2,800	2,800	3,400	3,400
	IP54	A	2,000	2,000	2,400	2,400	2,700	2,700
Horizontal flat busbar position	IP31 / IP54	A	1,800	1,800	2,200	2,200	2,350	2,350
Impedance per unit length								
of conducting paths with 50 Hz and +20 °C busbar temperature	R'_{20}	mΩ/m	0.022	0.022	0.015	0.016	0.013	0.013
	X'_{20}	mΩ/m	0.019	0.019	0.015	0.015	0.013	0.013
	Z'_{20}	mΩ/m	0.030	0.030	0.021	0.022	0.019	0.019
of conducting paths with 50 Hz and +140 °C busbar temperature	R'_{140}	mΩ/m	0.033	0.033	0.023	0.023	0.019	0.020
	X'_{140}	mΩ/m	0.019	0.019	0.015	0.015	0.013	0.013
	Z'_{140}	mΩ/m	0.038	0.038	0.027	0.028	0.023	0.024
of conducting paths for 4-pole systems in the event of a fault	R'_F	mΩ/m	0.059	0.046	0.044	0.034	0.038	0.029
	X'_F	mΩ/m	0.044	0.043	0.033	0.034	0.029	0.031
	Z'_F	mΩ/m	0.073	0.063	0.055	0.048	0.048	0.042
Zero-sequence impedance								
for 4-pole systems according to IEC 60909-0 (VDE 0102)	R'_0	mΩ/m	0.168	0.105	0.123	0.075	0.108	0.063
	X'_0	mΩ/m	0.153	0.141	0.114	0.108	0.099	0.096
	Z'_0	mΩ/m	0.227	0.176	0.168	0.131	0.147	0.115
Short-circuit withstand strength								
Rated short-time withstand current	R.m.s. value (t = 0.1 s) I_{cw}	kA	130	130	130	130	130	130
	R.m.s. value [1] (t = 1 s) I_{cw}	kA	116	116	116	116	116	116
Rated peak withstand current	Peak value I_{pk}	kA	286	286	286	286	286	286
Maximum thermal load	Quantity of heat I^2t	10^6A^2s	13,456	13,456	13,456	13,456	13,456	13,456
Conductor cross-section								
L1, L2, L3	Cross-section A	mm^2	1,412	1,412	2,044	2,044	2,464	2,464
PEN	Cross-section A	mm^2	706	1,412	1,022	2,044	1,232	2,464
Fire load								
Trunking unit without tap-off point		kWh/m	10.87	11.99	10.87	11.99	10.87	11.99
Per tap-off point		kWh	12.04	12.96	12.04	12.96	12.04	12.96
Maximum fixing distance								
At normal mechanical load		m	5	5	5	5	5	5

[1] Depending on the degree of protection and type of routing
[2] Including height offsets ≤ 1.3 m

Tab. 6/18: **Technical specifications for trunking units LDA64. to LDA84. (aluminum, 4-pole)**

System LDA.6. (aluminum, 5-pole)			LDA162	LDA262	LDA362	LDA461	LDA462	LDA561	LDA562
Number of busbars			**5**	**5**	**5**	**8**	**9**	**8**	**9**
Rated current I_e [1]	Degree of protection								
Horizontal edgewise busbar position [2]	IP34	A	1,100	1,250	1,600	2,000	2,000	2,500	2,500
	IP54	A	900	1,000	1,200	1,500	1,500	1,800	1,800
Vertical busbar position	IP34	A	950	1,100	1,250	1,700	1,700	2,100	2,100
	IP54	A	900	1,000	1,200	1,500	1,500	1,800	1,800
Horizontal flat busbar position	IP31 / IP54	A	700	750	1,000	1,200	1,200	1,700	1,700
Impedance per unit length									
of conducting paths with 50 Hz and +20 °C busbar temperature	R'_{20}	mΩ/m	0.060	0.046	0.046	0.030	0.030	0.026	0.026
	X'_{20}	mΩ/m	0.045	0.037	0.037	0.024	0.024	0.022	0.022
	Z'_{20}	mΩ/m	0.075	0.059	0.059	0.038	0.038	0.034	0.034
of conducting paths with 50 Hz and +140 °C busbar temperature	R'_{140}	mΩ/m	0.089	0.068	0.067	0.044	0.044	0.038	0.038
	X'_{140}	mΩ/m	0.045	0.037	0.037	0.024	0.024	0.022	0.021
	Z'_{140}	mΩ/m	0.100	0.077	0.077	0.050	0.050	0.044	0.044
of conducting paths for 5-pole systems (PE) in the event of a fault	R'_F	mΩ/m	0.111	0.089	0.090	0.080	0.080	0.073	0.073
	X'_F	mΩ/m	0.126	0.110	0.110	0.079	0.078	0.073	0.072
	Z'_F	mΩ/m	0.168	0.142	0.142	0.112	0.112	0.103	0.102
of conducting paths for 5-pole systems (N) in the event of a fault	R'_F	mΩ/m	0.136	0.105	0.105	0.097	0.067	0.085	0.055
	X'_F	mΩ/m	0.107	0.088	0.088	0.065	0.064	0.058	0.051
	Z'_F	mΩ/m	0.173	0.137	0.137	0.116	0.092	0.103	0.075
Zero-sequence impedance									
for 5-pole systems (PE) according to IEC 60909-0 (VDE 0102)	R'_0	mΩ/m	0.237	0.195	0.195	0.246	0.246	0.225	0.222
	X'_0	mΩ/m	0.468	0.405	0.405	0.303	0.306	0.273	0.279
	Z'_0	mΩ/m	0.525	0.449	0.449	0.390	0.393	0.354	0.357
for 5-pole systems (N) according to IEC 60909-0 (VDE 0102)	R'_0	mΩ/m	0.282	0.219	0.219	0.234	0.144	0.201	0.126
	X'_0	mΩ/m	0.237	0.192	0.192	0.159	0.150	0.141	0.135
	Z'_0	mΩ/m	0.368	0.291	0.291	0.283	0.208	0.246	0.185

[1] Depending on the degree of protection and type of routing
[2] Including height offsets ≤ 1.3 m

Tab. 6/19: **Technical specifications for trunking units LDA16. to LDA56. (aluminum, 5-pole) – part 1**

System LDA.6. (aluminum, 5-pole)			LDA162	LDA262	LDA362	LDA461	LDA462	LDA561	LDA562
Number of busbars			**5**	**5**	**5**	**8**	**9**	**8**	**9**
Short-circuit withstand strength									
Rated short-time withstand current	R.m.s. value (t = 0.1 s) I_{cw}	kA	55	70	80	110	110	125	125
	R.m.s. value (t = 1 s) I_{cw}	kA	40	55	58	80	80	110	110
Rated peak withstand current	Peak value I_{pk}	kA	121	154	176	242	242	275	275
Maximum thermal load	Quantity of heat I_{cw}	10^6A^2s	1,600	3,025	3,364	6,400	6,400	12,100	12,100
Rated short-time withstand current of the 5th conductor	R.m.s. value (t = 0.1 s) I_{cw}	kA	33	42	48	66	66	75	75
	R.m.s. value (t = 1 s) I_{cw}	kA	24	33	35	48	48	66	66
Maximum thermal load of the 5th conductor	Quantity of heat I^2t	10^6A^2s	1089	1764	2304	4356	4356	5625	5625
Conductor cross-section									
L1, L2, L3	Cross-section A	mm^2	530	706	706	1,060	1,060	1,232	1,232
N	Cross-section A	mm^2	530	706	706	530	1,060	616	1,232
PE	Cross-section A	mm^2	530	706	706	530	1,060	616	1,232
Fire load									
Trunking unit without tap-off point		kWh/m	7.28	7.29	7.29	10.87	11.99	10.87	11.99
Per tap-off point		kWh	8.32	8.32	8.32	12.04	12.96	12.04	12.96
Maximum fixing distance									
At normal mechanical load		m	6	6	6	5	5	5	5

Tab. 6/20: **Technical specifications for trunking units LDA16. to LDA56. (aluminum, 5-pole) – part 2**

System LDA.6. (aluminum, 5-pole)			LDA661	LDA662	LDA761	LDA762	LDA861	LDA862
Number of busbars			**8**	**9**	**8**	**9**	**8**	**9**
Rated current I_e [1]	Degree of protection							
Horizontal edgewise busbar position [2]	IP34	A	3,000	3,000	3,700	3,700	4,000	4,000
	IP54	A	2,000	2,000	2,400	2,400	2,700	2,700
Vertical busbar position	IP34	A	2,300	2,300	2,800	2,800	3,400	3,400
	IP54	A	2,000	2,000	2,400	2,400	2,700	2,700
Horizontal flat busbar position	IP31 / IP54	A	1,800	1,800	2,200	2,200	2,350	2,350
Impedance per unit length								
of conducting paths with 50 Hz and +20 °C busbar temperature	R'_{20}	mΩ/m	0.023	0.023	0.018	0.018	0.017	0.017
	X'_{20}	mΩ/m	0.020	0.019	0.015	0.015	0.014	0.014
	Z'_{20}	mΩ/m	0.030	0.030	0.023	0.023	0.022	0.022
of conducting paths with 50 Hz and +140 °C busbar temperature	R'_{140}	mΩ/m	0.034	0.034	0.027	0.027	0.025	0.025
	X'_{140}	mΩ/m	0.020	0.019	0.015	0.015	0.014	0.014
	Z'_{140}	mΩ/m	0.039	0.039	0.030	0.030	0.029	0.029
of conducting paths for 5-pole systems (PE) in the event of a fault	R'_F	mΩ/m	0.065	0.065	0.050	0.050	0.045	0.045
	X'_F	mΩ/m	0.067	0.066	0.053	0.052	0.047	0.047
	Z'_F	mΩ/m	0.093	0.093	0.073	0.072	0.065	0.065
of conducting paths for 5-pole systems (N) in the event of a fault	R'_F	mΩ/m	0.074	0.052	0.052	0.037	0.044	0.031
	X'_F	mΩ/m	0.052	0.051	0.036	0.039	0.034	0.035
	Z'_F	mΩ/m	0.090	0.073	0.063	0.054	0.056	0.047
Zero-sequence impedance								
for 5-pole systems (PE) according to IEC 60909-0 (VDE 0102)	R'_0	mΩ/m	0.201	0.198	0.153	0.150	0.135	0.135
	X'_0	mΩ/m	0.249	0.255	0.195	0.195	0.174	0.174
	Z'_0	mΩ/m	0.320	0.323	0.248	0.246	0.220	0.220
for 5-pole systems (N) according to IEC 60909-0 (VDE 0102)	R'_0	mΩ/m	0.177	0.111	0.126	0.078	0.105	0.069
	X'_0	mΩ/m	0.126	0.123	0.090	0.093	0.078	0.081
	Z'_0	mΩ/m	0.217	0.166	0.155	0.121	0.131	0.106

1) Depending on the degree of protection and type of routing
2) Including height offsets ≤ 1.3 m

Tab. 6/21: **Technical specifications for trunking units LDA66. to LDA86. (aluminum, 5-pole) – part 1**

System LDA.6. (aluminum, 5-pole)			LDA661	LDA662	LDA761	LDA762	LDA861	LDA862
Number of busbars			**8**	**9**	**8**	**9**	**8**	**9**
Short-circuit withstand strength								
Rated short-time withstand current	R.m.s. value (t = 0.1 s) I_{cw}	kA	130	130	130	130	130	130
	R.m.s. value (t = 1 s) I_{cw}	kA	116	116	116	116	116	116
Rated peak withstand current	Peak value I_{pk}	kA	286	286	286	286	286	286
Maximum thermal load	Quantity of heat I_{cw} (t = 1 s)	10^6A^2s	13,456	13,456	13,456	13,456	13,456	13,456
Rated short-time withstand current of the 5th conductor	R.m.s. value (t = 0.1 s) I_{cw}	kA	78	78	78	78	78	78
	R.m.s. value (t = 1 s) I_{cw}	kA	70	70	70	70	70	70
Maximum thermal load of the 5th conductor	Quantity of heat I^2t	10^6A^2s	6,084	6,084	6,084	6,084	6,084	6,084
Conductor cross-section								
L1, L2, L3	Cross-section A	mm^2	1,412	1,412	2,044	2,044	2,464	2,464
N	Cross-section A	mm^2	706	1,412	1,022	2,044	1,232	2,464
PE	Cross-section A	mm^2	706	706	1,022	1,022	1,232	1,232
Fire load								
Trunking unit without tap-off point		kWh/m	10.87	11.99	10.87	11.99	10.87	11.99
Per tap-off point		kWh	12.04	12.96	12.04	12.96	12.04	12.96
Maximum fixing distance								
At normal mechanical load		m	5	5	5	5	5	5

Tab. 6/22: **Technical specifications for trunking units LDA66. to LDA86. (aluminum, 5-pole) – part 2**

System LDC.4. (copper, 4-pole)			LDC242	LDC342	LDC641	LDC642	LDC741	LDC742	LDC841	LDC842
Number of busbars			**4**	**4**	**7**	**8**	**7**	**8**	**7**	**8**
Rated current I_e [1]	Degree of protection									
Horizontal edgewise busbar position [2]	IP34	A	2,000	2,600	3,400	3,400	4,400	4,400	5,000	5,000
	IP54	A	1,600	2,000	2,600	2,600	3,200	3,200	3,600	3,600
Vertical busbar position	IP34	A	1,650	2,100	2,700	2,700	3,500	3,500	4,250	4,250
	IP54	A	1,600	2,000	2,600	2,600	3,200	3,200	3,600	3,600
Horizontal flat busbar position	IP31 / IP54	A	1,200	1,550	2,000	2,000	2,600	2,600	3,000	3,000
Impedance per unit length										
of conducting paths with 50 Hz and +20 °C busbar temperature	R'_{20}	mΩ/m	0.027	0.019	0.013	0.013	0.011	0.011	0.011	0.011
	X'_{20}	mΩ/m	0.037	0.029	0.019	0.019	0.015	0.015	0.013	0.013
	Z'_{20}	mΩ/m	0.046	0.035	0.023	0.023	0.019	0.018	0.017	0.017
of conducting paths with 50 Hz and +140 °C busbar temperature	R'_{140}	mΩ/m	0.040	0.028	0.020	0.020	0.017	0.016	0.017	0.015
	X'_{140}	mΩ/m	0.037	0.029	0.019	0.019	0.015	0.015	0.013	0.013
	Z'_{140}	mΩ/m	0.055	0.040	0.028	0.028	0.023	0.022	0.021	0.020
of conducting paths for 4-pole systems in the event of a fault	R'_F	mΩ/m	0.058	0.044	0.039	0.031	0.028	0.023	0.025	0.020
	X'_F	mΩ/m	0.078	0.061	0.040	0.041	0.031	0.032	0.027	0.028
	Z'_F	mΩ/m	0.097	0.075	0.056	0.052	0.042	0.039	0.037	0.034
Zero-sequence impedance										
for 4-pole systems according to IEC 60909-0 (VDE 102)	R'_0	mΩ/m	0.129	0.096	0.105	0.066	0.075	0.048	0.066	0.042
	X'_0	mΩ/m	0.228	0.174	0.132	0.126	0.096	0.096	0.087	0.084
	Z'_0	mΩ/m	0.262	0.199	0.169	0.142	0.122	0.107	0.109	0.094
Short-circuit withstand strength										
Rated short-time withstand current	R.m.s. value (t = 0.1 s) I_{cw}	kA	80	80	130	130	130	130	130	130
	R.m.s. value [1] (t = 1 s) I_{cw}	kA	58	58	116	116	116	116	116	116
Rated peak withstand current	Peak value I_{pk}	kA	176	176	286	286	286	286	286	286
Maximum thermal load	Quantity of heat I^2t	10^6A^2s	3,364	3,364	13,456	13,456	13,456	13,456	13,456	13,456
Conductor cross-section										
L1, L2, L3	Cross-section A	mm^2	706	1,022	1,412	1,412	2,044	2,044	2,464	2,464
PEN	Cross-section A	mm^2	706	1,022	706	1,412	1,022	2,044	1,232	2,464
Fire load										
Trunking unit without tap-off point		kWh/m	7.09	7.09	10.87	11.99	10.87	11.99	10.87	11.99
Per tap-off point		kWh	8.32	8.32	12.04	12.96	12.04	12.96	12.04	12.96
Maximum fixing distance										
At normal mechanical load		m	5	4	4	4	3	3	2	2

[1] Depending on the degree of protection and type of routing
[2] Including height offsets ≤ 1.3 m

Tab. 6/23: **Technical specifications for trunking units LDC.4. (copper, 4-pole)**

System LDC.6. (copper, 5-pole)			LDC262	LDC362	LDC661	LDC662	LDC761	LDC762	LDC861	LDC862
Number of busbars			**5**	**4**	**8**	**9**	**8**	**9**	**8**	**9**
Rated current I_e [1]	Degree of protection									
Horizontal edgewise busbar position [2]	IP34	A	2,000	2,600	3,400	3,400	4,400	4,400	5,000	5,000
	IP54	A	1,600	2,000	2,600	2,600	3,200	3,200	3,600	3,600
Vertical busbar position	IP34	A	1,650	2,100	2,700	2,700	3,500	3,500	4,250	4,250
	IP54	A	1,600	2,000	2,600	2,600	3,200	3,200	3,600	3,600
Horizontal flat busbar position	IP31 / IP54	A	1,200	1,550	2,000	2,000	2,600	2,600	3,000	3,000
Impedance per unit length										
of conducting paths with 50 Hz and +20 °C busbar temperature	R'_{20}	mΩ/m	0.034	0.028	0.020	0.020	0.016	0.016	0.015	0.015
	X'_{20}	mΩ/m	0.037	0.028	0.019	0.019	0.015	0.015	0.014	0.014
	Z'_{20}	mΩ/m	0.050	0.039	0.027	0.027	0.022	0.022	0.021	0.021
of conducting paths with 50 Hz and +140 °C busbar temperature	R'_{140}	mΩ/m	0.051	0.041	0.029	0.030	0.024	0.024	0.023	0.023
	X'_{140}	mΩ/m	0.037	0.028	0.019	0.019	0.015	0.015	0.014	0.014
	Z'_{140}	mΩ/m	0.063	0.050	0.035	0.035	0.028	0.028	0.026	0.026
of conducting paths for 5-pole systems (PE) in the event of a fault	R'_F	mΩ/m	0.064	0.049	0.046	0.046	0.035	0.035	0.031	0.031
	X'_F	mΩ/m	0.104	0.087	0.062	0.062	0.049	0.049	0.045	0.044
	Z'_F	mΩ/m	0.122	0.100	0.077	0.077	0.061	0.060	0.054	0.054
of conducting paths for 5-pole systems (N) in the event of a fault	R'_F	mΩ/m	0.068	0.049	0.046	0.033	0.032	0.024	0.028	0.021
	X'_F	mΩ/m	0.082	0.063	0.048	0.048	0.035	0.036	0.031	0.032
	Z'_F	mΩ/m	0.106	0.080	0.066	0.058	0.048	0.043	0.042	0.039
Zero-sequence impedance										
for 5-pole systems (PE) according to IEC 60909-0 (VDE 0102)	R'_0	mΩ/m	0.141	0.105	0.132	0.132	0.099	0.099	0.087	0.087
	X'_0	mΩ/m	0.375	0.303	0.222	0.228	0.171	0.171	0.153	0.156
	Z'_0	mΩ/m	0.401	0.321	0.258	0.263	0.198	0.198	0.176	0.179
for 5-pole systems (N) according to IEC 60909-0 (VDE 0102)	R'_0	mΩ/m	0.141	0.102	0.111	0.072	0.075	0.051	0.066	0.045
	X'_0	mΩ/m	0.177	0.147	0.105	0.102	0.075	0.078	0.066	0.069
	Z'_0	mΩ/m	0.226	0.179	0.153	0.125	0.106	0.093	0.093	0.082

[1] Depending on the degree of protection and type of routing
[2] Including height offsets ≤ 1.3 m

Tab. 6/24: **Technical specifications for trunking units LDC.6. (copper, 5-pole) – part 1**

System LDC.6. (copper, 5-pole)			LDC262	LDC362	LDC661	LDC662	LDC761	LDC762	LDC861	LDC862
Number of busbars			**5**	**4**	**8**	**9**	**8**	**9**	**8**	**9**
Short-circuit withstand strength										
Rated short-time withstand current	R.m.s. value (t = 0.1 s) I_{cw}	kA	80	80	130	130	130	130	130	130
	R.m.s. value (t = 1 s) I_{cw}	kA	58	58	116	116	116	116	116	116
Rated peak withstand current	Peak value I_{pk}	kA	176	176	286	286	286	286	286	286
Maximum thermal load	Quantity of heat I^2t	10^6A^2s	3,364	3,364	13,456	13,456	13,456	13,456	13,456	13,456
Rated short-time withstand current of the 5th conductor	R.m.s. value (t = 0.1 s) I_{cw}	kA	48	48	78	78	78	78	78	78
	R.m.s. value (t = 1 s) I_{cw}	kA	35	35	70	70	70	70	70	70
Maximum thermal load of the 5th conductor	Quantity of heat I^2t	10^6A^2s	2,304	2,304	6,084	6,084	6,084	6,084	6,084	6,084
Conductor cross-section										
L1, L2, L3	Cross-section A	mm^2	706	1,022	1,412	1,412	2,044	2,044	2,464	2,464
N	Cross-section A	mm^2	706	1,022	706	1,412	1,022	2,044	1,232	2,464
PE	Cross-section A	mm^2	706	1,022	706	706	1,022	1,022	1,232	1,232
Fire load										
Trunking unit without tap-off point		kWh/m	7.29	7.29	10.87	11.99	10.87	11.99	10.87	11.99
Per tap-off point		kWh	8.32	8.32	12.04	12.96	12.04	12.96	12.04	12.96
Maximum fixing distance										
At normal mechanical load		m	5	4	4	4	3	3	2	2

Tab. 6/25: **Technical specifications for trunking units LDC.6. (copper, 5-pole) – part 2**

Connection pieces for non-Siemens distribution boards	Recommended conductor cross-sections in mm^2	Connectable LD systems	Connection piece for non-Siemens distribution boards	Recommended conductor cross-sections in mm^2	Connectable LD systems
LDA2.20-FA ...	CU 2 × 60 × 10	LDA1.2. and LDA2.2.	LDC2.20-FA ...	CU 100 × 15	LDC2.2.
LDA3.20-FA ...	CU 100 × 15	LDA3.2.	LDC3.20-FA ...	CU 100 × 15	LDC3.2.
LDA5..0-FA ...	CU 2 × 60 × 10	LDA4... and LDA5...	LDC6..0-FA ...	CU 2 × 100 × 10	LDC6...
LDA7..0-FA ...	CU 2 × 100 × 10	LDA6... and LDA7...	LDC7..0-FA ...	CU 4 × 100 × 12	LDC7...
LDA8..0-FA ...	CU 4 × 100 × 12	LDA8...	LDC8..0-FA ...	CU 4 × 120 × 12	LDC8...

Tab. 6/26: **Recommended conductor cross-sections (copper conductors) for the connection pieces for non-Siemens distribution boards**

Temperature characteristic							
Ambient temperature (24-h mean)	5 °C	15 °C	25 °C	35 °C	45 °C	55 °C	65 °C
Conversion factor for the rated current	1.15	1.10	1.05	1.00	0.95	0.90	0.85

Tab. 6/27: **Dependency of the rated current on the ambient temperature for the LD system**

Weight									
LDA trunking units		**LDA1...**	**LDA2...**	**LDA3...**	**LDA4...**	**LDA5...**	**LDA6...**	**LDA7...**	**LDA8...**
LDA.413	kg/m	-	-	-	24.1	27.4	27.4	33.7	37.2
LDA.423	kg/m	18.1	20.0	20.0	25.6	29.4	29.4	36.6	40.6
LDA.613	kg/m	-	-	-	25.6	29.4	29.4	36.6	40.6
LDA.623	kg/m	20.1	22.0	22.0	27.1	31.4	31.4	39.5	44.0
LDC trunking units			**LDC2...**	**LDC3...**			**LDC6...**	**LDC7...**	**LDC8...**
LDC.413	kg/m		-	-			60.3	82.0	100.2
LDC.423	kg/m		38.8	51.2			67.0	91.8	112.6
LDC.613	kg/m		-	-			67.0	91.8	112.6
LDC.623	kg/m		45.5	61.0			73.7	101.6	125.0
Distribution board and transformer connection units LDA..2.		**LDA3423**	**LDA3623**	**LDA6423**	**LDA6623**	**LDA7423**	**LDA7623**	**LDA8423**	**LDA8623**
-AS1	kg/unit	32.4	33.9	50.6	52.1	57.0	59.0	61.3	63.5
-AS2	kg/unit	35.1	47.4	56.0	71.2	65.0	81.0	70.8	86.6
-AS3	kg/unit	37.8	55.6	61.3	82.3	73.0	94.4	78.3	99.9
-AS4	kg/unit	41.6	68.8	69.6	101.7	83.9	117.1	93.1	126.4
Distribution board and transformer connection units LDA..1.				**LDA6413**	**LDA6613**	**LDA7413**	**LDA7613**	**LDA8413**	**LDA8613**
-AS1	kg/unit			48.2	49.8	54.1	56.0	57.6	59.8
-AS2	kg/unit			52.9	68.1	61.0	77.0	69.9	81.7
-AS3	kg/unit			57.6	78.7	67.7	89.1	72.4	94.1
-AS4	kg/unit			64.3	97.0	77.4	110.5	85.4	118.7
Distribution board and transformer connection units LDC..2.		**LDC3423**	**LDC3623**	**LDC6423**	**LDC6623**	**LDC7423**	**LDC7623**	**LDC8423**	**LDC8623**
-AS1	kg/unit	65.4	71.8	94.4	99.5	116.6	123.0	130.0	137.2
-AS2	kg/unit	78.6	95.7	112.5	131.2	142.9	162.9	160.8	181.7
-AS3	kg/unit	91.2	113.8	129.9	154.4	168.1	194.0	191.1	217.8
-AS4	kg/unit	103.4	141.5	153.0	191.2	204.6	242.2	234.5	272.9
Distribution board and transformer connection units LDC..1.				**LDC6413**	**LDC6613**	**LDC7413**	**LDC7613**	**LDC8413**	**LDC8613**
-AS1	kg/unit			86.6	91.6	105.9	112.4	117.6	124.9
-AS2	kg/unit			102.4	121.0	129.0	149.0	144.9	165.8
-AS3	kg/unit			117.6	142.1	151.1	176.9	171.1	197.8
-AS4	kg/unit			139.6	175.8	182.9	220.5	209.1	247.5
Incoming cable connection units LDA / LDC		**LDA142.**	**LDA162.**	**LDA242.**	**LDA262.**	**LDA342.**	**LDA362.**	**LDA442.**	**LDA462.**
-KE1 / -KE2	kg/unit	85	92	85	92	107	114	117	124
		LDA542.	**LDA562.**	**LDA441.**	**LDA461.**	**LDA541.**	**LDA561.**		
-KE1 / -KE2	kg/unit	137	144	115	122	135	142		
		LDC242.	**LDC262.**	**LDC342.**	**LDC362.**				
-KE1 / -KE2	kg/unit	115	122	127	134				
Distribution board connection pieces		**LDA2420**	**LDA3420**	**LDA5420**	**LDA7420**	**LDA8420**	**LDA5410**	**LDA7410**	**LDA8410**
-FA1 / -FA3 / -FA4 / -FA8PQ	kg/unit	11	23	37	59	69	32	52	62
		LDA2620	**LDA3620**	**LDA5620**	**LDA7620**	**LDA8620**	**LDA5610**	**LDA7610**	**LDA8610**
-FA1 / -FA3 / -FA4 / -FA8PQ	kg/unit	15	32	44	70	82	40	65	77
		LDC2420	**LDC3420**	**LDC6420**	**LDC7420**	**LDC8420**	**LDC6410**	**LDC7410**	**LDC8410**
-FA1 / -FA3 / -FA4 / -FA8PQ	kg/unit	26	57	110	135	159	96	118	139
		LDC2620	**LDC3620**	**LDC6620**	**LDC7620**	**LDC8620**	**LDC6610**	**LDC7610**	**LDC8610**
-FA1 / -FA3 / -FA4 / -FA8PQ	kg/unit	36	79	132	162	191	120	147	174

Tab. 6/28: **Weights for trunking units as well as for connection units and pieces**

General data	
Standards and specifications	IEC 61439-1 and -6
Climatic resistance	Damp heat, steady state, acc. to IEC 60068-2-78
	Damp heat, cyclic, according to IEC 60068-2-30
Degree of protection	IP30 / IP54
Ambient temperature	min. –5 °C / max. +40 °C / 24-h mean +35 °C
Overvoltage category / pollution degree	III / 3
Rated insulation voltage U_i according to IEC 61439-1	690 V AC
Rated operational voltage U_e	690 V AC
Rated frequency	50 Hz / 60 Hz
Color	Cover and external structure: RAL 7035 (light grey)
Material	Sheet steel, galvanized, partly painted

System-dependent data		
Type of tap-off unit	LD-K-*AK*-3NP-125-3..	LD-K-*AK*-3NP-125-3..
Type of fuse switch disconnector (MLFB)	3NP1133-1CA10	2 × 3NP1133-1CA10
Size of fuse link	NH00	2 × NH00
Current size	125 A	2× 125 A
Maximum permissible operational current I_{nC} (IP30/ IP54)		
Horizontal busbar, tap-off unit at the top	118 / 115 A	111 / 106 A
Horizontal busbar, tap-off unit at the side	125 / 125 A	119 / 117 A
Horizontal busbar, tap-off unit at the bottom	125 / 123 A	120 / 118 A
Vertical busbar	125 / 125 A	125 / 125 A
Cable entry	At the front	At the front
Aluminum plate, undrilled	360 × 130 mm	360 × 130 mm
Cable glands, maximum	15 × M32	15 × M32
Connection per pole	Bolt M8	Bolt M8
Connectable cables, maximum	2	2
Cable cross-section, min.	2.5 mm^2	2.5 mm^2
Cable cross-section, max.	95 mm^2	95 mm^2
Weights (IP30)*	24 kg	25 kg

Tab. 6/29: **Technical specifications for tap-off units with 3NP fuse switch disconnector**

System-dependent data			
Type of tap-off unit	LD-K-*AK*-3NP-250-3..	LD-K-*AK*-3NP-400-3..	LD-K-*AK*-3NP-630-3..
Type of fuse switch disconnector (MLFB)	3NP1143-1DA10	3NP1153-1DA10	3NP1163-1DA10
Size of fuse link	NH1	NH2	NH3
Current size	250 A	400 A	630 A
Maximum permissible operational current I_{nC} (IP30/ IP54)			
Horizontal busbar, tap-off unit at the top	194 / 185 A	300 / 290 A	440 / 425 A
Horizontal busbar, tap-off unit at the side	220 / 220 A	345 / 340 A	515 / 510 A
Horizontal busbar, tap-off unit at the bottom	215 / 210 A	340 / 335 A	505 / 470 A
Vertical busbar	237 / 226 A	365 / 355 A	535 / 520 A
Cable entry	At the front	At the front	At the front
Aluminum plate, undrilled	360 × 130 mm	360 × 130 mm	360 × 130 mm
Cable glands, maximum	15 × M32	15 × M32	15 × M32
Connection per pole	Bolt M10	Bolt M10	Bolt M10
Connectable cables, maximum	2	2	2
Cable cross-section, min.	16 mm^2	25 mm^2	120 mm^2
Cable cross-section, max.	150 mm^2	240 mm^2	300 mm^2
Weights (IP30)*	28 kg	30 kg	31 kg
*) Additional weight at IP54: ~4.5 kg			

Tab. 6/29: **Technical specifications for tap-off units with 3NP fuse switch disconnector** (continued)

General data	
Standards and specifications	IEC 61439-1 and -6
Climatic resistance	Damp heat, steady state, acc. to IEC 60068-2-78
	Damp heat, cyclic, according to IEC 60068-2-30
Degree of protection	IP20/ IP54
Ambient temperature	min. –5 °C / max. +40 °C / 24-h mean +35 °C
Overvoltage category / pollution degree	III / 3
Rated insulation voltage U_i according to IEC 61439-1	690 V AC
Rated operational voltage U_e	690 V AC
Rated frequency	50 Hz / 60 Hz
Color	Cover and external structure: RAL 7035 (light grey)
Material	Sheet steel, galvanized, partly painted

System-dependent data	
Type of tap-off unit	LD-K-*AK*-LTL-1000-*-...-P
Type of fuse switch disconnector (Jean Müller)	3p: LTL4A-3x3/9/1250 4p: LTL4A-4x4/9/1250
Size of fuse link	NH4
Current size	1000 A
Maximum permissible operational current I_{nC}	
Horizontal busbar, tap-off unit at the top	790 A (IP54)
Horizontal busbar, tap-off unit at the side	825 A (IP54)
Horizontal busbar, tap-off unit at the bottom	925 A (IP54)
Vertical busbar	925 A (IP54)
Cable entry	On two sides
Aluminum plate	468 × 208 mm
	max. 40 × M40
Cable grommets	4 × KT4
	14 ... 68 mm each
Connection per pole	4 × M12
Connectable cables, maximum	4
Weight	150 kg

Tab. 6/30: **Technical specifications for tap-off units with LTL fuse switch disconnector (premium version)**

Arc-resistant tap-off units with fuse switch disconnector					
LD-K- . AK . /...			**FSAM-250**	**FSAM-400**	**FSAM-630**
Rated current I_e		A	250	400	630
Maximum rated current $I_{r, max}$ of the fuse		A	250	400	630
Maximum permissible operational current $I_{r, max}$		A	230	400 [1]	540 [2]
Switching capacity of the installed fuse switch disconnector according to IEC 60947-3			AC-22B		
Short-circuit withstand strength for protection through fuses I_{cf} [3]		kA	110		
Cable entries	Multi-core cable [4]		1 cable grommet (KT 4) for cable diameters from 14 to 68 mm	2 cable grommets (KT 4) for cable diameters from 14 to 68 mm	
	Single-core cable		Undrilled aluminum plate for cable diameters from 21 to 35 mm	Al plate with 5 × M50 cable glands for cable diameters from 21 to 35 mm	
Conductor cross-sections [5]	L1, L2, L3	mm^2	1 × 25 to 1 × 300 / 2 × 240		
	N / PEN / PE	mm^2	1 × 25 to 1 × 300 / 2 × 240		
Weight		kg	45	69	75

[1] For vertical mounting position of the tap-off units, a derating of 5% is required (derating factor 0.95)
[2] For vertical mounting position of the tap-off units, a derating of 12% is required (derating factor 0.88)
[3] Fuses according to IEC 60269-1/-2
[4] With built-on cabling box for cable entry at the side
[5] Copper, bolt terminal with cable lugs

Tab. 6/31: **Technical specifications for arc-resistant tap-off units with fuse switch disconnector**

Tap-off units with 3VA circuit breaker – basic version						
LD-K- . AK . /...			**3VA1-0080- ...**	**3VA1-0100- ...**	**3VA1-0125- ...**	**3VA1-0160- ...**
Size of tap-off unit (see dimensional drawings)			1B	1B	1B	1B
Maximum permissible operational current I_{nC}		A	75	79	98	102
Type of molded case circuit breaker			3VA1180	3VA1110	3VA1112	3VA1116
Rated current of molded case circuit breaker		A	80	100	125	160
Cable entries for multi-core cables	Undrilled steel plate		At the front 250 mm × 150 mm			
	Cable glands, maximum		15 × M32			
Connection			Nut keeper kit at the 3VA circuit breaker, see 3VA documentation			
Weight		kg	25	25	25	25
LD-K- . AK . /...			**3VA1-0200- ...**	**3VA1-0250- ...**	**3VA2-0400- ...**	
Size of tap-off unit (see dimensional drawings)			2B	2B	3B	
Maximum permissible operational current I_{nC}		A	150	176	On request	
Type of molded case circuit breaker			3VA1220	3VA1225	3VA2340	
Rated current of molded case circuit breaker		A	200	250	400	
Cable entries for multi-core cables	Undrilled steel plate		At the front 250 mm × 150 mm			
	Cable glands, maximum		15 × M32			
Connection			Nut keeper kit at the 3VA circuit breaker, see 3VA documentation			
Weight		kg	30	30	35	

Tab. 6/32: **Technical specifications for tap-off units with 3VA circuit breaker (basic version)**

Tap-off units with 3VA circuit breaker – premium version				
Type of tap-off unit		**LD-K-.AK./3VA2-0100...**	**LD-K-.AK./3VA2-0160...**	**LD-K-.AK./3VA2-0250...**
Type of molded case circuit breaker		3VA2010 - 100A	3VA2116 - 160A	3VA2225 - 250 A 3VA2325 - 250 A (only ETU340)
Size of tap-off unit		Size 1	Size 1	Size 1, size 2 (only 250 A with ETU340)
Current size I_{size}	A	100	160	250
Maximum permissible operational current I_{nC}	A	100	160	240
Rated insulation voltage U_i according to IEC 61439-1	V	690	690	690
Rated operational voltage U_e	V	500	690	690
Current setting of overload releases		See documentation of the 3VA circuit-breaker		
Cable entry		2 entries at the side	2 entries at the side	2 entries at the side
Cable grommet KT		2 × KT3	2 × KT3	2 × KT3
Cable diameter		14 mm to 54 mm	14 mm to 54 mm	14 mm to 54 mm
Undrilled aluminum plate		210 mm × 140 mm	210 mm × 140 mm	210 mm × 140 mm
Cable glands, maximum		5 × M40	5 × M40	5 × M40
Connection		Connection lug	Connection lug	Connection lug
Phase		1 × M8	1 × M8	1 × M8
N/PEN/PE		1 × M8	1 × M8	1 × M8
Weight	kg	35	37	37
Type of tap-off unit		**LD-K-.AK./3VA2-0400...**	**LD-K-.AK./3VA2-0630...**	**LD-K-.AK.-3VA25-0630...**
Type of molded case circuit breaker		3VA2340 - 400 A 3VA2440 - 400 A (only ETU340)	3VA2463 - 630A	3VA2563 - 630A
Size of tap-off unit		Size 2	Size 2	Size 2 *)
Current size I_{size}	A	400	630	630
Maximum permissible operational current I_{nC}	A	400	470	630
Rated insulation voltage U_i according to IEC 61439-1	V	690	690	690
Rated operational voltage U_e	V	690	690	690
Current setting of overload releases		See documentation of the 3VA circuit-breaker		
Cable entry		2 entries at the side	2 entries at the side	2 entries at the side
Cable grommet KT		2 × KT4	2 × KT4	2 × KT4
Cable diameter		14 mm to 68 mm	14 mm to 68 mm	14 mm to 68 mm
Undrilled aluminum plate		271 mm × 136 mm	271 mm × 136 mm	271 mm × 136 mm
Cable glands, maximum		7 × M40	7 × M40	7 × M40
Connection		Connection lug	Connection lug	Connection lug
Phase		1 × M8	1 × M10	1 × M10
N/PEN/PE		1 × M8	1 × M10	1 × M10
Weight	kg	58	61	71

Tab. 6/33: **Technical specifications for tap-off units with 3VA circuit breaker (premium version)**

Type of tap-off unit		LD-K-.AK.-3VA2-0800...	LD-K-.AK.-3VA2-1000...	LD-K-.AK.-3VA2-1600...
Type of molded case circuit breaker		3VA2580 - 800A	3VA2510 - 1000A	3VA2716 - 1600A
Size of tap-off unit		Size 3	Size 3	Size 4
Current size I_{size}	A	800	1,000	1,600
Maximum permissible operational current I_{nC}	A	790	895	1,250
Rated insulation voltage U_i according to IEC 61439-1	V	690	690	690
Rated operational voltage U_e	V	690	690	690
Current setting of overload releases		See documentation of the 3VA circuit-breaker		
Cable entry		2 entries at the side	2 entries at the side	2 entries at the side
Cable grommet KT		4 × KT4	4 × KT4	4 × KT4
Cable diameter		14 mm to 68 mm	14 mm to 68 mm	14 mm to 68 mm
Undrilled aluminum plate		434 mm x 177 mm	434 mm x 177 mm	480 mm x 188 mm
Cable glands, maximum		24 × M40	24 × M40	24 × M40
Connection		Cable connection system	Cable connection system	Cable connection system
Phase		4 × M12	4 × M12	4 × M12
N/PEN/PE		4 × M12	4 × M12	4 × M12
Weight	kg	149	149	165

Tab. 6/33: **Technical specifications for tap-off units with 3VA circuit breaker (premium version)** (continued)

6.5 Fire Barrier for LD system

The fire barrier consists of an internal and an external part. The fire resistance class corresponds to S 120 according to DIN 4102-9 or EI 120 according to EN 13501-2. This also covers the lower fire resistances at constant wall thickness (S 30, S 60, S 90, or EI 30, EI 60, EI 90). Busbar trunking systems with fire barrier can only be delivered ex works.

Note: Retrofitting of the fire barrier is not possible.

When ordering, the type suffix ...+LD-L120A(B)-X* (Y*, Z*) is to be attached to the type code for the system component. If the fire barrier for the LD system is used within Germany, the approval kit LD-S120-ZUL-D must be ordered additionally.

The approval kit is delivered together with the fire barrier. The fire barrier is possible for straight trunking units, elbows, knees, offset elbows, and offset knees. Dimensions and positioning of the fire barrier are given in Tab. 6/34 and the corresponding Fig. 6/9.

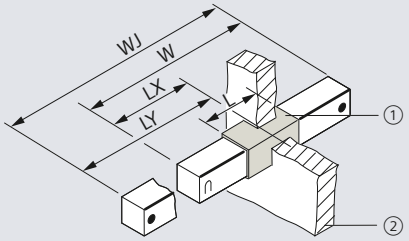
After mounting the busbar run in the fire wall or fire ceiling, the joints must be filled according to the wall or ceiling thickness with stable, non-inflammable material (class A1 or A2-s1, d0 according to EN 13501-1; e.g., with concrete or mortar). The concrete or mortar must comply with the applicable regulations for maintaining the fire resistance class of the wall or ceiling (e.g., EN 206 and EN 998-2).

Note: The fire barrier can be positioned off-center. Please observe that the fire barrier is located within the fire wall (wall thickness from 0.15 m to 0.48 m for LD.1 to LD.7 resp. to 0.68 m for LD.8; for other wall thicknesses, on request).

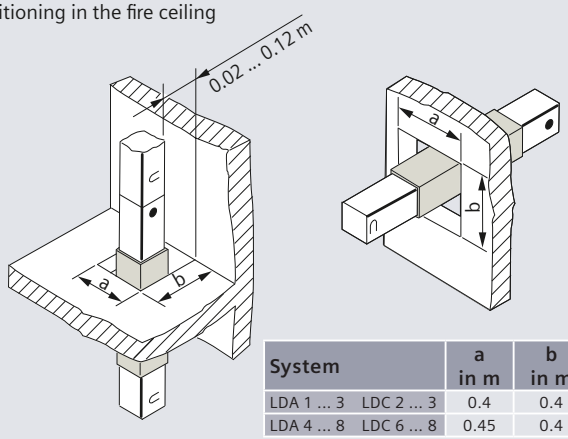
Dimensions for components of the LD system with fire barrier										
		Length of fire barrier	Minimum optional length		Limb length			Fire barrier positioning		
		L in m	W in m	WJ in m	X in m	Y in m	Z in m	LX in m	LY in m	LZ in m
Straight trunking unit	LD . 1 ... to LD . 7 ...	0.48	0.92 ... 1.24	0.92 ... 1.24	-	-	-	min. 0.44	min. 0.48	-
	LD . 8 ...	0.68	1.12 ... 1.24	1.12 ... 1.24	-	-	-	min. 0.54	min. 0.58	-
Knee	LD . 1 ... to LD . 7 ...	0.48	-	-	0.86 ... 1.24	0.90 ... 1.24	-	min. 0.44	min. 0.48	-
	LD . 8 ...	0.68	-	-	1.06 ... 1.24	1.10 ... 1.24	-	min. 0.54	min. 0.58	-
Offset knee	LD . 1 ... to LD . 3 ...	0.48	-	-	0.86 ... 1.24	0.90 ... 1.24	-	min. 0.44	min. 0.48	-
	LD . 4 ... to LD . 7 ...	0.48	-	-	0.92 ... 1.24	0.96 ... 1.24	-	min. 0.44	min. 0.48	-
	LD . 8 ...	0.68	-	-	1.12 ... 1.24	1.16 ... 1.24	-	min. 0.54	min. 0.58	-
Elbow	LD . 1 ... to LD . 3 ...	0.48	-	-	0.86 ... 1.24	0.90 ... 1.24	-	min. 0.44	min. 0.48	-
	LD . 4 ... to LD . 7 ...	0.48	-	-	0.92 ... 1.24	0.96 ... 1.24	-	min. 0.44	min. 0.48	-
	LD . 8 ...	0.68	-	-	1.12 ... 1.24	1.16 ... 1.24	-	min. 0.54	min. 0.58	-
Offset elbow (variable Z-dimension)	LD . 1 ... to LD . 3 ...	0.48	-	-	0.5	0.5	0.84 ... 1.30	-	-	min. 0.42
	LD . 4 ... to LD . 7 ...	0.48	-	-	0.5	0.5	0.90 ... 1.30	-	-	min. 0.42
	LD . 8 ...	0.68	-	-	0.5	0.5	1.10 ... 1.30	-	-	min. 0.52

Tab. 6/34: **Dimensions and positioning of the fire barrier for LD system components for partial figures a) to e) in Fig. 6/9 (dimensions in m)**

Straight trunking unit

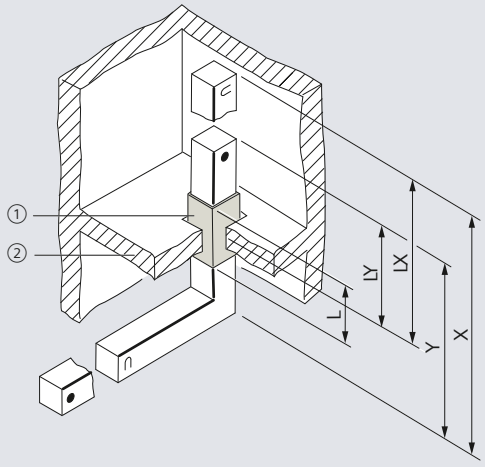


Positioning in the fire ceiling

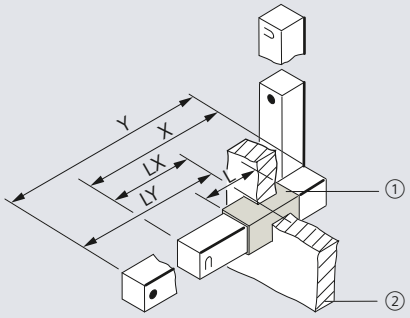


System	a in m	b in m
LDA 1 ... 3 LDC 2 ... 3	0.4	0.4
LDA 4 ... 8 LDC 6 ... 8	0.45	0.4

Knee

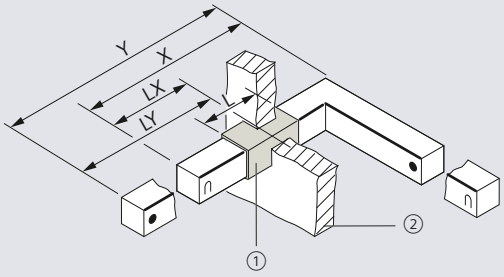


Knee, offset



① Fire barrier: center of fire wall = center of fire barrier
② Wall thickness of fire wall from 0.15 m to max. 0.48 m for LD.1 to LD.7, or up to max. 0.68 m for LD.8.
For larger wall thicknesses as well as for wall thicknesses below 0.15 m, the fire barrier can be provided on request.

Elbow



Elbow, offset

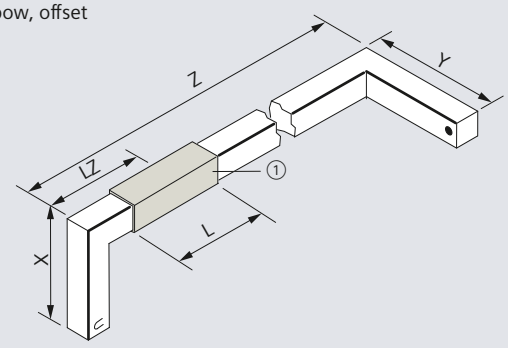


Fig. 6/9: **Graphics to Tab. 6/34 (dimensions and positioning of the fire barrier for LD system components, specifications in m)**

6.6 Functional Endurance of LD system

The LD busbar trunking system can be equipped with a 2-, 3-, or 4-side duct for functional endurance, and therefore fulfills the specifications of DIN 4102-12.

The general description for functional endurance is given in Chapter 9.3. The dimensions and derating factors (referred to the rated current and an ambient temperature of +35 °C in the 24-h mean) are given in Tab. 6/35.

Busbar trunking system		Functional endurance	PROMATECT® plates		External dimensions Promat duct [1]		Derating factors according to mounting position		
Type		Class	Thickness	Plate type	Width	Height	Horizontal edgewise	Horizontal flat	Vertical
LDA (IP34)	1 ... 3	E 30 ... E 60 [2]	20 mm	L500	260 mm	260 mm	0.57	-	-
		E 30 ... E 90 [2]	40 mm	L500	300 mm	300 mm	0.5	-	-
		E 30 ... E 90 [3]	45 mm	LS	310 mm	320 mm	0.5	-	0.5
	6 ... 8	E 30 ... E 90 [2]	20 mm	L500	320 mm	260 mm	0.57	-	-
		E 30 ... E 90 [3]	45 mm	LS	370 mm	320 mm	0.45	-	0.44
LDC (IP34)	2, 3	E 30 ... E 60 [2]	20 mm	L500	260 mm	260 mm	0.58	-	-
		E 30 ... E 90 [2]	40 mm	L500	300 mm	300 mm	0.52	-	-
		E 30 ... E 90 [3]	45 mm	LS	310 mm	320 mm	0.52	-	0.48
	6 ... 8	E 30 ... E 90 [2]	20 mm	L500	320 mm	260 mm	0.57	-	-
		E 30 ... E 90 [3]	45 mm	LS	370 mm	320 mm	0.44	-	0.48

[1] External dimensions are valid for designs with 4 barriers without external transverse joint connection (sleeve). The functional endurance class E 120 has been tested in conformity with the test standard DIN 4102-12. The standard only specifies the functional endurance classes E 30, E 60 and E 90. Other external dimensions (e.g., for designs with 3 barriers) on request.
[2] Civil Engineering Materials Testing Institute Braunschweig
[3] Civil Engineering Materials Testing Institute Leipzig

Tab. 6/35: **Dimensions and derating factors for the functional endurance of the LD system**

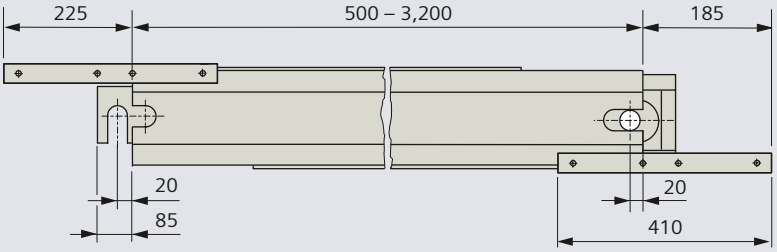
6.7 Dimensional Drawings and Dimensions

Only some selected dimensional drawings are illustrated. If not stated otherwise, all dimensions in the following figures and tables are given in millimeters [mm].

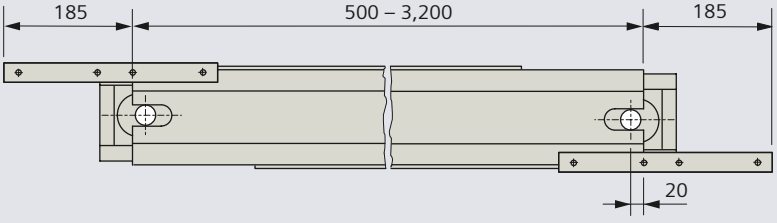
Figures:
- Fig. 6/10: Dimensional drawings for LD trunking units
- Fig. 6/11: Dimensional drawings for distribution board and transformer connection units (dimensions in Tab. 6/36)
- Fig. 6/12 and Fig. 6/13: Tag distances for distribution board and transformer connection units (dimensions in Tab. 6/37)
- Fig. 6/14: Dimensional drawings for connection tags, basic tags, PE connection tags, and offsets, as well as flange plates and corresponding enclosure cut-outs (see Tab. 6/36 and Tab. 6/37)
- Fig. 6/15: Dimensional drawings tap-off units with 3NP-fuse switch disconnector
- Fig. 6/16: Dimensional drawings tap-off units with LTL-fuse switch disconnector
- Fig. 6/17: Dimensional drawings for arc-resistant tap-off units with fuse switch disconnector
- Fig. 6/18: Dimensional drawings for tap-off units with 3VA circuit breaker up to 1,000 A, as well as empty tap-off units up to 400 A prepared for installation of molded case circuit breakers (Siemens, Schneider Electric)
- Fig. 6/19: Dimensional drawings for tap-off units with 3VA circuit breaker up to 1,600 A
- Fig. 6/20: Dimensional drawings for additional equipment components of the LD system
- Fig. 6/21: Dimensional drawings for incoming cable connection units and the entry plates for single-core cables.

Tables:
- Tab. 6/36: Dimensions for transformer and distribution board connection units and corresponding flange plates
- Tab. 6/37: Dimensions for connection tags AS1 to AS4 for transformer and distribution board connection units
- Tab. 6/38: Dimensions for transformer and distribution board connection units, as well as for distribution board connection flanges.

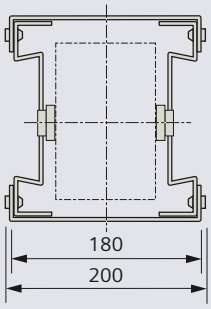
LDA(C)...-...
LDA(C)...-D-...
LDA(C)...-V-...



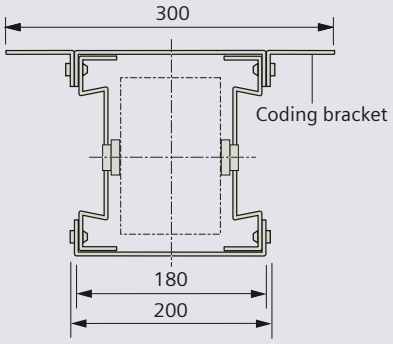
LDA(C)...-J-...



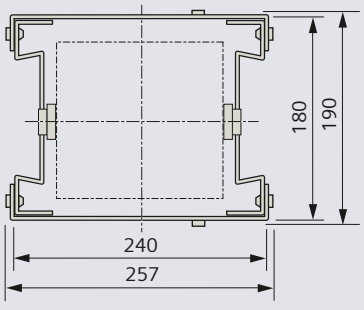
LDA(C)1... to LDA(C)3...



LDA(C)1...-K-... to LDA(C)3...-K-...



LDA(C)4... to LDA(C)8...



LDA(C)4...-K-... to LDA(C)8...-K-...

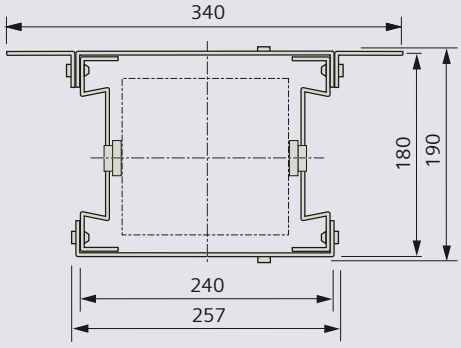
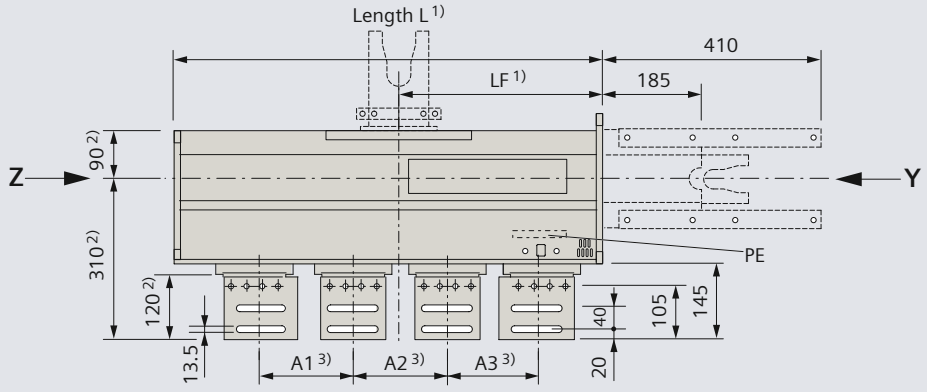
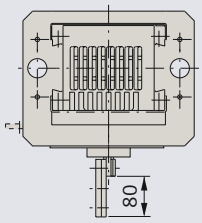


Fig. 6/10: **Dimensional drawings (dimensions in mm) for LD trunking units**

Side view LD.....-AS. (-T)

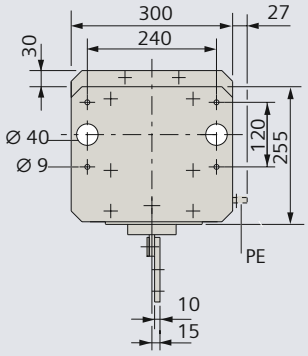


View Y

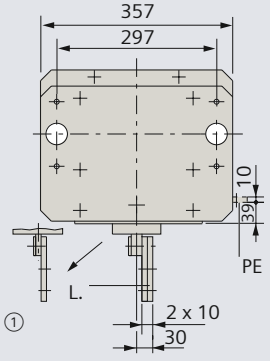


1) For reference dimension length L and distance LF for connection flange, see Tab. 6/32 (for selection keys and views, see Tab. 6/6)
2) Height dimensions apply to all LD connection units
3) Tag distances (for dimensions A1, A2, and A3, see Fig. 6/11 and Fig. 6/12) can be implemented for flexible strip / copper bar widths ≤ 120 mm

View Z
LDA3...-AS. +LD-...
LDC3...-AS. +LD-...

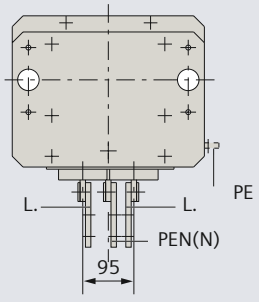


View Z
LDA 6(7)...-AS. +LD-...
LDC 6...-AS. +LD-...



① PEN(N) = ½ L for LDA 6(7).1. and LDC 6.1.

View Z
LDA 8.1.-AS. +LD-...
LDC 7(8).1.-AS. +LD-...
(with half PEN(N) conductor)



View Z
LDA 8.2.-AS.+LD-...
LDC 7(8).2.-AS.+LD-...
(with complete PEN(N) conductor, all connection tags identical)

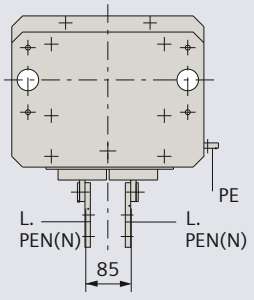
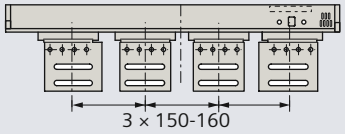


Fig. 6/11: **Dimensional drawings (dimensions in mm) for distribution board and transformer connection units LD.....-AS.(-T) (Tab. 6/36) and type suffix +LD-... for optional offset and selection of the phase sequence**

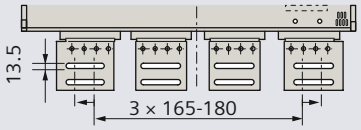
LD.....-AS1 +LD-..

Tag distances in as-delivered condition



Tag type I II II I

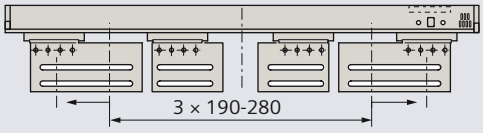
Tag distances can be implemented on site by rotation of the connection tags



Tag type I II II I

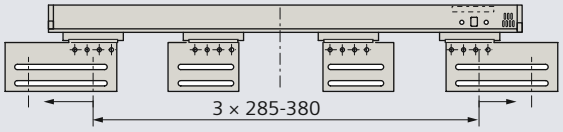
LD.....-AS2 +LD-..

Tag distances in as-delivered condition



Tag type III IV IV III

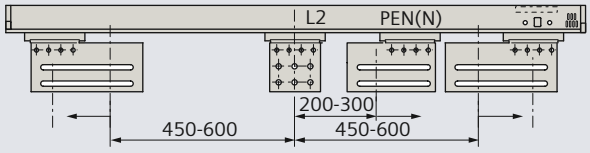
Tag distances can be implemented on site by rotation of the connection tags



Tag type III IV IV III

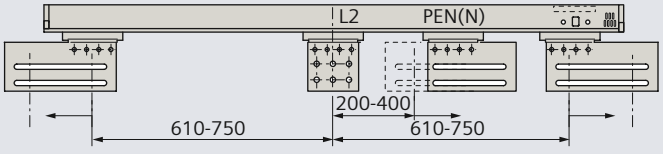
LD.....-AS3 +LD-.E (+LD-.G)

Tag distances in as-delivered condition



Tag type V VI VII V

Tag distances can be implemented on site by rotation of the connection tags

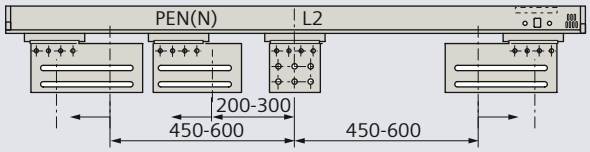


Tag type V VI VII V

Fig. 6/12: **Tag distances (dimensions in mm) for distribution board and transformer connection units AS.(-T) – part 1 (Tab. 6/37)**

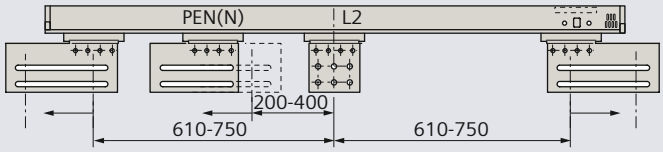
LD.....-AS3 +LD-.F (+LD-.H)

Tag distances in as-delivered condition



Tag type V VII VI V

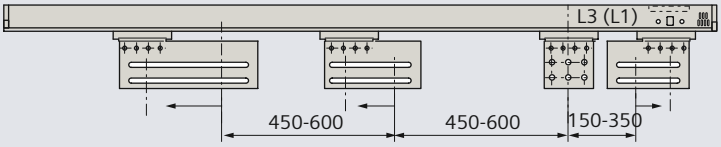
Tag distances can be implemented on site by rotation of the connection tags



Tag type V VII VI V

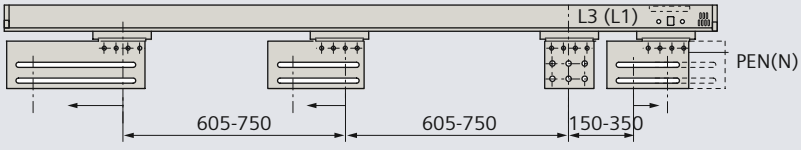
LD.....-AS4 +LD-..A(C)

Tag distances in as-delivered condition



Tag type VII V VI VII

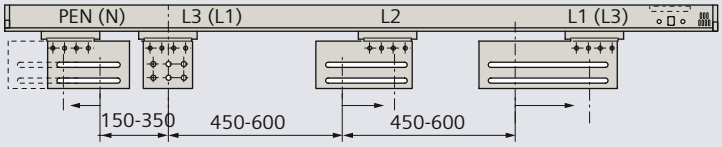
Tag distances can be implemented on site by rotation of the connection tags



Tag type VII V VI VII

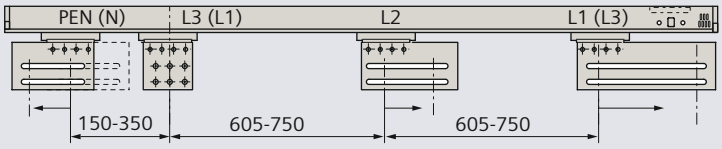
LD.....-AS4 +LD-..B(D)

Tag distances in as-delivered condition



Tag type VII VI V VIII

Tag distances can be implemented on site by rotation of the connection tags

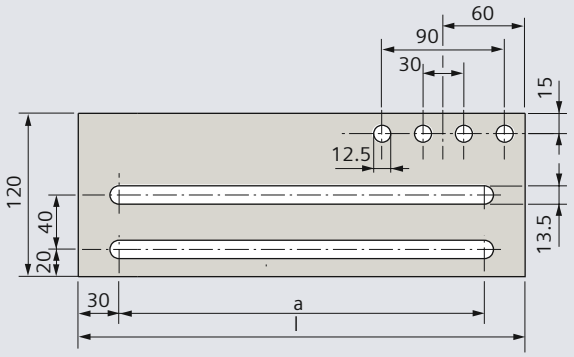


Tag type VII VI V VIII

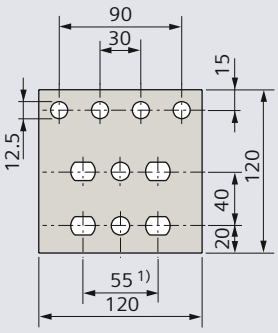
Fig. 6/13: **Tag distances (dimensions in mm) for distribution board and transformer connection units AS.(-T) – part 2 (Tab. 6/37)**

Connection tags AS1 to AS4

Type I to VIII (except type VI at AS3 and AS4)

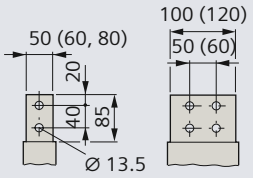


Type VI for AS3 and AS4

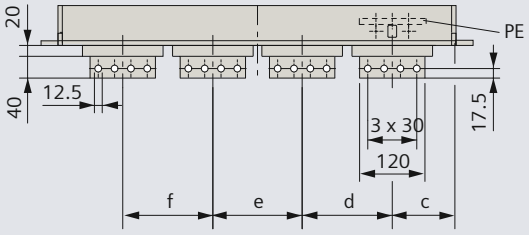


1) Elongated holes with center-to-center distance of 55 mm for implementation of:
50 mm distance for connection of flexible strips with a width of 100 mm,
60 mm distance for connection of flexible strips with a width of 120 mm.

Customer connection tags

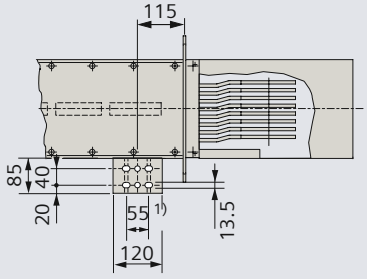


Basic tags of LD connection unit

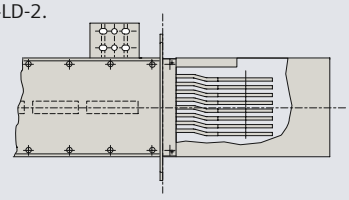


PE connection tags

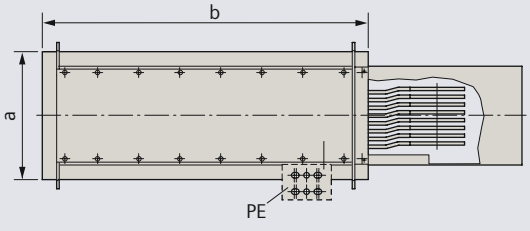
LD...6.-AS.+LD-1.

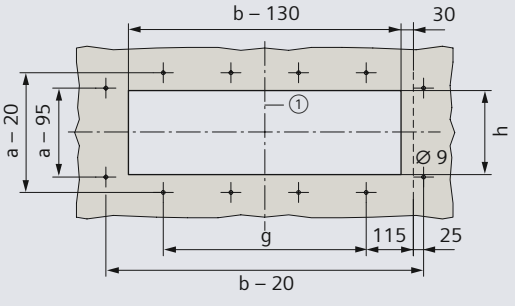


LD...6.-AS.+LD-2.



Aluminum flange plate and enclosure cut-out





① Centerline of LD.....-AS = centerline of cut-out

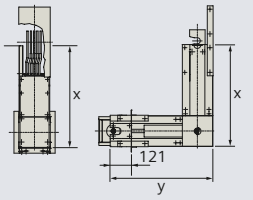
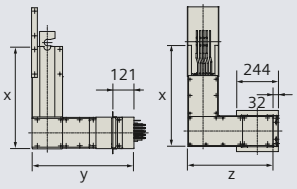
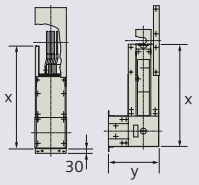
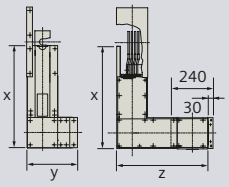
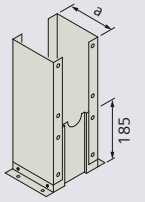
Fig. 6/14: **Dimensional drawings (dimensions in mm) for connection tags, basic tags, PE connection tags, and offsets, as well as flange plates and corresponding enclosure cut-outs (Tab. 6/36 and Tab. 6/37)**

Type	Type suffix	Fig. 6/11		Fig. 6/14							
		L in mm	LF in mm	a in mm	b in mm	c in mm	d in mm	e in mm	f in mm	g in mm	h in mm
LD.3...-AS1 (-T)	+LD-...	725	362.5	255	795	115	165.5	164	165.5	495	110
LDA6(7,8)...-AS1 (-T)	+LD-...			312							110
LDC 6...-AS1 (-T)	+LD-...			312							110
LDC 7(8)...-AS1 (-T)	+LD-...			312							205
LD.3...-AS2 (-T)	+LD-...	1,085	542.5	255	1,155	115	287.5	280	287.5	855	110
LDA6(7,8)...-AS2 (-T)	+LD-...			312							110
LDC 6...-AS2 (-T)	+LD-...			312							110
LDC 7(8)...-AS2 (-T)	+LD-...			312							205
LD.3...-AS3 (-T)	+LD-...	1,430	715	255	1,500	115	300 for +LD-.E(G) 600 for +LD-.F(H)	300	600 for +LD-.E(G) 300 for +LD-.F(H)	1,200	110
LDA6(7,8)...-AS3 (-T)	+LD-...			312							110
LDC 6...-AS3 (-T)	+LD-...			312							110
LDC 7(8)...-AS3 (-T)	+LD-...			312							205
LD.3...-AS4 (-T)	+LD-...A(C)	1,930	365	255	2,000	115	250	600	600	1,700	110
LDA6(7,8)...-AS4 (-T)	+LD-...A(C)			312							110
LDC 6...-AS4 (-T)	+LD-...A(C)			312							110
LDC 7(8)...-AS4 (-T)	+LD-...A(C)			312							205
LD.3...-AS4 (-T)	+LD-...B(D)	1,930	1,565	255	2,000	365	600	600	250	1,700	110
LDA6(7,8)...-AS4 (-T)	+LD-...B(D)			312							110
LDC 6...-AS4 (-T)	+LD-...B(D)			312							110
LDC 7(8)...-AS4 (-T)	+LD-...B(D)			312							205

Tab. 6/36: **Dimensions for transformer and distribution board connection units LD.....-AS... and corresponding flange plates**

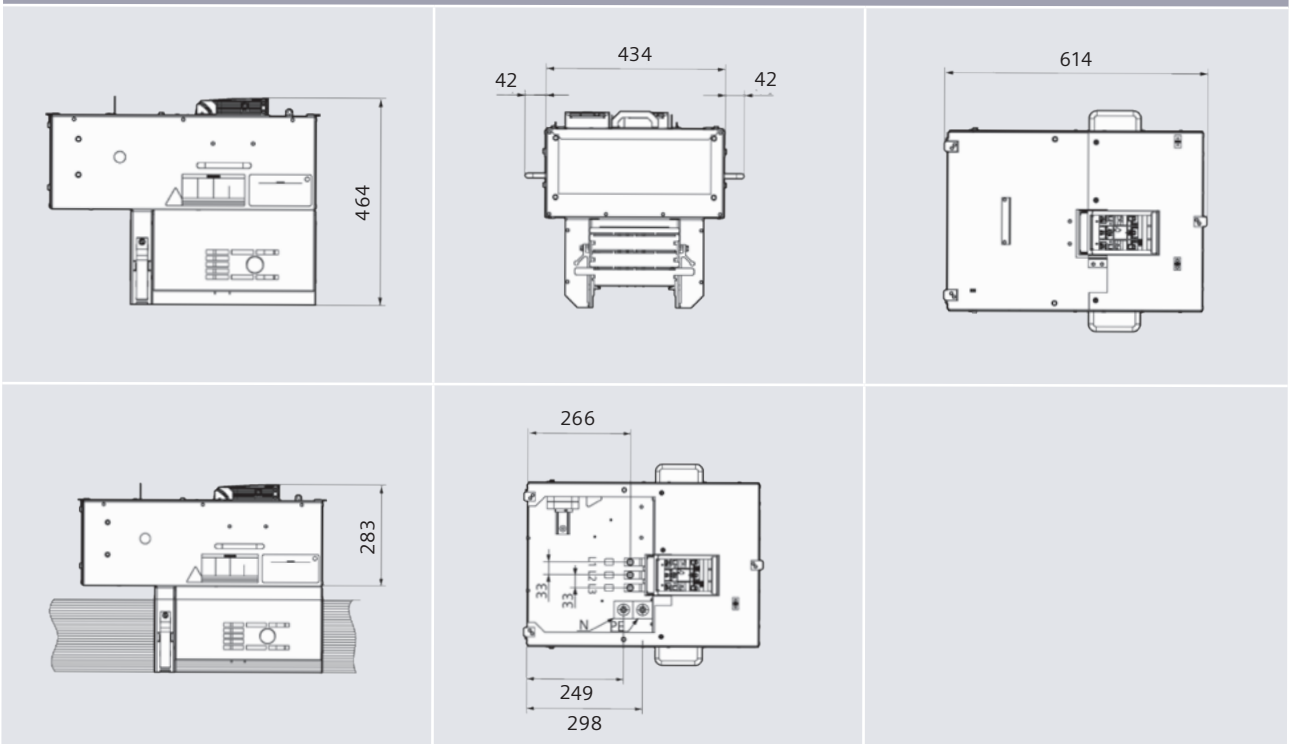
Fig. 6/12 Fig. 6/13	Fig. 6/14		Fig. 6/12 Fig. 6/13			
Tag type	Width a in mm	Length l in mm	AS1	AS2	AS3	AS4
I	82.5	142.5	×			
II	68	128	×			
III	202.5	262.5		×		
IV	110	170		×		
V	210	270			×	
VII	160	220			×	
VIII	360	420				×
V	210	270				×
VII	160	220				×

Tab. 6/37: **Dimensions for connection tags AS1 to AS4 for transformer and distribution board connection units**

Distribution board connection units for SIVACON S8 -VEU				
Angled connection units (example "LH")	x in mm	y in mm	z in mm	
LDA(C)....-VEU-L.	500	500		
LDA(C)....-VEU-L.-X*	500 to 1,240	500		
LDA(C)....-VEU-L.-Y*	500	500 to 1,240		
LDA(C)....-VEU-L.-X*/Y*	500 to 1,240	500 to 1,240		
Offset connection units (example "LHL")	x in mm	y in mm	z in mm	
LDA(C)....-VEU-L..	500	500	LD. 1 to 3 = 360; LD. 4 to 8 = 420	
LDA(C)....-VEU-L..-X*	500 to 1,240	500	LD. 1 to 3 = 360; LD. 4 to 8 = 420	
LDA(C)....-VEU-L..-Y*	500	500 to 1,240	LD. 1 to 3 = 360; LD. 4 to 8 = 420	
LDA(C)....-VEU-L..-X*/Y*	500 to 1,240	500 to 1,240	LD. 1 to 3 = 360; LD. 4 to 8 = 420	
LDA(C)....-VEU-L..-Z*	500	500	LD. 1 to 3 = 360 to 1,300; LD. 4 to 8 = 420 to 1,300	
Connection units for non-Siemens distribution boards -VE..				
Angled connection units (example "VEH")	x in mm	y in mm	z in mm	
LDA(C)....-VE.	500	300		
LDA(C)....-VE.-X*	500 to 1,240	300		
Offset connection units (example "VEHL")	x in mm	y in mm	z in mm	
LDA(C)....-VE..	500	300	LD. 1 to 3 = 360; LD. 4 to 8 = 420	
LDA(C)....-VE..-X*	500 to 1,240	300	LD. 1 to 3 = 360; LD. 4 to 8 = 420	
LDA(C)....-VE..-Z*	500	300	LD. 1 to 3 = 360 to 1,300; LD. 4 to 8 = 420 to 1,300	
Distribution board connection flanges -VEG .				
	a in mm			
LD-VEG1	180			
LD-VEG2	240			

Tab. 6/38: **Dimensional drawings (dimensions in mm) for transformer and distribution board connection units (-VEU for SIVACON S8 power distribution boards and -VE for non-Siemens distribution boards and incoming cable connections), as well as for distribution board connection flanges (-VEG)**

Tap-off units with 3NP fuse switch disconnector
LD-K-.AK.-3NP-125



Tap-off units with 3NP fuse switch disconnector
LD-K-.AK.-3NP-125-125

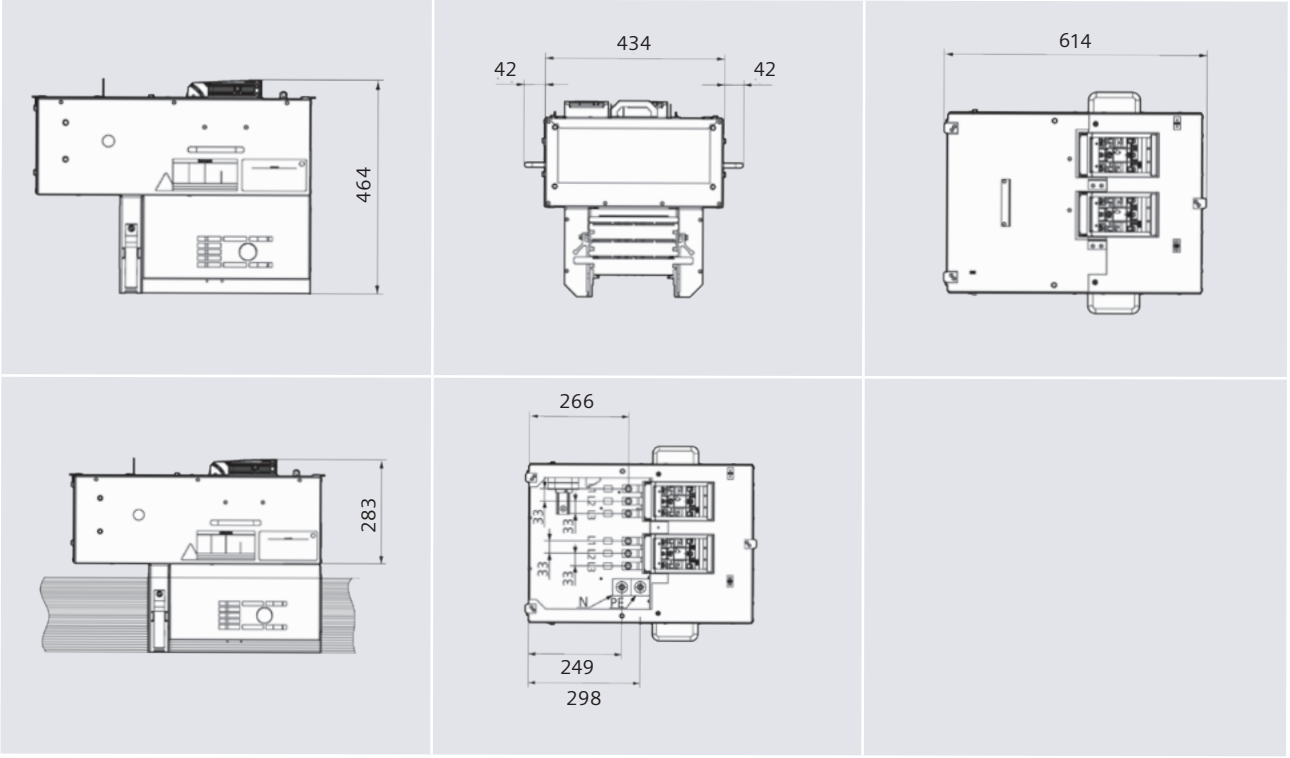
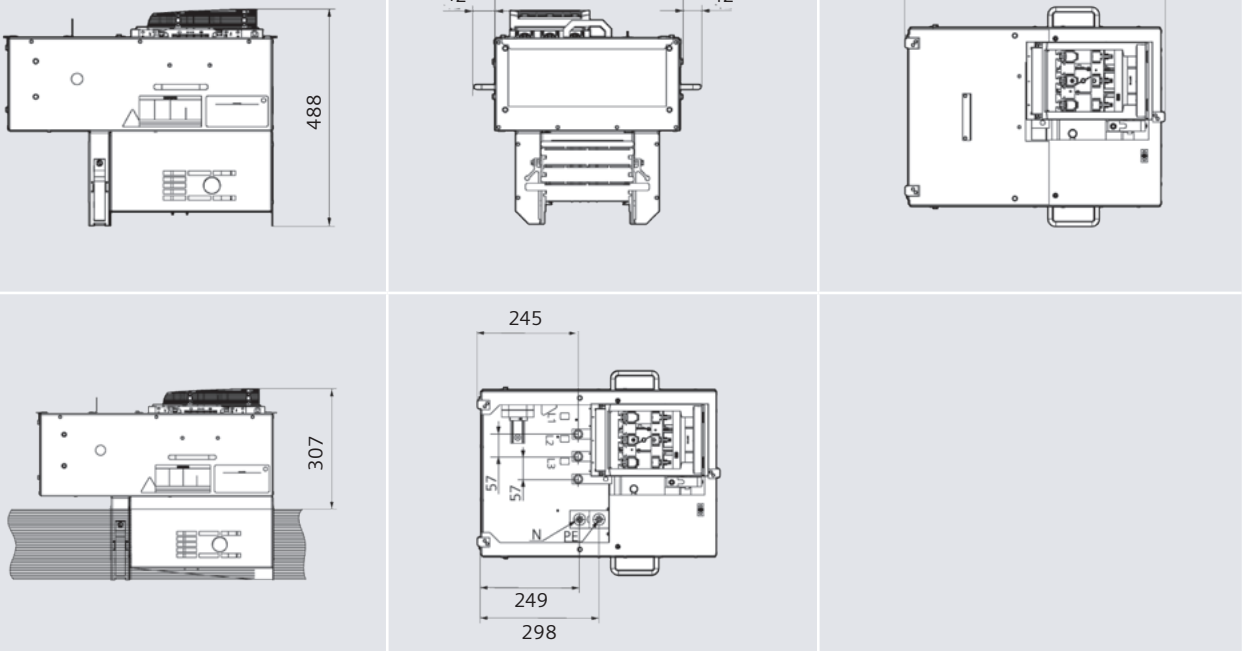


Fig. 6/15: **Dimensional drawings (dimensions in mm) for tap-off units with 3NP fuse switch disconnector**

Tap-off units with 3NP fuse switch disconnector
LD-K-.AK.-3NP-250-.



Tap-off units with 3NP fuse switch disconnector
LD-K-.AK.-3NP-400-.-IP54

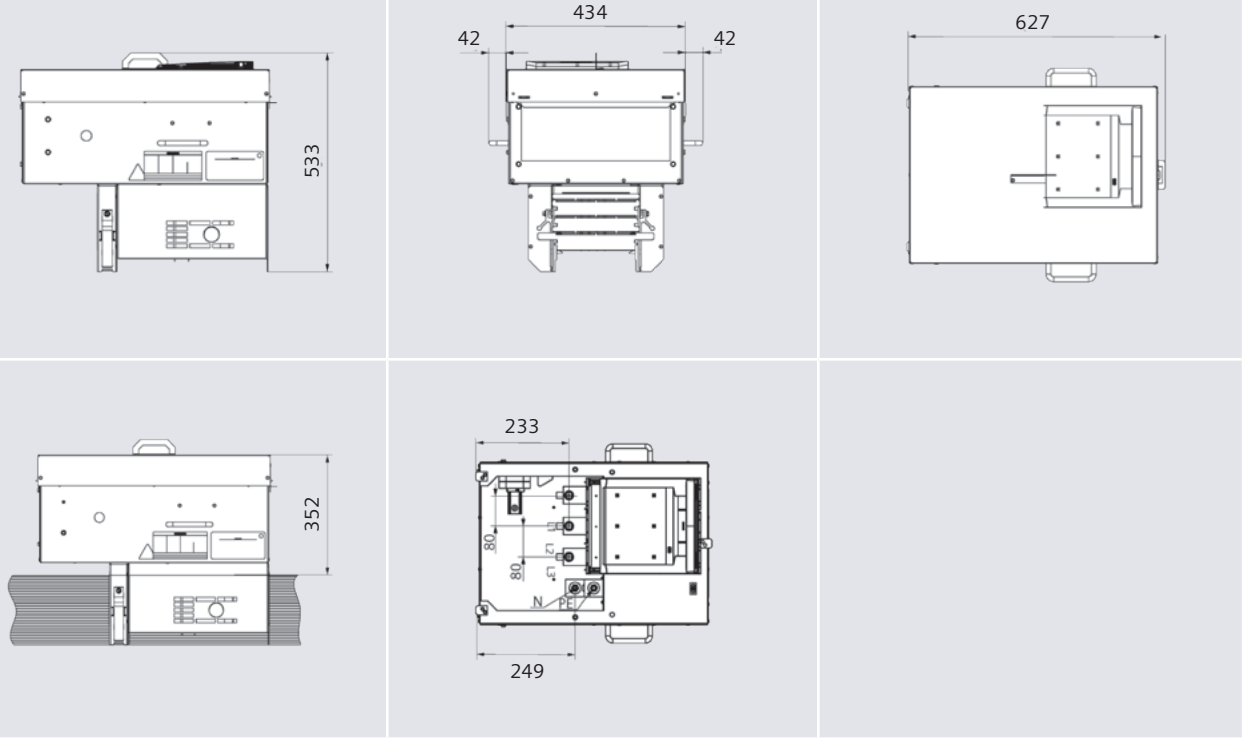
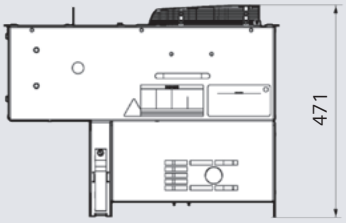
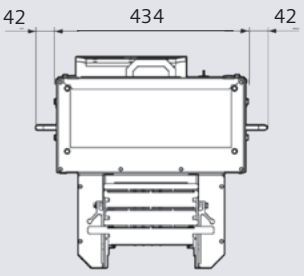
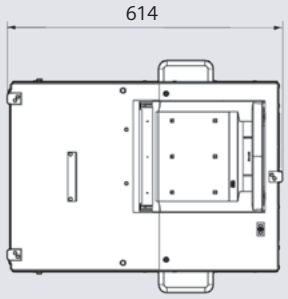


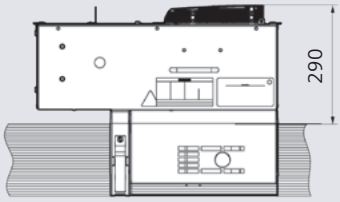
Fig. 6/15: **Dimensional drawings (dimensions in mm) for tap-off units with 3NP fuse switch disconnector** (continued)

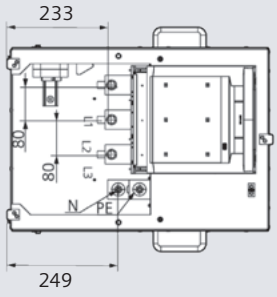
Tap-off units with 3NP fuse switch disconnector
LD-K-1AK5-3NP-630-3



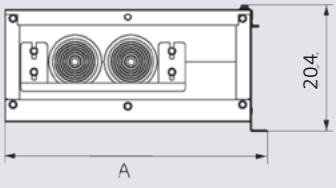


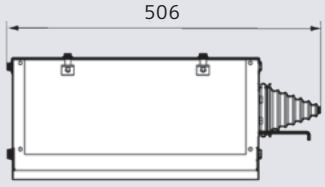


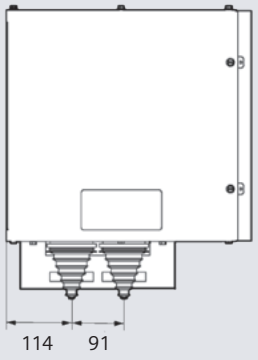




Tap-off units with 3NP fuse switch disconnector
LD-AK-B-KR.



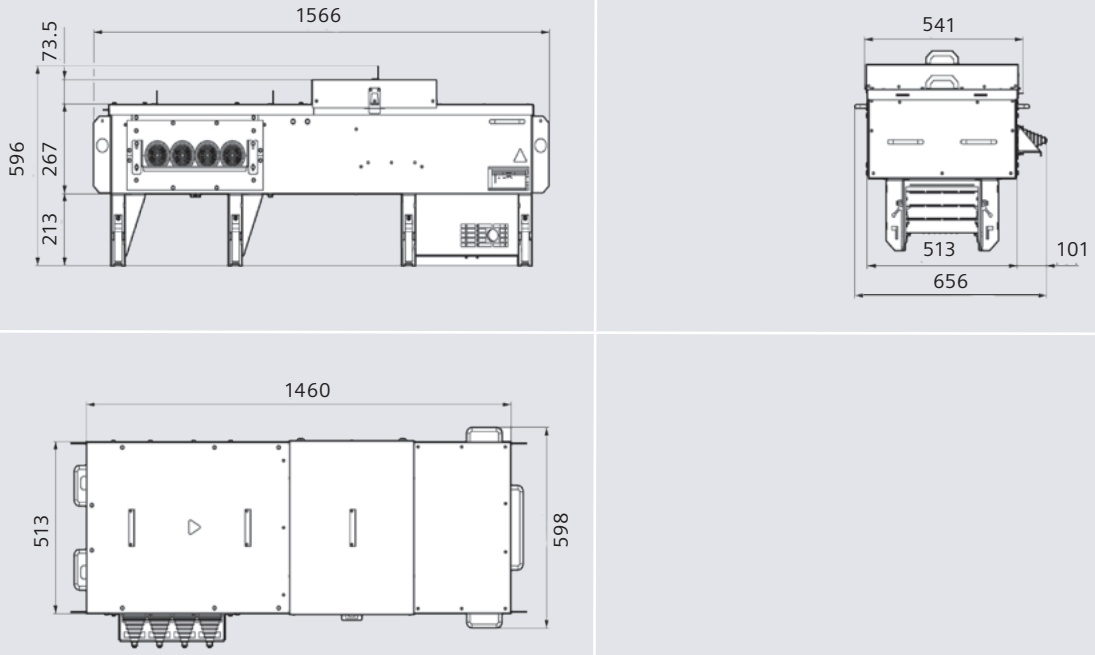




LD-AK-B-KR 1: A = 427 mm
LD-AK-B-KR 2: A = 345 mm

Fig. 6/15: **Dimensional drawings (dimensions in mm) for tap-off units with 3NP fuse switch disconnector** (continued)

Tap-off units with LTL fuse switch disconnector
LTL4-1000-IP54



Tap-off units with LTL fuse switch disconnector
LTL4-1000

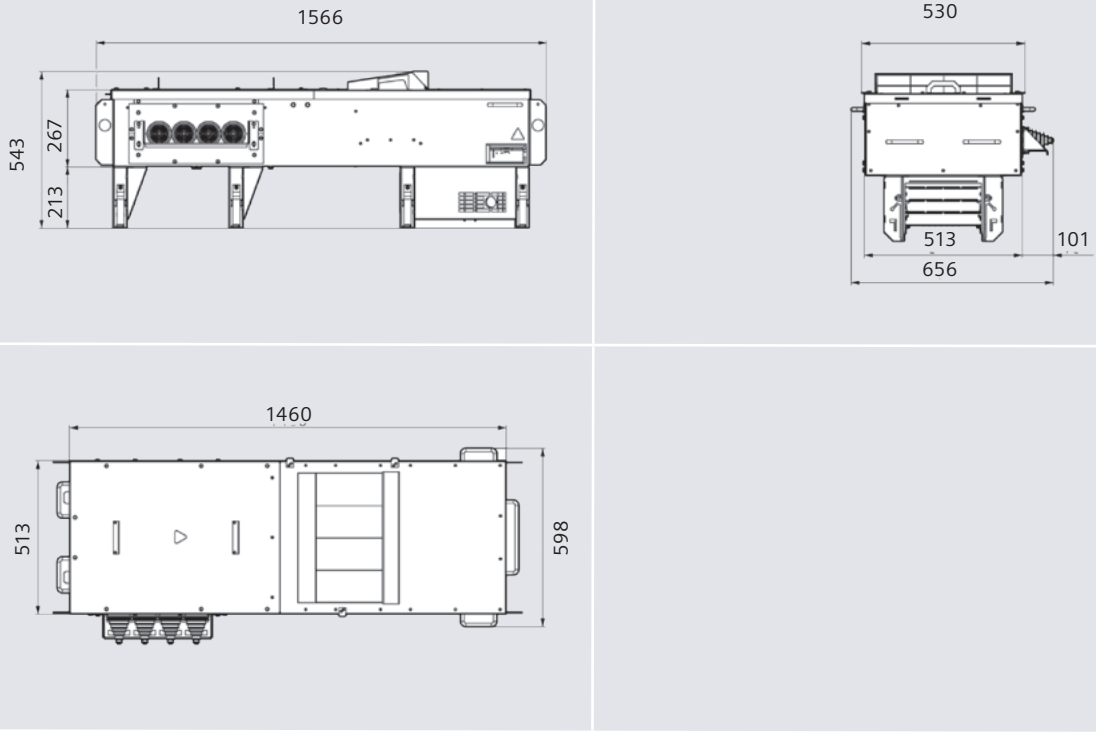
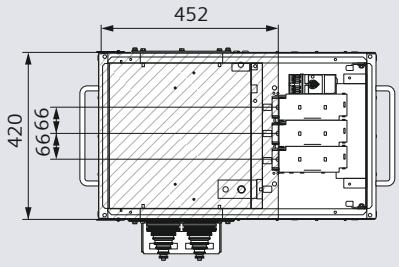
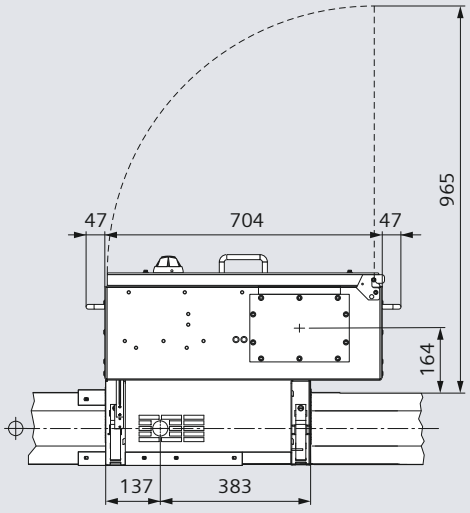


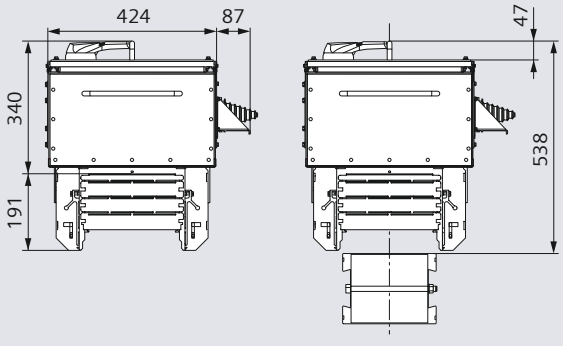
Fig. 6/16: **Dimensional drawings (dimensions in mm) for tap-off units with LTL fuse switch disconnector**

Tap-off units with fuse switch disconnector .../FSAM250



Indoor dimensions

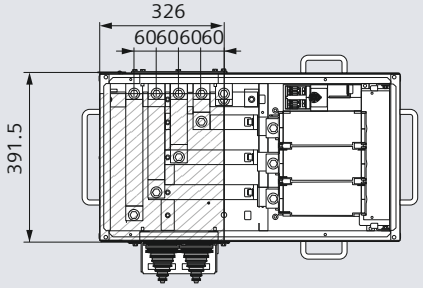




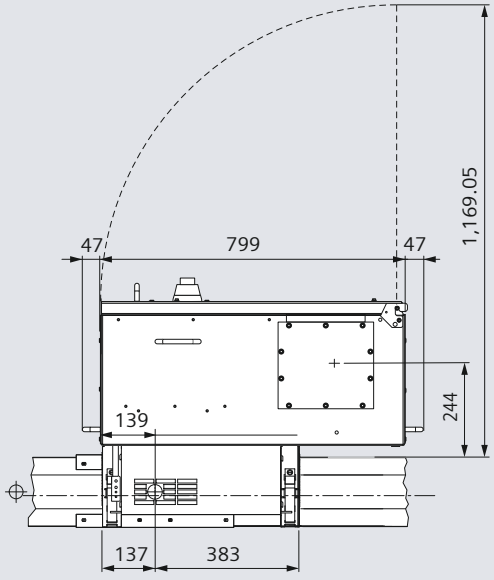
Top-mounted tap-off unit

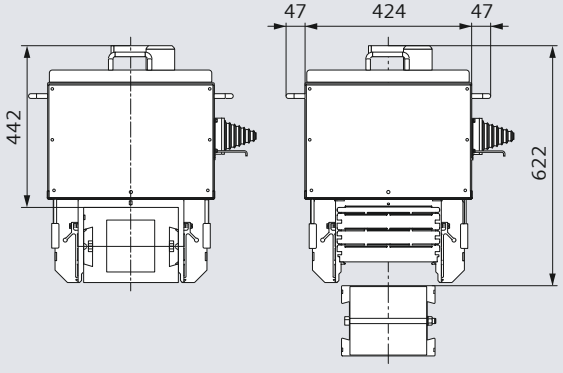
Space requirements for top mounting

Tap-off units with fuse switch disconnector .../FSAM400 and .../FSAM630



Indoor dimensions





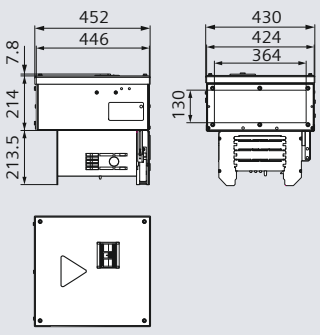
Top-mounted tap-off unit

Space requirements for top mounting

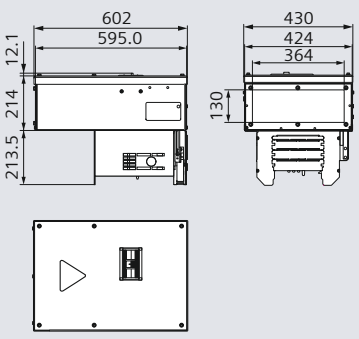
Fig. 6/17: **Dimensional drawings (dimensions in mm) for arc-resistant tap-off units with fuse switch disconnector**

Tap-off units with 3VA circuit breaker – basic version LD-K-.AK/...

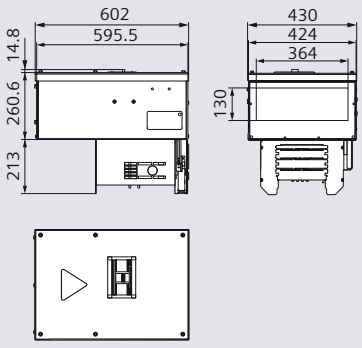
Size 1B (80 to 160 A)



Size 2B (200 and 250 A)

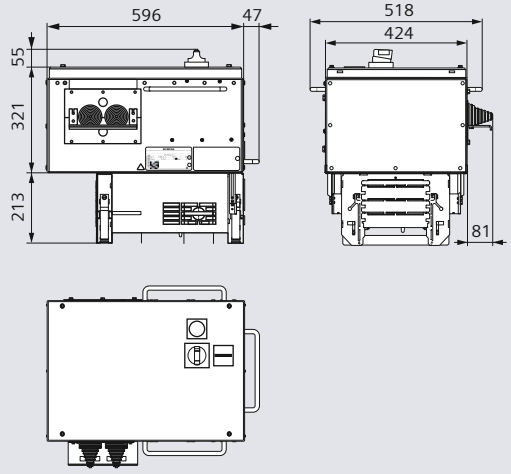


Size 3B (400 A)



Tap-off units with 3VA circuit breaker – premium version LD-K-.AK/... -P, and empty tap-off units LD- ... /E

Size 1 (100 to 250 A – except ETU 340 at 250 A: size 2)



Size 2 (400 to 630 A – and 250 A with ETU 340)

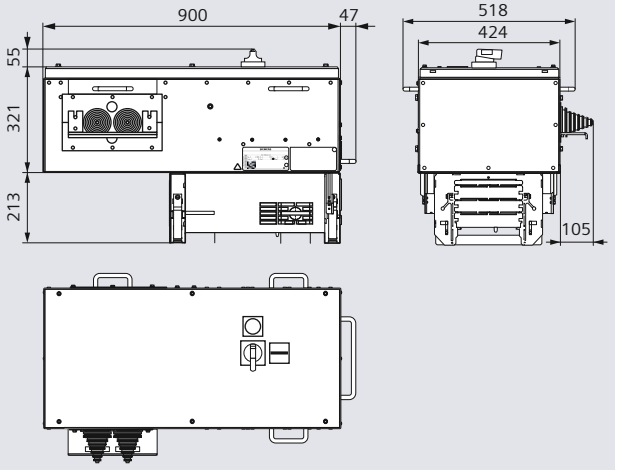
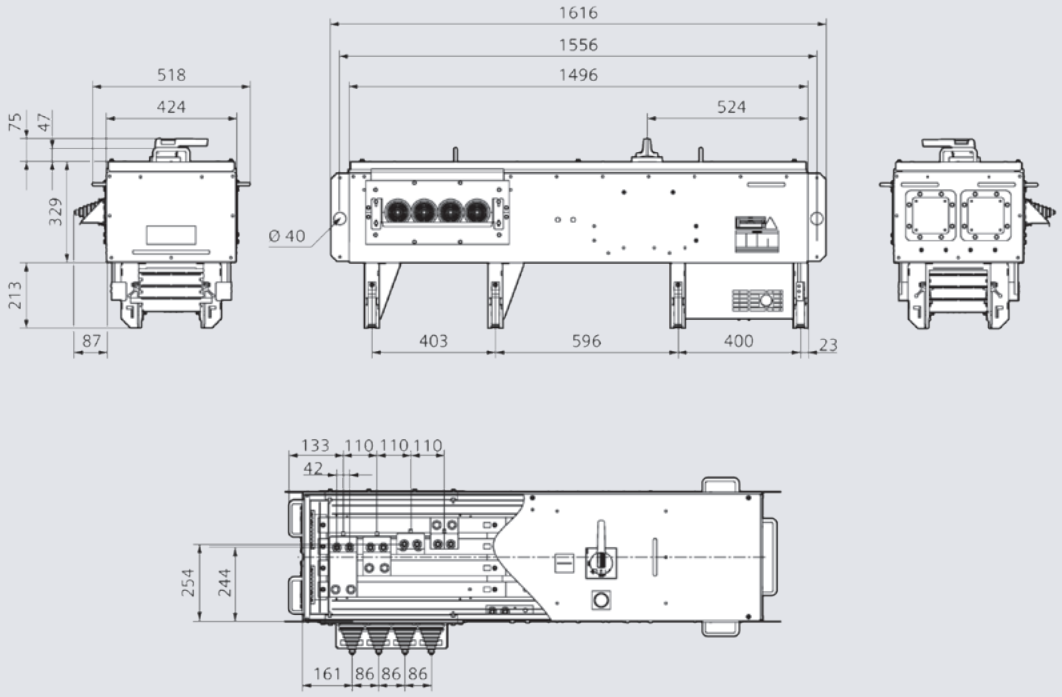
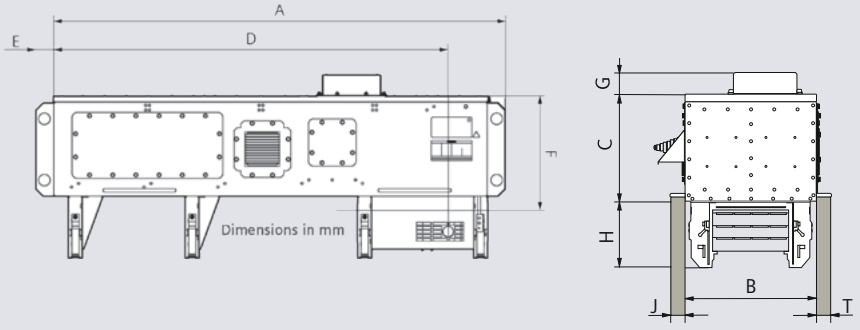


Fig. 6/18: **Dimensional drawings (dimensions in mm) for tap-off units with 3VA circuit breaker up to 1,000 A, as well as empty tap-off units up to 400 A prepared for installation of molded case circuit breakers (Siemens, Schneider Electric)**

Tap-off units with 3VA circuit breaker (800, 1,000 A) – LD-K-.AK./3VA ... -P, size 3



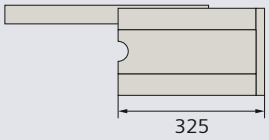
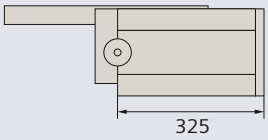
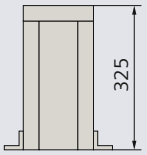
Tap-off units with 3VA circuit breaker (1,600 A) LD-K-. AK/LS ...-1250-LS



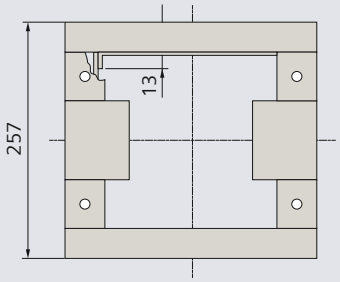
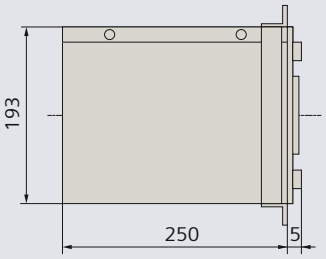
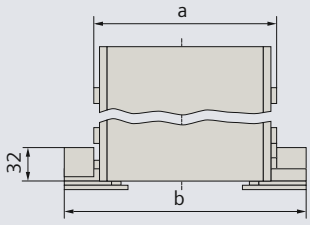
	[mm]
A	1,500
B	424
C	346.5
D	1,363
E	60
F	378
G	73
H	213
I	47
J	87.5

Fig. 6/19: **Dimensional drawings (dimensions in mm) for tap-off units with 3VA circuit breaker up to 1,600 A**

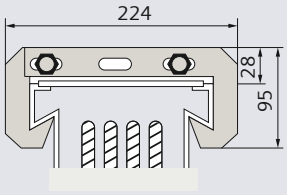
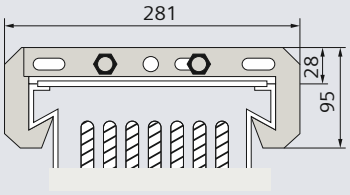
Flanges

LD .-EF .-H .	LD .-EF .-B .	LD .-VE .-BF . .
		

Protective sleeves

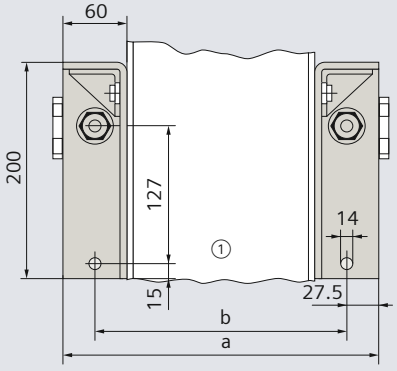
LD-DF 1B LD-DF 2B	a = 213 mm a = 270 mm	b = 270 mm b = 327 mm
		

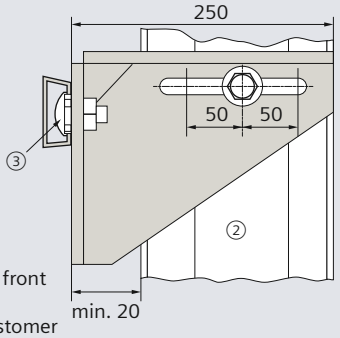
Suspension brackets for horizontal suspension

LD-B 1	LD-B 2
	

Fixing bracket for vertical fixing

LD-BV





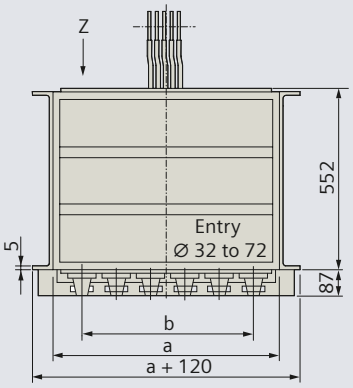
① LD system view from the front
② LD system from the side
③ To be provided by the customer

LDA1 ... LDA3	a = 300 mm	b = 245 mm
LDC2 ... LDC3	a = 300 mm	b = 245 mm
LDA4 ... LDA8	a = 357 mm	b = 302 mm
LDC6 ... LDC8	a = 357 mm	b = 302 mm

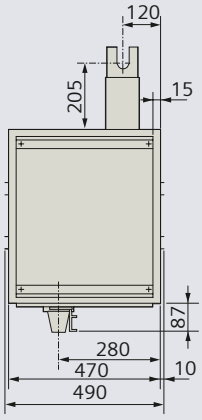
Fig. 6/20: **Dimensional drawings (dimensions in mm) for additional equipment components of the LD system (for type codes, see Tab. 6/15)**

Incoming cable connection units ... -KE

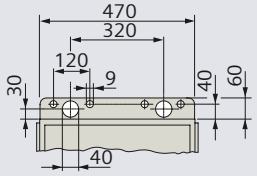
Front view



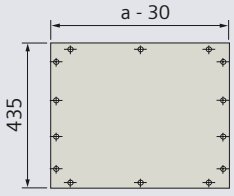
Side view



View Z



Cable entry plates for single-core cables (+LD-BPAL)



Dimensions (in mm) and sizes of the cable entries

Type	Enclosure size	Cable entries (see dimension b)	a in mm	b in mm
LDA 1.2.-KE.	1	4	450	3 × 90
LDA 2.2.-KE.	1	4	450	3 × 90
LDA 3.2.-KE.	2	6	650	5 × 90
LDA 4.1.-KE.	2	6	650	5 × 90
LDA 4.2.-KE.	2	6	650	5 × 90
LDC 2.2.-KE.	2	6	650	5 × 90
LDA 5.1.-KE.	3	8	800	7 × 90
LDA 5.2.-KE.	3	8	800	7 × 90
LDA 3.2.-KE.	3	8	800	7 × 90

Fig. 6/21: **Dimensional drawings (dimensions in mm) for incoming cable connection units (LD ... -KE .) and the entry plates for single-core cables (+LD-BPAL)**



Chapter 7

LI System – 800 to 6,300 A

7.1 Sizes and Conductor Configurations 218
7.2 Type Codes 221
7.3 Technical Specifications 233
7.4 Dimensions and Configuring Aids 251
7.5 Fire Barrier for LI system 284
7.6 Functional Endurance of LI system 291

7 LI System – 800 to 6,300 A

The LI busbar trunking system (Fig. 7/1) is used for:
- Power transmission
- Power distribution.

With the system being position-independent, a high level of flexibility is reached, which is particularly required for power distribution in multi-floor buildings. The high degree of protection up to IP55, as well as tap-off units up to 1,250 A, ensure a safe supply in industries with a high energy demand.

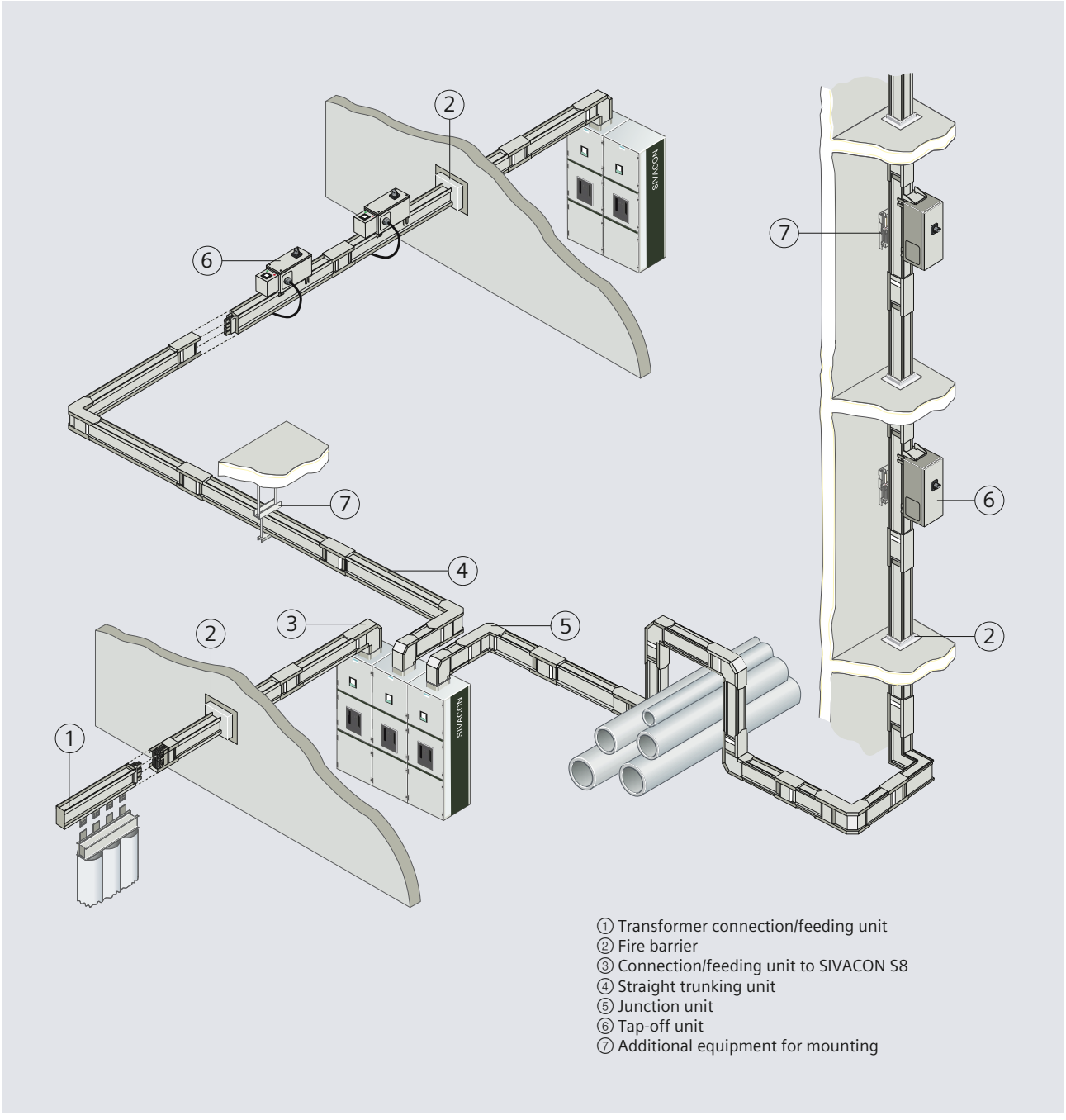


Fig. 7/1: **Overview of LI busbar trunking system**

Versions and properties

- Design verified low-voltage switchgear and controlgear assembly in accordance with IEC 61439-1/-6
- Sandwich design for applications from 800 to 6,300 A with copper (Cu) or aluminum (Al) as conductor material
- Aluminum enclosure, painted (color RAL 7035, light gray)
- 7 different conductor configurations for single and double bodies with 6 or 3 sizes, each for copper and aluminum (see Chapter 7.1)
- The aluminum busbars are nickel-plated and tinned; the copper busbars are tinned
- The busbars are insulated over their entire length
- Insulation coating made of Mylar
- High standard degree of protection up to IP55; IP66 is possible for power transmission without tap-off units and indoor installation
- Climatic resistance according to IEC 60068-2-1, -2-14, -2-30, -2-52, -2-61, and -2-78
- Fire barrier, tested to the fire resistance classes EI 90 and EI 120 according to the classification in EN 13501-2, is possible in order to fulfill the building regulations according to European standards and partly regional approvals
- Suitable for horizontal (edgewise or flat busbar position) and vertical installation
- Suitability for sprinklers
- Standardized system components such as
  - Straight trunking units with or without tap-off points
  - Junction elements with elbow, offset elbow, knee, offset knee, Z-units, and T-units
  - Special components, such as phase alteration units, transition units, or expansion compensation units
  - Feeding units for transformer, distribution board, and incoming cable connections
  - Tap-off units
  - Additional equipment such as flexible connectors, end caps, and fixing elements.

Components

Straight trunking units

- Without tap-off points: optional lengths of 0.5 m up to 3 m; grid 0.01 m
- With tap-off points (maximum 3 at the top and 3 at the bottom): optional lengths of 1.15 m up to 3 m; grid 10 mm; interval of tap-off points: 660 mm
- Tap-off points at the top: selectable from 670 to 2,510 mm
- Tap-off points at the bottom: selectable from 490 to 2,390 mm
- In the case of a double body, the tap-off points are to be distributed only at the top for one of the busbar runs and only at the bottom for the other one.

Junction units [1)]

- Elbow horizontal, left or right, with freely selectable limb lengths (X and Y), or a fixed limb length (FX or FY) at a freely selectable limb length (X or Y)
- Knee vertical, front or rear, with freely selectable limb lengths (X and Y), or a fixed limb length (FX or FY) at a freely selectable limb length (X or Y)
- Elbow offset, left-front or right-front as well as left-rear or right-rear, with selectable limb lengths (X, Y, and Z)
- Knee offset, front-left or front-right as well as rear-left or rear-right, with selectable limb lengths (X, Y, and Z)
- Z-units, vertical front or rear, with selectable limb lengths (X, Y, and Z)
- Z-units, horizontal left or right, with selectable limb lengths (X, Y, and Z)
- T-units edgewise with T-tap-off upwards or downwards and selectable limb lengths (X and Y).

Infeeds

- Transformer connection units, version “TCE” for connection to cast-resin or oil-immersed transformers, optionally with horizontal or vertical busbar tap-off
- Transformer connection units, versions “TCS” and “TCF” for connection to oil-immersed transformers, with vertical busbar tap-off
- Distribution board connection units to SIVACON S8 power distribution board from above or below
- Distribution board connection pieces for connection of non-Siemens distribution boards
- Incoming cable connection units as single-core or multi-core version (phase sequence left or right)
- Distribution board connection.

1) Specifications for permissible dimensions can be found in the dimensional drawings

Tap-off units

- 7 sizes in degrees of protection IP40 (size 2, size 3, size 5), IP54 (size 2, size 4) and IP55 (size 1 to size 5, size 8, size 9)
- Sheet-steel enclosure with powder coating (color RAL 7035)
- With 3VA molded case circuit breakers from 50 to 1,250 A, 3NP1 fuse switch disconnectors from 160 to 630 A, 3NH fuse bases from 160 to 630 A (size 00, 1, 2, or 3), and FSF switch-disconnector/fuse combinations from 160 to 630 A
- Empty tap-off units for non-Siemens devices and prepared for installation of SENTRON 3VA molded case circuit breakers
- One plug-on/-off facility for IP55 tap-off units at the tap-off point
  - guides the plugging and prevents incorrect installation
  - ensures compliance with IP2X and IPXXB during the plugging process
  - shows clearly whether the tap-off unit is disconnected or connected
- Due to a positive interlocking, the IP55 tap-off units (size 1 to size 5) can only be plugged on or off when the cover is open
- Pluggable while energized (exceptions are tap-off units with 3NH or specifications from regional standards)
- Leading PE contact for safe plugging contact
- Power pick-up through silver-plated Lyra contacts of sizes 1 to 5 at the tap-off points up to 630 A
- Power pick-up through busbars of sizes 8 to 9 at the bolted tap-off points up to 800 A.

Additional equipment

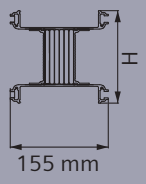
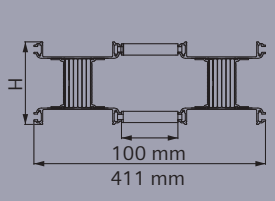
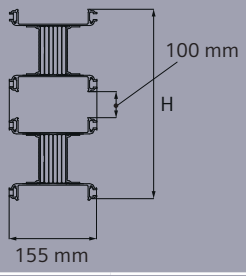
- End caps for end of busbar run
- Fixing bracket for horizontal or vertical installation
- Wall mounting elements
- Fire barrier factory-assembled or available as a kit for installation on site
- Accessories for transport and installation
- Flexible connectors and screw sets
- Spare parts.

7.1 Sizes and Conductor Configurations

The sizes (Tab. 7/1) depend on the rated current and the conductor material. There are 10 different overall heights and 2 different widths for single and double bodies. For the versions with aluminum and copper, six overall heights are available as single body (SB) and three overall heights as double body (DB) each.

Due to the modular design, double bodies can also be implemented in a top-on-top arrangement (DB TONT) by configuring two corresponding single bodies in order to achieve a high flexibility in the run layout and provide reduced space requirements for connection to switchboards.

Single bodies consist of an enclosure comprising 3 to 5 aluminum or copper busbars each. Accordingly, double bodies contain 5 to 10 busbars in two enclosures. The number of busbars is determined by the required conductor configuration.

Cross-section							
		Single body (SB)		**Double body (DB)**		**Double body top-on-top (DB TONT)**	
Width		155 mm		410 mm		155 mm	
Conductor material		Al	Cu	Al	Cu	Al	Cu
Type		LI-A	LI-C	LI-A	LI-C	LI-A	LI-C
Current sizes	**Types**	**Overall heights H [mm]**					
800 A	LI-..0800	111					
1000 A	LI-..1000	132	111				
1250 A	LI-..1250	146	117				
1,600 A	LI-..1600	182	146				
2,000 A	LI-..2000	230	174				
2,500 A	LI-..2500	297	213				
3,200 A	LI-..3200		280	182		464	
4,000 A	LI-..4000			230	174	560	448
5,000 A	LI-..5000			297	213	694	516
6,300 A	LI-..6300				280		660

Tab. 7/1: **Sizes (cross-sections) of busbar runs for the LI system**

Busbar design

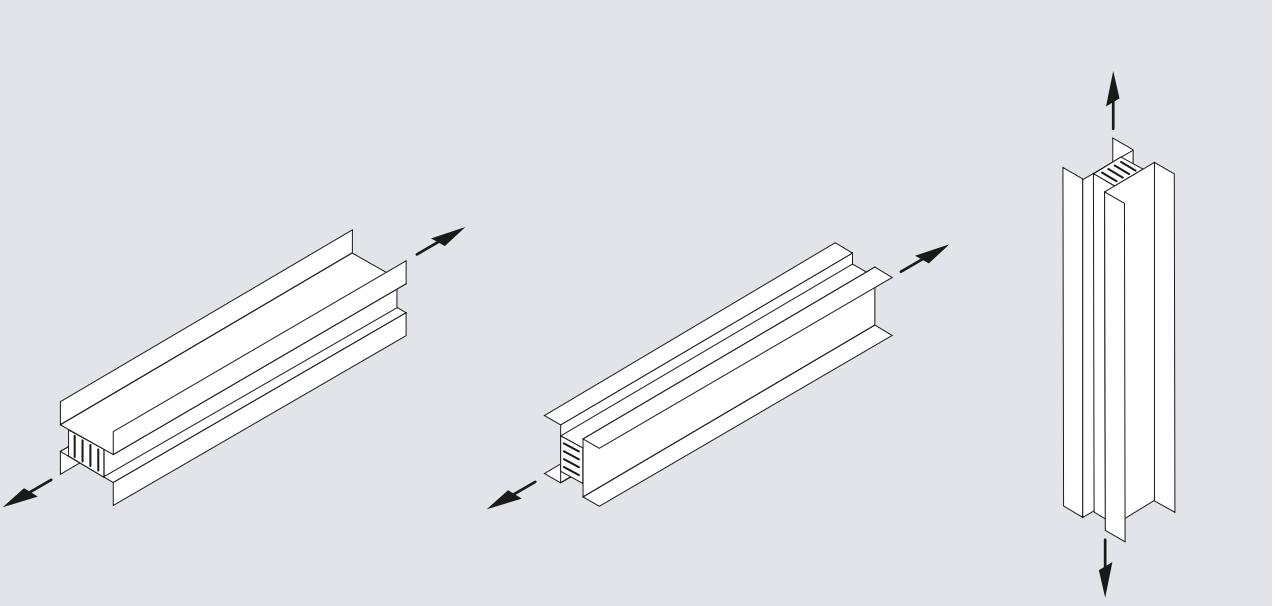
The busbars of the LI busbar trunking system are generally tinned and enclosed with highly resistant insulating material (Mylar). The conductor material is made of aluminum (LI-A) or of copper (LI-C). On top of the tin layer, aluminum busbars are also coated with a layer of nickel. The conductor thickness is 7 mm. The height depends on the system height.

Mounting positions

The sandwich design makes the current-carrying capacity of the LI busbar trunking system independent of the mounting position, enabling a flexible busbar run. Current derating is normally not required for edgewise and flat busbar positions in horizontal busbar runs, as well as for rising main busbars (vertical mounting position, Fig. 7/2). Only for LI-C . 5000 ... (for basic key, see Tab. 7/3) must the reduced rated operational current of 4,890 A be observed (see Tab. 7/17).

Conductor configurations

The LI busbar trunking system is available in six different conductor configurations (Tab. 7/2). The conductor configurations depend on
- the network configuration
- the size of the N and PE conductor cross-section
- a possible additional isolated PE conductor (Clean Earth).

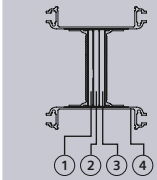
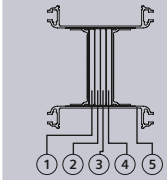
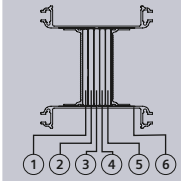


Horizontal mounting position, edgewise busbar position

Horizontal mounting position, flat busbar position

Vertical mounting position

Fig. 7/2: **Mounting positions of the busbar runs**

Body [1]		Conductor configuration						Enclosure
		①	②	③	④	⑤	⑥	
	LI-... 3B	L1	L2	L3	$PE_{encl.}$			Enclosure as PE conductor
	LI-... 4B	PEN	L1	L2	L3	$PE_{encl.}$		Galvanic connection between enclosure and PEN conductor
	LI-... 5B	N	L1	L2	L3	$PE_{encl.}$		Enclosure as PE conductor
	LI-... 5C	N	N	L1	L2	L3	$PE_{encl.}$	Enclosure as PE conductor
	LI-... 5H	N	L1	L2	L3	PE	$PE_{encl.}$	Galvanic connection between enclosure and PE conductor
	LI-... 6B	N	L1	L2	L3	CE [2]	$PE_{encl.}$	Enclosure as PE conductor

[1] For type codes, see Chapter 7.2
[2] CE: "Clean Earth" arrangement with separate PE conductor (functional PE), isolated against the enclosure of the busbar trunking system

Tab. 7/2: **Conductor configurations for busbar runs of the LI system**

Remarks:

- Cross-section of neutral conductor
  The asymmetrical loading of the individual phases due to alternating current loads and the increased use of electronic components generating harmonics can lead to a high stress for the neutral conductor in normal operation. In order to prevent failures that can result from excessive load on the neutral conductor, the conductor configuration with double N conductor can be selected for the LI busbar trunking system.
- Cross-section of PE conductor
  For the magnitude of short-circuit currents, the loop impedance over the PE conductor is important.
  With a low loop impedance in the case of larger cross-sections, upstream protection devices can trip sooner, thus providing for a higher safety level.
- Clean Earth (functional PE)
  The isolated PE conductor (Clean Earth) is completely separated galvanically from the busbar enclosure. With a common earthing system, as widely used nowadays, failures in the electric power distribution are also transferred to the shielding conductors for control, network, and communication systems. This can cause a deterioration of the data transmission speed or even to failures in data transmission. A separation of the equipotential bonding for the power supply on the one hand, and for the data technology on the other hand, can reduce this fault potential.

7.2 Type Codes

For the LI busbar trunking system, the type code for trunking units, junction units, infeeds, and connections is mostly composed of three parts:

- The basic key identifies the busbar trunking system
- The selection key characterizes the desired system component and is integrated in the basic key
- The additional specifications in the so-called e-texts serve for more precise definition of the selected system component and are attached to the type code. For example, the length 2.05 m of a straight trunking unit without tap-off point is defined by H0B:2050.

For tap-off units, additional equipment, fire barrier elements, as well as transport and installation facilities, separate type codes are specified. Generally, all type codes that are characteristic for the LI system start with "LI-". The type code for tap-off units starts with "LI-T-", and the type code for accessories with "LI-Z-".
In the following sections, only the type code structure is illustrated. Details, marginal conditions, explanations, and examples, among others also for the additional specifications, are described in the technical specifications (Chapter 7.3) and in the dimensional drawings (Chapter 7.4). For all parts with enclosure, the additional specification H0A:7035 for the standard color RAL 7035 is to be attached to the type code.

7.2.1 Type Codes and Selection Keys for the LI System

In Tab. 7/3 it has to be observed that a complete type code still requires the selection key (Tab. 7/4) as well as possible additional specifications – for example, for the color of the enclosure (RAL 7035 as standard) and the desired lengths and distances.

LI-	A	A	NNNN	NA-	NN-	. . . -	A (AA)	. . .
Conductor material								
Aluminum (Al)	A							
Copper (Cu)	C							
Insulating material								
Mylar foil		M						
Epoxy hybrid [1]		E						
Not specified		N						
Rated current I_n								
800 A (only for Al)			0800					
1,000 A			1000					
1,250 A			1250					
1,600 A			1600					
2,000 A			2000					
2,500 A			2500					
3,200 A			3200					
4,000 A			4000					
5,000 A			5000					
6,300 A (only for Cu)			6300					
Conductor configuration								
L1 + L2 + L3 + PE(H) [2]				3B				
L1 + L2 + L3 + PEN [3]				4B				
L1 + L2 + L3 + N + PE(H) [2]				5B				
L1 + L2 + L3 + N + N [4] + PE(H) [2]				5C				
L1 + L2 + L3 + N + PE [3] (PE conductor 100%)				5H				
L1 + L2 + L3 + N + (CE) [5] + PE(H) [2]				6B				
Degree of protection								
IP00					00			
IP40					40			
IP55					55			
IP66 [6]					66			
Selection keys for the desired component (see Tab. 7/4)						. . .		
Busbar ends								
Hook and bolt							HB	
Hook							H	
Bolt							B	
Hook, bolt, and bolt							HBB	
Hook, hook							HH	
Bolt, bolt							BB	
Additional specifications for the desired component (see Tab. 7/4) as well as Chapter 7.3 and Chapter 7.4.								. . .

[1] On request
[2] PE conductor = enclosure
[3] PE or PEN conductor = busbar with galvanic connection to the enclosure
[4] An additional busbar doubles the cross-section of the neutral conductor (200%)
[5] Separately routed PE conductor by means of an additional busbar isolated against the enclosure (Clean Earth)
[6] For power transmission

Tab. 7/3: **Type code structure for the LI system**

Type code (see Tab. 7/3) LI- . . . . . - . . -	Selection key . . . -	(. . . -)	(. . .)	Additional specifications (e-texts) / notes
Straight trunking units				
Straight trunking unit without tap-off points	L-			Length L 500 - 3,000 mm (H0B: 0500 - 3000)
Phase alteration unit	PT-			Phase alteration unit muss be configured by Siemens
Expansion compensation unit	EC-			
Increaser / reducer	I- / R-	[I_n] of the 2nd LI system . . . . -		". . . . -": 4-digit type number for the rated current of the 2nd system (on request: transition from single to double body)
Straight trunking unit with tap-off points Number: o (at the top) / u (at the bottom)	LTP	ou-		Length H0C: 1150 - 3000; for further remarks to tap-off points and additional specifications, see Chapter 7.4; o, u: number of tap-off points at the top, at the bottom (00, ..., 33)
Straight trunking unit (≥ 1,600 A) with one tap-off point for tap-off unit > 800 A (10: at the top / 01: at the bottom)	LTB	10- 01-		Length L = H0D: 2300, distance of tap-off point = H0S: 1700 (at the top) or H0S: 0600 (at the bottom) Tap-off point at the top: 10 / at the bottom: 01
Equipotential bonding (tap-off point at the top)	EPV-			
Equipotential bonding (tap-off point at the bottom)	EPH-			
Equipotential bonding (top-on-top)	EPTONT-			
Junction units		Angle	Fixed limb length	
Elbow horizontal left / right, variable limb lengths	LL- / LR-			Variable lengths: X = H0V, Y = H0U fixed angle H0W:090
Elbow horizontal left / right, angle: 85° - 175° (steps of 5°), fixed limb length X or Y	LL- / LR-	N90-	FX- FY-	Variable length: Y = H0U or X = H0V N90: variable angle H0W:085 to H0W:175
Knee front / rear, variable limb lengths	LV- / LH-			Variable lengths: X = H0V, Y = H0U fixed angle H0W:090
Knee front / rear, angle: 85° - 175° (steps of 5°), fixed limb length X or Y	LV- / LH-	N90-	FX- FY-	Variable length: Y = H0U or X = H0V N90: variable angle H0W:085 to H0W:175
Elbow offset: left-front / left-rear / right-front / right-rear	LLV- / LLH-/ LRV- / LRH-			Lengths H0X, H0Y, H0Z
Knee offset: left-front / left-rear / right-front / right-rear	LVL- / LHL-/ LVR- / LHR-			Lengths H0X, H0Y, H0Z
Z-unit horizontal left / right	ZL- / ZR-			Lengths H0X, H0Y, H0Z
Z-unit vertical front / rear	ZV- / ZH-			Lengths H0X, H0Y, H0Z
T-unit vertical, tap-off at the top / at the bottom	TV- / TH-		FZ-	Lengths H0X, H0Y
Infeeds / connections		Flange plate	Connection [1]	
Transformer connection units "E", busbar infeed at the side left / right	TCEL- / TCER-		H	Phase sequence H1E, phase distances H1A (see Chapter 7.4)
Transformer connection units "E", busbar infeed at the top, transformer connections left / right	TCETL- / TCETR-		H	
Transformer connection units "E", busbar infeed TONT version, at the side left / right	TCEL-TONT-/ TCER-TONT-		H	
Transformer connection units "S" (PEN, PE left / right)	TCSL- / TCSR-		H	
Transformer connection units "F", infeed SB-/DB-TONT version	TCF- TCF-TONT-		H	
Incoming cable connection units "E" right / left (1 / 2), flange plate for single-core / multi-core cable (MD / BD)	CFE1- / CFE2-	BD- / MD-	H	
Incoming cable connection units "S" right / left (1 / 2), flange plate for single-core / multi-core cable (MD / BD)	CFS1- / CFS2-	BD- / MD-	H	
Connection pieces for non-Siemens distribution boards, single body, PE right	FA-		H, B	
Connection pieces for non-Siemens distribution boards, double body, PE right / left	FA1- / FA2-		H, B	
Connection units for SIVACON S8 power distribution board at the front (installation at the top) / at the rear (installation at the bottom)	F8PQ V- / F8PQ H-		H, B	

[1] Connection of the trunking element selectable either only with hook (H), only with bolt (B), or both (hook or bolt)

Tab. 7/4: **Type codes and selection keys for trunking units, junction units, and infeeds of the LI system**

7.2.2 Type Codes for Tap-Off Units

Depending on the arrangement of components in the tap-off units, there are 7 sizes as standard (size 1, 2, 3, 4, 5, 8, 9).

The basic structure for the type codes of the available tap-off units can be found in Tab. 7/6. For this, the installed protection and switching devices (part "Installation device" in Tab. 7/6) still need to be specified in detail.

Moreover, empty tap-off units up to size 5, prepared for the installation of 3VA circuit breakers or for free arrangement of components, are available (Tab. 7/6). Further information on empty tap-off units is given in Chapter 9.

Size	Circuit breaker 3VA [1)2)] (3VA sizes)		Fuse switch disconnector 3NP1 [3)]		Switch disconnector + fuse FSF [4)], IP55	Fuse base NH [4)], IP55
	IP54 (basic)	IP55 (premium)	IP40 (basic)	IP55 (premium)		
1	-	50 ... 160 A (3VA11, 3VA21 [1)])	-	-	-	160 A
2	50 ... 160 A (3VA11, 3VA21) 200 ... 250 A (3VA12, 3VA22)	200 ... 250 A (3VA12, 3VA22)	160 A	160 A	160 A	250 A
3	-	320 ... 400 A (3VA13, 3VA23)	2 × 160 A 250 A	250 A	250 A	400 A
4	320 ... 400 A (3VA13, 3VA23) 500 ... 630 A (3VA14, 3VA24)	500 ... 630 A (3VA14, 3VA24)	400 A	400 A	400 A	630 A
5	-	630 A 3VA15, 3VA25	630 A	630 A	630 A	-
8 [6)]	-	800 A (3VA15, 3VA25 [5)]) 1,250 A (3VA27)	-	-	-	-
9 [7)]	-	1,250 A (3VA27)	-	-	-	-

[1)] Use of instrument transformers for energy management (MMU) only possible in premium version with 3VA2
[2)] Motor operating mechanisms only possible in premium version with 3VA2 from size 2 to size 9 (3VA27)
[3)] Use of instrument transformers for energy management (MMU) only possible in premium version
[4)] Use of instrument transformers for energy management (MMU) possible
[5)] Motor operating mechanisms are not available for 3VA25
[6)] Size 8 for 3VA15, 3VA25, and 3VA27 with rotary operating mechanism
[7)] Size 9 only for 3VA27 with motor operating mechanism

Tab. 7/5: **Sizes of LI tap-off units for the different switching and protection devices (rated current)**

LI-T-	NNNN-	NA-	55-	X...-	N-	AA-	A-	A-	A-	AA
Rated current I_n										
0 A (empty tap-off unit for arrangement with circuit breaker)	0000									
50 A	0050									
63 A	0063									
80 A	0080									
100 A	0100									
125 A	0125									
160 A	0160									
250 A	0250									
400 A	0400									
630 A	0630									
800 A	0800									
1,250 A	1250									
Conductor configuration (busbar trunking system)										
L1 + L2 + L3 + PE [1)] (3B)		3B								
L1 + L2 + L3 + PEN [4)] (4B)		3B / 5H [6)] / 5B [5), 7)]								
L1 + L2 + L3 + N + PE [1)] (5B)		3B / 5H [6)] / 5B [7)]								
L1 + L2 + L3 + N + N [3)] + PE [1)] (5C)		3B / 5H [6)]								
L1 + L2 + L3 + N + PE [4)] (5H)		3B / 5H								
L1 + L2 + L3 + N + (PE) [2)] + PE [1)] (6B)		3B / 5H [6)] / 6B								

For footnotes, see the following page

Tab. 7/6: **Type code structure for tap-off units of the LI system (installation devices must be specified separately)**

LI-T-	NN	X...-	N-	AA-	A-	A-	A-	AA
Degree of protection								
IP40	40							
IP54	54							
IP55	55							
Installation device								
NH (00, 1, 2, 3)		NH..						
3NP11 (33-3, 34-4, 43-3, 44-4, 53-3, 54-4, 63-3, 64-4)		3NP11..						
2 × 3NP1133-3		2-3NP11-3						
(on request)		3KF..						
3VA (11, 12, 13, 14, 15, 21, 22, 23 ,24 ,25, 27)		3VA..						
Switch disconnector with fuses (IEC, BS)		FSF-...						
Empty tap-off unit for 3VA11 (3VA016T), 3VA21 (3VA016), 3VA12 (3VA025T), 3VA22 (3VA025), 3VA13 and 3VA23 (3VA040), 3VA14 and 3VA24 (3VA063S), 3VA15 and 3VA25 (3VA063)		3VA0...						
Empty tap-off unit for free arrangement of components		0000						
Number of poles								
3-pole			3					
4-pole			4					
Operation								
Manual operating mechanism (for 3VA1, 3VA2, FSF)				RD				
Motor operating mechanism (for 3VA2)				MD				
Motor operating mechanism for 3VA27 (MDL = access to spring energy store on the left) (MDR = access to spring energy store on the right)				MDL, MDR				
Manual operation (for 3NP11, NH)				MO				
Without (empty tap-off units for free arrangement of components)				OO				
Fitting guide								
Plugging process via fitting guide (premium series)					G			
Plugging process without fitting guide (basic series)					N			
Cable entry								
Blanking plate (aluminum plate without holes)						B		
Combined with blanking plate (Al) and pre-punched plate						C		
Multi-core (sheet-steel plate including holes and cable grommets)						M		
Sheet-steel plate with pre-punched knockouts						P		
Cable connection								
Without							O	
Directly at the device							D	
Connection lugs							C	
Current transformers								
Without								OO
With								OT

[1] PE conductor = enclosure
[2] Separately routed PE conductor by means of an additional isolated busbar (Clean Earth) with separate PE connection possibility
[3] An additional busbar doubles the cross-section of the neutral conductor (200%)
[4] PE or PEN conductor = busbar with galvanic connection to the enclosure
[5] For TN-C-yxS system, the PEN bridge LI-Z-T-PEN-BAR- .... -S.
[6] Only for tap-off units from 50 A to 630 A
[7] 5B only for tap-off units from 800 A to 1,250 A

Tab. 7/6: **Type code structure for tap-off units of the LI system (installation devices must be specified separately)** (continued)

3VA circuit breakers

In tap-off units with 3VA circuit breakers, there is the basic version with arrangement of components at the factory as well as the option of prepared empty tap-off units for external 3VA arrangement on site.
For 3VA arrangement at the factory in all tap-off units, the 3VA circuit breakers must always be configured according to the required technical properties such as rated current, breaking capacity, trip units, number of poles, auxiliary releases, and auxiliary switches.

Otherwise, a difference is made for these tap-off units between the basic series without additional configuration options and the premium series with additional technical features and configuration options. Details can be found in the following table.

Empty tap-off units

A total of three different types of empty tap-off units (type code structure in Tab. 7/11) are available for the rated currents 160 A, 250 A, 400 A, or 630 A, and with conductor configuration 5H as standard:
- IP54 tap-off unit prepared for installation of 3VA circuit breakers
- IP55 tap-off unit for free arrangement of components.

Ordering example for an empty tap-off unit with free arrangement of components: LI-T-0160-55-5H-0000-3-OO-G-BO-OO

Note: The empty tap-off units are professionally mounted by Siemens and tested in accordance with IEC 61439-1 and -6. Please observe further notes and instructions in Chapter 9.

Cable entry plates

Besides the flange plate for measuring device boxes, further cable entry plates can be ordered for retrofitting the tap-off units. For further details, please contact your Siemens partner.

Ancillary equipment units for power consumption recording and communication

The tap-off units can optionally be extended with an electronic measuring or communication device (see Tab. 7/12).
The ancillary equipment unit (MMU) required to do this can be positioned at the side or at the front.

Current sizes	125 A – 630 A		800 A		1,250 A
Version	Basic	Premium	Premium		
Degree of protection	IP54	IP55	IP55		
Protection devices	3VA1., 3VA2.	3VA1., 3VA2.	3VA15	3VA25	3VA27
Color RAL 7035	Completely				
Special RAL colors	On request	Completely	Completely		
Disconnected position (plugging guide)	No	Yes	Yes		
Power pick-up	Lyra		Busbar		
Cable connection	Directly or via lugs (accessories)	Directly or configurable lugs	Lugs	Busbars	
Configurable current transformers	No	Yes	No	Yes	
Configurable energy management	No	PAC, others	No	PAC, others	
Communication capability	No	M-Bus, Ethernet, Modbus RTU, PROFINET	No	Ethernet, Modbus RTU, PROFINET	
I_{cc} at 400 V	Up to 85 kA	Up to 110 kA	Up to 70 kA	Up to 110 kA	Up to 85 kA
Rated voltage U_e = 500 V AC	No	3VA2 only	No	Yes	Yes
Option with motor operating mechanism	No	3VA21-3VA24	No		Yes

Tab. 7/7: **Overview of tap-off units with circuit breaker**

3VA1 (1 to 5), 3VA2 (1 to 5)	N	N	NN-	N	AA	NN-	0A	A0
Application								
Standard applications = 1 (3VA1 – only size 1 and 2) / Selectivity applications = 2 (3VA2)	1, 2							
3VA size								
3VA size 1 ... 5		1 ... 5						
Rated operational current I_n								
50 A ... 1,000 A (please observe Tab. 7/7 regarding size dependency)			50 ...					
Rated ultimate short-circuit breaking capacity I_{cu}								
25 kA (switching capacity "N" at 415 V for 3VA11 and $I_n \leq 160$ A)				3				
36, 55, 70, 85 kA (switching capacity "S", "M", "H" at 415 V; for dependencies, see Tab. 7/7)				4 ... 6				
110 kA (switching capacity "C" at 415 V for 3VA2.)				7				
Trip units								

	Function	Circuit breaker	N conductor protection, 4-pole	Short-circuit release				
TM220	ATFM [1]	3VA11 ($I_n \leq 160$ A, 3- and 4-pole)	0%	I_i fixed, instantaneous	EE			
TM220	ATFM [1]	3VA11 ($I_n \leq 160$ A, 4-pole)	100%	I_i fixed, instantaneous	GE			
TM240	ATAM [2]	3VA1. ($I_n \leq 250$ A, 3- and 4-pole)	0%	I_i adjustable, instantaneous	EF			
TM240	ATAM [2]	3VA1. ($I_n \leq 250$ A, 4-pole)	50%	I_i adjustable, instantaneous	FF			
TM240	ATAM [2]	3VA1. ($I_n \leq 250$ A, 4-pole)	100%	I_i adjustable, instantaneous	GF			
ETU320	LI [3]	3VA2. ($I_n \leq 630$ A, 3- and 4-pole)	0, 50, or 100%	I_i adjustable, instantaneous	HL			
ETU330	LIG [4]	3VA2. ($I_n \leq 630$ A, 4-pole)	0, 50, or 100%	I_i adjustable, instantaneous	HM			
ETU350	LSI [5]	3VA2. ($I_n \leq 630$ A, 3- and 4-pole)	0, 50, or 100%	I_i adjustable, delayed	HN			
ETU850	LSI [5]	3VA2. ($I_n \leq 630$ A, 3- and 4-pole)	from 20 / 40% to 100 / 160%	I_i adjustable, delayed	KP			
ETU860	LSIG [6]	3VA2. ($I_n \leq 630$ A, 3- and 4-pole)	from 20 / 40% to 100 / 160%	I_i adjustable, delayed	KQ			

Number of poles for customer connection								
3- / 4-pole, nut keeper kit						32, 42		
Auxiliary releases								
Without							0A	
Undervoltage release UVR (24 V DC)							0B	
Undervoltage release UVR (120-127 V AC 50/60Hz)							0C	
Undervoltage release UVR (208-230 V AC 50/60Hz)							0D	
Shunt trip left STL (12-30 V DC; 24 V AC 50/60 Hz)							0H	
Shunt trip left STL (110-127 V AC 50/60 Hz)							0J	
Shunt trip left STL (220-250 V DC; 206-277 V AC 50/60 Hz)							0K	
Auxiliary/alarm switches								
Without								A0
2 × standard switch (HP: max. 600 V, max. 10 A, 2 × conductor possible per contact point)								B0
2 × standard switch (HQ: max. 250 V, max. 6 A, 1 × conductor per contact point, suitable for electronics)								C0
3 × standard switch (HQ)								D0
4 × standard switch (HQ)								E0
1 × standard switch (HQ) + 1 × tripped signaling switch (HQ)								F0
1 × standard switch (HP) + 1 × tripped signaling switch (HP)								G0
2 × standard switch (HQ) + 1 × tripped signaling switch (HQ)								H0

[1] ATFM: Adjustable Thermal Fixed Magnetic Trip Unit – adjustable thermal overload release, magnetic short-circuit release with fixed setting
[2] ATAM: Adjustable Thermal Adjustable Magnetic Trip Unit – adjustable thermal overload release, adjustable magnetic short-circuit release
[3] LI: Overload protection (L) and instantaneous short-circuit protection (I)
[4] LIG: Overload protection (L), instantaneous short-circuit protection (I), and earth-fault protection (G)
[5] LSI: Overload protection (L), short-time delayed short-circuit protection (S), and instantaneous short-circuit protection (I)
[6] LSIG: Overload protection (L), short-time delayed short-circuit protection (S), instantaneous short-circuit protection (I), and earth-fault protection (G)

Tab. 7/8: **Selection keys for circuit breakers 3VA11 to 3VA15, 3VA21 to 3VA25 for configurable tap-off units**

3VA27 (3VA27 circuit breaker with I_n = 1,600 A)				-A	NN	AA	-NA	AN
Rated ultimate short-circuit breaking capacity I_{cu}								
55 kA (switching capacity "M" at 415 V)				1				
85 kA (switching capacity "H" at 415 V)				2				
Trip units								
	Function	N conductor protection, 4-pole	Short-circuit release (with earth-fault protection)					
ETU320	LI	50% to 200%	I_i adjustable, instantaneous		AB			
ETU350	LSI		I_i adjustable, delayed		AC			
ETU650[1)]					EE			
ETU360	LSIG		I_i adjustable, delayed, with earth-fault protection		AD			
ETU660[1)]					EF			
Number of poles, connection method directly at the 3VA27								
3-pole, main connection extended at the front (fixed mounting)						05		
4-pole with N conductor on the left, main connection extended at the front (fixed mounting)						15		
4-pole with N conductor on the right, main connection extended at the front (fixed mounting)						25		
Alarm switch, closing coil (CC), and remote reset coil (RR)								
Without alarm switch and without CC/RR coils							0A	
With tripped signaling switch TAS, tripped signaling switch S25, two leading auxiliary switches S26, and without CC/RR coils							3A	
2nd auxiliary release (ST) and 1st auxiliary release (UVR)								
Without undervoltage release (UVR) and without shunt trip (ST)								A0
With shunt trip (AC/DC 220 ... 240 V)								A7
With undervoltage release (AC/DC 220 ... 240 V)								H0
With shunt trip (AC/DC 220 ... 240 V) and with undervoltage release (AC/DC 220 ... 240 V)								H7

[1)] The ETU6.. has an advanced measuring function to which a communication interface Modbus TCP can be added via the Z-option "Z-F11-F26"
F11 = communication module COM043 with Modbus TCP interface
F26 = breaker connect module for 110–240 V AC/DC

Tab. 7/9: **Selection keys for standard tap-off units for 3VA27 circuit breaker (toggle lever for rotary operating mechanism)**

3VA27 (3VA27 circuit breaker with I_n = 1,600 A)				-A	NN	AA	-NA	AN
Rated ultimate short-circuit breaking capacity *I*cu								
55 kA (switching capacity "M" at 415 V)				1				
85 kA (switching capacity "H" at 415 V)				2				
Trip units								
	Function	N conductor protection, 4-pole	Short-circuit release (with earth-fault protection)					
ETU320	LI	50% to 200%	I_i adjustable, instantaneous		AB			
ETU350	LSI		I_i adjustable, delayed		AC			
ETU650[1)]					EE			
ETU360	LSIG		I_i adjustable, delayed, with earth-fault protection		AD			
ETU660[1)]					EF			
Number of poles, connection method directly at the 3VA27								
3-pole, main connection extended at the front (fixed mounting)						05		
4-pole with N conductor on the left, main connection extended at the front (fixed mounting)						15		
4-pole with N conductor on the right, main connection extended at the front (fixed mounting)						25		
Motor operating mechanism, closing coil (CC), and remote reset coil (RR)								
With motor operating mechanism (AC/DC 230 V) and closing coil / remote reset magnet (RR) (AC/DC 220 V)							4M	
2nd auxiliary release (ST) and 1st auxiliary release (UVR)								
With shunt trip (AC/DC 220 ... 240 V)								A0
With shunt trip (AC/DC 220 ... 240 V) and with undervoltage release (AC/DC 220 ... 240 V)								H7

[1)] The ETU6.. has an advanced measuring unction to which a communication interface Modbus TCP can be added via the Z-option "Z-F11-F26"
F11 = communication module COM043 with Modbus TCP interface
F26 = breaker connect module for 110–240 V AC/DC

Tab. 7/10: **Selection keys for standard tap-off units for 3VA27 circuit breaker (spring energy store for motor operating mechanism)**

Empty tap-off units, degree of protection of tap-off unit enclosure	Type codes (for explanations, see Tab. 7/6)								
	Tap-off unit	Rated current	Conductor configu-ration	IP	Circuit breaker (0000 = empty)	Number of poles	Operation / plugging guide (N = without, G = with)	Cable entry/ connection	Without current transformers
Prepared for 3VA, IP54	LI-T-	0000-	5H-[1)]	54-	3VA11, 3VA12, 3VA21, 3VA22	3- / 4-	RD-N-	PD-	OO
					3VA13, 3VA14, 3VA23, 3VA24	3- / 4-	RD-N-	CD-	OO
Prepared for 3VA, IP55	LI-T-	0000-	5H-[1)]	55-	3VA11 to 3VA14, 3VA21 to 3VA24	3- / 4-	RD-G-	BD-	OO
					3VA15, 3VA25	3- / 4-	RD-G-	BC-	OO
For free arrangement of components, IP55	LI-T-	0160- / 0250- / 0400- / 0630-	5H-[1)]	55-	0000-	3- / 4-	RD-G-	BD-	OO

[1)] Empty tap-off unit for 3B, 5C, 6B, 6C on request

Tab. 7/11: **Selection key for empty tap-off units**

NH fuse base

The tap-off units with fuse base cannot be plugged on/off while energized. Fuse sizes available as standard are:
- NH00 up to 160 A
- NH1 up to 250 A
- NH2 up to 400 A
- NH3 up to 630 A.

The types (NH00, NH1, NH2, or NH3) are then to be specified as “installation devices” in the type code for tap-off units. As standard, these tap-off units are 3-pole designs; the cover can be opened to insert the fuse link (manual operation = MO). The type code in Tab. 7/6 is therefore to be completed with:
-NH .. – 3 – MO-

3NP1 fuse switch disconnector

For tap-off units with 3NP1 fuse switch disconnector, there is a basic series IP40 with the 3NP disconnecting handle directly on the tap-off unit cover, as well as a premium series IP55 with the disconnecting handle for manual operation (MO) located under the cover.

The switching devices of the IP40 basic version are:
- 1 × 3NP11 3. up to 160 A, 3- or 4-pole
- 2 × 3NP11 3. up to 160 A, 3-pole
- 1 × 3NP11 4. up to 250 A, 3- or 4-pole
- 1 × 3NP11 5. up to 400 A, 3- or 4-pole
- 1 × 3NP11 6. up to 630 A, 3- or 4-pole.

The switching devices of the IP55 premium version are:
- 1 × 3NP11 3. up to 160 A, 3-pole
- 1 × 3NP11 4. up to 250 A, 3-pole
- 1 × 3NP11 5. up to 400 A, 3-pole
- 1 × 3NP11 6. up to 630 A, 3-pole.

In case of upside-down installation, the cover of the fuse switch disconnector is to be secured with a safety rope (type: LI-Z-T-SR-3NP-TOB). The type code in Tab. 7/6 is therefore to be completed with:
-3NP1 .. – . – MO-

FSF switch disconnector with fuses

Switching devices available as standard are:
- SOCOMEC Fuserbloc up to 160 A
- SOCOMEC Fuserbloc up to 250 A
- SOCOMEC Fuserbloc up to 400 A
- SOCOMEC Fuserbloc up to 630 A.

The switching devices are provided as standard in 3- or 4-pole design. They are either available for the area of the IEC Standards (IEC) or specifically for the area of British Standards (BS). The type code in Tab. 7/6 can therefore be completed with:
-FSF – IEC-
-FSF – BS-

7.2.3 Type Codes for Ancillary Equipment Units for Power Consumption Recording and Communication

GU-Z-MMU-	........-	NAA-	NNNNNNN
Installation device			
PAC 1600	PAC42		
PAC 2200	PAC32		
PAC 3120	PAC31		
PAC 3220	PAC22		
PAC 4220	PAC16		
PAC1600 with MID	MIDPAC22		
PAC2200 with MID	MIDPAC16		
UMG 96 RM-E	UMG96RME		
Prepared for power meter installation on site	MOSMMD		
Empty ancillary equipment unit	XXX0000		
COM100, COM60	COM100		
Communication module			
Without additional communication module		0NN	
With communication module for PROFINET		1PN	
With communication module for Modbus RTU		1MR	
No definition (depending on external device)		9NN	
Interface(s)			
PROFINET I/O (RJ45)			PN
Modbus RTU (RS485)			RTU
Modbus RTU (RS485), Modbus TCP (RJ45)			TCP
M-Bus			MBUS
Modbus RTU (RS485), Modbus TCP (RJ45)			RTU_TCP
No definition (depending on external device)			N

Tab. 7/12: **Selection keys for ancillary equipment units for power metering and communication at the tap-off unit**

7.2.4 Type Codes for Additional Equipment of the LI System

Examples for additional equipment are:

a) End caps:
If a busbar run does not feed into further distribution board cubicles, an end cap must be fitted at the end of the busbar run:
- For hook end: LI- . N .... NA- . . –E-H
- For bolt end: LI- . N .... NA- . . –E-B
- Metal kit for end caps: LI-Z- . N ....H(B)-NA-KOC-N

b) Fire barrier block for customer-/factory-side assembly:

	Customer side	Factory side
• For EI 90:	LI...-EI90-MOS	LI...-EI90-MIF
• For EI 120:	LI...-EI120-MOS	LI...-EI120-MIF

c) Wall/ceiling flange: LI- ... - WFF

d) Fixing bracket for horizontal installation:
- U-profile (Unistrut): LI-Z-BH1 to LI-Z-BH5
- Flexible bracket: LI-Z-BKK2 (2 nos.), LI-Z-BKK8 (8 nos.)
- Fixed point bracket: LI-Z-BKFK2 (2 nos.)

e) Fixing bracket for vertical installation:
- On walls: LI-Z-BV-01 to LI-Z-BV-08
- On walls with fixed point:
  LI-Z-BVFP-SB (2 nos. for single body)
  LI-Z-BVFP-DB (4 nos. for double body)

f) Ceiling mounting:
For rising main busbars (only in combination with fixing bracket for vertical installation):
- LI-Z-BVD-SB (2 nos. for single body)
- LI-Z-BVD-DB (3 nos. for double body)

For rising main busbars with fixed point:
- LI-Z-BVD-SB (1 no. for single body)
- LI-Z-BVD-DB (2 nos. for double body)

7.3 Technical Specifications

Apart from the general technical specifications for the LI system, the conversion factors for the temperature characteristic are listed in Tab. 7/13.

General system data										
Type	LI ...									
Standards and specifications	IEC 61439-1 and -6									
Rated insulation voltage U_i for trunking units according to IEC 61439-1	1,000 V AC									
Rated operational voltage U_e for power transmission / power distribution	1,000 V AC, 690 V AC									
Frequency	50 ... 60 Hz [1]									
Overvoltage category / pollution degree	III/3 (according to IEC 60947-1)									
Rated current U_n • Al busbars • Cu busbars	 • 800 ... 5,000 A • 800 ... 6,300 A									
Climatic resistance • Steady stae temperature / humidity, acc. to IEC 60068-2-78 • Cyclic temperature / humidity, acc. to IEC 60068-2-30 • Cold according to IEC 60068-2-1 • Temperature change acc. to IEC 60068-2-14 • Salt spray test acc. to IEC 60068-2-52 • Ice formation acc. to IEC 60068-2-61	 • 40 °C / 93% RH over 56 days • 56 times (25 ... 40 °C in 3 h; 40 °C for 9 h; 40 ... 25 °C in 3 ... 6 h; 25 °C for 6 h) / 95% RH • –45 °C for 16 h • 5 cycles (1 °C / min) –45 ... 55 °C, holding time min. 30 min • Severity grade 3 • Composite test: cyclic temperature / humidity [56 times (25 ... 40 °C in 3 h; 40 ... 25 °C in 3 ... 6 h; 25 °C for 6 h) / 95% RH] and cold [–45 °C for 16 h]									
Ambient temperature min. / max. / 24-h mean [2]	–25 °C / +40 °C / +35 °C									
Environmental class acc. to IEC 60721-3-3 derived from climatic resistance tests • Climatic environmental conditions	 • 3K24 for installation environment with weather protection									
Degree of protection acc. to IEC 60529	IP55 (IP66 for power transmission)									
Degree of protection against external mechanical impacts	IK08 acc. to IEC 62262 (at IP55) [3]									
Torque for clamped bolt connection (if re-used)	50 Nm ± 5 Nm									
Material of trunking units Surface treatment of the busbars	Powder-coated aluminum enclosure, light gray (RAL 7035) Insulated over the entire length (standard: Mylar) Aluminum nickel-plated and tinned at current transitions Copper tinned at current transitions Current transitions at the tap-off points, silver-plated									
Mounting position	• Horizontal, edgewise or flat • Vertical									
Material of tap-off units	Sheet steel powder-coated, light gray (RAL 7035)									
Temperature characteristic										
Ambient temperature in the 24-h mean	20 °C	25 °C	30 °C	35 °C	40 °C	45 °C	50 °C	55 °C	60 °C	65 °C
Conversion factor for the rated current, 50 Hz [1] [4] (all mounting positions, harmonics on request)	1.075	1.05	1.025	1	0.95	0.9	0.85	0.8	0.75	0.665

[1] At a frequency of 60 Hz, a derating factor of 0.95 is to be considered according to IEC 61439-1 for currents > 800 A
[2] Temperature factor for minimum and maximum ambient temperature on request; depending on the mounting position, higher temperatures are also permissible (values on request)
[3] Not valid for the devices installed in the tap-off units, for the measuring box, as well as for the cover of the tap-off points
[4] Derating factor for frequencies lower than 50 Hz or higher than 60 Hz and for DC current on request

Tab. 7/13: **General system data of the LI system**

7.3.1 Technical Specifications for LI Trunking Units

The tables are structured regarding the conductor material, the fault current calculation methods, and the fire loads:

- Tab. 7/14 Technical specifications for trunking units of the LI system (aluminum)
- Tab. 7/15 Impedances LI-A for calculation of fault currents according to the impedance method with ambient temperature 20 °C and frequency 50 Hz
- Tab. 7/16 Impedances LI-A for calculation of fault currents according to the symmetrical components method with ambient temperature 20 °C and frequency 50 Hz
- Tab. 7/17 Technical specifications for trunking units of the LI system (copper)
- Tab. 7/18 Impedances LI-C for calculation of fault currents according to the impedance method with ambient temperature 20 °C and frequency 50 Hz
- Tab. 7/19 Impedances LI-C for calculation of fault currents according to the symmetrical components method with ambient temperature 20 °C and frequency 50 Hz
- Tab. 7/20 Fire loads for trunking units of the LI system
- Tab. 7/21 Weights for trunking units of the LI system

LI-A			**0800**	**1000**	**1250**	**1600**	**2000**	**2500**	**3200**	**4000**	**5000**
Rated operational current I_{nC}		A	800	1,000	1,250	1,600	2,000	2,500	3,200	4,000	5,000
Impedance per unit length of conducting paths											
With 50 Hz and +20 °C ambient temperature	R'_{20}	mΩ/m	0.090	0.063	0.053	0.037	0.027	0.020	0.019	0.013	0.010
With 50 Hz, final temperature rise of the busbars and +35 °C ambient temperature	R'_1	mΩ/m	0.125	0.088	0.074	0.052	0.038	0.027	0.026	0.018	0.013
	X'_1	mΩ/m	0.021	0.016	0.014	0.010	0.008	0.006	0.005	0.004	0.003
	Z'_1	mΩ/m	0.127	0.089	0.075	0.053	0.038	0.028	0.027	0.018	0.014
Impedance per unit length of the PE path as a mere return conductor											
With 50 Hz and +20 °C ambient temperature	R'_{20}	mΩ/m	0.045	0.042	0.041	0.039	0.034	0.032	0.021	0.019	0.015
Short-circuit withstand strength: phases 3-pole, N (PEN) 1-pole, PE busbar (100%) 1-pole											
Rated short-time withstand current	R.m.s. value (t = 1 s) I_{cw}	kA	35	50	60	65	80	100	120	150	150
	R.m.s. value [1] (t =0.5 s) I_{cw}	kA	49	71	85	92	113	141	170	212	212
Rated peak withstand current	Peak value I_{pk}	kA	74	105	132	143	176	220	264	330	330
Maximum thermal load	Quantity of heat (t =1 s) I^2t	10^6 A^2s	1,225	2,500	3,600	4,225	6,400	10,000	14,400	22,500	22,500
Short-circuit withstand strength: PE enclosure, 1-pole											
Rated short-time withstand current	R.m.s. value (t = 1 s) I_{cw}	kA	21	30	36	39	48	60	72	90	90
	R.m.s. value [1] (t =0.5 s) I_{cw}	kA	30	42	51	55	68	85	102	127	127
Rated peak withstand current	Peak value I_{pk}	kA	44	63	76	82	106	132	158	198	198
Maximum thermal load	Quantity of heat (t =1 s) I^2t	10^6 A^2s	441	900	1,296	1,521	2,304	3,600	5,184	8,100	8,100
Conductor cross-section											
L1, L2, L3, N, CE, 100% PE = busbar	Cross-section A	mm^2	350	499	599	849	1,185	1,652	1,699	2,370	3,304
200% N	Cross-section A	mm^2	700	998	1,198	1,698	2,370	3,304	3,398	4,740	6,608
PEN	Cross-section A	mm^2	350	499	599	849	1,185	1,652	1,699	2,370	3,304
Enclosure cross-section Al	Cross-section A	mm^2	1,623	1,710	1,770	1,917	2,117	2,391	3,834	4,232	4,782
PE enclosure / conductor bar	Relation	%	464	343	295	226	179	145	226	179	145

[1] Calculated values

Tab. 7/14: **Technical specifications for trunking units of the LI system (aluminum)**

Resistances and reactances according to IEC 61439-6 Annex DD (impedance method)										
LI-A			**0800**	**1000**	**1250**	**1600**	**2000**	**2500**	**3200**	**4000**	**5000**
Impedance per unit length of the fault loops phase with phase (LI-A...3B, 4B, 5B, 5C, 5H, 6B)											
	$R'_{b20\text{-}ph\text{-}ph}$	mΩ/m	0.183	0.128	0.108	0.076	0.054	0.04	0.037	0.028	0.02
	$X'_{b20\text{-}ph\text{-}ph}$	mΩ/m	0.036	0.03	0.023	0.017	0.015	0.009	0.01	0.006	0.005
	$Z'_{b20\text{-}ph\text{-}ph}$	mΩ/m	0.186	0.131	0.11	0.078	0.056	0.041	0.038	0.028	0.02
Impedance per unit length of the fault loops phase with N[1] (LI-A...5B, 5H, 6B)											
	$R'_{b20\text{-}ph\text{-}N}$	mΩ/m	0.19	0.134	0.113	0.081	0.058	0.042	0.04	0.029	0.021
	$X'_{b20\text{-}ph\text{-}N}$	mΩ/m	0.052	0.043	0.033	0.025	0.019	0.013	0.014	0.009	0.008
	$Z'_{b20\text{-}ph\text{-}N}$	mΩ/m	0.197	0.141	0.117	0.084	0.061	0.044	0.042	0.03	0.022
Impedance per unit length of the fault loops phase with PEN (LI-A...4B) or phase with PE busbar incl. PE enclosure (LI-A...5H)											
	$R'_{b20\text{-}ph\text{-}PE\ /\ PEN}$	mΩ/m	0.127	0.096	0.083	0.062	0.047	0.035	0.032	0.024	0.018
	$X'_{b20\text{-}ph\text{-}PE\ /\ PEN}$	mΩ/m	0.045	0.035	0.03	0.023	0.016	0.012	0.012	0.009	0.006
	$Z'_{b20\text{-}ph\text{-}PE\ /\ PEN}$	mΩ/m	0.134	0.102	0.088	0.066	0.05	0.037	0.034	0.026	0.019
Impedance per unit length of the fault loops phase with PE enclosure (LI-A...3B, 5B, 5C, 6B)											
	$R'_{b20\text{-}ph\text{-}PE}$	mΩ/m	0.136	0.106	0.095	0.076	0.061	0.052	0.039	0.033	0.025
	$X'_{b20\text{-}ph\text{-}PE}$	mΩ/m	0.053	0.044	0.039	0.031	0.024	0.018	0.016	0.012	0.007
	$Z'_{b20\text{-}ph\text{-}PE}$	mΩ/m	0.146	0.115	0.102	0.082	0.066	0.055	0.042	0.035	0.026
[1] For conductor configuration with 200% N (5C) on request											

Tab. 7/15: **Impedances LI-A for calculation of fault currents according to the impedance method with ambient temperature 20 °C and frequency 50 Hz**

Zero-sequence impedances according to IEC 61439-6 Annex CC (symmetrical components method)										
LI-A			**0800**	**1000**	**1250**	**1600**	**2000**	**2500**	**3200**	**4000**	**5000**
Zero-sequence impedance of the phases with N[1] (LI-A...5B, 5H, 6B)											
	$R'_{0\ b20\text{-}ph\text{-}N}$	mΩ/m	0.387	0.273	0.231	0.165	0.12	0.087	0.081	0.06	0.042
	$X'_{0\ b20\text{-}ph\text{-}N}$	mΩ/m	0.117	0.096	0.075	0.054	0.048	0.03	0.03	0.018	0.018
	$Z'_{0\ b20\text{-}ph\text{-}N}$	mΩ/m	0.404	0.289	0.243	0.174	0.129	0.092	0.086	0.063	0.046
Zero-sequence impedance of the fault loops phase with PEN (LI-A...4B) or phase with PE busbar incl. PE enclosure (LI-A...5H)											
	$R'_{b0\ b20\text{-}ph\text{-}PE\ /\ PEN}$	mΩ/m	0.202	0.163	0.143	0.112	0.088	0.067	0.058	0.046	0.035
	$X'_{0\ b20\text{-}ph\text{-}PE\ /\ PEN}$	mΩ/m	0.102	0.078	0.069	0.051	0.039	0.03	0.039	0.018	0.015
	$Z'_{0\ b20\text{-}ph\text{-}PE\ /\ PEN}$	mΩ/m	0.226	0.181	0.158	0.123	0.096	0.074	0.07	0.049	0.038
Zero-sequence impedance of the phases with PE enclosure (LI-A...3B, 5B, 5C, 6B)											
	$R'_{0\ 20\text{-}ph\text{-}PE}$	mΩ/m	0.229	0.192	0.179	0.154	0.129	0.116	0.08	0.073	0.055
	$X'_{0\ b20\text{-}ph\text{-}PE}$	mΩ/m	0.126	0.108	0.096	0.078	0.06	0.045	0.039	0.03	0.033
	$Z'_{0\ b20\text{-}ph\text{-}PE}$	mΩ/m	0.262	0.22	0.203	0.173	0.142	0.124	0.089	0.079	0.064
[1] For conductor configuration with 200% N (5C) on request											

Tab. 7/16: **Impedances LI-A for calculation of fault currents according to the symmetrical components method with ambient temperature 20 °C and frequency 50 Hz**

LI-C		LI-C	1000	1250	1600	2000	2500	3200	4000	5000	6300
Rated operational current I_{nC}		A	1,000	1,250	1,600	2,000	2,500	3,200	4,000	4,890	6,300
Impedance per unit length of conducting paths											
With 50 Hz and +20 °C ambient temperature	R'_{20}	mΩ/m	0.053	0.047	0.031	0.024	0.018	0.012	0.012	0.009	0.006
With 50 Hz, final temperature rise of the busbars and +35 °C ambient temperature	R'_1	mΩ/m	0.074	0.065	0.044	0.034	0.025	0.017	0.017	0.012	0.009
	X'_1	mΩ/m	0.021	0.019	0.012	0.010	0.008	0.006	0.005	0.004	0.003
	Z'_1	mΩ/m	0.077	0.068	0.045	0.035	0.026	0.018	0.017	0.013	0.009
Impedance per unit length of the PE path as a mere return conductor											
With 50 Hz and +20 °C ambient temperature	R'_{20}	mΩ/m	0.047	0.046	0.041	0.039	0.036	0.033	0.020	0.019	0.017
Short-circuit withstand strength: phases 3-pole, N (PEN) 1-pole, PE busbar (100%) 1-pole											
Rated short-time withstand current	R.m.s. value (t = 1 s) I_{cw}	kA	43	60	65	80	100	100 [2] / 120 [3]	150	150	150
	R.m.s. value [1] (t =0.5 s) I_{cw}	kA	61	85	92	113	141	141 [2] / 170 [3]	212	212	212
Rated peak withstand current	Peak value I_{pk}	kA	90	132	143	176	220	220 [2] / 264 [3]	330	330	330
Maximum thermal load	Quantity of heat (t =1 s) I^2t	10^6 A^2s	1,849	3,600	4,225	6,400	10,000	10^{4} [2] / 1.44 10^{4} [3]	22,500	22,500	22,500
Short-circuit withstand strength: PE enclosure, 1-pole											
Rated short-time withstand current	R.m.s. value (t = 1 s) I_{cw}	kA	26	36	39	48	60	60	90	90	90
	R.m.s. value [1] (t =0.5 s) I_{cw}	kA	37	51	55	68	85	85	127	127	127
Rated peak withstand current	Peak value I_{pk}	kA	54	79	86	106	132	132	198	198	198
Maximum thermal load	Quantity of heat (t =1 s) I^2t	10^6 A^2s	676	1,296	1,521	2,304	3,600	3,600	8,100	8,100	8,100
Conductor cross-section											
L1, L2, L3, N, CE, 100% PE = busbar	Cross-section A	mm^2	328	397	562	795	1,068	1,537	1,589	2,135	3,037
200% N	Cross-section A	mm^2	565	794	1,124	1,590	2,136	3,074	3,178	4,270	6,074
PEN	Cross-section A	mm^2	328	397	562	795	1,068	1,537	1,589	2,135	3,037
Enclosure cross-section Al (Cu equivalent)	Cross-section A	mm^2	940	955	1,025	1,092	1,186	1,346	2,184	2,372	2,691
PE enclosure / conductor bar	Relation	%	287	241	182	137	111	88	137	111	88

[1] Calculated values
[2] With enclosure as PE: I_{cw}(1 s) = 100 kA; I_{cw}(0.5 s) = 141 A; I_{pk} = 220 kA; quantity of heat = 10,000 10^6 A^2s
[3] With separate PE busbar (100%): I_{cw}(1 s) = 120 kA; I_{cw}(0.5 s) = 170 A; I_{pk} = 264 kA; quantity of heat = 14,400 10^6 A^2s

Tab. 7/17: **Technical specifications for trunking units of the LI system (copper)**

Resistances and reactances according to IEC 61439-6 Annex DD (impedance method)											
LI-C			1000	1250	1600	2000	2500	3200	4000	5000	6300
Impedance per unit length of the fault loops phase with phase (LI-A...3B, 4B, 5B, 5C, 5H, 6B)											
	$R'_{b20\text{-}ph\text{-}ph}$	mΩ/m	0.106	0.094	0.063	0.048	0.036	0.025	0.024	0.018	0.013
	$X'_{b20\text{-}ph\text{-}ph}$	mΩ/m	0.04	0.036	0.026	0.019	0.016	0.01	0.009	0.008	0.006
	$Z'_{b20\text{-}ph\text{-}ph}$	mΩ/m	0.113	0.1	0.068	0.052	0.039	0.027	0.026	0.019	0.014
Impedance per unit length of the fault loops phase with N[1] (LI-A...5B, 5H, 6B)											
	$R'_{b20\text{-}ph\text{-}N}$	mΩ/m	0.116	0.103	0.069	0.053	0.04	0.028	0.027	0.021	0.014
	$X'_{b20\text{-}ph\text{-}N}$	mΩ/m	0.047	0.047	0.03	0.024	0.021	0.014	0.014	0.011	0.008
	$Z'_{b20\text{-}ph\text{-}N}$	mΩ/m	0.126	0.114	0.076	0.058	0.045	0.031	0.03	0.023	0.016
Impedance per unit length of the fault loops phase with PEN (LI-A...4B) or phase with PE busbar incl. PE enclosure (LI-A...5H)											
	$R'_{b20\text{-}ph\text{-}PE\,/\,PEN}$	mΩ/m	0.086	0.079	0.056	0.045	0.035	0.025	0.023	0.018	0.014
	$X'_{b20\text{-}ph\text{-}PE/PEN}$	mΩ/m	0.041	0.037	0.028	0.022	0.017	0.012	0.011	0.008	0.006
	$Z'_{b20\text{-}ph\text{-}PE/PEN}$	mΩ/m	0.096	0.087	0.062	0.05	0.039	0.028	0.025	0.02	0.015
Impedance per unit length of the fault loops phase with PE enclosure (LI-A...3B, 5B, 5C, 6B)											
	$R'_{b20\text{-}ph\text{-}PE}$	mΩ/m	0.101	0.093	0.073	0.063	0.054	0.045	0.032	0.028	0.023
	$X'_{b20\text{-}ph\text{-}PE}$	mΩ/m	0.05	0.047	0.038	0.03	0.024	0.017	0.016	0.012	0.009
	$Z'_{b20\text{-}ph\text{-}PE}$	mΩ/m	0.112	0.104	0.082	0.07	0.059	0.049	0.036	0.03	0.025

[1] For conductor configuration with 200% N (5C) on request

Tab. 7/18: **Impedances LI-C for calculation of fault currents according to the impedance method with ambient temperature 20 °C and frequency 50 Hz**

Zero-sequence impedances according to IEC 61439-6 Annex CC (symmetrical components method)											
LI-C			1000	1250	1600	2000	2500	3200	4000	5000	6300
Zero-sequence impedance of the phases with N[1] (LI-A...5B, 5H, 6B)											
	$R'_{0\ b20\text{-}ph\text{-}N}$	mΩ/m	0.24	0.213	0.144	0.111	0.084	0.06	0.054	0.042	0.03
	$X'_{0\ b20\text{-}ph\text{-}N}$	mΩ/m	0.108	0.105	0.066	0.051	0.045	0.033	0.03	0.024	0.015
	$Z'_{0\ b20\text{-}ph\text{-}N}$	mΩ/m	0.263	0.237	0.158	0.122	0.095	0.068	0.062	0.048	0.034
Zero-sequence impedance of the phases with PEN (LI-A...4B) or phases with PE busbar incl. PE enclosure (LI-A...5H)											
	$R'_{b0\ b20\text{-}ph\text{-}PE\,/\,PEN}$	mΩ/m	0.154	0.144	0.106	0.088	0.069	0.051	0.045	0.036	0.042
	$X'_{0\ b20\text{-}ph\text{-}PE\,/\,PEN}$	mΩ/m	0.09	0.084	0.06	0.048	0.036	0.027	0.024	0.021	0.012
	$Z'_{0\ b20\text{-}ph\text{-}PE\,/\,PEN}$	mΩ/m	0.179	0.167	0.122	0.1	0.078	0.058	0.051	0.042	0.031
Zero-sequence impedance of the phases with PE enclosure (LI-A...3B, 5B, 5C, 6B)											
	$R'_{0\ 20\text{-}ph\text{-}PE}$	mΩ/m	0.196	0.185	0.156	0.14	0.127	0.111	0.072	0.066	0.056
	$X'_{0\ b20\text{-}ph\text{-}PE}$	mΩ/m	0.123	0.12	0.093	0.078	0.063	0.045	0.042	0.033	0.024
	$Z'_{0\ b20\text{-}ph\text{-}PE}$	mΩ/m	0.231	0.221	0.181	0.16	0.142	0.12	0.083	0.073	0.061

[1] For conductor configuration with 200% N (5C) on request

Tab. 7/19: **Impedances LI-C for calculation of fault currents according to the symmetrical components method with ambient temperature 20 °C and frequency 50 Hz**

LI-A				0800	1000	1250	1600	2000	2500	3200	4000	5000
Trunking units, conductor configuration	**Number of busbars**	**Key for configuration (Tab. 7/4)**	**Unit**	**Fire load**								
3ph-PE(H)	3	3B	kWh/m	2.13	2.44	2.74	3.26	4.15	5.16	6.51	8.29	10.32
3ph-PEN	4	4B	kWh/m	2.37	2.8	3.12	3.73	4.81	6.03	7.46	9.62	12.06
3ph-N-PE(H)	4	5B	kWh/m	2.37	2.8	3.12	3.73	4.81	6.03	7.46	9.62	12.06
3ph-N-100% PE(B)	5	5H	kWh/m	2.63	3.11	3.55	4.2	5.48	6.9	8.4	10.95	13.8
3ph-200% N-PE(H)	5	5C	kWh/m	2.63	3.11	3.55	4.2	5.48	6.9	8.4	10.95	13.8
3ph-N-PE(H)-CE	5	6B	kWh/m	2.63	3.11	3.55	4.2	5.48	6.9	8.4	10.95	13.8
LI-C				**1000**	**1250**	**1600**	**2000**	**2500**	**3200**	**4000**	**5000**	**6300**
Trunking units, conductor configuration	**Number of busbars**	**Key for configuration (Tab. 7/4)**	**Unit**	**Fire load**								
3ph-PE(H)	3	3B	kWh/m	2.13	2.26	2.7	3.13	3.84	4.92	6.46	7.69	8.79
3ph-PEN	4	4B	kWh/m	2.37	2.56	3.06	3.57	4.43	5.76	7.4	8.85	11.52
3ph-N-PE(H)	4	5B	kWh/m	2.37	2.56	3.06	3.57	4.43	5.76	7.4	8.85	11.52
3ph-N-100% PE(B)	5	5H	kWh/m	2.63	2.84	3.48	4.01	5.01	6.6	8.35	10.02	13.19
3ph-200% N-PE(H)	5	5C	kWh/m	2.63	2.84	3.48	4.01	5.01	6.6	8.35	10.02	13.19
3ph-N-PE(H)-CE	5	6B	kWh/m	2.63	2.84	3.48	4.01	5.01	6.6	8.35	10.02	13.19
Fire load per tap-off point			**kWh**	**0.98**								

PE(H): enclosure as PE; PE(B): PE as a separate busbar

Tab. 7/20: **Fire loads for trunking units of the LI system**

LI-A				0800	1000	1250	1600	2000	2500	3200	4000	5000
Trunking units, conductor configuration	**Number of busbars**	**Key for configuration (Tab. 7/4)**	**Unit**	**Weight**								
3ph-PE(H)	3	3B	kg/m	11.2	12.7	13.7	16.2	19.5	24.1	32.3	39.0	48.2
3ph-PEN	4	4B	kg/m	12.2	14.1	15.4	18.5	22.8	28.8	37.1	45.7	57.5
3ph-N-PE(H)	4	5B	kg/m	12.2	14.1	15.4	18.5	22.8	28.8	37.1	45.7	57.5
3ph-N-100% PE(B)	5	5H	kg/m	13.2	15.5	17.0	20.9	26.2	33.4	41.9	52.3	66.7
3ph-200% N-PE(H)	5	5C	kg/m	13.2	15.5	17.0	20.9	26.2	33.4	41.9	52.3	66.7
3ph-N-PE(H)-CE	5	6B	kg/m	13.2	15.5	17.0	20.9	26.2	33.4	41.9	52.3	66.7
LI-C				**1000**	**1250**	**1600**	**2000**	**2500**	**3200**	**4000**	**5000**	**6300**
Trunking units, conductor configuration	**Number of busbars**	**Key for configuration (Tab. 7/4)**	**Unit**	**Weight**								
3ph-PE(H)	3	3B	kg/m	17.4	19.3	24.2	31.0	39.0	52.7	61.6	77.6	105.1
3ph-PEN	4	4B	kg/m	20.4	23.0	29.4	38.47	48.9	67.0	76.2	97.3	133.4
3ph-N-PE(H)	4	5B	kg/m	20.4	23.0	29.4	38.47	48.9	67.0	76.2	97.3	133.4
3ph-N-100% PE(B)	5	5H	kg/m	23.4	26.7	34.7	45.7	58.8	81.2	90.8	116.9	161.8
3ph-200% N-PE(H)	5	5C	kg/m	23.4	26.7	34.7	45.7	58.8	81.2	90.8	116.9	161.8
3ph-N-PE(H)-CE	5	6B	kg/m	23.4	26.7	34.7	45.7	58.8	81.2	90.8	116.9	161.8

PE(H): enclosure as PE; PE(B): PE as a separate busbar

Tab. 7/21: **Weights for trunking units of the LI system**

7.3.2 Technical Specifications and Connections of LI Tap-off Units

The tap-off units meet the product requirements of the IEC 61439-1 and -6 standards, as well as those of the IEC 60068-2-78 and -30 standards in respect of climatic resistance. Further specifications for tap-off units are:

- Rated insulation voltage U_i = 690 V AC
- Rated frequency f_r = 50 Hz
- Rated operational voltage U_e (V AC); 400 V, 500 V, or 690 V depending on the switching/protection device
- Degree of protection per version IP40, IP54, or IP55
- Ambient temperature: min. = –25 °C / max. = 40 °C / mean = 35 °C.

Depending on the installed components, important values such as the permissible operational current, the rated conditional short-circuit current, the connection conditions, and the weights are listed in Tab. 7/22 to Tab. 7/30. The dimensions of the tap-off units are given in the dimensional drawings. The cable entry of the tap-off units is always possible either at the front or at the side, depending on the version.

IP54 tap-off units LI-T from 50 A to 630 A with 3VA1 circuit breaker			**3VA11**	**3VA12**	**3VA13**	**3VA14**
Rated operational voltage U_e		V	400			
Rated currents						
Rated current I_n		A	50, 63, 80, 100, 125, 160	200, 250	320, 400	500, 630
Maximum permissible operational current I_{nC}		A	50, 63, 80, 100, 125, 140	200, 235	320, 385	410, 475
Rated conditional short-circuit current I_{cc}	Switching capacity N at 400 V	kA	25	-	-	-
	Switching capacity S at 400 V	kA	36	36	36	36
	Switching capacity M at 400 V	kA	55	55	55	55
	Switching capacity H at 400 V	kA	70	70	70	85
Cable entry						
	At the front		×	×	×	×
	At the side [1]		-	-	×	×
Multi-core cables [2]			1 × KT4		2 × KT4	
Single-core cables through undrilled Al plate			[3] 4 × M40 or 5 × M32		[4] 9 ×M50 or 14 ×M40	
Connections						
Direct connection to 3VA [5] L1, L2, L3, N and PE			M6 (M8 for N, PE)	M8	M10	M10
		mm²	120	120	150	150
Via copper lug (accessories) to L1, L2, L3, N (4-pole); for N (3-pole) / PE, PEN to copper lug			M8	M8	M10	M10
		mm²	-	-	1 × 95 ... 240	1 × 95 ... 240
		mm²	-	-	2 × 50 ... 185	2 × 50 ... 240
Weight		kg	28	33	55	55
Size			2		4	
Degree of protection			IP54			

[1] For entries at the side, the bending radii of the cable manufacturer have to be observed
[2] Cable grommets KT4 for cable diameters from 14 to 68 mm are not included in the scope of supply and can be ordered as accessories "LI-Z-T-MCC..."
[3] Al plate (extra accessory) and cable glands are not included in the scope of supply; cable glands with strain relief are required
[4] Cable glands are not included in the scope of supply; cable glands with strain relief are required
[5] Specification of the max. cross-section of copper conductor when a cable lug is used according to DIN 46234 for connection to 3VA nut keeper kit (for details, see 3VA manual)

Tab. 7/22: **IP54 tap-off units LI-T from 50 A to 630 A with 3VA1 circuit breaker**

IP54 tap-off units LI-T from 63 A to 630 A with 3VA2 circuit breaker			3VA21	3VA22	3VA23	3VA24
Rated operational voltage U_e		V	400			
Rated currents						
Rated current I_n		A	63, 100, 160	200, 250	250, 400	400, 630
Maximum permissible operational current I_{nC}		A	63, 100, 160	200, 250	250, 385	400, 475
Rated conditional short-circuit current I_{cc}	Switching capacity M at 400 V	kA	55			
	Switching capacity H at 400 V	kA	85			
Cable entry						
	At the front		×	×	×	×
	At the side [1]		-	-	×	×
Multi-core cables [2]			1 × KT4		2 × KT4	
Single-core cables through undrilled Al plate [3]			[3] 4 × M40 or 5 × M32		[4] 9 × M50 or 14 × M50	
Connections						
Direct connection [5] L1, L2, L3, N and PE			M6 (M8 for N, PE)	M8	M10	M10
		mm²	120	120	150	150
To bolt via copper lug L1, L2, L3, N (4-pole) or bolt terminal N (3-pole) / PE			M8	M8	M10	M10
		mm²	-	-	1 × 95 ... 240	1 × 95 ... 240
		mm²	2 × 95 ... 120	2 × 95 ... 120	2 × 50 ... 185	2 × 50 ... 240
Weight		kg	29	34	55	57
Size			2		4	
Degree of protection			IP54			

[1] For entries at the side, the bending radii of the cable manufacturer have to be observed
[2] Cable grommets KT4 for cable diameters from 14 to 68 mm are not included in the scope of supply and can be ordered as accessories "LI-Z-T-MCC..."
[3] Al plate (extra accessory) and cable glands are not included in the scope of supply; cable glands with strain relief are required
[4] Cable glands are not included in the scope of supply; cable glands with strain relief are required
[5] Specification of the max. cross-section of copper conductor when a cable lug is used according to DIN 46234 for connection to 3VA nut keeper kit (for details, see 3VA manual)

Tab. 7/23: **IP54 tap-off units LI-T from 63 A to 630 A with 3VA2 circuit breaker**

IP55 tap-off units LI-T from 50 A to 630 A with 3VA1 circuit breaker [1]			3VA11	3VA12	3VA13	3VA14	3VA15
Rated operational voltage U_e		V	400				
Rated currents							
Rated current I_n		A	50, 63, 80, 100, 125, 160	200, 250	320, 400	500, 630	630
Maximum permissible operational current I_{nC}		A	50, 63, 80, 100, 125, 141	200, 248	320, 385	410, 475	600
Rated conditional short-circuit current I_{cc}	Switching capacity N at 400 V	kA	25	-	-	-	-
	Switching capacity S at 400 V	kA	36				
	Switching capacity M at 400 V	kA	55				
	Switching capacity H at 400 V	kA	70				
Cable entry at the front / at the side [2]							
Single-core cables through undrilled Al plate [3] [4]			7 × M32	7 × M40	7 × M50	14 × M50	14 × M50
Connections							
Direct connection to 3VA [5] L1, L2, L3, N (4-pole)			M6	M8	M10	M10	-
		mm²	120	120	150	150	-
To bolt via copper lug (accessory only) L1, L2, L3, N (4-pole) or bolt terminal N (3-pole) / PE, PEN			M8	M8	M10	M10	M10
		mm²	1 × 50 ... 150	1 × 50 ... 150	1 × 95 ... 240	1 × 95 ... 240	1 × 95 ... 240
		mm²	2 × 50 ... 120	2 × 50 ... 120	2 × 50 ... 185	2 × 50 ... 240	2 × 50 ... 240
Weight		kg	19	25	44	55	79
Size			1	2	3	4	5
Degree of protection			IP55				

[1] For versions with 3VA1, there are various restrictions; among other things, they cannot be configured with motor operating mechanism, current transformers, and other components

[2] Cable entry possible at the front and at the side: recommended at the front; for entries at the side, the bending radii of the cable manufacturer have to be observed

[3] Al plate, undrilled for cable glands; cable glands with strain relief are required (not included in the scope of supply)

[4] Multi-core cable entries can only be configured for versions with 3VA2, or, for 3VA1, they can only be ordered as accessories; cable grommets KT4 for cable diameters from 14 to 68 mm

[5] Specification of the max. cross-section of copper conductor when a cable lug is used according to DIN 46234 for connection to 3VA nut keeper kit (for details, see 3VA manual)

Tab. 7/24: **IP55 tap-off units LI-T from 50 A to 630 A with 3VA1 circuit breaker**

IP55 tap-off units LI-T from 63 A to 630 A with 3VA2 circuit breaker			3VA21	3VA22	3VA23	3VA24	3VA25 [5]
Rated operational voltage U_e		V	400 (500)				
Rated currents							
Rated current I_n		A	63, 100, 160	200, 250	250, 400	400, 630	630
Maximum permissible operational current I_{nC}		A	63, 100, 160	200, 245	250, 385	410, 475	630
Rated conditional short-circuit current I_{cc}	Switching capacity M at 400 V (500 V)	kA	55 (36)				
	Switching capacity H at 400 V (500 V)	kA	85 (55)				
	Switching capacity C at 400 V (500 V)	kA	110 (85)				
Cable entry at the front / at the side [1]							
Single-core cables through undrilled Al plate [2]			7 × M32	7 × M40	7 × M50	14 × M50	14 × M50
Cable grommets for multi-core cables [3]			1 × KT4	1 × KT4	1 × KT4	2 × KT4	2 × KT4
Connections							
Direct connection to 3VA [4] L1, L2, L3, N (4-pole)			M6	M8	M10	M10	-
		mm²	120	120	150	150	-
To bolt via copper lug L1, L2, L3, N (4-pole) or bolt terminal N (3-pole) / PE			M8	M8	M10	M10	M10
		mm²	1 × 50 ... 150	1 × 50 ... 150	1 × 95 ... 240	1 × 95 ... 240	1 × 95 ... 240
		mm²	2 × 50 ... 120	2 × 50 ... 120	2 × 50 ... 185	2 × 50 ... 240	2 × 50 ... 240
Weight		kg	19	25	44	55	79
Size			1 [6]	2	3	4	5
Degree of protection			IP55				

[1] Cable entry possible at the front and at the side: recommended at the front; for entries at the side, the bending radii of the cable manufacturer have to be observed
[2] Al plate, undrilled for cable glands; cable glands with strain relief are required (not included in the scope of supply)
[3] Multi-core cable entries can only be configured for versions with 3VA2, or, for 3VA1, they can only be ordered as accessories; cable grommets KT4 for cable diameters from 14 to 68 mm
[4] Specification of the max. cross-section of copper conductor when a cable lug is used according to DIN 46234 for connection to 3VA nut keeper kit (for details, see 3VA manual)
[5] No motor operating mechanism possible
[6] With instrument transformer module and motor operating mechanism: size 2 of the tap-off unit

Tab. 7/25: **IP55 tap-off units LI-T from 63 A to 630 A with 3VA2 circuit breaker**

IP55 tap-off units LI-T of 800 A and 1,250 A with 3VA circuit breaker			3VA1510 [1) 2)]	3VA2510 [1) 2)]	3VA2716
Rated operational voltage U_e		V	400	400 (500)	
Rated currents					
Rated current I_n		A	800	800	1,250
Maximum permissible operational current I_{nC}		A	710	860	1,200
Rated conditional short-circuit current I_{cc}	Switching capacity M at 400 V (500 V)	kA	55	55 (36)	
	Switching capacity H at 400 V (500 V)	kA	70	85 (55)	
	Switching capacity C at 400 V (500 V)	kA	-	110 (85)	-
Cable entry at the side [3)]					
Single-core cables through undrilled Al plate [4)]			24 × M40 or 20 × M50		
Cable grommets for multi-core cables [5)]			4 × KT4		
Connections					
To bolt via copper lug/KSY to L1, L2, L3, N, PE			M12	M12 (KSY)	M12 (KSY)
		mm²	1 × 95 ... 300	1 × 95 ... 300	1 × 95 ... 300
		mm²	2 × 95 ... 300	4 × 95 ... 300	4 × 95 ... 300
		mm²	2 × 95 ... 120	2 × 95 ... 120	2 × 50 ... 185
Weight		kg	118	147	150 (169) [6)]
Size			8	8	8 (9) [6)]
Degree of protection			IP55		

[1)] For versions with 3VA1, there are various restrictions; among other things, they cannot be configured with motor operating mechanism, current transformers, and other components
[2)] No motor operating mechanism possible
[3)] For entries at the side, the bending radii of the cable manufacturer have to be observed
[4)] Al plate, undrilled for cable glands; cable glands with strain relief are required (not included in the scope of supply)
[5)] Cable grommets KT4 for cable diameters from 14 to 68 mm
[6)] Values in brackets apply to tap-off-units with 3VA27 and motor operating mechanism

Tab. 7/26: **IP55 tap-off units LI-T of 800 A and 1,250 A with 3VA1 and 3VA2 circuit breaker**

IP40 tap-off units LI-T from 160 A to 630 A with 3NP11 switch disconnector[1]		3NP1133-3 3NP1134-4	2-3NP11	3NP1143-3 3NP1144-4	3NP1153-3 3NP1154-4	3NP1163-3 3NP1164-4
Rated currents						
Max. rated current of the fuses	A	160	2 × 160	250	400	630
Maximum permissible operational current I_{nC}	A	152	2 × 133	250	360	478
Switching capacity of switch disconnector[2]		AC-22B				
Rated conditional short-circuit current I_{cc} for protection by fuses[3] (690 V)	kA	100				
Cable entry at the front / at the side[2]						
Multi-core cable via bushing on each side in the enclosure frame[3]		1 × KT4	1 × KT4	1 × KT4	2 × KT4	2 × KT4
Single-core cable via bushing on each side in the enclosure frame[4]		2 × M32			-	-
Single-core cables via Al plate[5]		-	-	-	5 × M50 (at the side) 10 × M50 (at the front)	
Connections						
Direct connection at the installation device[6] L1, L2, L3, N, and PE		M6	M8	M10	M10	M10
	mm²	95	95	150	150	150
Via copper lug L1, L2, L3, N (4-pole) or bolt terminal N (3-pole) / PE		M8	M8	M10	M10	M10
	mm²	1 × 50 ... 150	1 × 50 ... 150	1 × 95 ... 240	1 × 95 ... 240	1 × 95 ... 240
	mm²	-	-	-	2 × 50 ... 120	2 × 50 ... 240
Weight	kg	23	35	39	48	52
Size		2	3	3	5	5
Degree of protection		IP40				

[1] For IP40 versions with 3NP11, there are various restrictions; among other things, they cannot be configured with current transformers. Connection lugs for extended customer connection are only available as accessories

[2] Cable entry possible at the front and at the side: recommended at the front; for entries at the side, the bending radii of the cable manufacturer have to be observed

[3] Cable grommets KT4 for cable diameters from 14 to 68 mm are not included in the scope of supply and can be ordered as accessories "LI-Z-T-MCC..."

[4] Cable glands with strain relief are required (not included in the scope of supply)

[5] Al plate, undrilled for cable glands; cable glands with strain relief are required (not included in the scope of supply)

[6] Specification of the max. cross-section of copper conductor when a cable lug is used according to DIN 46234 for connection to 3VA nut keeper kit (for details, see 3VA manual)

Tab. 7/27: **IP40 tap-off units LI-T from 160 A to 630 A with 3NP1 switch disconnector**

IP55 tap-off units LI-T from 160 A to 630 A with 3NP11 switch disconnector		3NP1133	3NP1143	3NP1153	3NP1163
Rated currents					
Max. rated current of the fuses	A	160	250	400	630
Maximum permissible operational current I_{nC}	A	160	225	340	460
Switching capacity of switch disconnector [1]		AC-22B	AC-22B	AC-22B	AC-22B
Rated conditional short-circuit current I_{cc} for protection by fuses [2]	kA	100	100	100	100
Connectable cross-sections					
Connection to bolt with copper lug		M8	M8	M10	M10
L1, L2, L3	mm²	1 × 50 ... 150	1 × 50 ... 150	1 × 95 ... 240	1 × 95 ... 240
	mm²	2 × 50 ... 120	2 × 50 ... 120	2 × 95 ... 120	2 × 95 ... 120
Direct connection at the installation device		M8	M10	M10	M10
L1, L2, L3	mm²	Max. 95	Max. 150	Max. 240	Max. 300
Connection to bolt		M8	M8	M10	M10
N, PE, PEN	mm²	1 × 50 ... 150	1 × 50 ... 150	1 × 95 ... 240	1 × 95 ... 240
	mm²	2 × 50 ... 120	2 × 50 ... 120	2 × 95 ... 120	2 × 95 ... 120
Cable grommets for multi-core cables [3]		KT4	KT4	2 × KT4	2 × KT4
Single-core cables through undrilled Al plate [4]		7 × M40	7 × M50	14 × M50	14 × M50
Weight	kg	28	38	54	60
Size of tap-off unit		2	3	4	5

[1] Utilization category for installed switch disconnector according to IEC 60947-3
[2] Fuses according to IEC 60269-1 and -2
[3] Cable grommets KT4 for cable diameters from 14 to 68 mm
[4] Al plate, undrilled for cable glands; cable glands with strain relief are required (not included in the scope of supply)

Tab. 7/28: **IP55 tap-off units LI-T from 160 A to 630 A with 3NP1 switch disconnector**

IP55 tap-off units LI-T from 160 A to 630 A with FSF fuse switch disconnector		FSF160	FSF250	FSF400	FSF630
NH / BS fuse link (British Standard)		NH00 / A4	NH1 / B3	NH2 / B4	NH3 / C2
Rated currents					
Max. rated current I_n of the fuses	A	160	250	400	630
Maximum permissible operational current I_{nC}: NH / BS	A	130 / 130	215 / 195	320 / 300	485 [1] / 505
Switching capacity of fuse switch disconnector [2]		AC-22B	AC-22B	AC-22B	AC-22B
Rated conditional short-circuit current I_{cc} for protection by fuses [3]: NH (BS)	kA	50 / 100 (80)	50 / 100 (80)	50 / 100 (80)	50 / 100 (80)
Connectable cross-sections					
Connection to bolt with copper lug		M8	M8	M10	M10
L1, L2, L3	mm²	1 × 50 ... 150	1 × 50 ... 150	1 × 95 ... 240	1 × 95 ... 240
	mm²	2 × 50 ... 120	2 × 50 ... 120	2 × 95 ... 120	2 × 95 ... 120
Direct connection at the installation device		M8	M10	M10	M12
L1, L2, L3	mm²	Max. 95	Max. 240	Max. 240	Max. 300
Connection to bolt		M8	M 8	M10	M10
N, PE, PEN	mm²	1 × 50 ... 150	1 × 50 ... 150	1 × 95 ... 240	1 × 95 ... 240
	mm²	2 × 50 ... 120	2 × 50 ... 120	2 × 95 ... 120	2 × 95 ... 120
Cable grommets for multi-core cables [4]		KT4	KT4	2 × KT4	2 × KT4
Single-core cables through undrilled Al plate [5]		7 × M40	7 × M50	14 × M50	14 × M50
Weight	kg	29	40	54	78
Size of tap-off unit		2	3	4	5

[1] Max. permissible operational current I_{nC} for horizontal system mounting position and tap-off unit at the top; for all other positions: I_{nC} = 465 A
[2] Utilization category for installed fuse switch disconnector according to IEC 60947-3
[3] Valid for U_e = 400 V and fuses: IEC 269-1-2, NF EN 60269-1, NFC 63211, NFC 63210, VDE 0636-1, DIN 43620, I_{cc} = 100 kA valid up to and incl. 400 V (U_e), for greater than 400 V up to 690 V, 50 kA apply
[4] Cable grommets KT4 for cable diameters from 14 to 68 mm
[5] Al plate, undrilled for cable glands; cable glands with strain relief are required (not included in the scope of supply)

Tab. 7/29: **Technical specifications for LI tap-off units with FSF fuse switch disconnector**

IP55 tap-off units LI-T from 160 A to 630 A with fuse bases		NH00	NH1	NH2	NH3
NH fuse link		NH00	NH1	NH2	NH3
Rated currents					
Max. rated current I_n of the fuses	A	160	250	400	630
Maximum permissible operational current I_{nC}	A	160	250	385	520 [1]
Rated conditional short-circuit current I_{cc} for protection by fuses [2]	kA	120	120	120	120
Connectable cross-sections					
Connection to bolt with copper lug		M8	M8	M10	M10
L1, L2, L3	mm²	1 × 50 ... 150	1 × 50 ... 150	1 × 95 ... 240	1 × 95 ... 240
	mm²	2 × 50 ... 120	2 × 50 ... 120	2 × 95 ... 120	2 × 95 ... 120
Direct connection at the installation device		M8	M10	M10	M12
L1, L2, L3	mm²	Max. 95	Max. 240	Max. 240	Max. 300
Connection to bolt		M8	M8	M10	M10
N, PE, PEN	mm²	1 × 50 ... 150	1 × 50 ... 150	1 × 95 ... 240	1 × 95 ... 240
	mm²	2 × 50 ... 120	2 × 50 ... 120	2 × 95 ... 120	2 × 95 ... 120
Cable grommets for multi-core cables [3]		KT4	KT4	2 × KT4	2 × KT4
Single-core cables through undrilled Al plate [4]		7 × M40	7 × M50	14 × M50	14 × M50
Weight	kg	22	26	48	58
Size of tap-off unit		1	2	3	4

[1] Max. permissible operational current I_{nC} for vertical system mounting position: I_{nC} = 125 A
[2] Fuses according to IEC 60269-1 and -2
[3] Cable grommets KT4 for cable diameters from 14 to 68 mm
[4] Al plate, undrilled for cable glands; cable glands with strain relief are required (not included in the scope of supply)

Tab. 7/30: **Technical specifications for LI tap-off units with NH fuse bases**

7.3.3 Technical Specifications for Infeeds and Connections of the LI System

Transformer connection units "TCE"

The transformer connection units type TCE are particularly suitable for connection to cast-resin transformers due to the standard variable phase sequences (see Tab. 7/31) and phase distances.
Type TCE is used for horizontal arrangement, type TCET for vertical arrangement, and type TCE-TONT for connection of double-body busbar trunking systems in top-on-top arrangement.

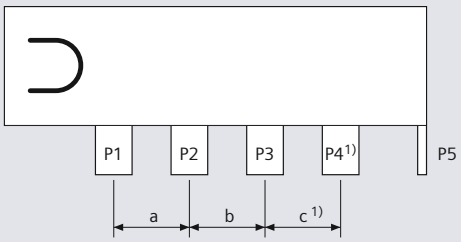
The distances between the phases can be selected within the specified minimum and maximum values.

Being equipped with an adapter frame (AH) , the transformer connection unit can be flanged onto a distribution board enclosure / transformer enclosure.
This provides an enclosure transition from the transformer to the busbar trunking system enclosure.

	Connection tags				
Phase sequence	**P1**	**P2**	**P3**	**P4**	**P5**
A	L1	L2	L3	PEN / N	PE(H) / PE
B	PEN / N	L3	L2	L1	PE(H) / PE
C	L3	L2	L1	PEN / N	PE(H) / PE
D	PEN / N	L1	L2	L3	PE(H) / PE
E	L1	L2	PEN / N	L3	PE(H) / PE
F	L3	PEN / N	L2	L1	PE(H) / PE
G	L3	L2	PEN / N	L1	PE(H) / PE
H	L1	PEN / N	L2	L3	PE(H) / PE
I	L1	L2	L3	-	PE(H)
K	L3	L2	L1	-	PE(H)

- In the specifications with a slash, those before the slash refer to 4-conductor configurations with PEN; those after the slash refer to 5-conductor configurations with PE
- The phase sequences "I" and "K" refer to the conductor configurations 3B (3Ph, PE)

Tab. 7/31: **Phase sequences for transformer connection units TCE, TCET, and TCE-TONT**



System	Min. a, b, c for special tags CCSL	Min. a, b, c for special tags CCSTDL	a, b, c: 4B, 5B, 5H (a, b: 3B) maximum 2)
LIA0800, LIC1000	-	135 mm	800 mm
LIA1000	150 mm	160 mm	800 mm
LIA1250, LIC1600	150 mm	175 mm	800 mm
LIA1600, LIA3200	150 mm	215 mm	800 mm
LIA2000, LIA4000	150 mm	270 mm	800 mm
LIA2500, LIA5000	150 mm	340 mm	800 mm
LIC1250	-	145 mm	800 mm
LIC2000, LIC4000	150 mm	205 mm	800 mm
LIC2500, LIC5000	150 mm	250 mm	800 mm
LIC3200, LIC6300	150 mm	325 mm	800 mm

Maximum possible total length: 3,000 mm:
1) Conductor configuration 3B: phase 4 and distance c are omitted
2) Larger distances are possible depending on the total length (on request)

Tab. 7/32: **Phase distances of the transformer connection units TCE, TCET, and TCE-TONT**

Transformer connection units "TCS"

The transformer connection units type TCS are suitable for connection to oil-immersed transformers due to the standard fixed phase sequence PEN/N-L1-L2-L3-PE and a fixed phase distance of 160 mm.

The busbar trunking system connection is vertical and is available for single and double bodies in the standard side-by-side versions. Optionally, a bellows can be ordered, for example, for connecting the transformer connection unit to an enclosed transformer.
The additional height of the bellows is 90 mm. The lateral movement is approx. ± 10 mm as a maximum. Vertically, the bellows can be compressed or stretched by a maximum of about ± 20 mm.

Transformer connection units "TCF"

The transformer connection units type TCF are suitable for connection to oil-immersed transformers due to the standard fixed phase sequence PEN/N-L1-L2-L3-PE and a fixed phase distance of 160 mm. The busbar trunking system connection is vertical and is available for single and double bodies in top-on-top arrangement.

Incoming cable connection units "CFE" and "CFS"

The incoming cable connection units type CFE with degree of protection IP55 are only available for single bodies, and feature a cable connection system (busbar system) that enables the comfortable connection of several conductors per phase (bolt terminal). The incoming cable connection units type CFS can be used for both single and double bodies. The degree of protection of the incoming cable connection units type "S" is IP40 as standard. Both types are available with the conductor configurations 3B, 4B, 5B, and 5H, and are equipped with a hook terminal as standard. The cross-sections for the cable connection are given in Tab. 7/33.

Connection to connection pieces for non-Siemens distribution boards

To connect the FA connection pieces for non-Siemens distribution boards, the conductor cross-sections given in Tab. 7/34 must be provided.

Cable connection: number of cables × cross-section size		
System	**LI ... -CFE ...**	**LI ... -CFS ...**
LI-A . 0800	3 × 300 mm²	2 × 300 mm²
LI-A . 1000, LI-C . 1000	4 × 300 mm²	4 × 300 mm²
LI-A . 1250, LI-C . 1250	5 × 300 mm²	4 × 300 mm²
LI-A . 1600, LI-C . 1600	6 × 300 mm²	4 × 300 mm²
LI-A . 2000, LI-C . 2000	8 × 300 mm²	6 × 300 mm²
LI-A . 2500, LI-C . 2500	10 × 300 mm²	8 × 300 mm²
LI-C . 3200	11 × 300 mm²	8 × 300 mm²
LI-A . 3200		8 × 300 mm²
LI-C . 4000		10 × 300 mm²
LI-A . 4000		12 × 300 mm²
LI-C . 5000		14 × 300 mm²
LI-A . 5000		16 × 300 mm²
LI-C . 6300		16 × 300 mm²

Tab. 7/33: **Cable connection for incoming cable connection units "CFE" and "CFS"**

Width × thickness of the bare copper busbars				
	Number of copper busbars			
System	**1**	**2**	**3**	**4**
LI-A . 0800	50 mm × 10 mm	20 mm × 10 mm	-	-
LI-A . 1000, LI-C . 1000	80 mm × 10 mm	30 mm × 10 mm	20 mm × 10 mm	-
LI-A . 1250, LI-C . 1250	100 mm × 10 mm	40 mm × 10 mm	30 mm × 10 mm	-
LI-A . 1600, LI-C . 1600	120 mm × 10 mm	60 mm × 10 mm	40 mm × 10 mm	-
LI-A . 2000, LI-C . 2000	160 mm × 10 mm	80 mm × 10 mm	50 mm × 10 mm	40 mm × 10 mm
LI-A . 2500, LI-C . 2500	200 mm × 10 mm	120 mm × 10 mm	80 mm × 10 mm	50 mm × 10 mm
LI-A . 3200, LI-C . 3200	-	160 mm × 10 mm	100 mm × 10 mm	80 mm × 10 mm
LI-A . 4000, LI-C . 4000	-	200 mm × 10 mm	160 mm × 10 mm	120 mm × 10 mm
LI-A . 5000, LI-C . 5000	-	-	200 mm × 10 mm	160 mm × 10 mm
LI-C . 6300	-	-	-	200 mm × 10 mm

Tab. 7/34: **Conductor cross-sections for bare copper busbars for connecting the connection pieces for non-Siemens distribution boards according to DIN 43671**

7.4 Dimensions and Configuring Aids

Some parameters of the system components are not part of the type code; for example, length specifications, position specifications of tap-off points, angle values for junction units, phase sequences for transformer connections, color, etc. These parameters are determined as additional specifications (e-text) to the respective article number and automatically generated in the SIMARIS busbarplan planning tool when the parts lists are created.

For configuration, symbolic representations of the system components (Fig. 7/3) are important for the unambiguity of the configuration data. The following must be stated:

- ① In as-delivered condition, the shear-off nut is located on the N / PEN or L1 side.
  ② The busbar end with the bolt is marked with a dot (•).
  ③ The auxiliary line for configuration is located on the side of the L3 or PE conductor, and is marked on the unit at the right upper edge with a bold line.
  ④ To define the trunking unit types, the open hook end is looked at, whereby the auxiliary line for configuration is on the right side and the conductors are in edgewise position.
- The four basic directions for junction units are:
  V to the front (top)
  H to the rear (bottom)
  R to the right
  L to the left
- Limbs and angles with e-text designations for junction units with 2 limbs, such as elbow and knee:
  X-limb with hook,
  fixed FX-limb with hook
  → e-text H0V:
  Y-limb with bolt,
  fixed FY-limb with bolt
  → e-text H0U:
  Elbow W between limbs X and FY
  or FX and Y
  → e-text H0W:
- Limbs and angles with e-text designations for junction units with 3 limbs, such as offset elbows, Z-units and T-units:
  X-limb with hook → e-text H0X:
  Y-limb with bolt → e-text H0Y:
  Z-limb between limbs X and Y → e-text H0Z:

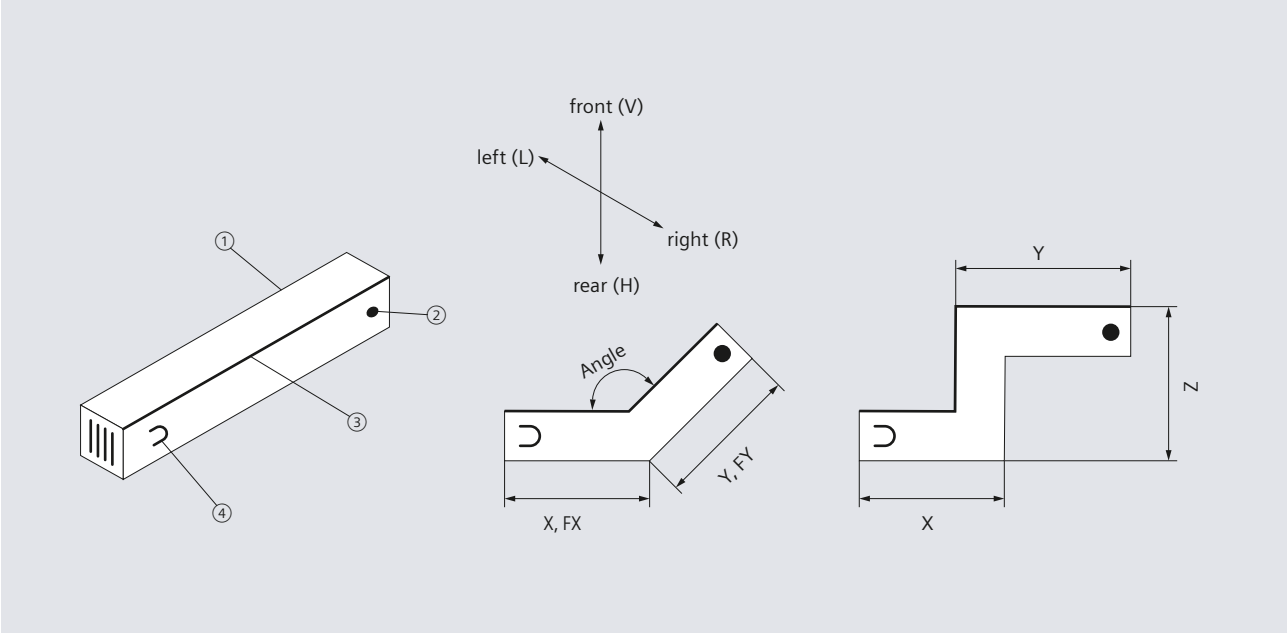
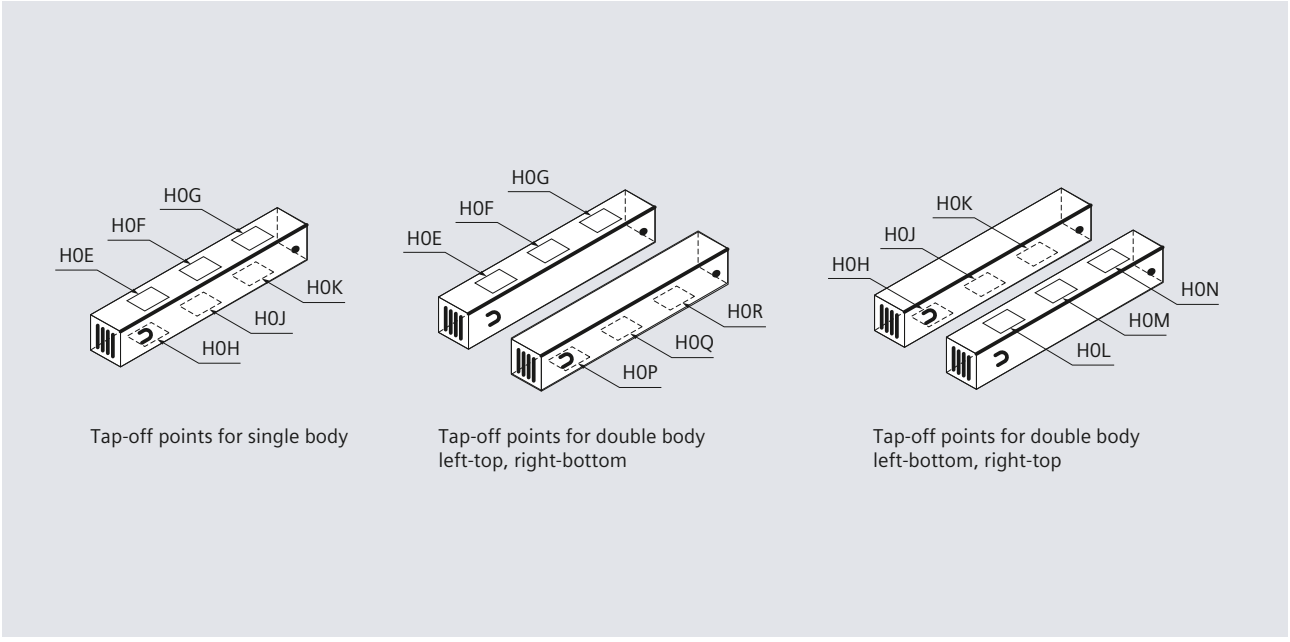


Fig. 7/3: **Symbolic representation of LI trunking units without tap-off points for configuration**

7.4.1 Straight Trunking Units

Additional specifications are:
- Color H0A:7035
- Trunking units without tap-off points: length H0B (4-digit specification 0500 ... 3000 in mm; e.g., "H0B:0500" for 500 mm)
- Trunking units with tap-off points (selection key "LTP.." in Tab. 7/3): length H0C (4-digit specification 1150 ... 3000 in mm; e.g., "H0C:3000" for 3,000 mm)
  Position of the tap-of points (Fig. 7/4):
  H0E, H0F, H0G at the top for single body and left-top for double system
  H0H, H0J, H0K at the bottom for single body and left-bottom for double body
  H0L, H0M, H0N right-top for double body
  H0P, H0Q, H0R right-bottom for double body
- For systems from 1,600 A, a tap-off unit with 800 A or 1,250 A can be mounted at the top (selection key "LTB10" in Tab. 7/4) or at the bottom (selection key "LTB01" in Tab. 7/4) on a tap-off point with bolt.
  Additional specifications:
  Busbar length H0D:2300 and distance for tap-off point at the top H0S:1700, or at the bottom H0S:600.



Tap-off points for single body

Tap-off points for double body left-top, right-bottom

Tap-off points for double body left-bottom, right-top

Fig. 7/4: **Symbolic representation of LI trunking units with tap-off points for configuration**

The connections for single and double body are shown in Fig. 7/5. Depending on the different heights of the systems, there are one, two, or three bolt connections between the trunking units (Fig. 7/6).

The following illustrations always show only one version, with a different number of bolts for connection according to the busbar height.

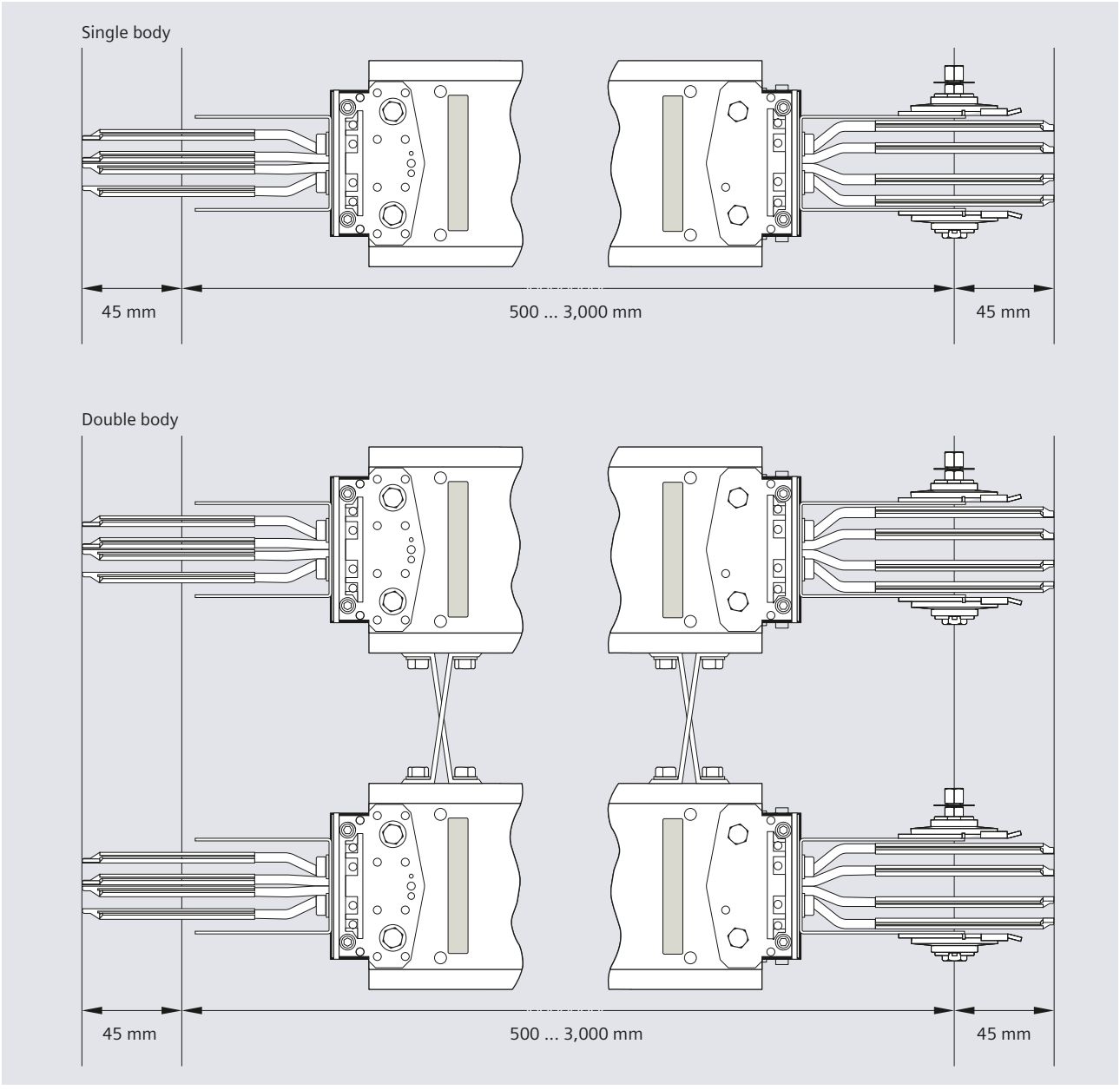
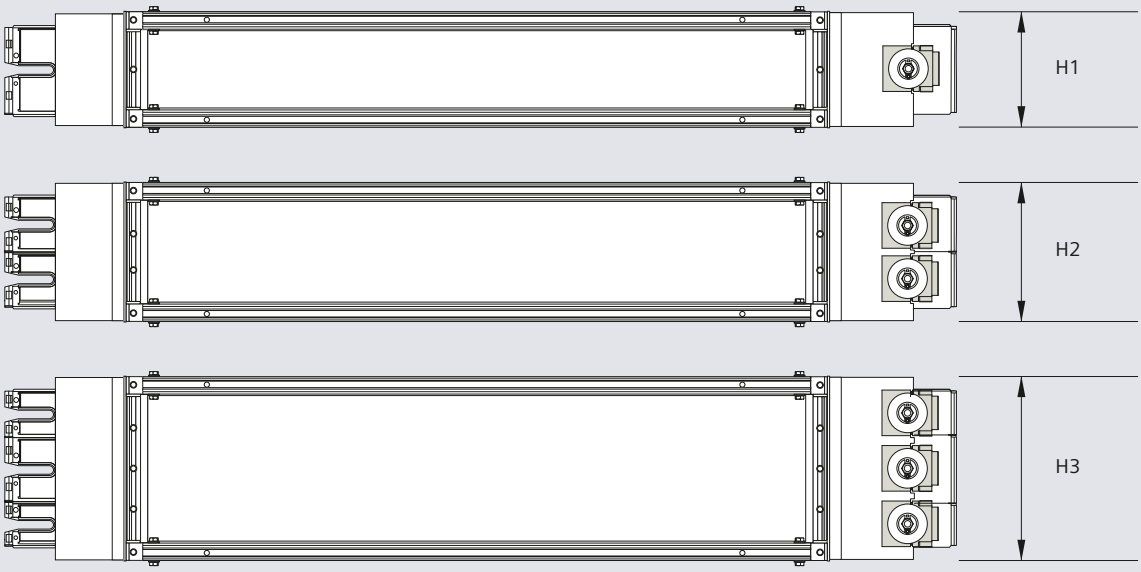


Fig. 7/5: **Top view for the ends of the trunking units**



Overall height	Height	Type code			
		Single body		Double body	
H1	111 mm	LI-A . 0800	LI-C . 1000		
	117 mm		LI-C . 1250		
	132 mm	LI-A . 1000			
	146 mm	LI-A . 1250	LI-C . 1600		
	174 mm		LI-C . 2000		LI-C . 4000
	182 mm	LI-A . 1600		LI-A . 3200	
H2	213 mm		LI-C . 2500		LI-C . 5000
	230 mm	LI-A . 2000		LI-A . 4000	
H3	280 mm		LI-C . 3200		LI-C . 6300
	297 mm	LI-A . 2500		LI-A . 5000	

Fig. 7/6: **Side view for the different overall heights**

7.4.2 Junction Units

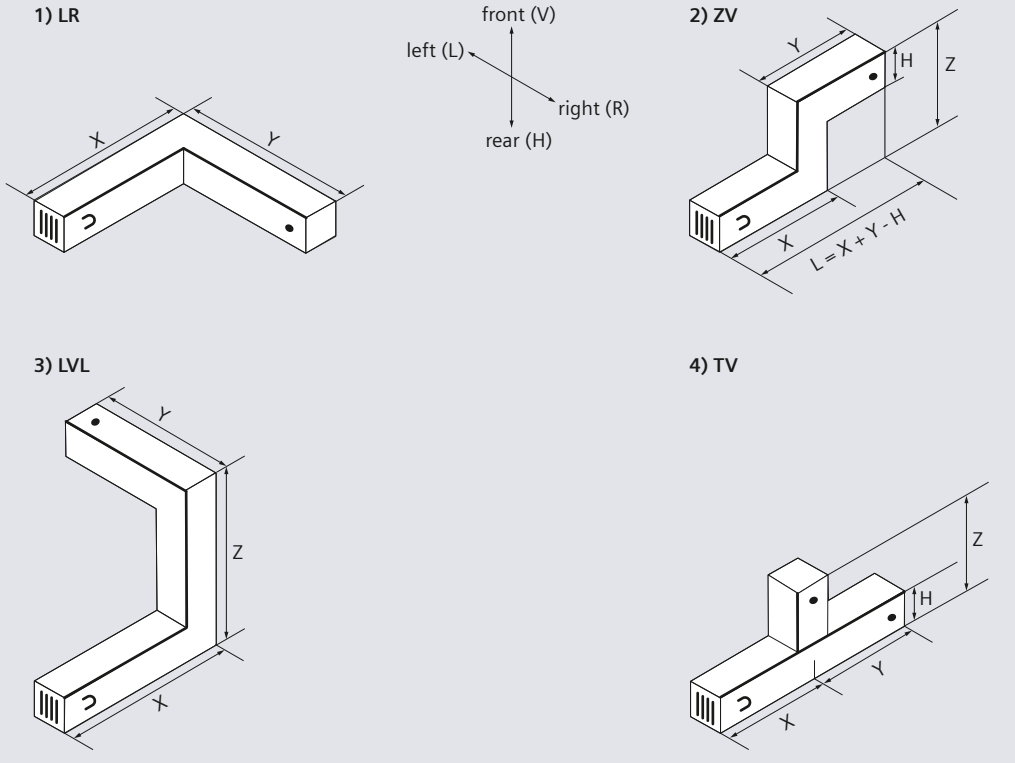
Additional specifications for the junction units elbow, offset elbow, knee, offset knee, Z-unit, and T-unit (symbolic representations in Fig. 7/7) are:

Color H0A: 7035

Length X, Y, and Z: Minimum and maximum values as well as e-text designations of the different junction units are listed in Tab. 7/35.

Angle W (e-text H0W: . . . .): for simple knees and elbows with a fixed limb (FX, FY), angles between 85° and 175° are possible in 5° increments; for free selection of the two limb lengths, as well as for offset knees or elbows, 90° angles are fixed.

For T-units, the bolts of the vertical tap-offs (height H/2 upwards or downwards) are provided 200 mm above the edge of the trunking unit, which means that the height Z = H + 200 mm (Fig. 7/7) is predefined for each type (the overall height H is given according to Tab. 7/1).



1) Elbow or knee (here: elbow, right, LR)
2) Z-unit (here: Z-unit, front, ZV)
3) Offset elbow or offset knee (here: knee, front-left, LVL)
4) T-unit (here: T-unit, front, TV)

Fig. 7/7: **Schematic representation for junction units and length specifications (Tab. 7/35)**

LI-A			0800	1000	1250	1600	2000	2500	3200	4000	5000
LI-C			**1000**	**1250**	**1600**	**2000**	**2500**	**3200**	**4000**	**5000**	**6300**
Junction unit	**Types**	**Parameters (e-text)**	**Lengths in mm**								
Elbow	LL, LR[1)]	X(H0V:), Y(H0U:)	340 - 1,700	340 - 1,700	340 - 1,700	340 - 1,700	340 - 1,700	340 - 1,700	600 - 1,700	600 - 1,700	600 - 1,700
	LL(-N90)-FX(FY), LR(-N90)-FX(FY)	X(H0V:), Y(H0U:) FX(H0V:), FY(H0U:)	480 - 1,700 / 270	480 - 1,700 / 270	480 - 1,700 / 270	480 - 1,700 / 270	480 - 1,700 / 270	480 - 1,700 / 270	740 - 1,700 / 525	740 - 1,700 / 525	740 - 1,700 / 525
Knee	LV, LH[2)]	X(H0V:), Y(H0U:)	330 - 1,700	350 - 1,700	370 - 1,700	400 - 1,700	450 - 1,700	520 - 1,700	400 - 1,700	450 - 1,700	520 - 1,700
	LV(-N90)-FX(FY), LH(-N90)-FX(FY)	X(H0V:), Y(H0U:) FX(H0V:), FY(H0U:)	420 - 1,700 / 300	430 - 1,700 / 320	450 - 1,700 / 320	480 - 1,700 / 370	530 - 1,700 / 420	600 - 1,700 / 470	480 - 1,700 / 370	530 - 1,700 / 420	600 - 1,700 / 470
Elbow, offset	LLV, LLH, LRV, LRH[3)]	X_{min} (H0X:)	330	350	370	400	450	520	400	450	520
		Y_{min} (H0Y:)	340	340	340	340	340	340	600	600	600
		Z_{min} (H0Z:)	320	340	350	390	440	500	640	690	760
Knee, offset	LVL, LHL, LVR, LHR[3)]	X_{min} (H0X:)	340	340	340	340	340	340	600	600	600
		Y_{min} (H0Y:)	330	350	370	400	450	520	400	450	520
		Z_{min} (H0Z:)	320	340	350	390	440	500	640	690	760
Z-unit	ZH, ZV[3)]	X(H0X:), Y(H0Y:)	330 - 1,500	350 - 1,500	370 - 1,500	400 - 1,500	450 - 1,500	520 - 1,500	400 - 1,500	450 - 1,500	520 - 1,500
		Z(H0Z:)	270 - 1,200	310 - 1,200	340 - 1,200	410 - 1,200	510 - 1,200	640 - 1,200	410 - 1,200	510 - 1,200	640 - 1,200
	ZL, ZR[4)]	X(H0X:), Y(H0Y:)	340 - 1,500	340 - 1,500	340 - 1,500	340 - 1,500	340 - 1,500	340 - 1,500	600 - 1,500	600 - 1,500	600 - 1,500
		Z(H0Z:)	360 - 1,200	360 - 1,200	360 - 1,200	360 - 1,200	360 - 1,200	360 - 1,200	870 - 1,200	870 - 1,200	870 - 1,200
T-unit	TV-FZ, TH-FZ[3)]	X(H0X:), Y(H0Y:)	450 - 2,000	450 - 2,000	500 - 2,000	500 - 2,000	500 - 2,000	550 - 2,000	550 - 2,000	600 - 2,000	700 - 2,000

[1)] X + Y = 2,600 mm maximum
[2)] X + Y = 2,600 mm maximum
[3)] X + Y + Z = 2,600 mm maximum
[4)] X + Y + Z = 2,600 mm maximum

Tab. 7/35: **Length specifications for junction units of the LI system**

7.4.3 LI Compensation Units

For adjustment, the LI system offers various possibilities of compensation:
- Expansion compensation units
- Equipotential bonding units for double bodies
- Transition units between different LI systems (so-called reducers and increasers)
- Transition units between LI systems and LR systems.

i) Equipotential bonding units (EP)

In the case of double bodies, the use of tap-off units may lead to an asymmetrical current load in the individual sub-runs. To avoid this, rules for equipotential bonding must be observed. Important preconditions are:

- The tap-off points should, if possible, be positioned alternatively on the left and on the right. The side should be changed after each trunking unit
- The total of the operational currents of all tap-off units on the left side should be approximately equal to the total on the right side. The load should be uniformly distributed to both sub-runs of the double body.

An EP unit (Fig. 7/8) establishes equipotential bonding between the left-hand and right-hand sub-runs. The maximum current-carrying capacity of an equipotential bonding unit EP is 1,600 A. Double bodies for power transmission do not require equipotential bonding, as no tap-off units are used.

The EP unit is available in two versions (always viewed from the hook side):
- Compensation unit at the top "...-EPV- ..."
- Compensation unit at the bottom "...-EPH- ...".
- Compensation unit for top-on-top arrangement "...-EPTONT- ..."

Note: Distribution board flanges type FA- and F8PQ.- as well as incoming cable connection units type CFE.- and CFS.- also feature equipotential bonding functionality. Please contact your Siemens partner for further support.

ii) Expansion compensation units

By using special compensation strips, the expansion compensation unit (Fig. 7/10) absorbs the expansion of the busbar run up to the specified maximum run length, and must be positioned in conformity with the configuration rules for a horizontal or vertical busbar run. During configuration, it has to be observed that the cover is accessible, so that the expansion compensation can be released after installation.

The use of expansion compensation units depends on the lengths of the busbar runs and the positioning of fixed points (FP). Fixed points are special fixing brackets that solidly fix the trunking unit by means of the fixing material provided by the customer, thus ensuring expansion compensation in a defined direction. Fixed points are to be provided on straight trunking units, junction units, and infeeds depending on the length and layout of the run.

Within a defined area, expansion compensation can compensate for both compression and tensile forces. The expansion compensation units for double bodies always contain additionally the function of an equipotential bonding between the individual sub-runs. Your Siemens contact partner will be pleased to support you for the configuration of expansion compensation units.

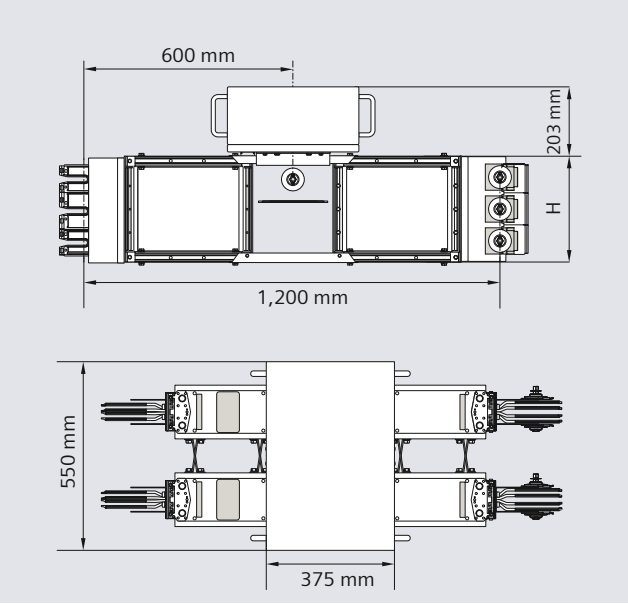


Fig. 7/8: **Equipotential bonding unit for LI double bodies (height H corresponds to the values from Tab. 7/1; dimensions in mm)**

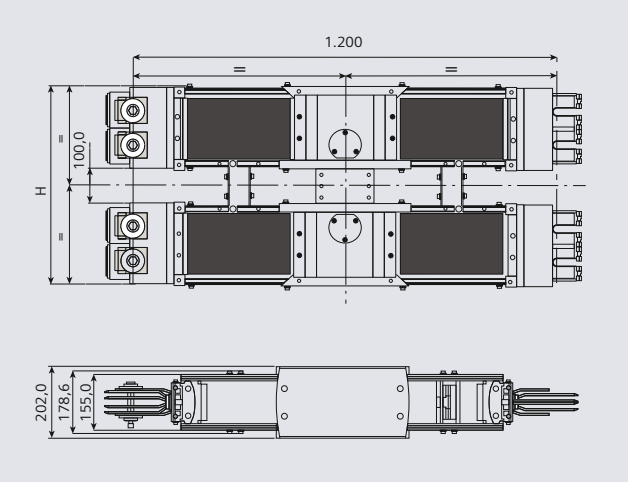
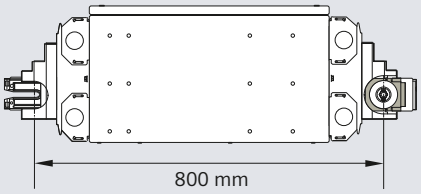
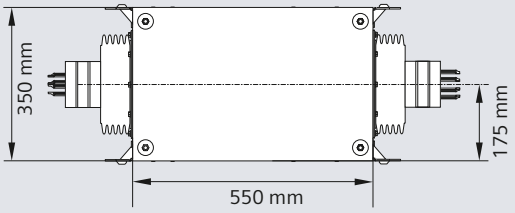


Fig. 7/9: **Equipotential bonding unit for LI double bodies in top-on-top arrangement (height H corresponds to the values from Tab. 7/1; dimensions in mm)**

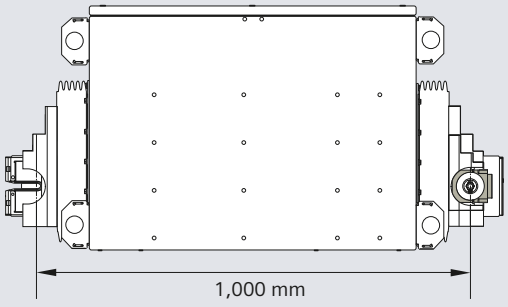
Side view for single body



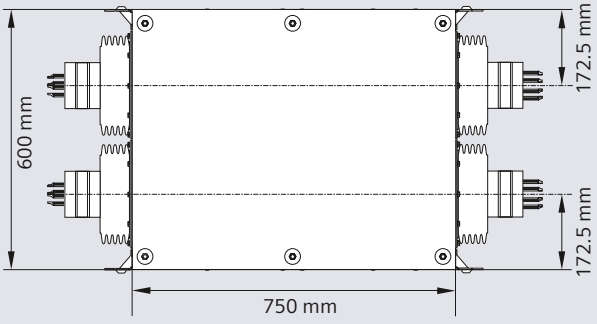
Top view for single body

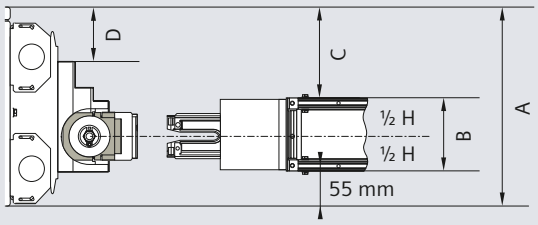


Side view for double body



Top view for double body





Single bodies				
System	**A**	**B**	**C**	**D**
LI-A . 0800	314 mm	110 mm	149 mm	87 mm
LI-A . 1000		121 mm	127 mm	
LI-A . 1250		128 mm	113 mm	
LI-A . 1600		146 mm	77 mm	
LI-A . 2000	429 mm	170 mm	144 mm	98 mm
LI-A . 2500		203 mm	78 mm	
LI-C . 1000	314 mm	110 mm	149 mm	87 mm
LI-C . 1250		114 mm	142 mm	
LI-C . 1600		128 mm	113 mm	
LI-C . 2000		142 mm	85 mm	
LI-C . 2500	429 mm	162 mm	161 mm	98 mm
LI-C . 3200		195 mm	94 mm	

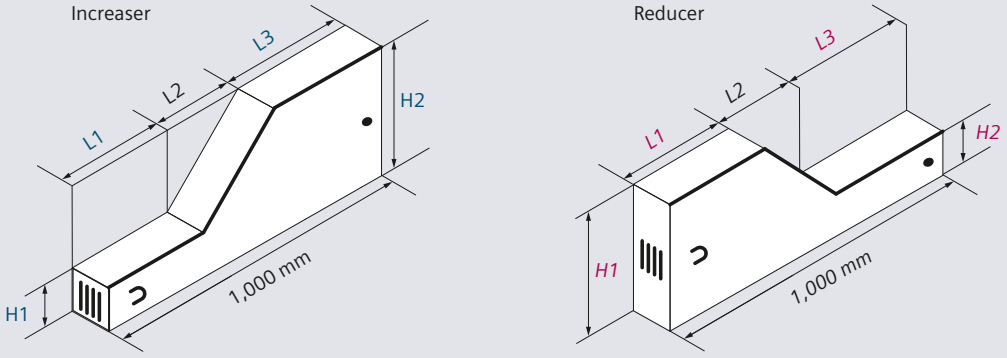
Double bodies				
System	**A**	**B**	**C**	**D**
LI-A . 3200	562 mm	146 mm	325 mm	231 mm
LI-A . 4000		170 mm	277 mm	
LI-A . 5000		203 mm	211 mm	
LI-C - 4000		142 mm	333 mm	
LI-C . 5000		162 mm	294 mm	
LI-C . 6300		195 mm	227 mm	

Fig. 7/10: **Dimensions for equipotential bonding units of the LI system (dimensions in mm)**

iii) Transition units LI-LI

To adjust the LI busbar trunking system to the actual load, the busbar cross-section can be increased (for fire barriers / functional endurance) or reduced (for reduced load). If the cross-section is reduced, it must absolutely be ensured that the busbar section with the smaller cross-section is protected against short circuit and overload.

The reducers are available with a reduction by down to three system sizes. On the other hand, an increase by up to three system sizes can provide a larger cross-section (increaser) (dimensions in Tab. 7/36).



LI-A (increaser "I": blue / reducer "R": red, italics)					
Currents	**L1, *L3* in mm**	**L2 in mm**	**L3, *L1* in mm**	**H1, *H2* in mm**	**H2, *H1* in mm**
800 A → 1,000 A / ***1,000 A → 800 A***	503	79	418	111	132
800 A → 1,250 A / ***1,250 A → 800 A***	540	42	418	111	146
1,000 A → 1,250 A / ***1,250 A → 1,000 A***	529	53	418	132	146
800 A → 1,600 A / ***1,600 A → 800 A***	497	85	418	111	182
1,000 A → 1,600 A / ***1,600 A → 1,000 A***	523	59	418	132	182
1,250 A → 1,600 A / ***1,600 A → 1,250 A***	540	42	418	146	182
1,000 A → 2,000 A / ***2,000 A → 1,000 A***	466	116	418	132	230
1,250 A → 2,000 A / ***2,000 A → 1,250 A***	482	100	418	146	230
1,600 A → 2,000 A / ***2,000 A → 1,600 A***	525	57	418	182	230
1,250 A → 2,500 A / ***2,500 A → 1,250 A***	402	180	418	146	297
1,600 A → 2,500 A / ***2,500 A → 1,600 A***	445	137	418	182	297
2,000 A → 2,500 A / ***2,500 A → 2,000 A***	503	79	418	230	297
3,200 A → 4,000 A / ***4,000 A → 3,200 A***	525	57	418	182	230
3,200 A → 5,000 A / ***5,000 A → 3,200 A***	445	137	418	182	297
4,000 A → 5,000 A / ***5,000 A → 4,000 A***	503	79	418	230	297

LI-C (increaser "I": blue / reducer "R": red, italics)					
Currents	**L1, *L3* in mm**	**L2 in mm**	**L3, *L1* in mm**	**H1, *H2* in mm**	**H2, *H1* in mm**
1,000 A → 1,250 A / ***1,250 A → 1,000 A***	505	77	418	111	117
1,000 A → 1,600 A / ***1,600 A → 1,000 A***	540	42	418	111	146
1,250 A → 1,600 A / ***1,600 A → 1,250 A***	475	107	418	117	146
1,000 A → 2,000 A / ***2,000 A → 1,000 A***	507	75	418	111	174
1,250 A → 2,000 A / ***2,000 A → 1,250 A***	482	100	418	117	174
1,600 A → 2,000 A / ***2,000 A → 1,600 A***	525	57	418	146	174
1,250 A → 2,500 A / ***2,500 A → 1,250 A***	468	114	418	117	213
1,600 A → 2,500 A / ***2,500 A → 1,600 A***	445	137	418	146	213
2,000 A → 2,500 A / ***2,500 A → 2,000 A***	503	79	418	174	213
1,600 A → 3,200 A / ***3,200 A → 1,600 A***	422	160	418	146	280
2,000 A → 3,200 A / ***3,200 A → 2,000 A***	456	126	418	174	280
2,500 A → 3,200 A / ***3,200 A → 2,500 A***	502	80	418	213	280
4,000 A → 5,000 A / ***5,000 A → 4,000 A***	503	79	418	174	213
4,000 A → 6,300 A / ***6,300 A → 4,000 A***	456	126	418	174	280
5,000 A → 6,300 A / ***6,300 A → 5,000 A***	502	80	418	213	280

Tab. 7/36: **Dimensions for LI-LI transition units (dimensions in mm)**

iv) Transition units LR-LI

To connect the LR busbar trunking system with the LI system electrically and mechanically, a transition unit LR-LI must be used. This connection is design verified according to IEC 61439-1 and -6. Conductor configurations available for the LI system are 4B, 5B, and 5H. The LR system must be selected accordingly with 4 or 5 conductors (Tab. 7/37).

As standard, the transition unit has a hook terminal on the LI side (Fig. 7/11).
The LR-LI transition units are configured with the LR system, which means that the LR system is specified first in the article number.

Al system	Cu system
LRA03 . 1-LIAN0800 ..	LRC03 . 1-LICN1000 ..
LRA04 . 1-LIAN1000 ..	LRC04 . 1-LICN1250 ..
LRA05 . 1-LIAN1250 ..	LRC05 . 1-LICN1600 ..
LRA07 . 1-LIAN1600 ..	LRC07 . 1-LICN2000 ..
LRA08 . 1-LIAN2000 ..	LRC08 . 1-LICN2500 ..
LRA09 . 1-LIAN2500 ..	LRC09 . 1-LICN3200 ..
LRA27 . 1-LIAN3200 ..	LRC27 . 1-LICN4000 ..
LRA28 . 1-LIAN4000 ..	LRC28 . 1-LICN5000 ..
LRA29 . 1-LIAN5000 ..	LRC29 . 1-LICN6300 ..
. = 4 or 5 .. = 4B or 5B or 5H	

Tab. 7/37: **Type codes for LR-LI transition units**

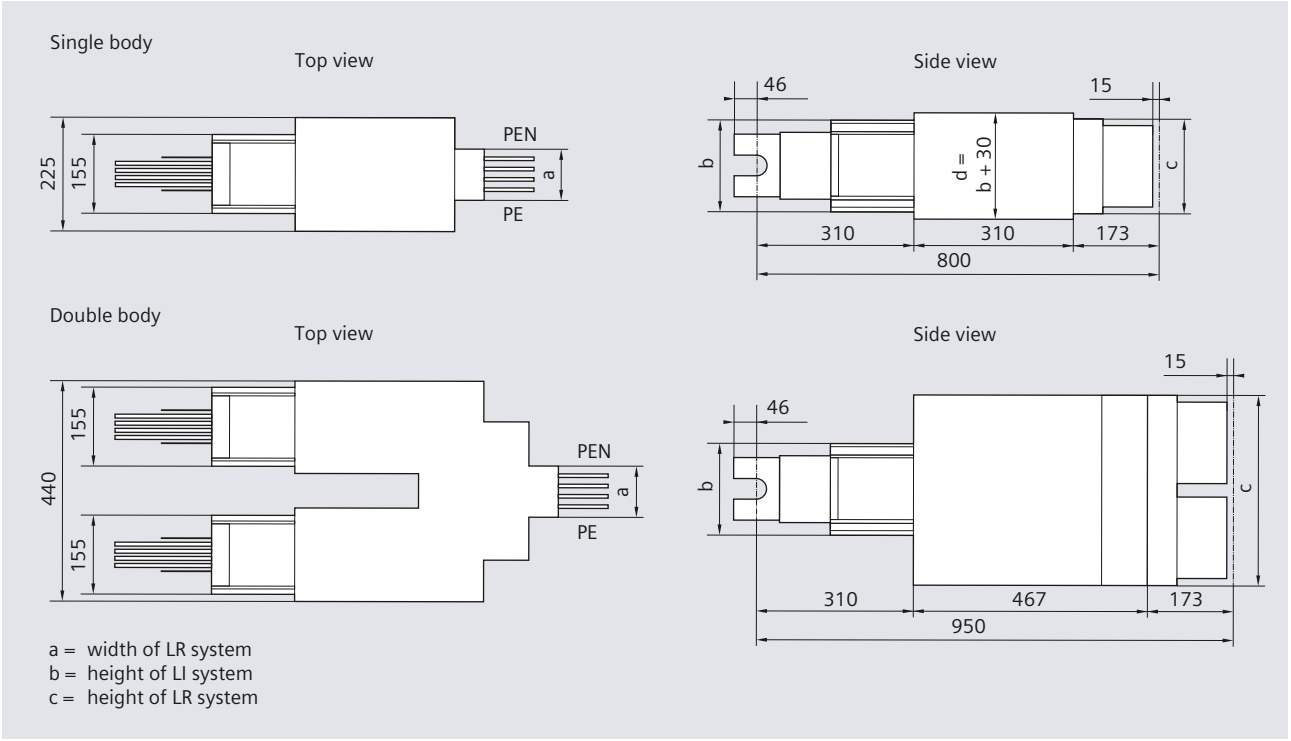


Fig. 7/11: **Dimensions for LR-LI transition units (dimensions in mm)**

7.4.4 Infeeds, Connections

For easy connection of the LI busbar trunking system to cable systems and power distribution components such as transformers and power distribution boards, there are special connections available:

i) Transformer connection units
ii) Incoming cable connection units
iii) Connection pieces for non-Siemens distribution boards
iv) Distribution board connection units for SIVACON S8.

i) Transformer connection units and connection flanges

Cast-resin transformers are most diverse regarding the phase sequence and the distances between the connections, which means that the connection pieces of the busbar trunking systems must also feature a high versatility. Transformer connection units with busbar connection from above (TCET), or from the side (TCE), as well as TEC-TONT for double bodies in top-on-top arrangement are available. For oil-immersed transformers, there are universal connection units TCS as well as TCF available with a fixed phase distance (160 mm), which can also be used for the connection of distribution boards.

For the types TCE... and TCS, a difference is made between left "L" and right "R" regarding the position of the auxiliary line for configuration (Fig. 7/12). At the connection unit type TCE, the busbar position is edgewise and the connection tag P1 is located at the end of the hook. In the horizontal basic unit of TCET, the busbar position is also edgewise. The TCE-TONT units are normally used in flat position (Fig. 7/12 and Fig. 7/13). The phase sequences available as standard in TCE... units are listed in Tab. 7/31 for 3-, 4-, and 5-conductor configurations.

All transformer connection units are only available with hook terminal as standard. The conductor configurations 3B, 4B, and 5B are available as standard; for TCE, TCS, and TCF, the configuration 5H is additionally available. All types of trunking units can be connected, except for TCET. The scope of supply includes one set of fixing screws, nuts, and conical spring washers per tag as standard.

The connection tags are positioned permanently in compliance with the stipulations in the order and can no longer be altered on site. Dimensions are given in Tab. 7/32. The T-limb of the connection unit type TCET has a fixed length that cannot be selected. No fixed limb of an elbow or a knee from the LI busbar trunking system can be connected to it.

For the connection units type TCS and TCF , a suitable connection flange (for enclosure, see Chapter 7.4.6) must be ordered that ensures the degree of protection of the connection point.
The type of the connection flange depends on the type of the trunking unit to be connected. For connecting the TCS to an enclosed transformer, a bellows can optionally be used. Other accessories are copper strips and screwing sets as well as adapters for local adjustment.

In the case of the double-body TCE and TCET, the connection tags can each be positioned either under the left-hand or the right-hand sub-run (Fig. 7/15).
The tags are mounted in the factory according to the specifications. However, the tags can be modified on site.

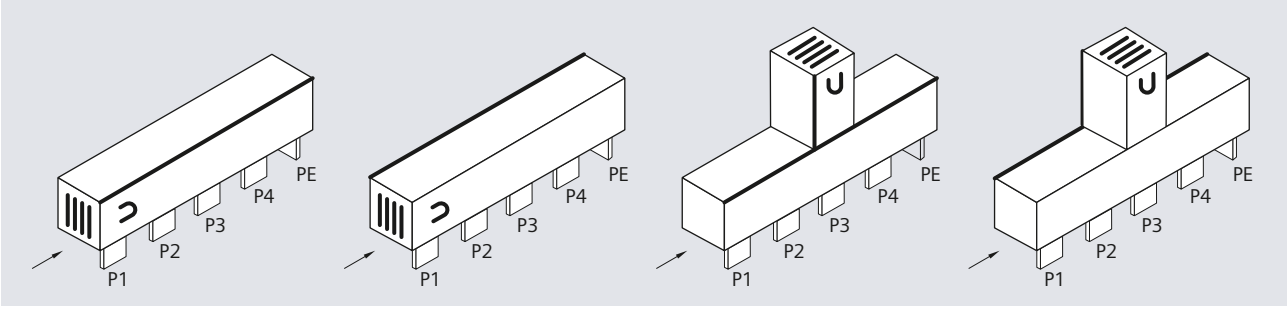


Fig. 7/12: **PE conductor arrangement for LI transformer connection units TCE and TCET**

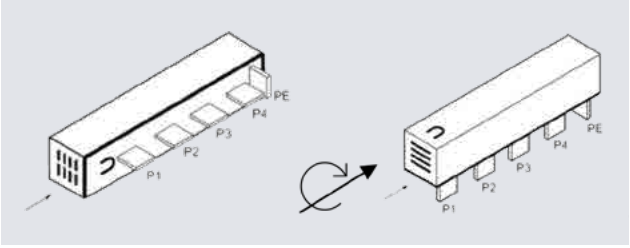


Fig. 7/13: **PE conductor arrangement for LI transformer connection units TCER-TONT**

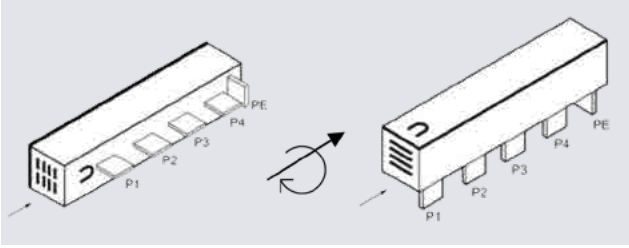


Fig. 7/14: **PE conductor arrangement for LI transformer connection units TCEL-TONT**

Connection units of the types TCS and TCF are used as cost-efficient infeeds for transformer and distribution board connection. The fixed phase distance of 160 mm is particularly suitable for connection to oil-immersed transformers. Dimensions for the different types are given in Tab. 7/38.

A suitable connection flange (enclosure) that ensures the degree of protection of the connection point must also be ordered (see Chapter 7.4.6).

Optionally, a bellows can be ordered (e.g., type LI-Z-TCS-H01), for example, for connecting the connection units type TCS to an enclosed transformer. The additional height of the bellows is 90 mm. The lateral movement is approx. ± 10 mm as a maximum. Vertically, the bellows can be compressed or stretched by a maximum of about ± 20 mm.

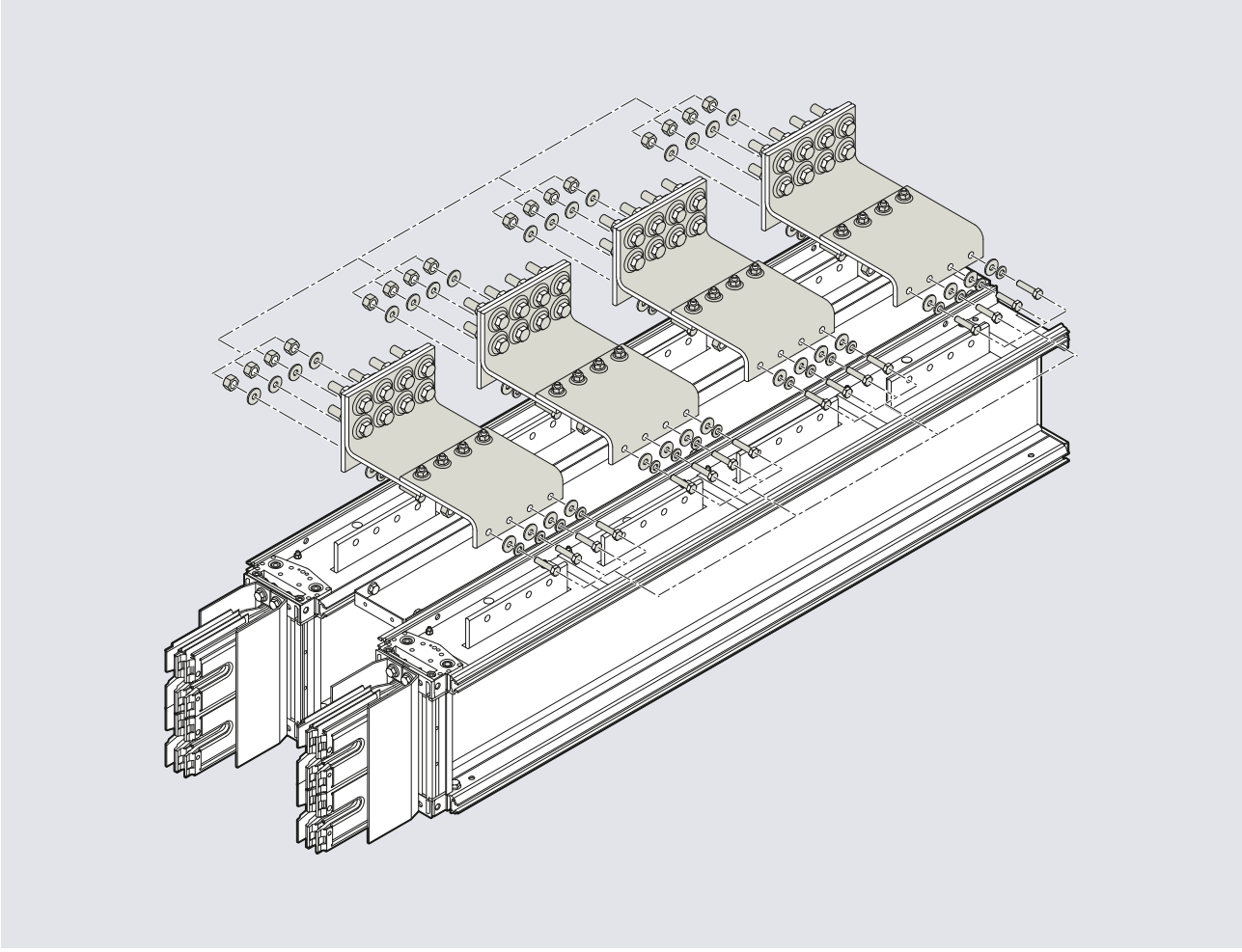
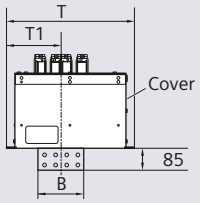


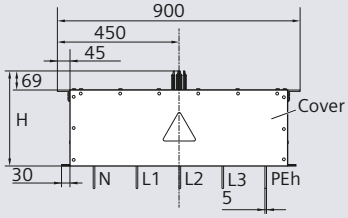
Fig. 7/15: **Connection tags for transformer connection TCE / TCET on an LI double body**

Connection units TCS for single bodies

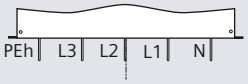
Side view



LI ... TCSR-H



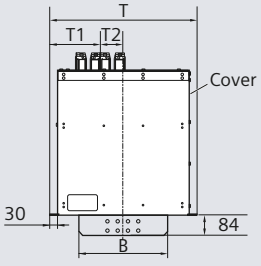
LI ... TCSL-H



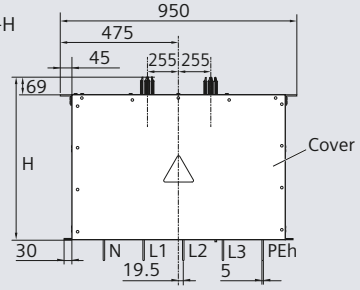
Type	T	T1	T2	B	H
LI-A . 0800 .. -00-TCS . -H	350 mm	140 mm		51 mm	431 mm
LI-A . 1000 .. -00-TCS . -H	350 mm	151 mm		72 mm	431 mm
LI-A . 1250 .. -00-TCS . -H	350 mm	158 mm		86 mm	431 mm
LI-A . 1600 .. -00-TCS . -H	350 mm	176 mm		122 mm	431 mm
LI-A . 2000 .. -00-TCS . -H	470 mm	200 mm		170 mm	431 mm
LI-A . 2500 .. -00-TCS . -H	470 mm	233 mm		237 mm	431 mm
LI-C . 1000 .. -00-TCS . -H	350 mm	140 mm		51 mm	431 mm
LI-C . 1250 .. -00-TCS . -H	350 mm	144 mm		57 mm	431 mm
LI-C . 1600 .. -00-TCS . -H	350 mm	158 mm		86 mm	431 mm
LI-C . 2000 .. -00-TCS . -H	350 mm	172 mm		114 mm	431 mm
LI-C . 2500 .. -00-TCS . -H	470 mm	192 mm		153 mm	431 mm
LI-C . 3200 .. -00-TCS . -H	470 mm	225 mm		220 mm	431 mm

Connection units TCS for double bodies

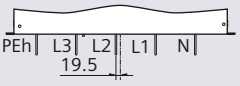
Side view



LI ... TCSR-H



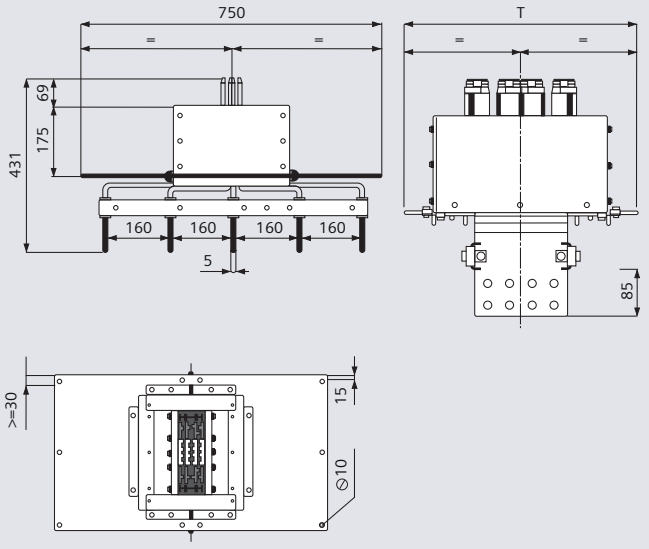
LI ... TCSL-H



Type	T	T1	T2	B	H
LI-A . 3200 .. -00-TCS . -H	490 mm	244 mm	68 mm	259 mm	690 mm
LI-A . 4000 .. -00-TCS . -H	586 mm	292 mm	92 mm	355 mm	738 mm
LI-A . 5000 .. -00-TCS . -H	718 mm	359 mm	126 mm	488 mm	804 mm
LI-C . 4000 .. -00-TCS . -H	490 mm	237 mm	65 mm	243 mm	690 mm
LI-C . 5000 .. -00-TCS . -H	586 mm	276 mm	84 mm	321 mm	738 mm
LI-C . 6300 .. -00-TCS . -H	718 mm	343 mm	118 mm	455 mm	804 mm

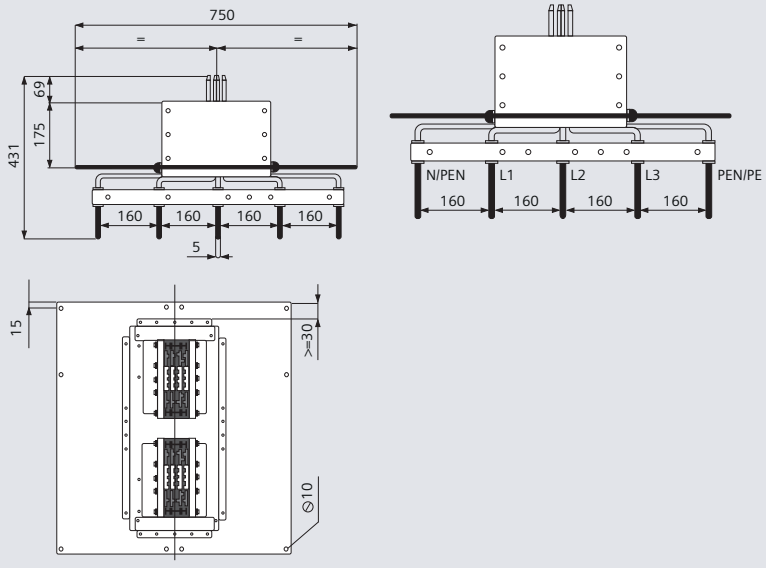
Tab. 7/38: **Dimensions (dimensions in mm) for connection units TCS of the LI system**

Connection units TCF for single bodies



Type	T
LI-AM0800..-00-TCF-H	325 mm
LI-AM1000..-00-TCF-H	325 mm
LI-AM1250..-00-TCF-H	375 mm
LI-AM1600..-00-TCF-H	375 mm
LI-AM2000..-00-TCF-H	425 mm
LI-AM2500..-00-TCF-H	500 mm
LI-CM1000..-00-TCF-H	325 mm
LI-CM1250..-00-TCF-H	325 mm
LI-CM1600..-00-TCF-H	375 mm
LI-CM2000..-00-TCF-H	375 mm
LI-CM2500..-00-TCF-H	425 mm
LI-CM3200..-00-TCF-H	475 mm

Connection units TCF-TONT for double bodies in top-on-top arrangement



Type	T
LI-AM3200..-00-TCFTONT-H	700 mm
LI-AM4000..-00-TCFTONT-H	800 mm
LI-AM5000..-00-TCFTONT-H	900 mm
LI-CM4000..-00-TCFTONT-H	650 mm
LI-CM5000..-00-TCFTONT-H	750 mm
LI-CM6300..-00-TCFTONT-H	850 mm

Tab. 7/39: **Dimensions (dimensions in mm) for connection units TCF of the LI system**

ii) Incoming cable connection units

The incoming cable connection units type CFE and CFS are used for feeding into the LI busbar trunking system when only cable connection is possible. CFE and CFS units are equipped with a hook terminal to the trunking units. The conductor configurations 3B, 4B, 5B, and 5H are available as standard. Additionally, a connection flange HS, HE, or HK is required, which ensures the degree of protection of the connection point. The incoming cable connection units can be ordered with:

- PE right "-CF . 1-" or PE left "-CF . 2-"
- Flange plate for multi-core cables "CF .. -MD-H" or for single-core cables "-CF .. -BD-H" (maximum cross-section of the individual conductors 300 mm²).

The CFE units enable easy connection of several conductors per phase by means of busbars in the unit (bolt terminal). CFE units are only available for LI single bodies (Tab. 7/40).

CFS units, however, can be used for both LI single and LI double bodies. They feature connection tags, which enable the connection (bolt terminal) of several conductors per phase. The CFS units have the degree of protection IP40 as standard.

For further information on incoming cable connection units type CFS, such as for example dimensions and connections, please contact your Siemens partner.

iii) Connection pieces for non-Siemens distribution boards

The busbar head type FA (Fig. 7/16) is used to connect an LI busbar run to a non-Siemens distribution board. Normally, the FA is installed by the panel builder under their own responsibility. For connection, hooks or bolts can be selected. The FA with bolt is to be preferably used, as the associated transformer connection unit at the other end of the busbar run, for example, has a hook end as standard.

For the double body, there are two FA versions available, which differ at the connection position:

- FA1: busbar connection at the rear (PE position: right)
- FA2: busbar connection at the rear (PE position: left).

In addition to the FA, you must order a suitable distribution board flange (see Chapter 7.4.6) that ensures the degree of protection of the connection between the busbar and the switchboard cubicle. As described above, the flange type primarily depends on the type of the trunking unit that is to be connected to the distribution board.

For customer-specific solutions, it is necessary to coordinate early with the distribution board manufacturer. The executing company, normally the distribution board manufacturer, is responsible for the copper connection of the non-Siemens connection piece with the distribution board busbars.

The rated currents apply in accordance with IEC 61439-1 and -6 for an ambient temperature of 40 °C in the 24-h mean. The limit temperature of the conductors provided with a highly heat-resistant insulating foil is 135 °C. When using connection pieces for non-Siemens distribution boards, it must be ensured that the limit temperature is not exceeded.

The short-circuit withstand strength of the connection pieces for non-Siemens distribution boards depends on the conductor dimensioning as well as on the switching and protection devices in the distribution board. The short-circuit withstand strength of the busbar trunking systems can only be verified by the distribution board manufacturer. The connection piece for non-Siemens distribution boards is design verified in as-delivered condition. With regard to its strength, the copper connections must be dimensioned for the required short-circuit level.

The degree of protection for the transition from the trunking unit to the distribution board depends on the installation of the connection piece for non-Siemens distribution boards in the distribution board. The connection piece for non-Siemens distribution boards must be installed according to the enclosed installation instructions. The verification of the degree of protection can only be provided by the distribution board manufacturer.

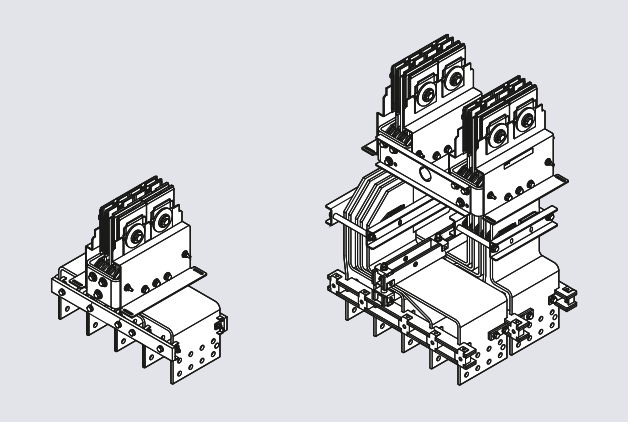
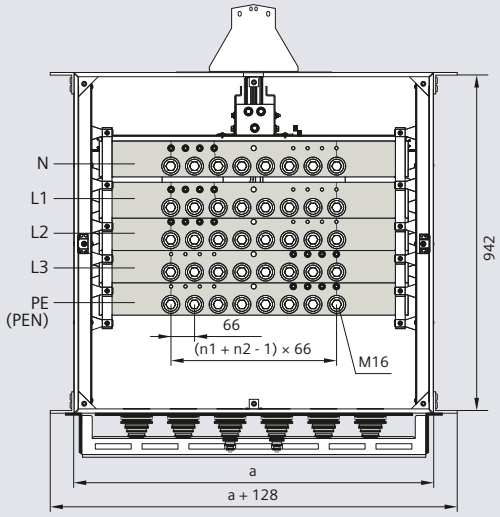


Fig. 7/16: **Connection pieces for non-Siemens distribution boards for single body (left) and double body (right)**

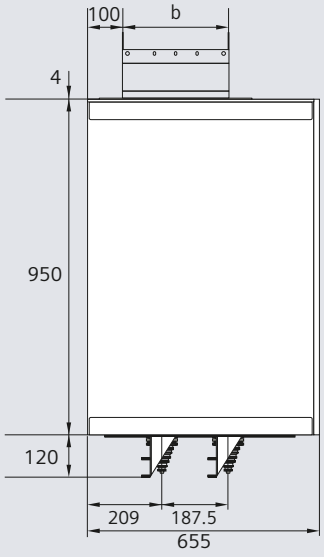
Incoming cable connection units CFE for single bodies

Front view:

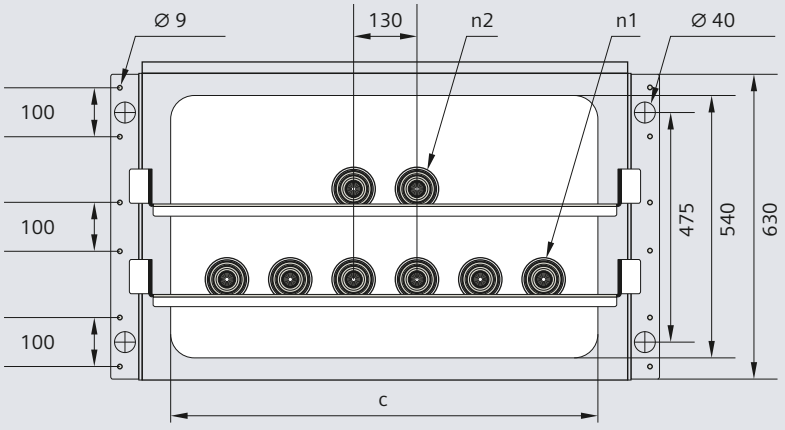


System	a in mm	b in mm	c in mm	n1	n2	Screw
LI-AM0800- .. -CFE ...	670	110.5	540	3	0	3 × M16
LI-AM1000- .. -CFE ...	670	131.8	540	3	1	4 × M16
LI-AM1250- .. -CFE ...	670	146.1	540	3	2	5 × M16
LI-AM1600- .. -CFE ...	670	181.8	540	3	3	6 × M16
LI-AM2000- .. -CFE ...	1,000	229.8	880	6	2	8 × M16
LI-AM2500- .. -CFE ...	1,000	296.5	880	6	4	10 × M16
LI-CM1000- .. -CFE ...	670	110.5	540	3	1	4 × M16
LI-CM1250- .. -CFE ...	670	117.2	540	3	2	5 × M16
LI-CM1600- .. -CFE ...	670	146.1	540	3	3	6 × M16
LI-CM2000- .. -CFE ...	1,000	174	880	6	2	8 × M16
LI-CM2500- .. -CFE ...	1,000	213	880	6	4	10 × M16
LI-CM3200- .. -CFE ...	1,000	280	880	6	5	11 × M16

Side view:



View from below:



Tab. 7/40: **Dimensions (in mm) for incoming cable connection units CFE of the LI system**

iv) Distribution board connection pieces for connection to SIVACON S8

The busbar head type F8PQ is used for installation in a SIVACON S8 power distribution board and enables the connection of the LI busbar run (Fig. 7/17). The combination of busbar head and distribution board is design verified in accordance with the standards IEC 61439-1 and -6.

Depending on the type of the connected 3WA circuit breaker, the busbar heads are identified by 3 different selection keys: -F8PQ, -F8PQA, -F8PQB. Furthermore, a difference is made in the selection key regarding the connection position of the busbar trunking system: "V" at the top or "H" at the bottom. For connection, hooks "H" or bolts "B" can be selected.

Here is an example for a type code:

Basic key	Selection key
LI- ...	-F8PQAV-H.

Information on the combinations of busbar trunking system connection type, circuit breaker type of the SIVACON S8 cubicle, and connection flange type HS, HK, HE or HSI, HKI, HEI (for connection of a smaller LI busbar trunking system to a busbar head with a rated current of 1,600 A) can be obtained from your Siemens contact partner.

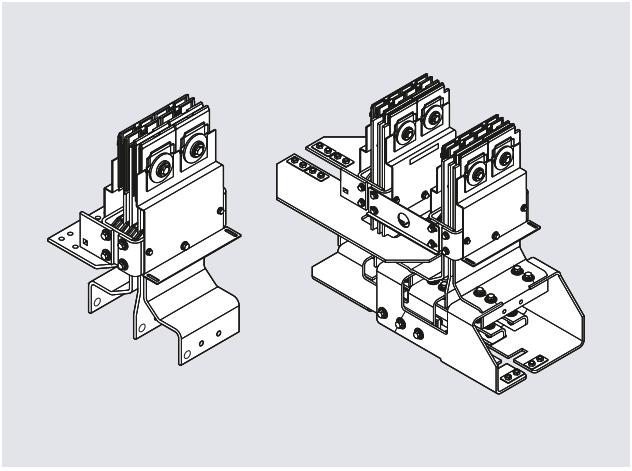


Fig. 7/17: **Busbar heads F8PQ for connection to the SIVACON S8 power distribution board**

7.4.5 Overview of Connection Options

Tab. 7/41 summarizes the connection options between the components of the busbar trunking system among each other, and between system components and connections.

System component	Limb of a junction unit	
	Fixed	Variable
Straight trunking unit	Yes	Yes
Fixed limb of a junction unit (knee, elbow, T-unit)	No	Yes
Variable limb of a junction unit (knee, elbow, Z-unit, T-unit)	Yes	Yes
End flange	No	Yes
Expansion compensation EC	No	Yes
Connection for non-Siemens distribution boards FA	Yes [1)]	Yes [2)]
Distribution board connection to SIVACON S8 F8PQ from above	Yes [1)]	Yes [2)]
Distribution board connection to SIVACON S8 F8PQ from below	No	Yes [2)]
Transformer connection TCE	Yes	Yes
Transformer connection TCET	No	Yes
Transformer connection TCS	Yes [1)]	Yes [2)]
Incoming cable connection CFE	Yes [1)]	Yes [2)]
Incoming cable connection CFS	Yes [1)]	Yes [2)]
Equipotential bonding EP	Yes	Yes
LI-LR / LI-LX adapter	Yes	Yes

Yes: can be connected
No: cannot be connected
[1)] With enclosure types HE or HK
[2)] With enclosure type HS

Tab. 7/41: **Connection options for components of the LI busbar trunking system**

7.4.6 Connection Flange (Enclosure)

The flange type (Fig. 7/18) depends on the connection type and the type of the trunking unit to be connected.

- Type HS: straight connection for straight trunking units or variable limbs of a junction unit
- Type HE: elbow connection for the fixed limb of an elbow (LL or LR)
- Type HK: knee connection for the fixed limb of a knee (LH or LV).

Two cases must be distinguished:

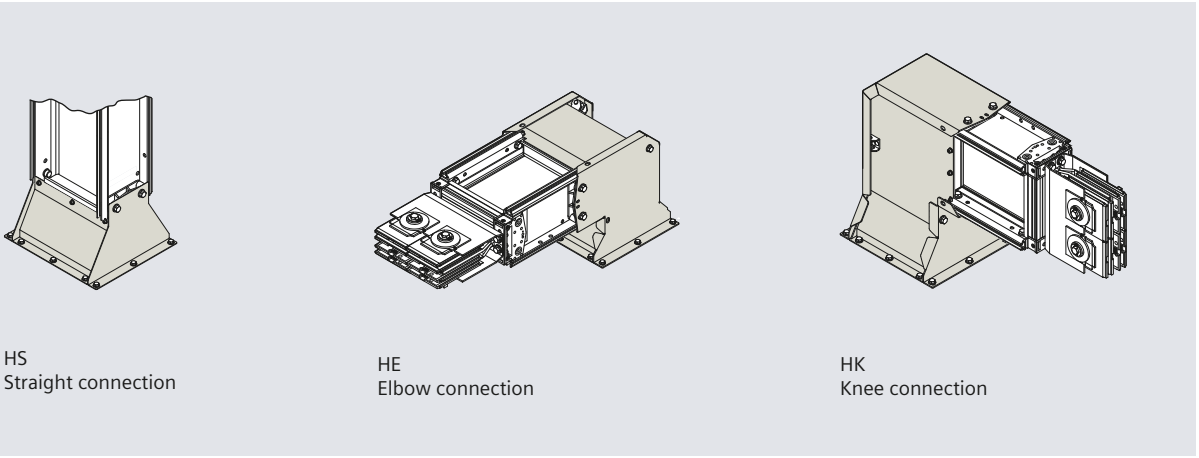
- The trunking unit and the busbar head have the same system size: In this case, please order the flange type HS, HK, or HE
- The trunking unit belongs to a smaller system than the busbar head (example: connection of an LIA0800 system to an LIA1600 busbar head): In this case, you must order the interface flange type HSI, HKI, or HEI ("I" for Interface).

The shape, rated current, and degree of protection identify a connection flange used to re-establish the degree of protection at the connection points between trunking unit and connection type (CFE, CFS, TCS,TCF, FA, F8PQ).

Order number LI-Z- ① N ② NA- ③ - ④ - ⑤ -N with

① Conductor material: Al = A, Cu = C
② Rated current: 800 A = 0800, 1,000 A = 1000, ...
③ Degree of protection: IP40 = 40, IP55 = 55
④ Connection type: CFE / CFS / TCS / FA / F8PQV (S8 from above) = FA; F8PQH (S8 from below) = F8PQH
⑤ Shape of the flange: HS, HK, HE or HSI, HKI, HEI

Ordering examples:
LI-Z-AN2500NA-55-FA-HS-N
LI-Z-CN2500NA-40-F8PQH-HS-N



HS
Straight connection

HE
Elbow connection

HK
Knee connection

Fig. 7/18: **Connection flange elements HS, HE, and HK of the LI system**

7.4.7 Tap-off Units

The tap-off units can be plugged on/off while energized, depending on the type of installation device (Fig. 7/19). This means that it is not necessary to de-energize the LI busbar trunking system for mounting or removing the tap-off unit. Country-specific regulations must be observed. The leading PE contact is provided for safe plugging on/off.

For the various versions with the respective installation devices, such as IP40 with 3NP1, IP54 with 3VA, as well as IP55 with 3NP1, 3NH, FSF, or 3VA, the basic units differ in terms of dimensions, max. current (depending on the rated current), cable entries, and mounting. The dimensions are given in Fig. 7/26 and Tab. 7/44.

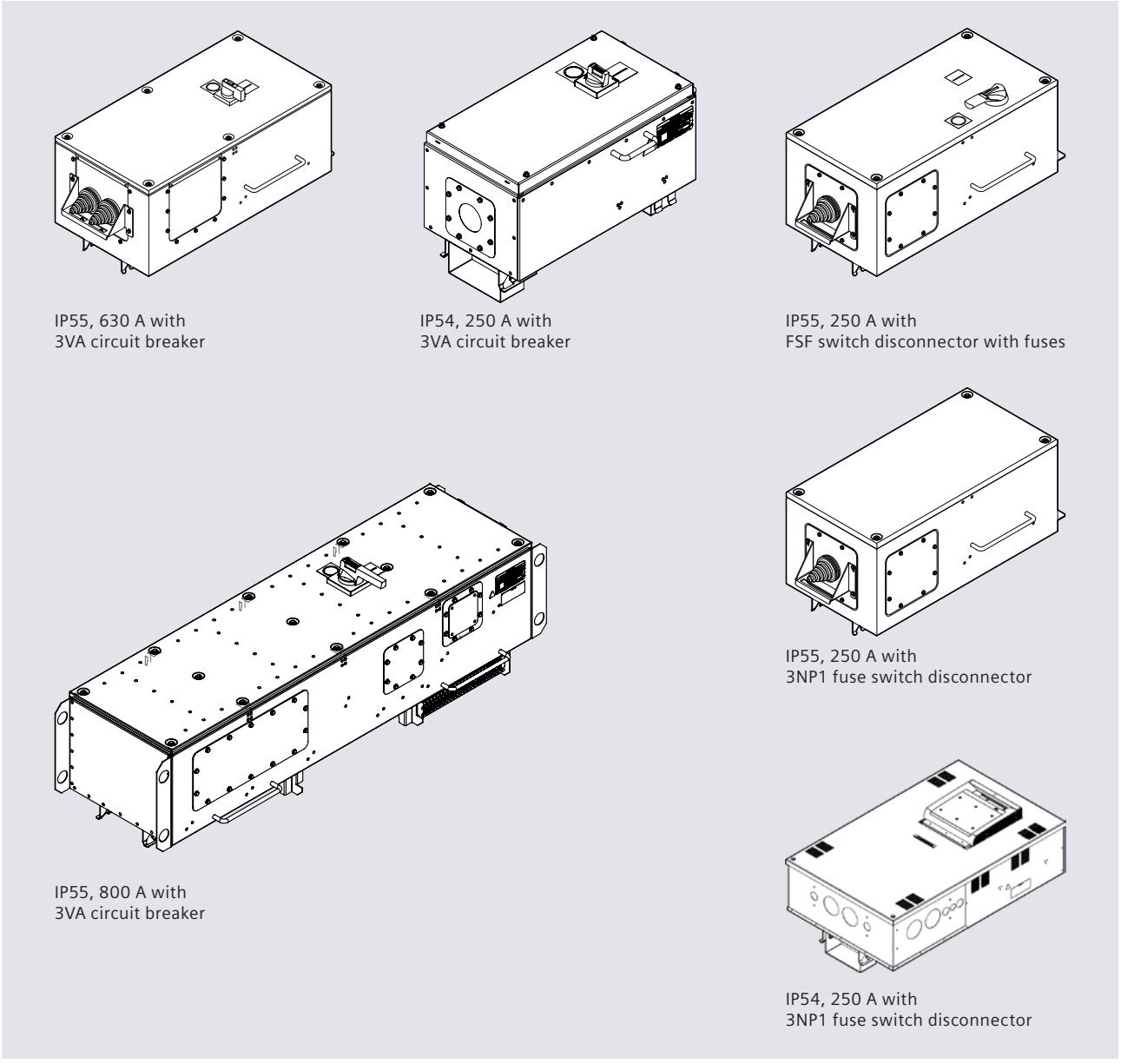


Fig. 7/19: **Examples for LI tap-off units for a rated current up to 250 A or up to 630 A**

When planning the tap-off units, it should always be observed that the distance between the tap-off units is sufficient to plug on the planned tap-off units and avoid collision between them. Additionally, there must be enough space available to connect the customer cables. In case of cable entry at the side, the minimum distance between two tap-off units must not be less than 100 mm. Otherwise, the distance between the units must be increased.

Over the tap-off point there should be enough space available to allow swinging in the tap-off unit at the pivot point and plugging it on the tap-off point. Recommendation: The space over the tap-off unit should at least double the height of the tap-off unit.

As for the overall height of the planned tap-off unit, it has to be observed that the pivot point (swing axis) is not located on the flange cover of the trunking unit. If this should be absolutely necessary, however, special flange covers with lateral holes can be ordered as additional equipment. Furthermore, the width of the tap-off unit must be considered in order to avoid collision with other installations, and the tap-off units must not be positioned over fire barrier blocks.

Note: In double bodies, the tap-off point can be positioned on the left-hand or right-hand body. If necessary, the left-hand and right-hand trunking unit can be exchanged on site in order to exchange the position of the tap-off point as well.

Fig. 7/20 and Tab. 7/42 illustrate the positioning of tap-off units for the sizes 1 to 5 and 7. The smallest configuring dimension for the upper tap-off point is 670 mm (for the lower tap-off point: 490 mm). During configuration, the first tap-off point for tap-off units size 3, 4, or 5 must be selected in such a way that the unit can be fastened on the straight length and not in the area of the connection point.

If a tap-off unit size 3, 4, or 5 has to be plugged on the tap-off point with the minimum position 670 mm, the standard flange cover must be replaced by a special flange cover type LI-Z-T-SJC-TOB. This cover features lateral holes in a grid of 20 mm, which can be used for the pivot point of the tap-off unit (Fig. 7/21).

Attention: Flange covers can only be replaced if the busbar is de-energized.

To configure tap-off points for tap-off units of sizes 800 A and 1,250 A, please observe Fig. 7/22 and note that use is only possible for system sizes as from 1,600 A.

Tap-off points up to 630 A

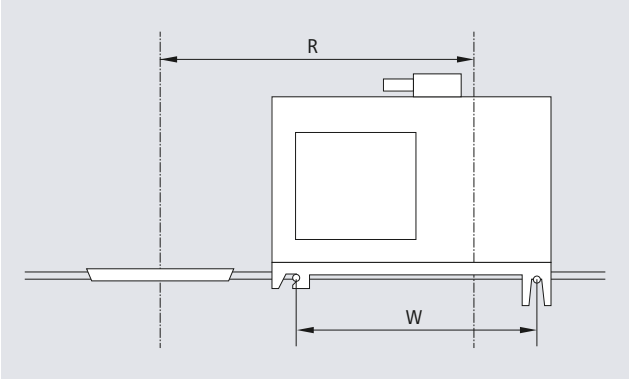


Fig. 7/20: **Positioning of tap-off points for tap-off units size 1 to 5 (for dimensions R and W, see Tab. 7/42)**

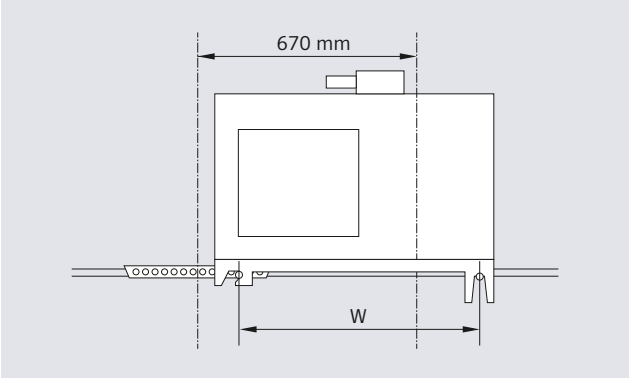


Fig. 7/21: **Tap-off points (dimensions in mm) for special case with flange cover type LI-Z-T-SJC-TOB for tap-off units size 3, 4 or 5 with distance W from Tab. 7/41 (here: size 3 shown schematically)**

Dimension	Size				
	1	2	3	4	5
R in mm	670	670	860	920	920
W in mm	419	509	705.5	765.5	765.5

Tab. 7/42: **Dimensions in mm for positioning the tap-off points (sizes 1 to 5)**

Tap-off points from 800 A

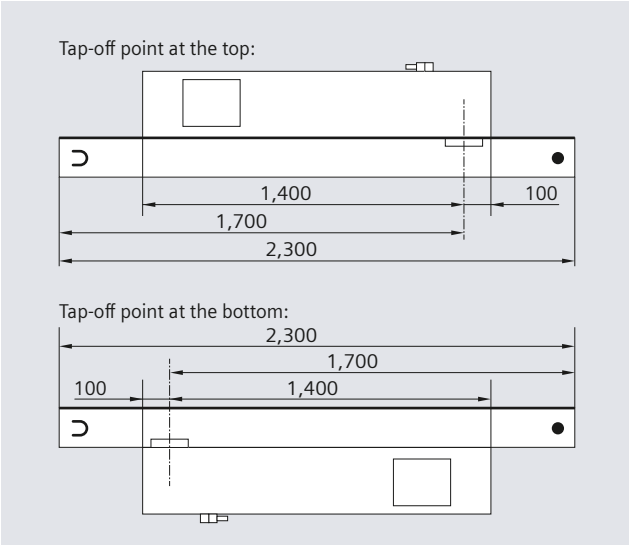


Fig. 7/22: **Positioning of tap-off points (dimensions in mm) for tap-off units of 800 A and 1,250 A**

IP40 tap-off units with
3NP1 fuse switch disconnector

The IP40 tap-off units have important features for basic requirements.

- Installation devices: 3NP1 fuse switch disconnector, can be operated at the tap-off unit from outside
- Pluggable while energized without plugging guide
- Simple cable entries for multi-core and single-core cables as well as accessories for customer connections.

Size 2 (160 A), size 3 (250 A, 2 x 160 A), size 5 (400 A, 630 A)

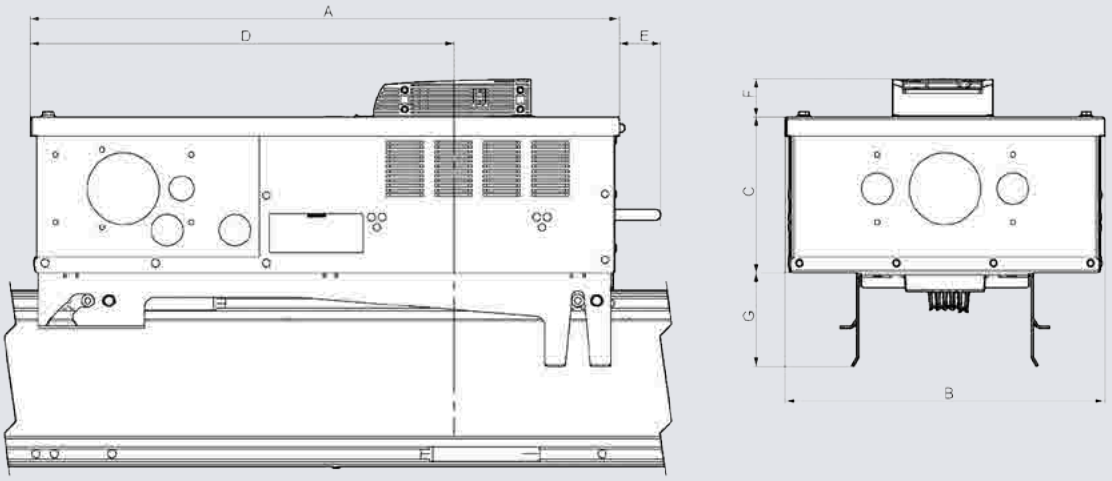


Fig. 7/23: **Views and dimensions for LI tap-off units IP40 with 3NP1**

Dimension	Size		
	2	3	5
A	607 mm	807 mm	867 mm
B	329 mm	409 mm	539 mm
C	161 mm	223 mm	223 mm
D	437 mm	637 mm	697 mm
E	43 mm	43 mm	43 mm
F	39 mm	45 mm	49 mm
G	97 mm	97 mm	97 mm

Tab. 7/43: **Views and dimensions for LI tap-off units IP40 with 3NP1 (for views with dimensions, see Fig. 7/23)**

IP55 tap-off units with 3NP1 fuse switch disconnector

IP55 tap-off units can optionally be equipped with current transformers and a connectable measuring device box including an electronic measuring device from the SENTRON PAC series (Fig. 7/26).

To connect a measuring device box, the tap-off unit must be equipped with current transformers and a power supply unit for the PAC measuring device, e.g., via a 3RV circuit breaker.

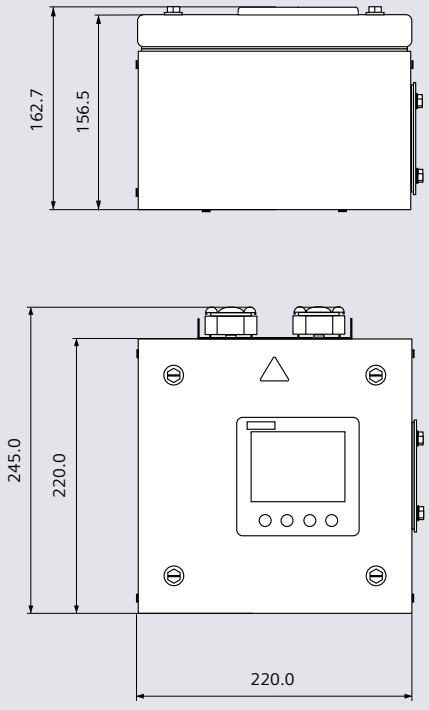
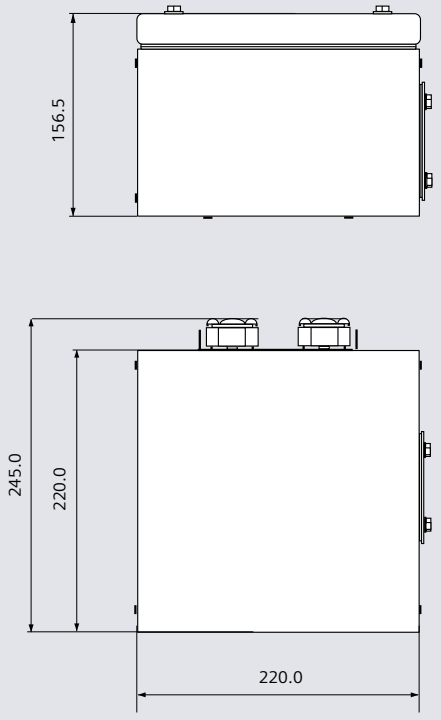
MMU modules with PAC3120, PAC3220, PAC4220 and UMG96	MMU modules with PAC1600, PAC2200, COM100, empty module XXX0000, and module for external devices MOSMMD
	

Fig. 7/24: **Views and dimensions of the measuring device box (dimensions in mm) for LI tap-off units**

IP55 tap-off units with 3VA

The IP55 tap-off units have special features for a high level of safety and flexibility.

- Installation devices: 3VA circuit breaker; fused devices 3NP, NH, and FS
- Plugging guide for safe installation and disconnected position
- Various configurations for customer connections, measuring, and communication
- Versions for different cable entries, motor operating mechanism, and special colors.

The cable entry is available for:

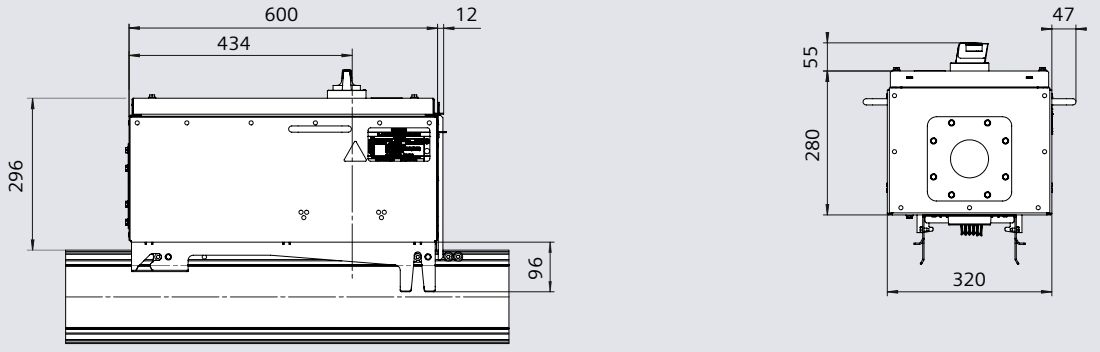
- Multi-core cables: sheet-steel flange plate with cable grommet and strain relief at the front side ; one sheet-steel blanking plate each at the side; for versions with 3VA circuit breaker, one pressure relief plate at the side
- Single-core cables: aluminum flange plate without cable glands at the front side; one sheet-steel blanking plate and one pressure relief plate each at the side; a cable gland is available as additional equipment.

IP54 tap-off units with 3VA circuit breaker

The IP54 tap-off units with 3VA have important features for basic requirements.

- Installation devices: 3VA circuit breaker with rotary operating mechanism
- Pluggable while energized without plugging guide
- Simple cable entries for multi-core and single-core cables as well as accessories for customer connections.

Size 2 (50 A to 250 A)



Size 4 (320 A to 630 A)

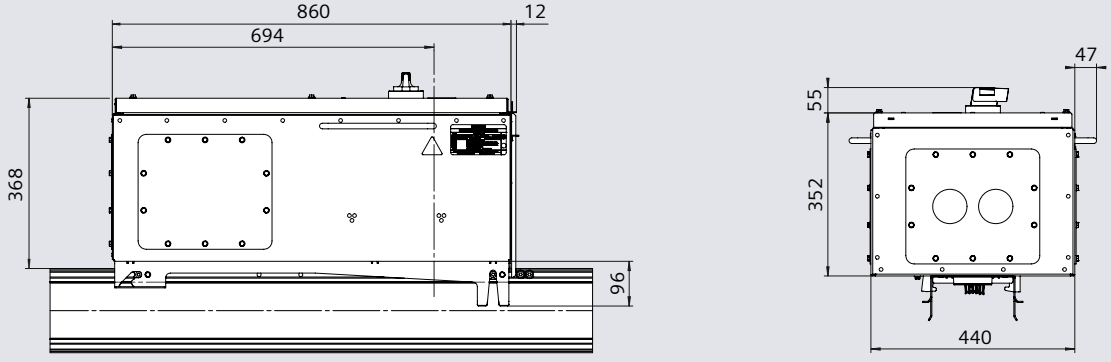


Fig. 7/25: **Views and dimensions for LI tap-off units IP54 with 3VA**

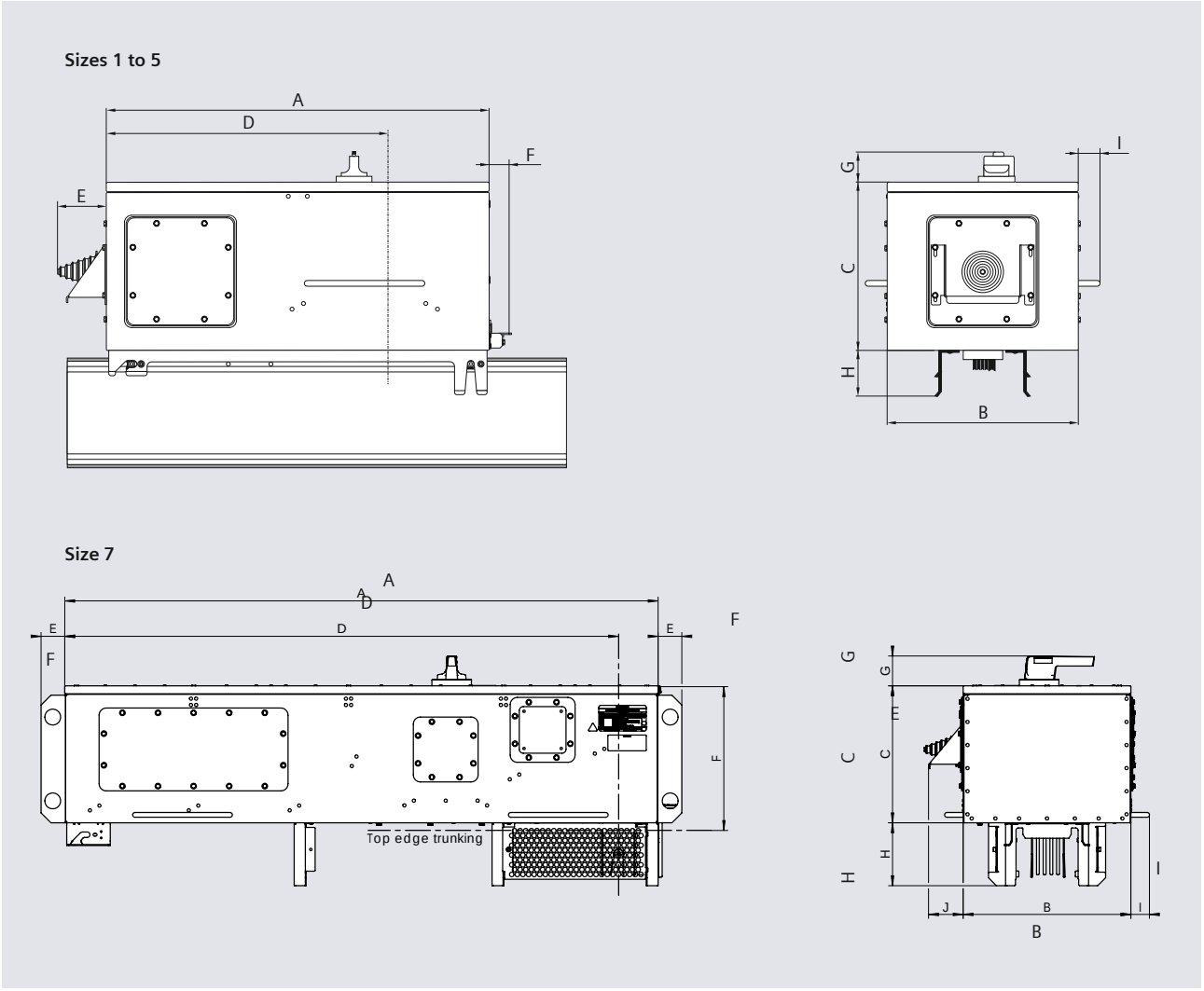


Fig. 7/26: **Views and dimensions for LI tap-off units IP55 (for dimensions from A to I, see Tab. 7/43)**

Dimension	Size					
	1	2	3	4	5	8
A	510 mm	600 mm	800 mm	860 mm	860 mm	1,500 mm
B	250 mm	320 mm	400 mm	440 mm	530 mm	424 mm
C	250 mm	280 mm	352 mm	352 mm	382 mm	347 mm
D	345 mm	435 mm	635 mm	695 mm	695 mm	1,400 mm
E	85 mm	85 mm	85 mm	85 mm	85 mm	60 mm
F	50 mm	50 mm	50 mm	50 mm	50 mm	364 mm
G	55 mm [3)]	55 mm [3)]	55 mm [3)]	55 mm [3)]	75 mm [3)]	75 mm
H	95 mm	95 mm	95 mm	95 mm	95 mm	159 mm
J	0 [1)]	47 mm [2)]	47 mm	47 mm	47 mm	88 mm

[1)] No handles
[2)] I = 0 for tap-off units size 2 with 3VA circuit breaker (no handles)
[3)] For tap-off unit with 3VA

Tab. 7/44: **Dimensions for LI tap-off units IP55 (for views with dimensions, see Fig. 7/26)**

7.4.8 Additional Equipment

For the examples given in Chapter 7.2.4, specifications regarding the dimensions and the use of accessories are given in the following illustrations:

- Fig. 7/27: End caps LI- ... -E-H and ... -E-B
- Fig. 7/28: Vertical fixings: spring bracket LI-Z-BV-.. and fixed point bracket LI-Z-BVFP-..
- Fig. 7/29: U-profiles LI-Z-BH. and fixing elements LI-Z-BKK. or LI-Z-BKFK2 for horizontal fixing
- Fig. 7/30: Fixing elements for ceiling cut-outs: LI-Z-BVD-.. as counterpart for the spring bracket LI-Z-BVF-.. .

Type	Height H
LI-A . 08... and LI-C . 10...	114.5 mm
LDC . 12...	121.2 mm
LI-A . 10...	135.8 mm
LI-A . 12... and LI-C . 16...	150.1 mm
LI-C . 20... and LI-C . 40...	178.0 mm
LI-A . 16... and LI-A . 32...	185.8 mm
LI-C . 25... and LI-C . 50...	217.0 mm
LI-A . 20... and LI-A . 40...	233.8 mm
LI-C . 32... and LI-C . 63...	284.0 mm
LI-A . 25... and LI-A . 50...	300.5 mm

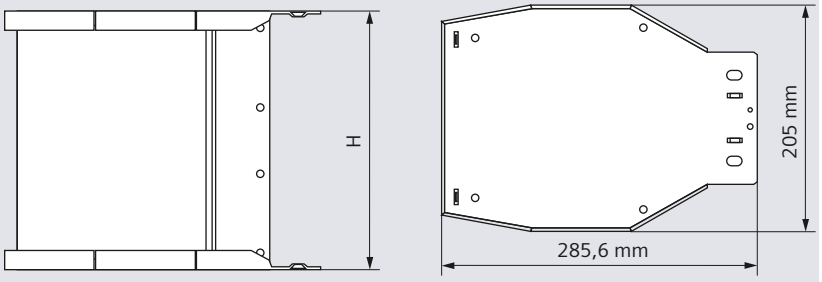


Fig. 7/27: **Dimensions (in mm) and views for end caps of the LI system**

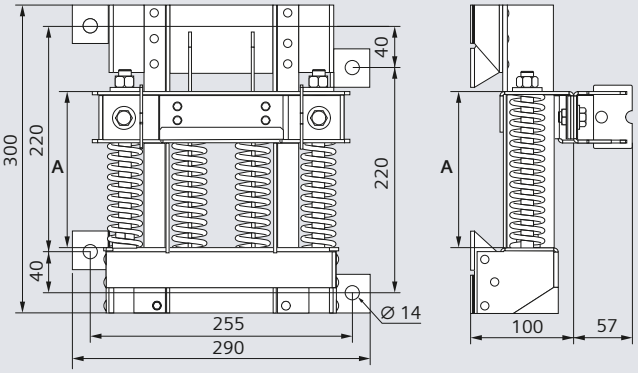
The spring brackets LI-Z-BV .. for vertical fixing provide the regular distribution of the weight onto the supporting building parts, allowing for expansion of the busbar run at the same time. The spring brackets are selected according to the weight of the busbar run (depending on the rated current and the conductor configuration; Fig. 7/28 and Tab. 7/45) and the weight of the tap-off units.

The spring brackets are selected according to the supporting length above. At the lowermost spring bracket, the supporting length of the lowermost run is added to the free supporting length above the spring bracket. The dimensioning of the spring brackets for power distribution in vertical direction is designed with an average of 1 to 2 tap-off units per "floor" (height according to the supporting distances of Tab. 7/45).

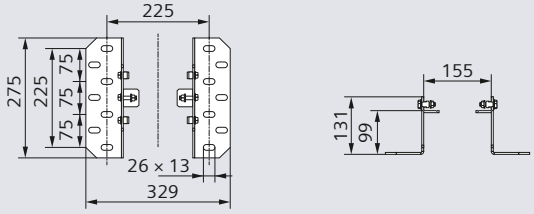
Spring bracket type	Color of the spring	Number of springs	A	Load
LI-Z-BV-01	yellow	3	106 mm	30 to 79 kg
LI-Z-BV-02	red	3	101 mm	80 to 119 kg
LI-Z-BV-03	red	4	99 mm	120 to 159 kg
LI-Z-BV-04	blue	4	108 mm	160 to 199 kg
LI-Z-BV-05	green	4	118 mm	200 to 239 kg
LI-Z-BV-06	gray	4	127 mm	240 to 279 kg
LI-Z-BV-07	dark gray	4	137 mm	280 to 319 kg
LI-Z-BV-08	dark gray	4	134 mm	320 to 359 kg
LI-Z-BV-09	black	4	143 mm	on request
LI-Z-BV-10	black	4	141 mm	on request

Views

Spring bracket LI-Z-BV-..



Fixed point bracket LI-Z-BFPV



Drilling templates

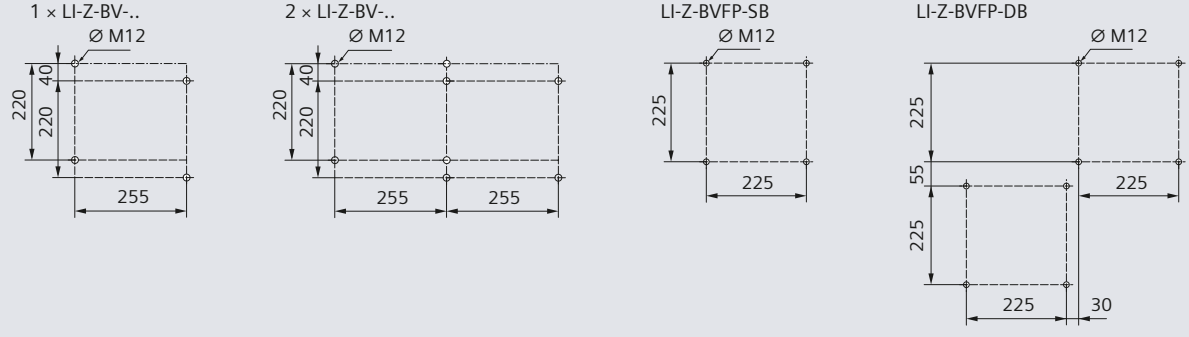
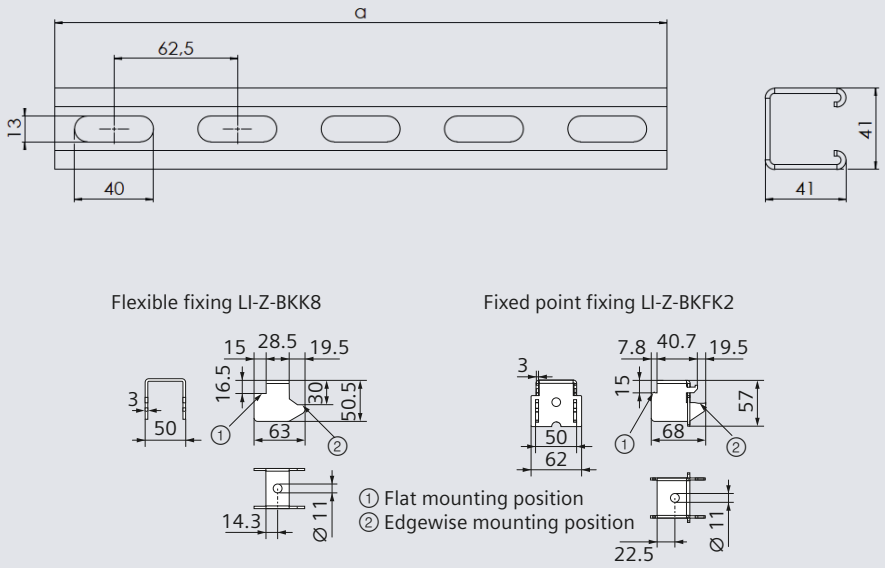


Fig. 7/28: **Dimensions (in mm) and views for spring brackets and fixed point brackets for vertical fixing of the LI system**

Busbar	For power distribution (with tap-off units)							
	Supporting distance 3.3 up to 4.1 m				Supporting distance 4.2 up to 5.0 m			
	Conductor configuration				Conductor configuration			
	LI- ... 3B- ...	LI- ... 4B- ... / LI- ... 5B- ...	LI- ... 5C- ... / LI- ... 5H- ... / LI- ... 6B- ...	LI- ... 6C- ...	LI- ... 3B- ...	LI- ... 4B- ... / LI- ... 5B- ...	LI- ... 5C- ... / LI- ... 5H- ... / LI- ... 6B- ...	LI- ... 6C- ...
LI-A . 0800 ..-...	LI-Z-BV-01	LI-Z-BV-01	LI-Z-BV-01	LI-Z-BV-01	LI-Z-BV-01	LI-Z-BV-02	LI-Z-BV-02	LI-Z-BV-02
LI-A . 1000 ..-...	LI-Z-BV-01	LI-Z-BV-02	LI-Z-BV-02	LI-Z-BV-02	LI-Z-BV-02	LI-Z-BV-02	LI-Z-BV-02	LI-Z-BV-02
LI-A . 1250 ..-...	LI-Z-BV-02	LI-Z-BV-02	LI-Z-BV-02	LI-Z-BV-02	LI-Z-BV-02	LI-Z-BV-02	LI-Z-BV-03	LI-Z-BV-03
LI-A . 1600	LI-Z-BV-02	LI-Z-BV-02	LI-Z-BV-03	LI-Z-BV-03	LI-Z-BV-03	LI-Z-BV-03	LI-Z-BV-03	LI-Z-BV-04
LI-A . 2000 ..-...	LI-Z-BV-03	LI-Z-BV-03	LI-Z-BV-03	LI-Z-BV-04	LI-Z-BV-03	LI-Z-BV-04	LI-Z-BV-04	LI-Z-BV-05
LI-A . 2500 ..-...	LI-Z-BV-04	LI-Z-BV-04	LI-Z-BV-04	LI-Z-BV-05	LI-Z-BV-04	LI-Z-BV-05	LI-Z-BV-06	LI-Z-BV-06
LI-A . 3200 ..-...	2 × LI-Z-BV-02	2 × LI-Z-BV-02	2 × LI-Z-BV-03	2 × LI-Z-BV-03	2 × LI-Z-BV-03	2 × LI-Z-BV-03	2 × LI-Z-BV-03	2 × LI-Z-BV-04
LI-A . 4000 ..-...	2 × LI-Z-BV-03	2 × LI-Z-BV-03	2 × LI-Z-BV-03	2 × LI-Z-BV-04	2 × LI-Z-BV-03	2 × LI-Z-BV-04	2 × LI-Z-BV-04	2 × LI-Z-BV-05
LI-A . 5000 ..-...	2 × LI-Z-BV-03	2 × LI-Z-BV-03	2 × LI-Z-BV-04	2 × LI-Z-BV-05	2 × LI-Z-BV-04	2 × LI-Z-BV-05	2 × LI-Z-BV-06	2 × LI-Z-BV-06
LI-C . 1000 ..-...	LI-Z-BV-02	LI-Z-BV-02	LI-Z-BV-02	LI-Z-BV-03	LI-Z-BV-02	LI-Z-BV-03	LI-Z-BV-03	LI-Z-BV-03
LI-C . 1250 ..-...	LI-Z-BV-02	LI-Z-BV-02	LI-Z-BV-03	LI-Z-BV-03	LI-Z-BV-03	LI-Z-BV-03	LI-Z-BV-03	LI-Z-BV-04
LI-C . 1600	LI-Z-BV-03	LI-Z-BV-03	LI-Z-BV-04	LI-Z-BV-04	LI-Z-BV-03	LI-Z-BV-04	LI-Z-BV-05	LI-Z-BV-05
LI-C . 2000 ..-...	LI-Z-BV-04	LI-Z-BV-04	LI-Z-BV-05	LI-Z-BV-06	LI-Z-BV-04	LI-Z-BV-05	LI-Z-BV-06	LI-Z-BV-07
LI-C . 2500 ..-...	LI-Z-BV-05	LI-Z-BV-06	LI-Z-BV-07	LI-Z-BV-07	LI-Z-BV-06	LI-Z-BV-07	LI-Z-BV-08	on request
LI-C . 3200 ..-...	LI-Z-BV-06	LI-Z-BV-08	on request	on request	LI-Z-BV-08	on request	-	-
LI-C . 4000 ..-...	2 × LI-Z-BV-04	2 × LI-Z-BV-04	2 × LI-Z-BV-05	2 × LI-Z-BV-06	2 × LI-Z-BV-04	2 × LI-Z-BV-05	2 × LI-Z-BV-06	2 × LI-Z-BV-07
LI-C . 5000 ..-...	2 × LI-Z-BV-05	2 × LI-Z-BV-06	2 × LI-Z-BV-07	2 × LI-Z-BV-07	2 × LI-Z-BV-06	2 × LI-Z-BV-07	2 × LI-Z-BV-08	on request
LI-C . 6300 ..-...	2 × LI-Z-BV-06	2 × LI-Z-BV-08	on request	on request	2 × LI-Z-BV-08	on request	-	-
Busbar	**For power transmission (without tap-off units)**							
	Supporting distance 3.3 up to 4.1 m				**Supporting distance 4.2 up to 5.0 m**			
	Conductor configuration				**Conductor configuration**			
	LI- ... 3B- ...	**LI- ... 4B- ... / LI- ... 5B- ...**	**LI- ... 5C- ... / LI- ... 5H- ... / LI- ... 6B- ...**	**LI- ... 6C- ...**	**LI- ... 3B- ...**	**LI- ... 4B- ... / LI- ... 5B- ...**	**LI- ... 5C- ... / LI- ... 5H- ... / LI- ... 6B- ...**	**LI- ... 6C- ...**
LI-A . 0800 ..-...	LI-Z-BV-01	LI-Z-BV-01	LI-Z-BV-01	LI-Z-BV-01	LI-Z-BV-01	LI-Z-BV-01	LI-Z-BV-01	LI-Z-BV-01
LI-A . 1000 ..-...	LI-Z-BV-01	LI-Z-BV-01	LI-Z-BV-01	LI-Z-BV-01	LI-Z-BV-01	LI-Z-BV-01	LI-Z-BV-02	LI-Z-BV-02
LI-A . 1250 ..-...	LI-Z-BV-01	LI-Z-BV-01	LI-Z-BV-01	LI-Z-BV-02	LI-Z-BV-01	LI-Z-BV-02	LI-Z-BV-02	LI-Z-BV-02
LI-A . 1600	LI-Z-BV-01	LI-Z-BV-02	LI-Z-BV-02	LI-Z-BV-02	LI-Z-BV-02	LI-Z-BV-02	LI-Z-BV-02	LI-Z-BV-03
LI-A . 2000 ..-...	LI-Z-BV-02	LI-Z-BV-02	LI-Z-BV-03	LI-Z-BV-03	LI-Z-BV-02	LI-Z-BV-03	LI-Z-BV-03	LI-Z-BV-04
LI-A . 2500 ..-...	LI-Z-BV-02	LI-Z-BV-03	LI-Z-BV-03	LI-Z-BV-04	LI-Z-BV-03	LI-Z-BV-04	LI-Z-BV-04	LI-Z-BV-05
LI-A . 3200 ..-...	2 × LI-Z-BV-01	2 × LI-Z-BV-02	2 × LI-Z-BV-02	2 × LI-Z-BV-02	2 × LI-Z-BV-02	2 × LI-Z-BV-02	2 × LI-Z-BV-02	2 × LI-Z-BV-03
LI-A . 4000 ..-...	2 × LI-Z-BV-02	2 × LI-Z-BV-02	2 × LI-Z-BV-03	2 × LI-Z-BV-03	2 × LI-Z-BV-02	2 × LI-Z-BV-03	2 × LI-Z-BV-03	2 × LI-Z-BV-04
LI-A . 5000 ..-...	2 × LI-Z-BV-02	2 × LI-Z-BV-03	2 × LI-Z-BV-03	2 × LI-Z-BV-04	2 × LI-Z-BV-03	2 × LI-Z-BV-04	2 × LI-Z-BV-04	2 × LI-Z-BV-05
LI-C . 1000 ..-...	LI-Z-BV-01	LI-Z-BV-02	LI-Z-BV-02	LI-Z-BV-03	LI-Z-BV-02	LI-Z-BV-02	LI-Z-BV-03	LI-Z-BV-03
LI-C . 1250 ..-...	LI-Z-BV-02	LI-Z-BV-02	LI-Z-BV-03	LI-Z-BV-03	LI-Z-BV-02	LI-Z-BV-03	LI-Z-BV-03	LI-Z-BV-04
LI-C . 1600	LI-Z-BV-02	LI-Z-BV-03	LI-Z-BV-03	LI-Z-BV-04	LI-Z-BV-03	LI-Z-BV-04	LI-Z-BV-04	LI-Z-BV-05
LI-C . 2000 ..-...	LI-Z-BV-03	LI-Z-BV-04	LI-Z-BV-05	LI-Z-BV-05	LI-Z-BV-04	LI-Z-BV-05	LI-Z-BV-06	LI-Z-BV-06
LI-C . 2500 ..-...	LI-Z-BV-04	LI-Z-BV-05	LI-Z-BV-06	LI-Z-BV-07	LI-Z-BV-05	LI-Z-BV-06	LI-Z-BV-07	LI-Z-BV-08
LI-C . 3200 ..-...	LI-Z-BV-05	LI-Z-BV-07	LI-Z-BV-08	on request	LI-Z-BV-06	LI-Z-BV-08	on request	-
LI-C . 4000 ..-...	2 × LI-Z-BV-03	2 × LI-Z-BV-04	2 × LI-Z-BV-05	2 × LI-Z-BV-05	2 × LI-Z-BV-04	2 × LI-Z-BV-05	2 × LI-Z-BV-06	2 × LI-Z-BV-06
LI-C . 5000 ..-...	2 × LI-Z-BV-04	2 × LI-Z-BV-05	2 × LI-Z-BV-06	2 × LI-Z-BV-07	2 × LI-Z-BV-05	2 × LI-Z-BV-06	2 × LI-Z-BV-07	2 × LI-Z-BV-08
LI-C . 6300 ..-...	2 × LI-Z-BV-05	2 × LI-Z-BV-07	2 × LI-Z-BV-08	on request	2 × LI-Z-BV-06	2 × LI-Z-BV-08	on request	-

Tab. 7/45: **Supporting distances for mounting spring brackets in case of vertical installation (other supporting distances on request)**

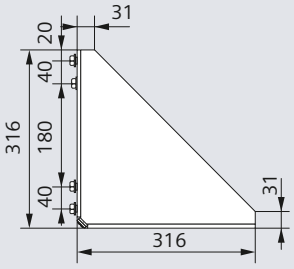
Dimensions			
Type	**a**	**Number of elongated holes**	
LI-Z-BH1	311 mm	5	
LI-Z-BH2	373 mm	6	
LI-Z-BH3	498 mm	8	
LI-Z-BH4	562 mm	9	
LI-Z-BH5	686 mm	11	
LI-Z-BH6	811 mm	13	
LI-Z-BH7	873 mm	14	

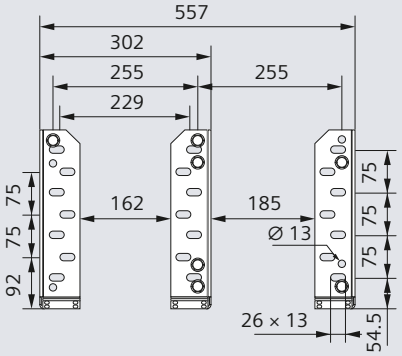


Assignment: busbar type – fixing type					
Trunking unit type	**Flat mounting position**		**Trunking unit type**	**Flat mounting position**	**Edgewise mounting position**
LI-A.0800...	LI-Z-BH1		LI-C.1000...	LI-Z-BH1	LI-Z-BH1
LI-A.1000...	LI-Z-BH1		LI-C.1250...	LI-Z-BH1	LI-Z-BH1
LI-A.1250...	LI-Z-BH1		LI-C.1600...	LI-Z-BH1	LI-Z-BH1
LI-A.1600...	LI-Z-BH2		LI-C.2000...	LI-Z-BH2	LI-Z-BH1
LI-A.2000...	LI-Z-BH2		LI-C.2500...	LI-Z-BH2	LI-Z-BH1
LI-A.2500...	LI-Z-BH3		LI-C.3200...	LI-Z-BH3	LI-Z-BH1
LI-A.3200...	LI-Z-BH2		LI-C.4000...	LI-Z-BH2	LI-Z-BH4
LI-A.4000...	LI-Z-BH2		LI-C.5000...	LI-Z-BH2	LI-Z-BH4
LI-A.5000...	LI-Z-BH3		LI-C.6300...	LI-Z-BH3	LI-Z-BH4
Universal use	LI-Z-BH5		Universal use	LI-Z-BH5	LI-Z-BH5
2 × LI-A16 (TONT)	LI-Z-BH5		2 × LI-C20 (TONT)	LI-Z-BH5	LI-Z-BH1
2 × LI-A20 (TONT)	LI-Z-BH7		2 × LI-C25 (TONT)	LI-Z-BH7	LI-Z-BH1
2 × LI-A25	LI-Z-BH7		2 × LI-C32 (TONT)	LI-Z-BH7	LI-Z-BH1

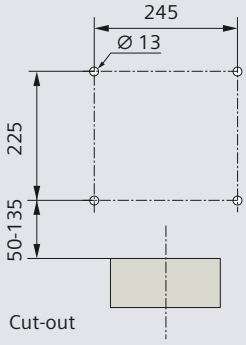
Fig. 7/29: **Dimensions (in mm) and views for horizontal fixings of the LI system**

Fixing LI-Z-BVD-..

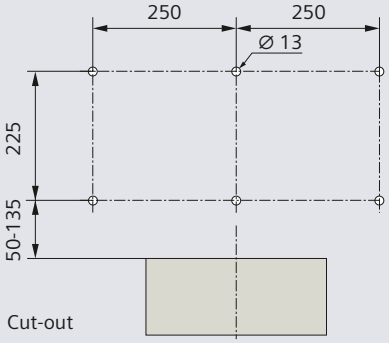




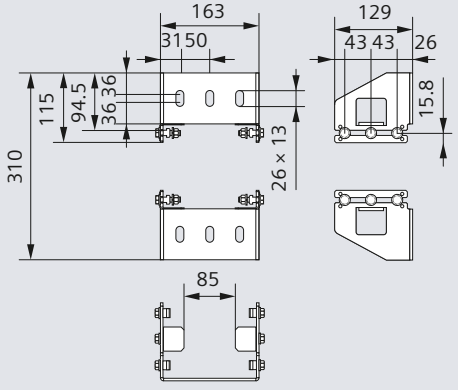
Drilling template LI-Z-BVD-SB



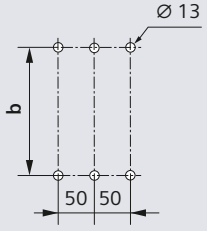
Drilling template LI-Z-BVD-DB



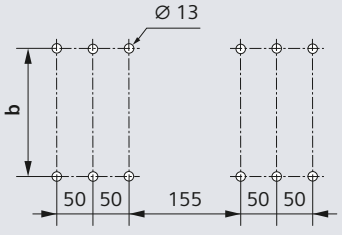
Fixing LI-Z-BVF-..



Drilling template LI-Z-BVD-SB



Drilling template LI-Z-BVD-DB



Type	b
LIA.0800...-L...	198 mm
LIA.1000...-L...	219 mm
LIA.1250...-L...	234 mm
LIA.1600...-L...	269 mm
LIA.2000...-L...	317 mm
LIA.2500...-L...	384 mm
LIA.3200...-L...	269 mm
LIA.4000...-L...	317 mm
LIA.5000...-L...	384 mm
LIC.1000...-L...	198 mm
LIC.1250...-L...	205 mm
LIC.1600...-L...	234 mm
LIC.2000...-L...	262 mm
LIC.2500...-L...	300 mm
LIC.3200...-L...	368 mm
LIC.4000...-L...	262 mm
LIC.5000...-L...	300 mm
LIC.6300...-L...	368 mm

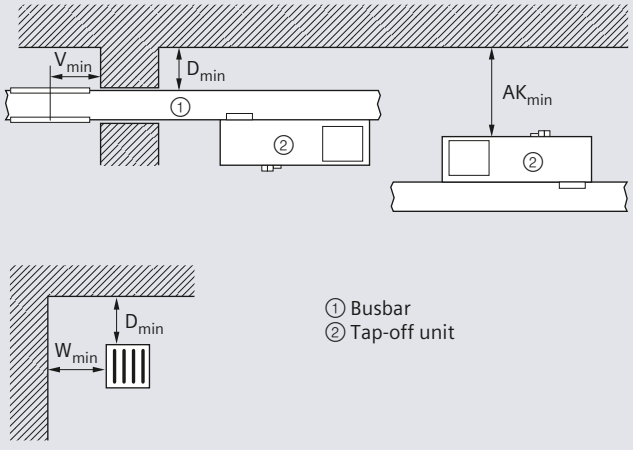
Fig. 7/30: **Dimensions (in mm) and views for fixing elements at ceiling cut-outs (LI-Z.BVDF-.. in connection with spring bracket LI-Z-BV .. and LI-Z-BVF-..)**

7.4.9 Distances from Building Elements

Minimum wall/ceiling distances must be observed to enable installation of the system, particularly at the connection points, as well as to ensure sufficient ventilation or heat dissipation. Minimum values for horizontal runs with edgewise busbars can be found in Tab. 7/46. In this context, please observe the following:

- When an expansion compensation or an equipotential bonding is used (see Chapter 7.4.3), the minimum distances must be increased accordingly. The expansion compensation unit must be accessible from the cover side, as screws must be removed to unlock the expansion function!
- As for the fire barrier, the ceiling distance at these points is accordingly lower
- The connection point between two system components should not be inside a wall cut-out or ceiling cut-out. The minimum dimension V_{min} (Tab. 7/46) up to the wall cut-out or other building parts must be observed
- It must be possible to open the cover of a tap-off unit. Therefore, the distance from a top-mounted tap-off unit to the ceiling must be at least the height of the cover. It must be possible to mount/remove the tap-off units. For this reason, the minimum distance AK_{min} of a tap-off unit (Tab. 7/46) from the ceiling must at least be its own height including the handle and the top-mounting height.

Abbreviation	Description	Distance [1]
D_{min}	Ceiling – trunking unit	100 mm
W_{min}	Wall – trunking unit	100 mm
V_{min}	Wall – center of connection point	250 mm
AK_{min}	Ceiling – tap-off unit	300 mm [2]



[1] Attention: When an expansion compensation or an equipotential bonding is used, the minimum distance D_{min}, W_{min} must be increased accordingly by 100 mm as a minimum

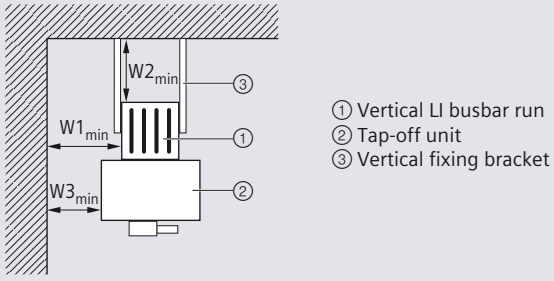
[2] Recommended minimum distance to ensure that work to be performed, such as cable connection and installation of fuse links, can be carried out without obstruction

Tab. 7/46: **Wall and ceiling distances for horizontal LI runs with edgewise busbar position**

For the wall and ceiling distances of vertical busbar runs (Tab. 7/47), the following has to be observed:

- The minimum lateral wall distance $W1_{min}$ depends on the dimensions of the selected tap-off unit and on the space requirement for installation/removal of the trunking units and the vertical fixing brackets. The fixing screws for the vertical fixing brackets must still be sufficiently accessible
- As a rule, the minimum wall distance $W2_{min}$ is predefined by the dimensions of the vertical fixing bracket. When the spring bracket LI-Z-BV.. is used, the distance $W2_{min}$ is 100 mm
- However, the minimum wall distance $W2_{min}$ is also dependent on the required fixing material to be provided by the customer in order to compensate uneven or inclined walls. The fixing material is selected according to the corresponding load. The fixing brackets can be attached directly to the wall if there are no uneven or inclined walls.

Abbreviation	Description	Distance [1)]
$W1_{min}$	Wall – trunking unit (flat side)	100 mm
$W2_{min}$	Wall – trunking unit (edgewise side)	100 mm
$W3_{min}$	Wall – tap-off side	50 mm



Tab. 7/47: **Wall distances for vertical LI runs**

7.5 Fire Barrier for LI system

The trunking units of the LI system can be equipped with a fire barrier for customer and factory assembly. Thus, they fulfil the stipulations of EN 1366-3 and conform to the fire resistance classes EI 90 or EI 120 in accordance with EN 13501-2. Accordingly, they reach the fire resistance duration of 90 or 120 minutes according to the international standards ISO 834-1 and IEC 61439-6.
For the fire barriers LI-...-EI90 and LI-...-EI120, the approval Z-19.15-2209 of the German Institute for Building Engineering in Berlin (DIBt) is available, including a general German type approval (aBG) number Z-19.53-2548.

To install the busbar trunking unit with a permissible fire barrier, a difference is made between a solid wall, a solid ceiling, or a lightweight partition wall:

- The solid wall must be made of masonry, concrete, ferroconcrete, or autoclaved aerated concrete with a density of ≥ 600 kg/m^3.
- The solid ceiling must be made of concrete, ferroconcrete, or autoclaved aerated concrete with a density of ≥ 600 kg/m^3
- The lightweight partition wall must be erected in post-type construction with steel sub-structure, and cladded on both sides with at least 2 layers of cement- or plaster-bound structural panels with a thickness of 12.5 mm and with fire behavior class A1 or A2 according to EN 13501-1. Further details can be found in the fire barrier installation specifications.

The fire barrier is possible for straight trunking units or junction units. The dimensions of the fire barrier block are given in Fig. 7/31, and the positioning on the trunking unit is given in Fig. 7/32. As for the fire barriers, the dimensions and distances of the cut-outs required when leading through solid walls and solid ceilings as well as through lightweight partition walls can be found hereafter.

In this context, the following has to be observed:

- The fire barrier block must not be mounted over connection points and tap-off points
- In the case of tap-off points, a minimum distance of 125 mm must be kept between the fire barrier block and the tap-off point (outside edge)
- Tap-off units must not be positioned over the fire barrier plates
- In case of multiple cut-outs, the systems must be led through several wall or ceiling openings. The minimum distance between the wall or ceiling openings are given in the tables of the following pages.

System type	Fire resistance class			
	EI 90		EI 120	
	Thickness a	Length L	Thickness a	Length L
LI-A...	25 mm	700 mm	50 mm (2 × 25 mm)	750 mm
LI-C...	50 mm (2 × 25 mm)	800 mm	50 mm (2 × 25 mm)	950 mm

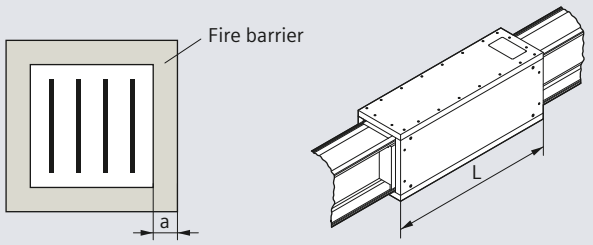
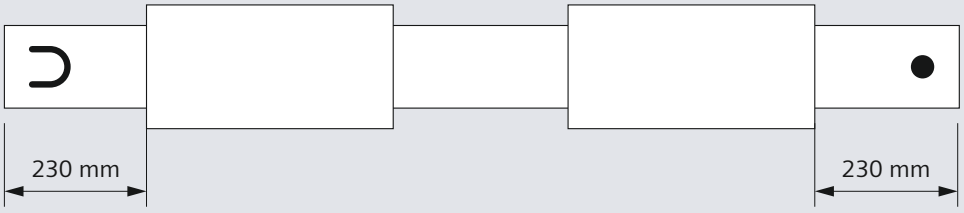


Fig. 7/31: **Dimensions and views for fire barriers LI-...-EI90-... and LI-...-EI120-...**

Straight length: minimum distance up to the edge of the fire barrier block

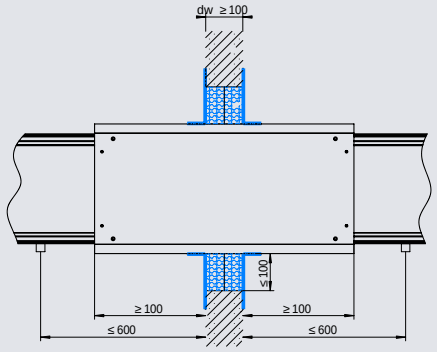


Note: The minimum distance up to the edge of the fire barrier block is 370 mm if the craning tool is to be attached to load slings for suspending and transporting the trunking unit via load slings.

Fig. 7/32: **Positioning of the fire barrier blocks on the LI trunking units**

- The system-specific fixing elements must be used. No fire barrier may be configured on a fixed limb.
- The busbar trunking unit must be fastened in such a way that it remains functional in the event of a fire, that no additional mechanical load will arise at the barrier, and that the latter is maintained throughout the classification period. Details can be found in the fire barrier installation specifications.
- After installation, all remaining joints between the fire barrier block and the wall or ceiling opening in the thickness of the wall or ceiling must be filled completely with non-combustible building material such as concrete or mortar, or optionally firmly packed with non-combustible mineral wool.
- All information and specifications related to the use of the approved materials (concrete, mortar, fixing materials, and many others) can be found in the fire barrier installation specifications.
- In case of deviations, consultation with the responsible Siemens product management is required.

Closure type A



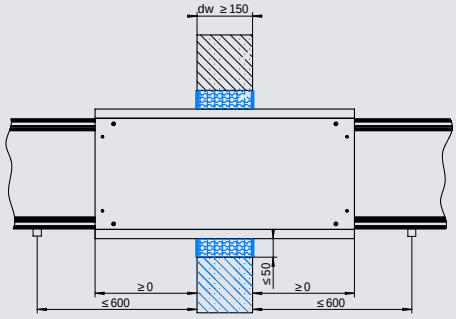
Applications *(fire resistance duration* [1) 2)]*)*

- Lightweight partition wall ≥ 100 mm *(30 min, 60 min, 90 min)*
- Solid wall ≥ 100 mm *(30 min, 60 min, 90 min)*
- Solid ceiling ≥ 150 mm *(30 min, 60 min, 90 min, 120 min)*

Explanations

- Max. 100 mm circumferential ring gap around the LI fire barrier block
- The distance from the wall or ceiling opening up to the fire barrier block can be reduced to 20 mm
- Barrier plates consisting of mineral-wool plates 2 × 50 mm and PROMSATOP-CC coating

Closure type B



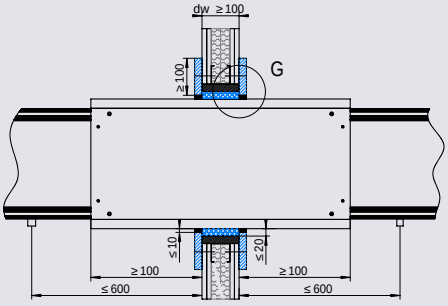
Applications *(fire resistance duration* [1) 2)]*)*

- Solid wall ≥ 150 mm *(30 min, 60 min, 90 min, 120 min)*
- Solid ceiling ≥ 150 mm *(30 min, 60 min, 90 min, 120 min)*

Explanations

- Max. 50 mm circumferential ring gap around the LI fire barrier block
- The distance from the wall or ceiling opening up to the fire barrier block can be reduced to 20 mm
- Closure of the ring gap with
  a) mineral wool and filler, and b) with mortar, concrete

Closure type C (for lightweight partition walls)



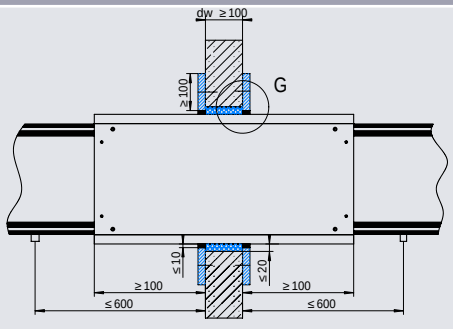
Applications *(fire resistance duration* [1) 2)]*)*

- Lightweight partition wall ≥ 100 mm *(30 min, 60 min, 90 min)*

Explanations

- 40 mm circumferential ring gap around the LI fire barrier block
- Stud profiles are to be placed inside all around
- Inside reveals are to be cladded all around with 20 mm thick PROMATECT-H plates
- The remaining gap is to be filled with mineral wool
- On the outside, a circumferential frame is to be mounted to the wall and sealed

Closure type C (for solid walls)



Applications *(fire resistance duration* [1) 2)]*)*

- Solid wall ≥ 100 mm *(30 min, 60 min, 90 min)*

Explanations

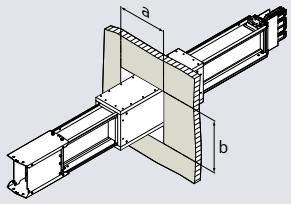
- 20 mm circumferential ring gap around the LI fire barrier block
- The remaining gap is to be filled with mineral wool
- On the outside, a circumferential frame is to be mounted to the wall and sealed

[1)] Classification according to EN 13501 Part 2: EI 30 (30 min), EI 60 (60 min), EI 90 (90 min), EI 120 (120 min)
[2)] Classification according to aBG (Germany): flame-retardant (30 min), highly flame-retardant (60 min), fire-resistant (90 min), very highly fire-resistant (120 min)

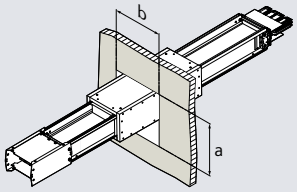
Tab. 7/48: **Dimensions and distances (dimensions in mm) for wall cut-outs and ceiling cut-outs with LI fire barrier in lightweight partition walls**

Design in lightweight partition wall with thickness ≥100 mm

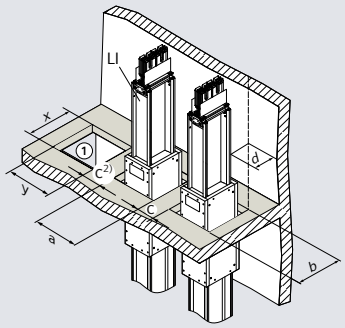
Wall cut-out, edgewise trunking unit



Wall cut-out, flat trunking unit



a/B = Maximum wall or ceiling opening dimensions



Distances to each other or to other installations/openings

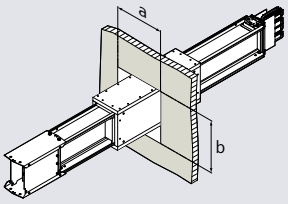
	LI system	LI-...-EI90								LI-...-EI120							
		Closure type A				Closure type C				Closure type A				Closure type C			
		a 1)	b 1)	c	d	a	b	c	d	a 1)	b 1)	c	d	a	b	c	d
Aluminum																	
Single	LI-AM0800 ...	364	408			244	288			414	458			294	338		
	LI-AM1000 ...	385	408			265	288			435	458			315	338		
	LI-AM1250 ...	400	408			280	288			450	458			330	338		
	LI-AM1600 ...	435	408			315	288			485	458			365	338		
	LI-AM2000 ...	483	408	≥ 200	≥ 100	363	288	≥ 200	≥ 100	533	458	≥ 200	≥ 100	413	338	≥ 200	≥ 100
	LI-AM2500 ...	550	408			430	288			600	458			480	338		
Side-by-side	LI-AM3200 ...	435	666			315	546			485	716			365	596		
	LI-AM4000 ...	483	666			363	546			533	716			413	596		
	LI-AM5000 ...	550	666			430	546			600	716			480	596		
Top-on-top	LI-AM3200 ...	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	LI-AM4000 ...	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	LI-AM5000 ...	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper																	
Single	LI-CM1000 ...	414	458			294	338			414	458			294	338		
	LI-CM1250 ...	419	458			299	338			419	458			299	338		
	LI-CM1600 ...	450	458			330	338			450	458			330	338		
	LI-CM2000 ...	478	458			358	338			478	458			358	338		
	LI-CM2500 ...	517	458	≥ 200	≥ 100	397	338	≥ 200	≥ 100	517	458	≥ 200	≥ 100	397	338	≥ 200	≥ 100
	LI-CM3200 ...	584	458			464	338			584	458			464	338		
Side-by-side	LI-CM4000 ...	478	716			358	596			478	716			358	596		
	LI-CM5000 ...	517	716			397	596			517	716			397	596		
	LI-CM6300 ...	584	716			464	596			584	716			464	596		
Top-on-top	LI-CM3200 ...	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	LI-CM4000 ...	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	LI-CM6300 ...	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

1) The opening dimensions a and b can be reduced to 20 mm up to the fire barrier block in order to still be able to close the wall or ceiling opening.
2) The recommended minimum dimension is 200 mm. Smaller distances may also be possible in the individual case (on request).

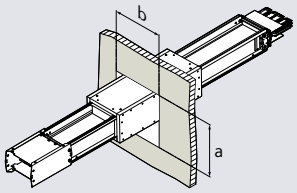
Tab. 7/49: **Dimensions and distances (dimensions in mm) for wall cut-outs and ceiling cut-outs with LI fire barrier in lightweight partition walls**

Design in solid wall with thickness ≥ 100 mm up to < 150 mm

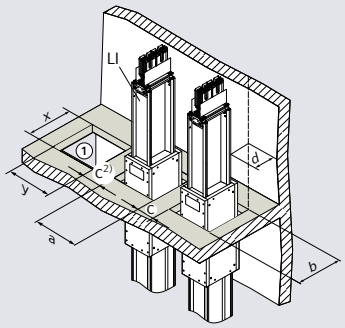
Wall cut-out,
edgewise trunking unit



Wall cut-out,
flat trunking unit



a/B = Maximum wall or ceiling opening dimensions



Distances to each other or to other installations/openings

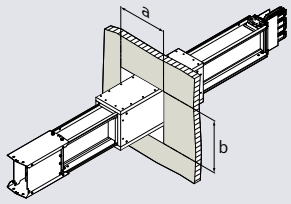
	LI system	LI-...-EI90								LI-...-EI120							
		Closure type A				Closure type C				Closure type A				Closure type C			
		a 1)	b 1)	c	d	a	b	c	d	a 1)	b 1)	c	d	a	b	c	d
Aluminum																	
Single	LI-AM0800 ...	364	408	≥ 200 3)	≥ 100	204	248	≥ 200 3)	≥ 100	414	458	≥ 200 3)	≥ 100	254	298	≥ 200 3)	≥ 100
	LI-AM1000 ...	385	408			225	248			435	458			275	298		
	LI-AM1250 ...	400	408			240	248			450	458			290	298		
	LI-AM1600 ...	435	408			275	248			485	458			325	298		
	LI-AM2000 ...	483	408			323	248			533	458			373	298		
	LI-AM2500 ...	550	408			390	248			600	458	≥ 200		440	298	≥ 200	
Side-by-side	LI-AM3200 ...	435	666	≥ 200		275	506	≥ 200		485	716	≥ 200		325	556	≥ 200	
	LI-AM4000 ...	483	666			323	506			533	716			373	556		
	LI-AM5000 ...	550	666			390	506			600	716			440	556		
Top-on-top	LI-AM3200 ...	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	LI-AM4000 ...	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	LI-AM5000 ...	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper																	
Single	LI-CM1000 ...	414	458	≥ 200	≥ 100	254	298	≥ 200	≥ 100	414	458	≥ 200	≥ 100	254	298	≥ 200	≥ 100
	LI-CM1250 ...	419	458			259	298			419	458			259	298		
	LI-CM1600 ...	450	458			290	298			450	458			290	298		
	LI-CM2000 ...	478	458			318	298			478	458			318	298		
	LI-CM2500 ...	517	458			357	298			517	458			357	298		
	LI-CM3200 ...	584	458			424	298			584	458			424	298		
Side-by-side	LI-CM4000 ...	478	716			318	556			478	716			318	556		
	LI-CM5000 ...	517	716			357	556			517	716			357	556		
	LI-CM6300 ...	584	716			424	556			584	716			424	556		
Top-on-top	LI-CM3200 ...	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	LI-CM4000 ...	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	LI-CM6300 ...	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

1) The opening dimensions a and b can be reduced to 20 mm up to the fire barrier block in order to still be able to close the wall or ceiling opening.
2) The recommended minimum dimension is 200 mm. Smaller distances may also be possible in the individual case (on request).
3) The recommended minimum dimension is 200 mm. Distance c1 can be reduced to 100 mm if the neighboring openings are each ≤ 400 mm × 400 mm.

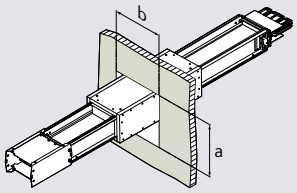
Tab. 7/50: **Dimensions and distances (dimensions in mm) for wall cut-outs and ceiling cut-outs with LI fire barrier in solid walls ≥ 100 mm up to < 150 mm**

Design in solid wall with thickness ≥ 150 mm

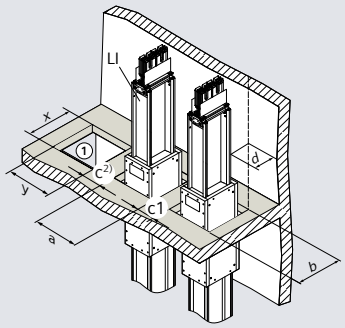
Wall cut-out,
edgewise trunking unit



Wall cut-out,
flat trunking unit



a/B = Maximum wall or ceiling opening dimensions



Distances to each other or to other installations/openings

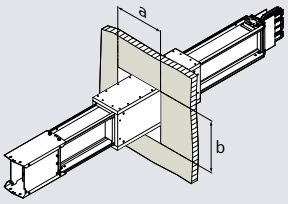
	LI system	LI-...-EI90								LI-...-EI120							
		Closure type A				Closure type B				Closure type A				Closure type B			
		a [1]	b [1]	c1	d	a	b [1]	c1	d	a [1]	b [1]	c1	d	a	b [1]	c1	d
Aluminum																	
Single	LI-AM0800 ...	364	408	≥ 200 [3]	≥ 100	264	308	≥ 200 [3]	≥ 100	414	458	≥ 200 [3]	≥ 100	314	358	≥ 200 [3]	≥ 100
	LI-AM1000 ...	385	408			285	308			435	458			335	358		
	LI-AM1250 ...	400	408			300	308			450	458			350	358		
	LI-AM1600 ...	435	408			335	308			485	458			385	358		
	LI-AM2000 ...	483	408			383	308			533	458			433	358		
	LI-AM2500 ...	550	408			450	308			600	458	≥ 200		500	358	≥ 200	
Side-by-side	LI-AM3200 ...	435	666	≥ 200		335	566	≥ 200		485	716	≥ 200		385	616	≥ 200	
	LI-AM4000 ...	483	666			383	566			533	716			433	616		
	LI-AM5000 ...	550	666			450	566			600	716			500	616		
Top-on-top	LI-AM3200 ...	720	408			620	308			770	458			670	358		
	LI-AM4000 ...	816	408			716	308			866	458			766	358		
	LI-AM5000 ...	950	408			850	308			1000	458			900	358		
Copper																	
Single	LI-CM1000 ...	414	458	≥ 200 [3]	≥ 100	314	358	≥ 200 [3]	≥ 100	414	458	≥ 200 [3]	≥ 100	314	358	≥ 200 [3]	≥ 100
	LI-CM1250 ...	419	458			319	358			419	458			319	358		
	LI-CM1600 ...	450	458			350	358			450	458			350	358		
	LI-CM2000 ...	478	458			378	358			478	458			378	358		
	LI-CM2500 ...	517	458			417	358			517	458			417	358		
	LI-CM3200 ...	584	458			484	358			584	458	≥ 200		484	358	≥ 200	
Side-by-side	LI-CM4000 ...	478	716	≥ 200		378	616	≥ 200		478	716	≥ 200		378	616	≥ 200	
	LI-CM5000 ...	517	716			417	616			517	716			417	616		
	LI-CM6300 ...	584	716			484	616			584	716			484	616		
Top-on-top	LI-CM3200 ...	756	458			656	358			756	458			656	358		
	LI-CM4000 ...	834	458			734	358			834	458			734	358		
	LI-CM6300 ...	968	458			868	358			968	458			868	358		

[1] The opening dimensions a and b can be reduced to 20 mm up to the fire barrier block in order to still be able to close the wall or ceiling opening.
[2] The recommended minimum dimension is 200 mm. Smaller distances may also be possible in the individual case (on request).
[3] The recommended minimum dimension is 200 mm. Distance c1 can be reduced to 100 mm if the neighboring openings are each ≤ 400 mm × 400 mm.

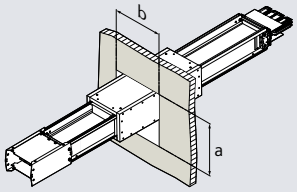
Tab. 7/51: **Dimensions and distances (dimensions in mm) for wall cut-outs and ceiling cut-outs with LI fire barrier in solid walls ≥ 150 mm**

Design in solid ceiling with thickness ≥ 150 mm

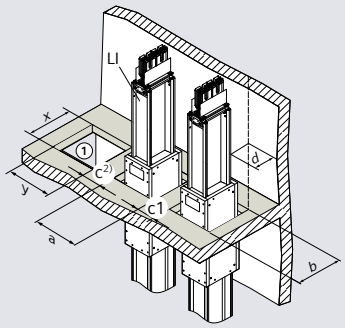
Wall cut-out,
edgewise trunking unit



Wall cut-out,
flat trunking unit



a/B = Maximum wall or ceiling opening dimensions



Distances to each other or to other installations/openings

	LI system	LI-...-EI90								LI-...-EI120							
		Closure type A				Closure type B				Closure type A				Closure type B			
		a [1]	b [1]	c1	d	a	b [1]	c1	d	a [1]	b [1]	c1	d	a	b [1]	c1	d
Aluminum																	
Single	LI-AM0800 ...	364	408	≥ 200 [3]	≥ 100	264	308	≥ 200 [3]	≥ 100	414	458	≥ 200 [3]	≥ 100	314	358	≥ 200 [3]	≥ 100
	LI-AM1000 ...	385	408			285	308			435	458			335	358		
	LI-AM1250 ...	400	408			300	308			450	458			350	358		
	LI-AM1600 ...	435	408			335	308			485	458			385	358		
	LI-AM2000 ...	483	408			383	308			533	458			433	358		
	LI-AM2500 ...	550	408			450	308			600	458	≥ 200		500	358	≥ 200	
Side-by-side	LI-AM3200 ...	435	666	≥ 200		335	566	≥ 200		485	716	≥ 200		385	616	≥ 200	
	LI-AM4000 ...	483	666			383	566			533	716			433	616		
	LI-AM5000 ...	550	666			450	566			600	716			500	616		
Top-on-top	LI-AM3200 ...	720	408			620	308			770	458			670	358		
	LI-AM4000 ...	816	408			716	308			866	458			766	358		
	LI-AM5000 ...	950	408			850	308			1000	458			900	358		
Copper																	
Single	LI-CM1000 ...	414	458	≥ 200 [3]	≥ 100	314	358	≥ 200 [3]	≥ 100	414	458	≥ 200 [3]	≥ 100	314	358	≥ 200 [3]	≥ 100
	LI-CM1250 ...	419	458			319	358			419	458			319	358		
	LI-CM1600 ...	450	458			350	358			450	458			350	358		
	LI-CM2000 ...	478	458			378	358			478	458			378	358		
	LI-CM2500 ...	517	458			417	358			517	458			417	358		
	LI-CM3200 ...	584	458			484	358			584	458	≥ 200		484	358	≥ 200	
Side-by-side	LI-CM4000 ...	478	716	≥ 200		378	616	≥ 200		478	716	≥ 200		378	616	≥ 200	
	LI-CM5000 ...	517	716			417	616			517	716			417	616		
	LI-CM6300 ...	584	716			484	616			584	716			484	616		
Top-on-top	LI-CM3200 ...	756	458			656	358			756	458			656	358		
	LI-CM4000 ...	834	458			734	358			834	458			734	358		
	LI-CM6300 ...	968	458			868	358			968	458			868	358		

[1] The opening dimensions a and b can be reduced to 20 mm up to the fire barrier block in order to still be able to close the wall or ceiling opening.
[2] The recommended minimum dimension is 200 mm. Smaller distances may also be possible in the individual case (on request).
[3] The recommended minimum dimension is 200 mm. Distance c1 can be reduced to 100 mm if the neighboring openings are each ≤ 400 mm × 400 mm.

Tab. 7/52: **Dimensions and distances (dimensions in mm) for wall cut-outs and ceiling cut-outs with LI fire barrier in solid ceilings ≥ 150 mm**

7.6 Functional Endurance of LI system

All LI trunking units can be equipped with a 3- or 4-side duct for functional endurance, and therefore fulfill the specifications of DIN 4102-12 (functional endurance classes E 15 ... E 90). The general description for functional endurance is given in Chapter 9. The dimensions and derating factors (referred to the rated current and an ambient temperature of +35 °C in the 24-h mean) are given in Tab. 7/53.

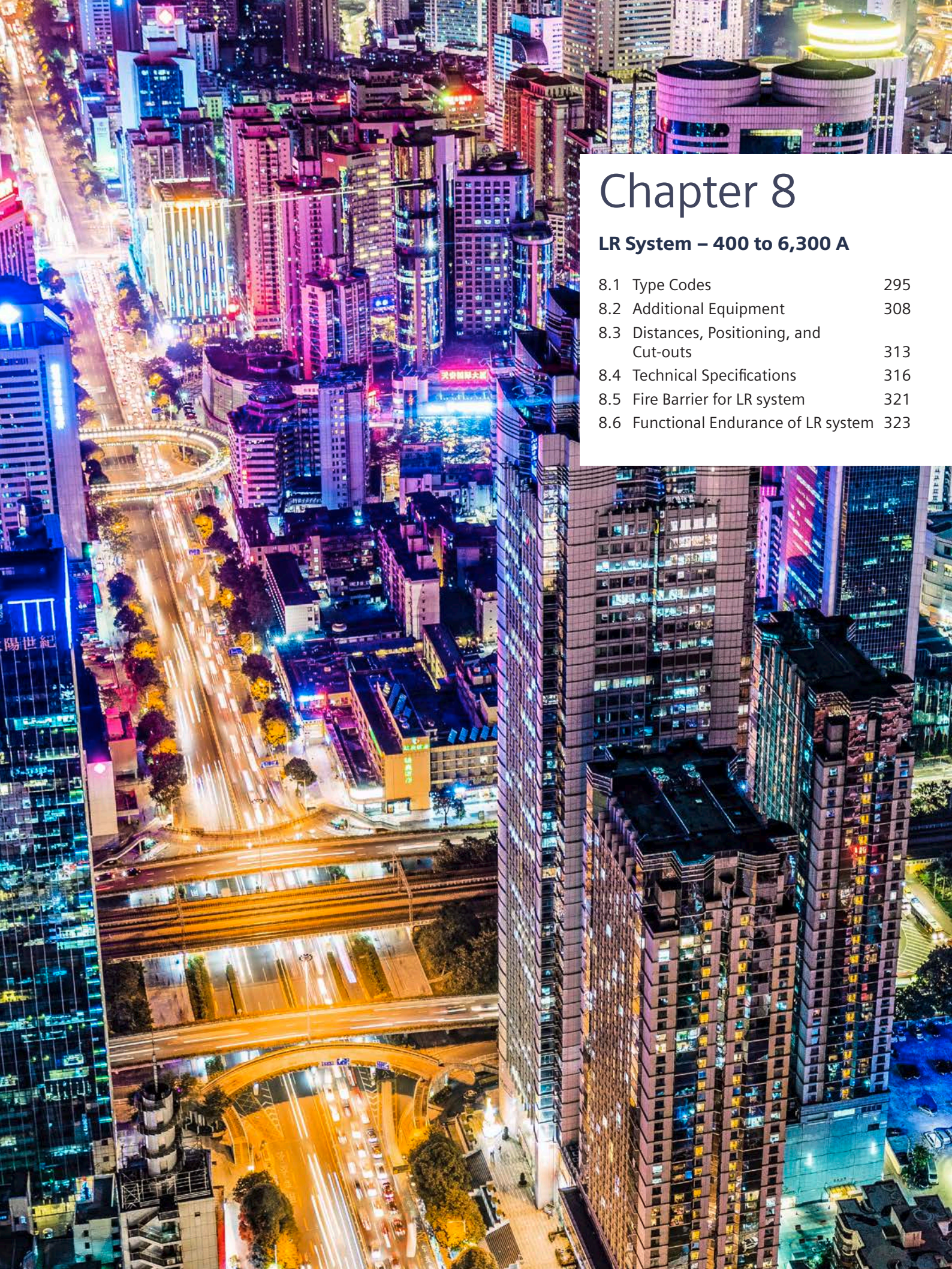
The general building inspectorate certificate (German: abP = allgemeines bauaufsichtliches Prüfzeugnis) with the approval number P-SAC-02/III-694 describes the design for

- ducts led on 4 sides in case of horizontal installation
- ducts on 3 sides for horizontal and vertical installation.

Please contact your Siemens partner for more information on functional endurance.

Busbar trunking system		PROMATECT® plates		External dimensions horizontal, edgewise (ducts on 4 sides)		External dimensions horizontal, flat (ducts on 4 sides)		Derating factors (all positions) for the barrier length of the functional endurance	
Type		Thickness	Plate type	Width	Height	Width	Height	≤ 3.20 m	> 3.20 mA
LI-A .	0800	45 mm	LS	300 mm	240 mm	250 mm	290 mm	0.55	0.61
	1000				260 mm	270 mm		0.56	0.62
	1250				280 mm	290 mm		0.53	0.58
	1600				310 mm	320 mm		0.52	0.58
	2000				360 mm	370 mm		0.56	0.61
	2500				430 mm	440 mm		0.55	0.61
	3200			550 mm	310 mm	on request	on request	0.57	0.59
	4000				360 mm			0.55	0.58
	5000				430 mm			0.54	0.57
LI-C .	1000			300 mm	240 mm	on request	on request	0.57	0.62
	1250				260 mm			0.53	0.58
	1600				280 mm			0.53	0.57
	2000				310 mm			0.52	0.57
	2500				360 mm			0.48	0.53
	3200				430 mm			0.54	0.59
	4000			550 mm	310 mm	on request	on request	0.50	0.53
	5000				360 mm			0.52	0.55
	6300				430 mm			0.58	0.61

Tab. 7/53: **Dimensions and derating factors for the functional endurance (functional endurance classes E 15 ... E 90) of the LI system**



Chapter 8

LR System – 400 to 6,300 A

8.1 Type Codes 295
8.2 Additional Equipment 308
8.3 Distances, Positioning, and Cut-outs 313
8.4 Technical Specifications 316
8.5 Fire Barrier for LR system 321
8.6 Functional Endurance of LR system 323

8 LR System – 400 to 6,300 A

The LR busbar trunking system (Fig. 8/1) is mainly used as:

- Power transmission system for extreme conditions
  - in unprotected outdoor environments
  - in case of aggressive ambient conditions (e.g., high air humidity, corrosive or saline atmospheres)
- Connection between transformer and switchboard
- Generator leads
- Motor supply.

Thanks to its cast epoxy resin enclosure with high degree of protection IP68 and high short-circuit withstand strength, the LR system is perfectly suitable for reliable power transmission, even under the harshest ambient conditions, and also for outdoor applications. The compact system is suitable for horizontal installation with edgewise or flat busbar position, as well as for vertical installation – as required – in applications from 400 A to 6,300 A. With only minimum space requirements, it can be optimally adjusted to the construction conditions with elbow elements, connectors, and T-elements for change of direction. Places of use are both the industrial sector and infrastructure projects such as railway stations, airports, or data centers.

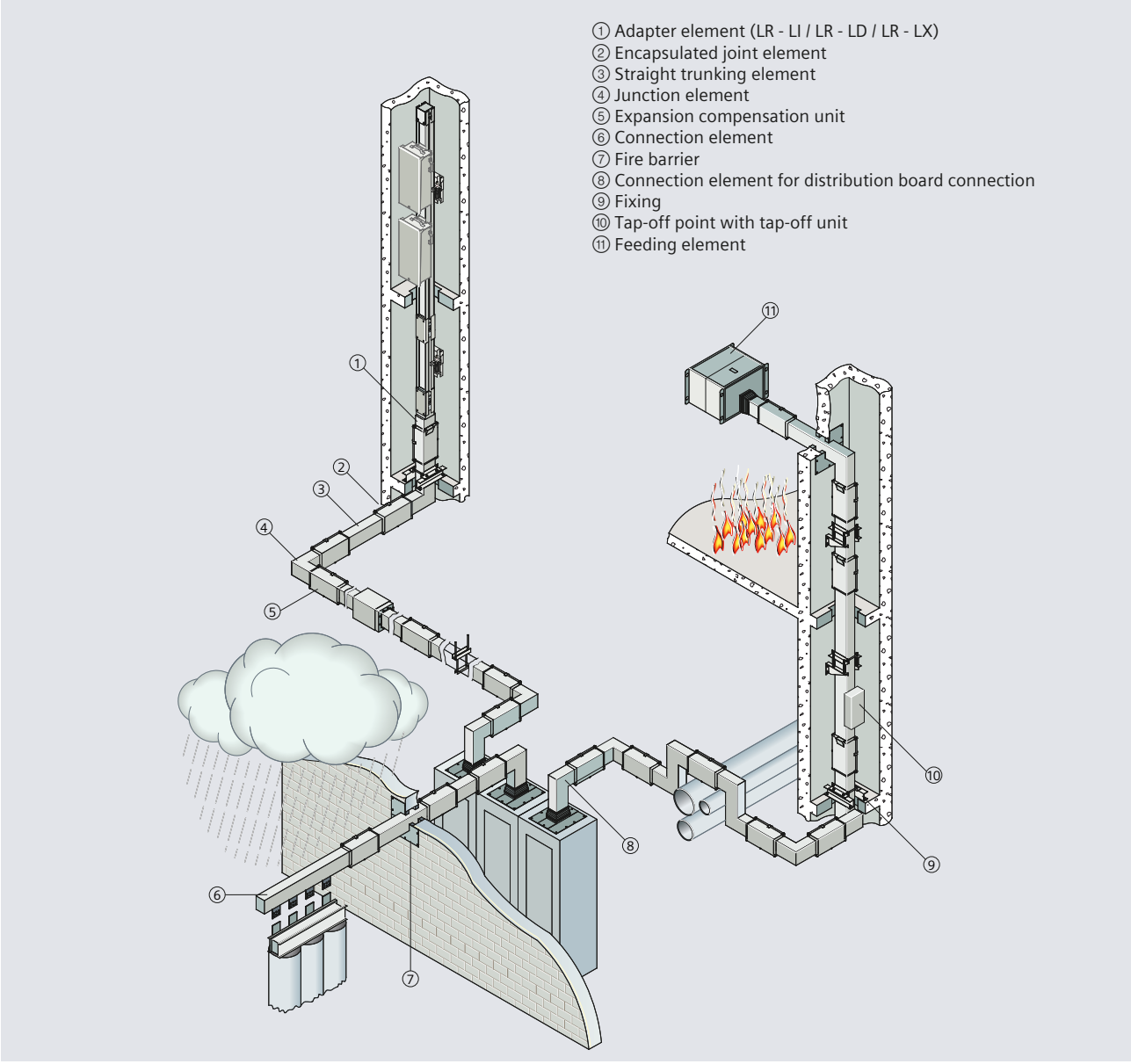


Fig. 8/1: **Overview of LR busbar trunking system**

Versions and properties

- Design verified low-voltage switchgear and controlgear assembly in accordance with IEC 61439-1/-6
- Enclosure made of cast epoxy resin for applications from 400 to 6,300 A with copper (Cu) or aluminum (Al) as conductor material
- The encapsulated design means that the current-carrying capacity is independent of the mounting position. Current derating is not required for edgewise and flat busbars in horizontal mounting position, as well as on rising main busbars (vertical mounting position)
- Color of the trunking elements: similar to RAL 7030, stone gray (other colors on request)
- 4-conductor and 5-conductor configurations for single and double bodies with 7 or 3 sizes, each for copper and aluminum (see Chapter 7.1)
- 3-conductor configuration available on request
- Aluminum busbars are nickel-tinned or copper-tinned
- The straight busbars, with a configurable length of 0.30 m up to 3.00 m are insulated over the entire length
- Resistance to internal faults and flame-retardant or self-extinguishing insulation in accordance with the standard series IEC 60332 (VDE 0482-332)
- High standard degree of protection IP68
- Maintenance-free
- High resistance against:
  – Fungal infestation, rodents, birds, and insects
  – Mechanical loads
  – Various chemicals
  – UV radiation
- High short-circuit withstand strength and low voltage drop
- Climatic resistance according to IEC 60068-2-78 (steady state) and IEC 60068-2-30 (cyclic); suitable for tropical climate and seawater atmosphere
- Halogen-free according to EN 50642 (VDE 0604-2-100)
- Fire barrier:
  – Functional endurance class E 90 possible as per DIN 4102-12
  – Fire resistance class EI 60 up to EI 120 for wall/ceiling cut-outs according to EN 1366-3 / EN 1363-1 / DIN 4102-9
  – Fire resistance duration 180 minutes according to IEC 60331-1

System components

- Straight trunking elements
- Tap-off units with enclosed interface for power pick-up up to 630 A, which are generally not pluggable while energized (available on request)
- Tap-off units for integration of a circuit breaker or customer-specific equipment (available on request)
- Joint blocks for electromechanical connection of individual trunking elements ensure that only trunking elements of identical size and conductor configuration can be connected. The connection points must be encapsulated
- Junction elements with elbow, offset elbow, knee, offset knee, Z-type, and T-type elements
- Feeding elements for transformer, distribution board, and cable connections
- Adapter elements to other high-current busbar trunking systems
- Expansion compensation units for compensation of thermal length expansion
- Phase alteration elements for compensation of potential gradients between individual phases
- Additional equipment such as casting material and fixing brackets.

Certifications and tests

- ATEX approval for explosive atmospheres (French: atmosphères explosibles): device group II, categories 3G and 3D according to Directive 2014/34/EU
- DNV-GL certificate for onboard application on ships and for offshore installations
- Ambient conditions and vibration tests:
  – IBC 2012 Class D
  – UBC 1997 Zone 4
  – EN 60068-3-3: 1993
  – EN 60068-2-6: 2008
  – EN 60068-2-47: 2005
  – ETGI-1020 (high earthquake risk; e.g., Chile)
- ISO 9001 / ISO 14001 / BS OHSAS 18001 (management certificates)
- Test on toxic gases in accordance with IEC 61034-2 (VDE 0482-1034-2), IEC 60754-1 and -2 (VDE 0482-754-1 and -2)
- Halogen-free design according to the safety data sheet of the material manufacturer.

PEP Ecopassport Environmental Product Declaration according to the ISO 14025 standard

8.1 Type Codes

The type codes for the different sizes (Tab. 8/1) depend on the rated current, the conductor material, and the conductor configuration. There are 10 different overall heights and 3 different widths for single and double bodies (Tab. 8/3). Single bodies carry 4 or 5 aluminum or copper busbars. Double bodies carry 8 or 10 busbars in an accordingly higher enclosure.

For most of the trunking elements, these type codes are complemented specifically for the design:

- Straight trunking elements: characteristic length specification (e.g., -0,5 or 1,0 or 3,0)
- Expansion compensation (-D)
- Adapter elements to other SIVACON 8PS busbar trunking systems (LR-LX, LR-LI, LR-LD): characteristic type code specifications to the subsequent system LX, LI, LD (e.g., LR ... -LX ..... or LR ... -LI .... 00 .. or LR ... -LD .... 0)
- Junction elements: elbow (-E) / knee (-K) / Z-elements right, left (-ZE) or front, rear (-ZK) / offset knee flat edgewise (-XL) or edgewise flat (-XR) / T-elements flat (-TV) or edgewise (-TR)

LR		A	NN	NN		-N	- ...
Conductor material							
Aluminum (Al)		A					
Copper (Cu)		C					
Rated current I_{nA}					Conductor height		
Al	Cu						
400 A	630 A		01		60 mm	-6	
630 A	800 A		02		60 mm	-6	
800 A	1,000 A		03		60 mm	-6	
1,000 A	1,350 A		04		80 mm	-8	
1,250 A	1,600 A		05		100 mm	-0	
1,400 A	1,700 A		06		120 mm	-2	
1,600 A	2,000 A		07		2 × 80 mm	-8	
2,000 A	2,500 A		08		2 × 100 mm	-0	
2,500 A	3,200 A		09		2 × 120 mm	-2	
3,200 A	4,000 A		27		2 × 2 × 80 mm	-8	
4,000 A	5,000 A		28		2 × 2 × 100 mm	-0	
5,000 A	6,300 A		29		2 × 2 × 120 mm	-2	
Conductor version							
4-conductor configuration (L1, L2, L3, PEN)				41			
5-conductor configuration (L1, L2, L3, PE, N)				51			
Busbar length (min. - max.)							
300 - 500 mm							-0,5
510 - 1,000 mm							-1,0
1,010 - 1,500 mm							-1,5
1,510 - 2,000 mm							-2,0
2,010 - 2,500 mm							-2,5
2,510 - 3,000 mm							-3,0

Tab. 8/1: **Type code structure for straight trunking elements of the LR system**

LR		A	NN	NN		-N	- ...
Conductor material							
Aluminum (Al)		A					
Copper (Cu)		C					
Rated current I_{nA}					Conductor height		
Al	Cu						
400 A	630 A		01		60 mm	-6	
630 A	800 A		02		60 mm	-6	
800 A	1,000 A		03		60 mm	-6	
1,000 A	1,350 A		04		80 mm	-8	
1,250 A	1,600 A		05		100 mm	-0	
1,400 A	1,700 A		06		120 mm	-2	
1,600 A	2,000 A		07		2 × 80 mm	-8	
2,000 A	2,500 A		08		2 × 100 mm	-0	
2,500 A	3,200 A		09		2 × 120 mm	-2	
3,200 A	4,000 A		27		2 × 2 × 80 mm	-8	
4,000 A	5,000 A		28		2 × 2 × 100 mm	-0	
5,000 A	6,300 A		29		2 × 2 × 120 mm	-2	
Conductor version							
4-conductor configuration (L1, L2, L3, PEN)				41			
5-conductor configuration (L1, L2, L3, PE, N)				51			
Specification of the requested option							
Fire barrier kit							-S120
Any phase alteration							-P

Complete type suffix for tap-off point up to 630 A	
2nd entry: in addition to the type code for straight trunking element	LR-AD

Tab. 8/2: **Selection keys for fire barrier kits and phase alteration elements, as well as for tap-off points to be specified as an addition to the type code as required**

- Connection elements with different arrangement of conductors (-TO / -TC / -TO-F / -TC-F / -TJ-F / -TG-F / -TM-F / -TK-F / -TX-F / -TD-F / -TE-F)
- Incoming cable connection elements (-KE).

For straight trunking elements with phase alteration, with tap-off point, or in case of addition of a fire barrier kit, the type code (Tab. 8/1) is amended with a type suffix (Tab. 8/2):
- Fire barrier kit: LR . . . . . - . -S120
- Phase alteration: LR . . . . . - . -P for any phase alterations in straight trunking elements
- Tap-off points: LR-AD for tap-off unit to type code LR... for straight trunking element.

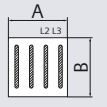
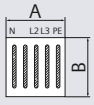
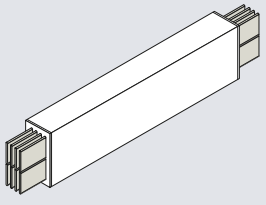
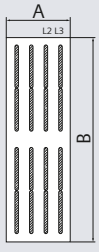
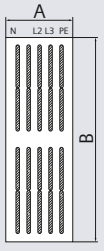
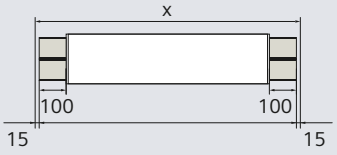
With the fire barrier kits, the trunking elements reach the fire resistance classes EI 90 or EI 120 beyond the standard fire resistance class EI 60. They are used for wall or ceiling cut-outs and consist of the following parts:
- "PROMATECT®-200" plates
- Sealing material "PROMASEAL®" for sealing the gaps between the busbar and the "PROMATECT®-200" plates.

Note: In Germany, an approval kit (type code: LRA-S120-ZUL-D or LRC-S120-ZUL-D) is required. To fill the mounting space between the plates and the masonry/ceiling, a fire protection mortar provided by the customer (for example, PROMASTOP® type S, Art. No. 705020 from Promat GmbH) must be used.

Order examples:
a) Straight length 1.7 m, conductor material Cu, rated current 2,000 A, 4-conductor configuration with fire barrier kit
Entry 1: LRC0741-8-2,0 (X = 1.7 m)
Entry 2: LRC0741-8-S120

a) Straight length 2.7 m, conductor material Al, rated current 800 A, 4-conductor configuration with any phase alteration
Entry 1: LRA0341-6-3,0 (X = 2.7 m)
Entry 2: LRA0341-6-P

a) Straight length 1.9 m, conductor material Cu, rated current 1,000 A, 4-conductor configuration with tap-off point
Entry 1: LRC0341-6-2,0 (X = 1.9 m)
Entry 2: LR-AD (D = 0.4 m).

4-conductor configuration				5-conductor configuration				4- and 5-conductor configuration
Type code	Width A in mm	Height B in mm	Dimensional drawing	Type code	Width A in mm	Height B in mm	Dimensional drawing	Side view
LR . 0141-6	90	90		LR . 0151-6	90	90		
LR . 0241-6		90		LR . 0251-6		90		
LR . 0341-6		90		LR . 0351-6		90		
LR . 0441-8	100	110		LR . 0451-8	120	110		
LR . 0541-0		130		LR . 0551-0		130		
LR..0641-2		150		LR . 0651-2		150		
LR..0741-8		190		LR . 0751-8		190		
LR . 0841-0		230		LR . 0851-0		230		
LR . 0941-2		270		LR . 0951-2		270		
LR . 2741-8	100	380		LR . 2751-8	120	380		Busbar length x: 300 to 3,000 mm 
LR . 2841-0		460		LR . 2851-0		460		
LR . 2941-2		540		LR . 2951-2		540		

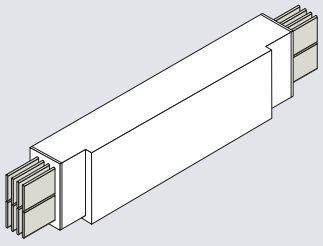
Tab. 8/3: **Sizes and dimensional drawings (dimensions in mm) for straight trunking elements (observe 15 mm space for joint blocks on each side). Order example: Straight length 1.7 m, conductor material Cu, 4-conductor configuration, rated current 2,000 A: LRC0741-8-2,0 (X = 1.7 m)**

Phase alteration elements

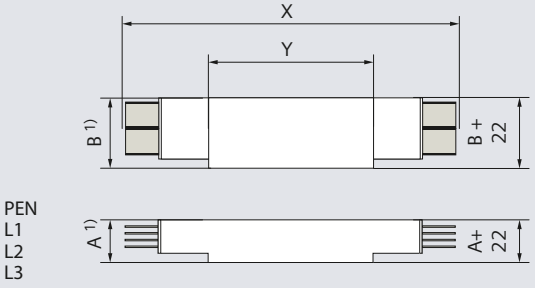
View and dimensions for phase alteration elements (type suffix LR ... -P) (neutral conductor alteration elements with type suffix LR ... -PN and phase alteration elements for voltage drops with type suffix LR ... -PS are available on request) are summarized in Fig. 8/2. For the phase alteration elements LR ... -P, the phases can be rearranged as required; this must be submitted in the additional specifications to the order.

Attention: Depending on the required phase rearrangement, the width Y varies for the phase alteration element (in Fig. 8/2, only minimum and maximum values are specified for the different rated currents).

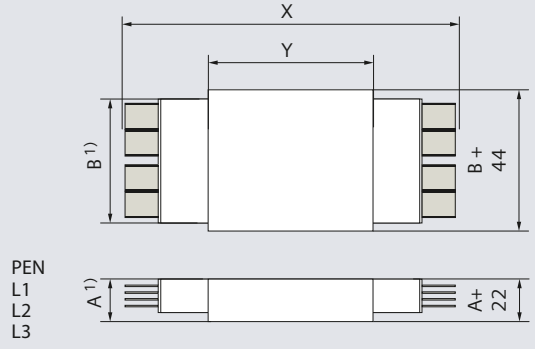
During power transmission over longer distances, the individual conductors may have differently high voltage drops due to the conductor configuration (typical distance: more than 90 m; the distance may also be shorter depending on the maximum permissible voltage drop). This effect can be compensated by the phase alteration elements LR ... -PS (on request). Three individual elements are configured on one third each of the total distance, which means that the initial phase position is reached at the end of the run. The phase alteration elements LR ... -PS may only be used for power transmission. No tap-off points and tap-off units may be used.



LR.01 to LR.09



LR.27 to LR.29



LR ... –P	X_{min} in mm	Y_{min} in mm	Y_{max} in mm
LR.01 - LR.03	1,000	155	435
LR.04	1,000	175	515
LR.05	1,000	195	595
LR.06	1,000	215	675
LR.07, LR.27	1,500	255	835
LR.08, LR.28	1,500	295	995
LR.09, LR.29	1,500	335	1,155

[1] For specifications on width A and height B, see Tab. 8/3

Fig. 8/2: **Views and dimensions (in mm) of the phase alteration elements LR ... -P and neutral conductor alteration elements LR ... -PN (illustrations for 4-conductor configuration)**

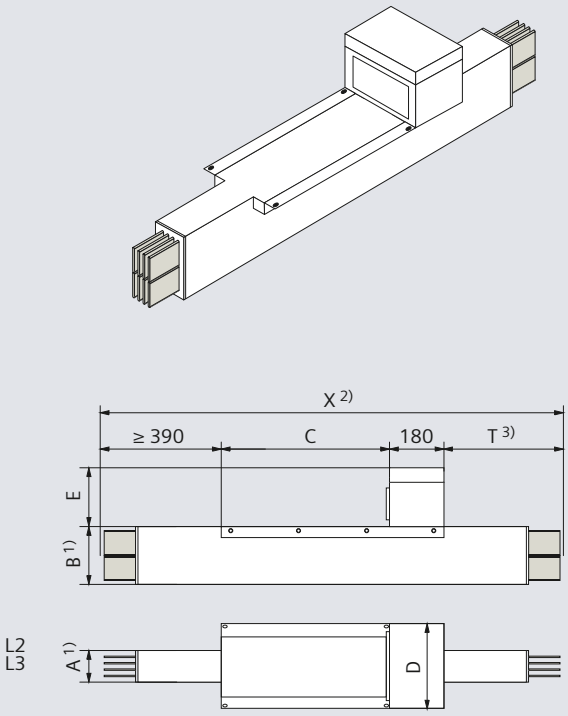
Tap-off points

Views and dimensions for trunking elements with tap-off point (type suffix LR-AD) are given in Fig. 8/3. Tap-off units up to 630 A are available on request. The tap-off units can generally not be plugged on/off while energized. Further information and the order data can be obtained from your Siemens contact partner.

For trunking elements with tap-off point, a minimum distance of 390 mm to the center of the joint block must be observed on either side for positioning the unit. Apart from that, the positioning can be selected freely, and the distance T in Fig. 8/3 must be submitted as an additional specification. Further properties and technical specifications must be clarified specifically to the project.

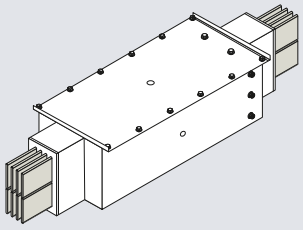
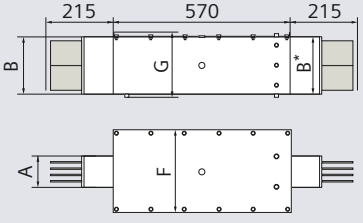
Adapter, expansion compensation, junction elements, connections

For adapter elements, expansion compensation units, junction elements (including T-elements), connection, and incoming cable connection elements, the characteristic structures of the respective type codes are listed in Fig. 8/4 up to Fig. 8/9 together with views, dimensions, versions, and examples. For junction elements and connection pieces, the length specifications X, Y, and possibly Z must be specified to the type codes as so-called "e-texts" in the SAP orders (see examples). On request, junction elements can be factory-assembled with a protective enclosure consisting of "PROMATECT®-200" plates (LR-SOND).



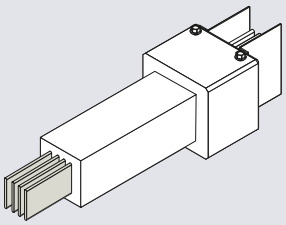
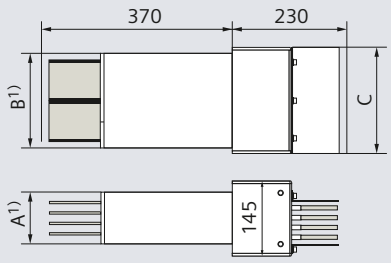
1) For specifications on width A and height B, see Tab. 8/3
2) The length X of the trunking element is 1,680 mm as a minimum and 3,000 mm as a maximum
3) The distance T between the tap-off unit and the center of the joint block must be 390 mm as a minimum

Fig. 8/3: **Views and dimensions (in mm) of the trunking elements with tap-off point**

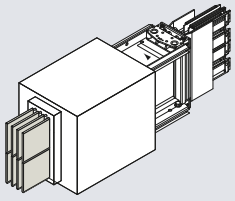
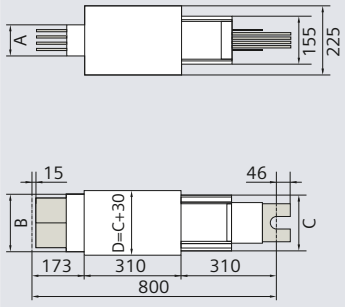
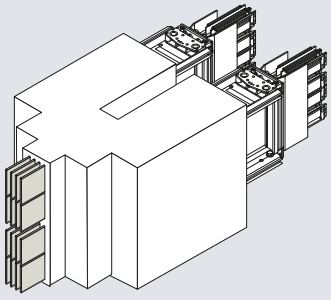
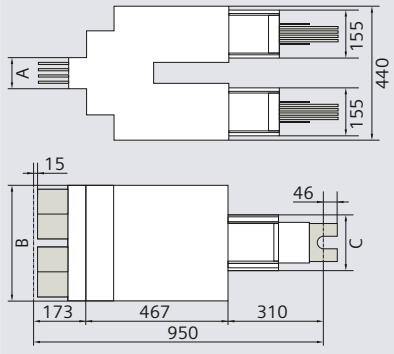
Type code	Width F in mm	Height G 1) in mm	Expansion compensation unit	Dimensional drawing
LR . 0141-.-D to LR . 0941-.-D	270	B + 30		
LR . 2741-.-D to LR . 2941-.-D	250	B + 45		
LR . 0151-.-D to LR . 0951-.-D	320	B + 30		
LR . 2751-.-D up to LR . 2951-.-	300	B + 45		

1) For specifications on width A and height B, see Tab. 8/3

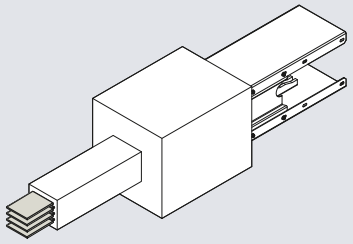
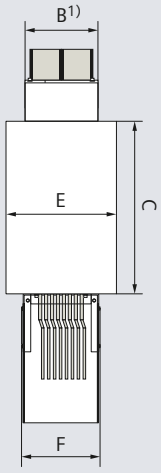
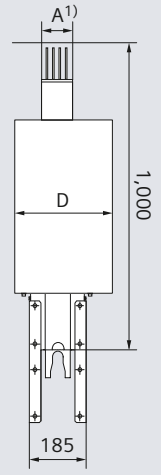
Tab. 8/4: **Type code structure and dimensions for expansion compensation units of the LR system (dimensions in mm); in the type code, "A" must be inserted for Al or "C" for Cu, as well as the ID number 0, 2, 6, or 8 for the conductor height according to Tab. 8/3. Example: type code for expansion compensation unit with Cu, 3,200 A, 4-conductor configuration = LRC0941-2-D**

Type code		Height C in mm	Adapter element	Dimensional drawing
LR . 03 . 1-6	-LX . 01 . 1	137		
LR . 04. 1-8	-LX . 02. 1	137		
LR . 05 . 1-0	-LX . 04. 1	162		
LR . 07 . 1-8	-LX . 05 . 1	207		
LR . 08 . 1-0	-LX . 06 . 1	287		
LR . 09 . 1-2	-LX . 07 . 1	287		
LR . 27 . 1-8	-LX . 08 . 1	439		
LR . 28 . 1-0	-LX . 09 . 1	599		
LRA29 . 1-2	-LXA10 . 1	599		
1) For specifications on width A and height B, see Tab. 8/3				

Tab. 8/5: **Type code structure and dimensions for adapter elements from the LR system to the LX system (dimensions in mm). In the type code, "A" must be inserted for Al or "C" for Cu, as well as the number of conductors (4, 5) accordingly for LR and LX. Example: type code for adapter element LR-LX with Al, 1,600 A, 4-conductor configuration = LRA0741-8-LXA0541**

Type code		Height C in mm	Adapter element	Dimensional drawing
LRA03 . 1	-LIAN0800 . .	111		 A = width of LR system 1) B = height of LR system 1) C = height of LI system
LRA04 . 1	-LIAN1000 . .	132		
LRA05 . 1	-LIAN1200 . .	146		
LRA07 . 1	-LIAN1600 . .	182		
LRA08 . 1	-LIAN2000 . .	230		
LRA09 . 1	-LIAN2500 . .	297		
LRC03 . 1	-LICN1000 . .	111		
LRC04 . 1	-LICN1250 . .	117		
LRC05 . 1	-LICN1600 . .	146		
LRC07 . 1	-LICN2000 . .	174		
LRC08 . 1	-LICN2500 . .	213		
LRC09 . 1	-LICN3200 . .	280		
LRA27 . 1	-LIAN3200 . .	182		 A = width of LR system 1) B = height of LR system 1) C = height of LI system
LRA28 . 1	-LIAN4000 . .	230		
LRA29 . 1	-LIAN4600 . .	297		
LRC27 . 1	-LICN4000 . .	174		
LRC28 . 1	-LICN5000 . .	213		
LRC29 . 1	-LICN6150 . .	280		
1) For specifications on width A and height B of the LR system, see Tab. 8/3				

Tab. 8/6: **Type code structure and dimensions (in mm) for adapter elements from the LR system to the LI system. In the type code, the number of conductors (4, 5) for LR and LI, as well as the PE conductor for LI (B = enclosure, H = PE busbar 100%) must be inserted for 5-conductor configurations. Attention: For LR, the identification of the conductor height is omitted. Example: type code for adapter element LR-LI with Al, 1,600 A, 5-conductor configuration, PE (LI) is the enclosure = LRA0751-LIAN16005B**

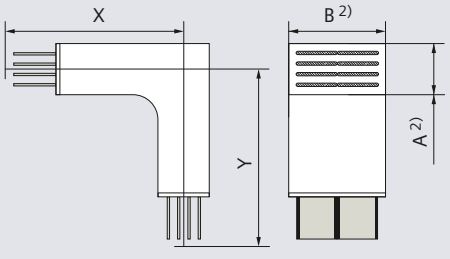
Type code		Length C in mm	Width D in mm	Height E in mm	Height F in mm	Dimensional drawing
LRA0441-8	-LDA2420	350	270	270	180	
LRA0541-0	-LDA2420	350	270	270	180	
LRA0641-2	-LDA3420	350	270	350	180	
LRA0741-8	-LDA3420	350	270	270	180	
LRA0841-0	-LDA5420	550	310	350	242	
LRA0941-2	-LDA5420	550	310	350	242	
LRA2741-8	-LDA7420	550	310	410	242	
LRA2841-0	-LDA8420	550	310	460	242	
LRC0741-8	-LDC2420	350	270	270	180	
LRC0841-0	-LDC3420	350	270	270	180	
LRC0941-2	-LDC6420	550	310	410	242	
LRC2741-8	-LDC7420	550	310	410	242	
LRC2841-0	-LDC8420	550	310	460	242	
LRA0451-8	-LDA2620	400	270	270	180	
LRA0551-0	-LDA2620	400	270	270	180	
LRA0651-2	-LDA3620	400	270	350	180	
LRA0751-8	-LDA3620	400	270	350	180	
LRA0851-0	-LDA5620	600	310	350	242	
LRA0951-2	-LDA5620	600	310	350	242	
LRA2751-8	-LDA7620	600	310	460	242	
LRA2851-0	-LDA8620	600	330	460	242	
LRC0751-8	-LDC2620	400	270	350	180	
LRC0851-0	-LDC3620	400	270	350	180	
LRC0951-2	-LDC6620	600	310	410	242	
LRC2751-8	-LDC7620	600	310	460	242	
LRC2851-0	-LDC7620	600	330	460	242	
LRA0841-0	-LDA5410	550	310	350	242	
LRA0941-2	-LDA5410	550	310	350	242	
LRA2741-8	-LDA7410	550	310	410	242	
LRA2841-0	-LDA8410	550	310	460	242	
LRA0851-0	-LDA5610	600	310	350	242	
LRA0951-2	-LDA5610	600	310	350	242	
LRA2751-8	-LDA7610	600	310	460	242	
LRA2851-0	-LDA8610	600	330	460	242	
LRC0941-2	-LDC6410	550	310	410	242	
LRC2741-8	-LDC7410	550	310	410	242	
LRC2841-0	-LDC8410	550	310	460	242	
LRC0951-2	-LDC6610	600	310	410	242	
LRC2751-8	-LDC7610	600	310	460	242	
LRC2851-0	-LDC7610	600	330	460	242	

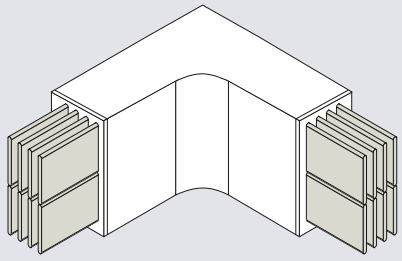
[1] For specifications on width A and height B of the LR system, see Tab. 8/3

Tab. 8/7: **Type code structure and dimensions (in mm) for adapter elements from the LR system to the LD system. Example: type code for adapter element LR-LD with Al, 1,600 A, 5-conductor configuration, LD with 100% N busbar = LRA0751-8-LDA3620**

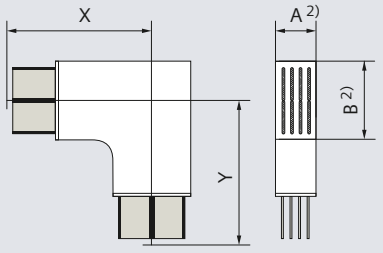
Type code		(X + Y) in mm		X in mm		Y in mm	
		min.	max.	min.	max.	min.	max.
LR . 01 . 1 to LR . 29 . 1 [1]	-E	600	600	300	300	300	300
	-E-1,0	610	1,000	300	700	300	700
	-E-1,5	1,010	1,500	300	1,200	300	1,200
LR . 01 . 1 to LR . 09 . 1 [1]	-K	700	700	350	350	350	350
	-K-1,0	710	1,000	350	650	350	650
	-K-1,5	1,010	1,500	350	1,150	350	1,150
LR . 27 . 1 to LR . 29 . 1 [1]	-K-1,0	1,000	1,000	500	500	500	500
	-K-1,5	1,010	1,500	500	1,000	500	1,000

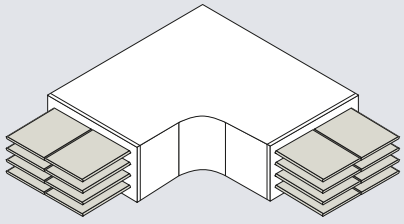
Dimensional drawing of edgewise elbow (LR ... -E)





Dimensional drawing of flat elbow (LR ... -K)



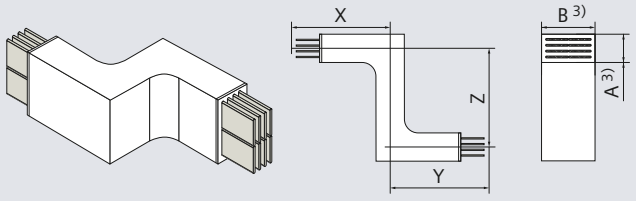


[1] Specifications for the respective conductor height (-0, -2, -6, -8) must be inserted in the type code in front of the addition for the junction element
[2] For width A and height B, see Tab. 8/3

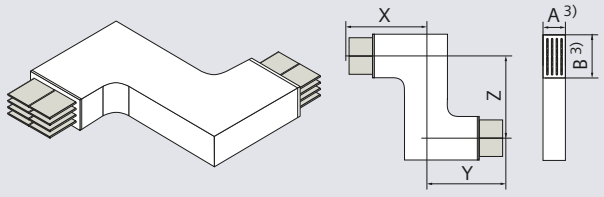
Tab. 8/8: **Type code structure and dimensions (in mm) for edgewise angles (elbow ... -E) and flat angles (knee ...-K) of the LR system. In the type code, Al or Cu (A, C) and the number of conductors (4 or 5) must be inserted. Example: type code for elbow element with Cu, 2,000 A, 5-conductor configuration, length X = 0.55 m and Y = 0.9 m: LRC0751-8-E-1,5 (X = 0.55 m / Y = 0.9 m)**

Type code		X + Y + Z in mm		X in mm		Y in mm		Z in mm	
		min.	max.	min.	max.	min.	max.	min.	max.
LR . 01 . 1 to LR . 29 . 1 [1]	-ZE	610	1,400	300	700	300	700	10	700
LR . 01 . 1 to LR . 09 . 1 [1]	-ZK	710	1,400	350	700	350	700	10	700
LR . 27 . 1 to LR . 29 . 1 [1]	-ZK	1,010	2,000	500	700	500	700	10	1,000
LR . 01 . 1-6 to LR . 03 . 1-6	-XL or -XR	740	1,400	300	700	350	700	90	700
LR . 0441-8 / LR . 0451-8	-XL or -XR	755/765 [2]	1,400	300	700	350	700	105/115 [2]	700
LR . 0541-0 / LR . 0551-0	-XL or -XR	765/775 [2]	1,400	300	700	350	700	115/125 [2]	700
LR . 0641-2 / LR . 0651-2	-XL or -XR	775/785 [2]	1,400	300	700	350	700	125/135 [2]	700
LR . 0741-8 / LR . 0751-8	-XL or -XR	795/805 [2]	1,400	300	700	350	700	145/155 [2]	700
LR . 0841-0 / LR . 0851-0	-XL or -XR	815/825 [2]	1,400	300	700	350	700	165/175 [2]	700
LR . 0941-2 / LR . 0951-2	-XL or -XR	835/845 [2]	1,400	300	700	350	700	185/195 [2]	700
LR . 2741-8 / LR . 2751-8	-XL or -XR	1,040/1,050 [2]	2,000	300	700	500	1,000	240/250 [2]	1,000
LR . 2841-0 / LR . 2851-0	-XL or -XR	1,080/1,090 [2]	2,000	300	700	500	1,000	280/290 [2]	1,000
LR . 2941-2 / LR . 2951-2	-XL or -XR	1,120/1,130 [2]	2,000	300	700	500	1,000	320/330 [2]	1,000
LR . 01 . 1 to LR . 09 . 1 [1]	-TV	1,050		350		350		350	
LR . 27 . 1 to LR . 29 . 1 [1]	-TV	1,500		500		500		500	
LR . 01 . 1 to LR . 09 . 1 [1]	-TV-2,0	1,060	2,000	350	1,150	350	1,150	350	500
LR . 27 . 1 to LR . 29 . 1 [1]	-TV-2,0	1,510	2,000	500	1,000	500	1,000	500	700

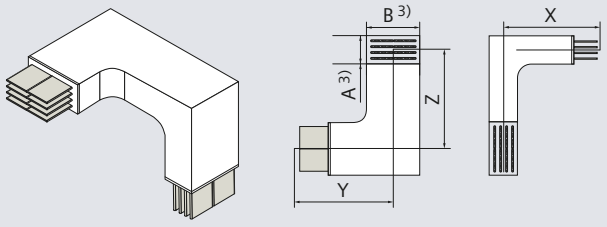
Z-element right / left: LR ... -ZE



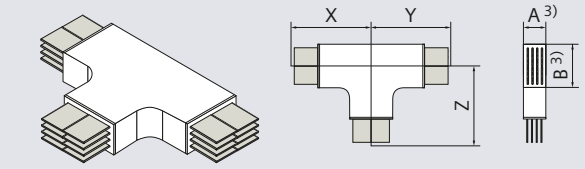
Z-element front / rear: LR ... -ZK



Offset knee right / left: LR ... -XR / LR ... -XL



T-element flat: LR ... -TV



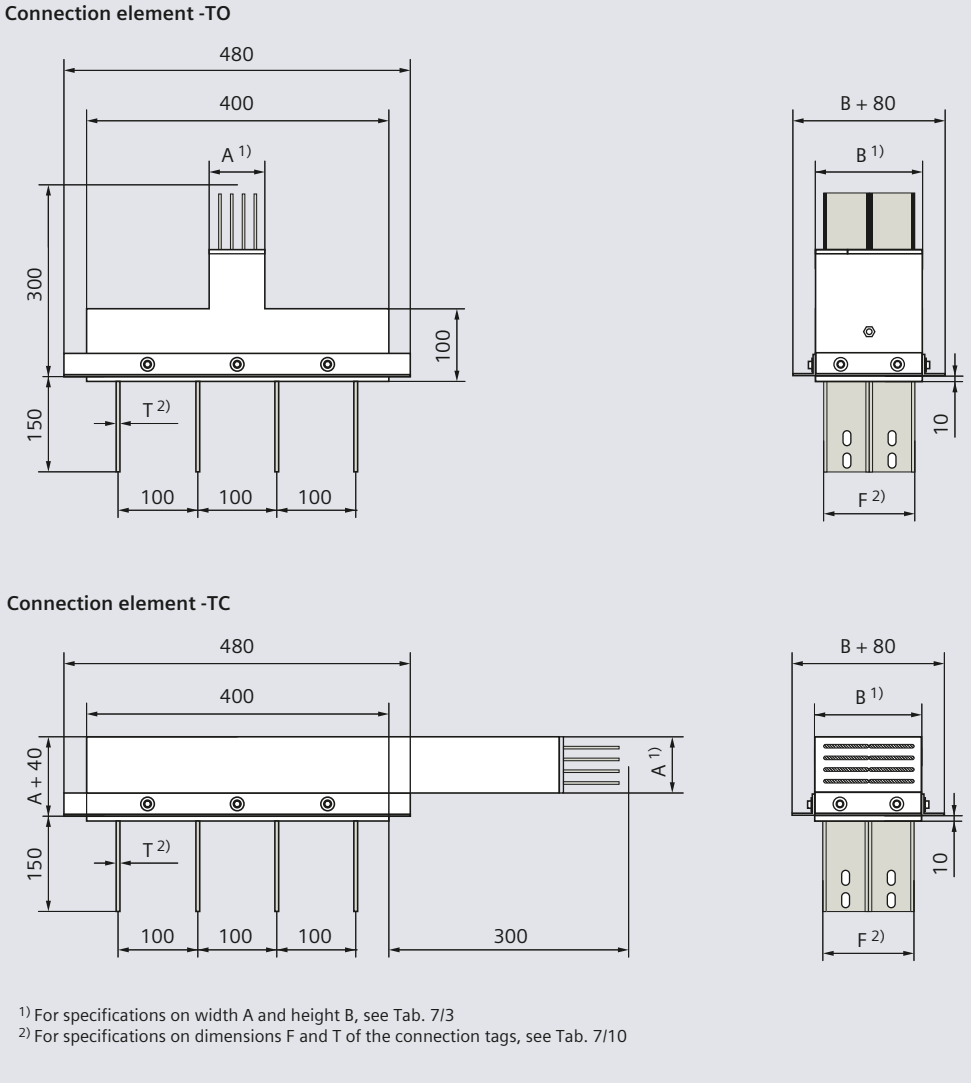
[1] Specifications for the respective conductor height (-0, -2, -6, -8) must be inserted in the type code in front of the addition for the junction element
[2] Specifications for 4-conductor configuration / 5-conductor configuration
[3] For width A and height B, see Tab. 8/3

Tab. 8/9: **Type code structure and dimensions for double angles (offset) and T-element of the LR system (dimensions in mm): -ZE = Z-element right/left; -ZK = Z-element front/rear; -XL / -XR = offset knee right/left; -TV = T-element flat. In the type code, Al or Cu (A, C) and the number of conductors (4 or 5) must be inserted. Example: type code for Z-element front/rear with Al, 2,000 A, 4-conductor configuration, length X = 0.4 m, Y = 0.7 m, and Z = 0.2 m: LRA0841-0-ZK (X = 0.4 m / Y = 0.7 m / Z = 0.2 m)**

To meet the variety of transformers and distribution boards as well as the different network and installation conditions, there are numerous different connection elements (up to 6,300 A) as 4- or 5-conductor configurations, and with Al or Cu as conductor material. In the dimensional drawings of Fig. 8/4 and Fig. 8/5, only the connection elements with 4 conductors are shown.

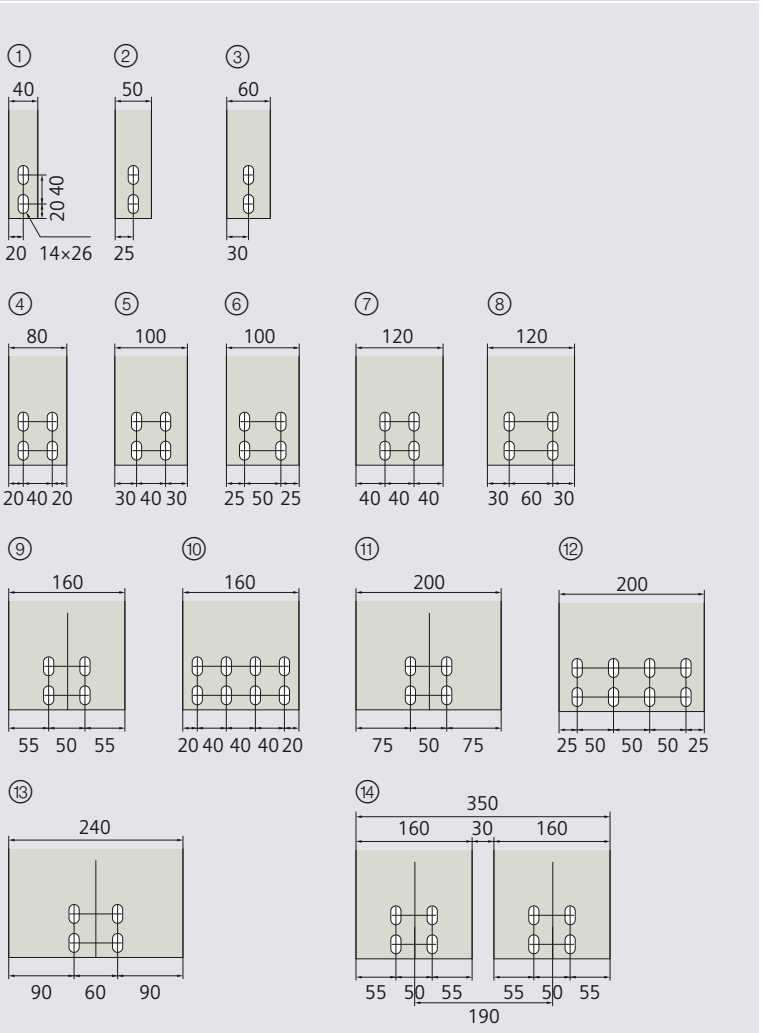
The dimensions of the connection elements LR....-..-TO and LR....-.6.-TC in Fig. 8/4 are firmly correlated with the values "A" and "B" (see Tab. 8/3). The dimensions and hole patterns of the tags can be found in Tab. 8/11.

Further connection elements LR....-..-T.-F with dimensions that can be selected within certain limits are shown in Fig. 8/5. The design-specific values are given in Tab. 8/10.



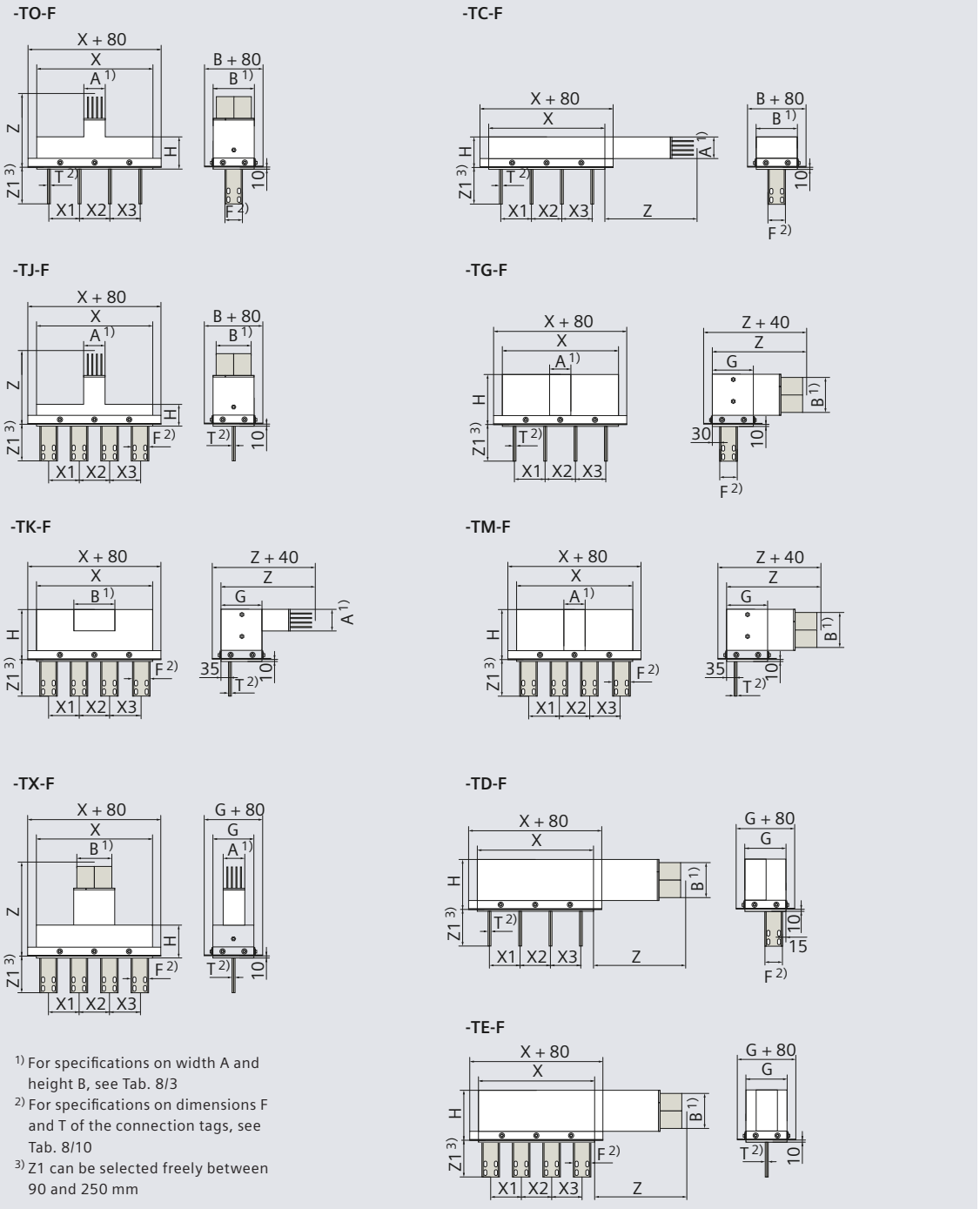
1) For specifications on width A and height B, see Tab. 7/3
2) For specifications on dimensions F and T of the connection tags, see Tab. 7/10

Fig. 8/4: **Dimensional drawings (dimensions in mm) for connection elements LR ... –TO and LR ... –TC to distribution boards or transformers (only elements with 4-conductor configuration are shown)**

Type code LR ... [1]	Width F × thickness T in mm for tags of connection elements		Hole patterns for connection tags Dimensions in mm
	...-TO / ...-TC	...-T.-F [2]	
.01.1-6	60 × 3	40 × 10 50 × 10 60 × 10	
.02.1-6	60 × 4		
.03.1-6	60 × 6		
.04.1-8	80 × 6	50 × 20 60 × 10 80 × 10	
.05.1-0	100 × 6	50 × 20 60 × 20 80 × 10 100 × 10	
.06.1-2	120 × 6.3 (Al) 120 × 6.2 (Cu)	60 × 20 80 × 10 100 × 10	
.07.1-8	160 × 6	60 × 20 80 × 20 100 × 10 120 × 10	
.08.1-0	200 × 6	80 × 20 100 × 20 120 × 20	
.09.1-2	240 × 6.3 (Al) 240 × 6.2 (Cu)	100 × 30 120 × 20 160 × 10	
.27.1-8	2*160 × 6	100 × 40 120 × 30 160 × 20 200 × 20	
.28.1-0	2*200 × 6	100 × 50 120 × 40 160 × 30 200 × 20	
.29.1-8	2*240 × 6.3 (Al) 2*240 × 6.2 (Cu)	120 × 50 160 × 40 200 × 30	

[1] For the type code, "A" or "C" must be added for the conductor material, and "4" or "5" for the number of conductors
[2] For the connection elements LR...-T.F, the respective specification "O", "C", "J", "G", "M", "K", "X", "D", or "E" must be inserted

Tab. 8/10: **Tag widths and tag thicknesses T for connection tags of the LR system, and associated hole patterns (dimensions in mm)**



1) For specifications on width A and height B, see Tab. 8/3
2) For specifications on dimensions F and T of the connection tags, see Tab. 8/10
3) Z1 can be selected freely between 90 and 250 mm

Fig. 8/5: **Dimensional drawings (dimensions in mm) for the connection elements LR ... –T.-F (only elements with 4-conductor configuration are shown). For values of the variable dimensions G, H, X, Z, see Tab. 8/11**

Type code LR ... [1]			X1, X2, X3 (,X4) in mm [3]	X_{min} in mm [3]	X_{max} in mm [3]	Z_{min} in mm [3]	Z_{max} in mm [3]	G in mm [3]	H in mm [3]
.01.1 to .29.1	-TC-F		min. 2*T+50	4-conductor configuration: T+100+X1+X2+X3 5-conductor configuration: T+100+X1+X2+X3+X4	800	200	500	-	-
.01.1 to .29.1	-TD-F	Offset r/l [2]						A+F+15	B+40
.01.1 to .29.1	-TO-F					300		-	4 L [4]: 120 5 L [4]: 140
.01.1 to .29.1	-TG-F					F+245		F+85	B+40
.0141 to .2941	-TE-F	4 conductors [5]	min. F+25	F+100+X1+X2+X3	1,200	200	500	2*T+190	B+40
.0151 to .2951		5 conductors [5]		F+100+X1+X2+X3+X4				3*T+225	
.0141 to .2941	-TJ-F	4 conductors		F+100+X1+X2+X3		300		-	T+85
.0151 to .2951		5 conductors		F+100+X1+X2+X3+X4				-	T+125
.0141 to .2941	-TM-F	4 conductors		F+100+X1+X2+X3		T+255		T+95	B+40
.0151 to .2951		5 conductors		F+100+X1+X2+X3+X4		T+295		T+135	
.0141 to .0941	-TK-F	4 conductors [5]		F+100+X1+X2+X3		B+T+290	700	B+T+130	2*T+205
.2741 to .2941						B/2+T+290		B/2+T+130	
.0151 to .0951		5 conductors [5]		F+100+X1+X2+X3+X4		B+T+290		B+T+130	3*T+245
.2751 to .2951						B/2+T+290		B/2+T+130	
.0141 to .0941	-TX-F	4 conductors [5]		F+100+X1+X2+X3		B+260		2*T+210	B+100
.2741 to .2941						B/2+260			B/2+100
.0151 to .0951		5 conductors [5]		F+100+X1+X2+X3+X4		B+260		3*T+250	B+100
.2751 to .2951						B/2+260			B/2+100

[1] Specifications for the respective conductor height (-0, -2, -6, -8) must be inserted in the type code in front of the addition for identification of the connection element
[2] The offset "right" or "left" must be specified in the manufacturing instructions with the dimensions for X1, X2, X3 and, if required, for X4, Z, Z1, F, and T
[3] For specifications on width A and height B for the different sizes, see Tab. 8/3; for specifications on the dimensions F and T for connection tags, see Tab. 8/10
[4] Height H for 4- or 5-conductor configuration
[5] The phase sequence of the conductors can be selected freely and must be specified in the manufacturing instructions

Tab. 8/11: **Type code structure and dimensions (in mm) for the different sizes of the connection elements LR... -T from Fig. 8/5. To increase X_{max} by 0.1 respectively, an additional entry: LR ... -0,1 can be made for the specified connection elements (see example 2)**

Examples for type codes of connection elements

Example 1:
Connection element TO with Cu, 5-conductor configuration, 4,000 A

LRC2751-8-TO

Example 2:
Connection element TO-F with Cu, 5-conductor configuration, 4,000 , height Z = 0.5 m, regular tag distances 0.2 m, and width X = 1 m by addition of 0.1 m on each side, respectively

Entry 1: LRC2751-8-TO-F (Z1 = 0.17 m, F = 0.16 m, T = 0.02 m, Z=0.5 m, X1 = X2 = X3 = X4 = 0.2 m)

Entry 2: 2 × LRC2751-8-0,1

Incoming cable connection elements LR.... -. -KE

With the incoming cable connection elements (LR....-.-KE) (Fig. 8/6), single-core or multi-core cables can be connected. Cross-sections up to 300 mm² (bolt terminal) can be directly connected to the connection tags of the incoming cable connection element, and then encapsulated. The material required to do this (casting shell and casting compound) is supplied as well. The degree of protection of the incoming cable connection elements encapsulated with the compound is IP68.

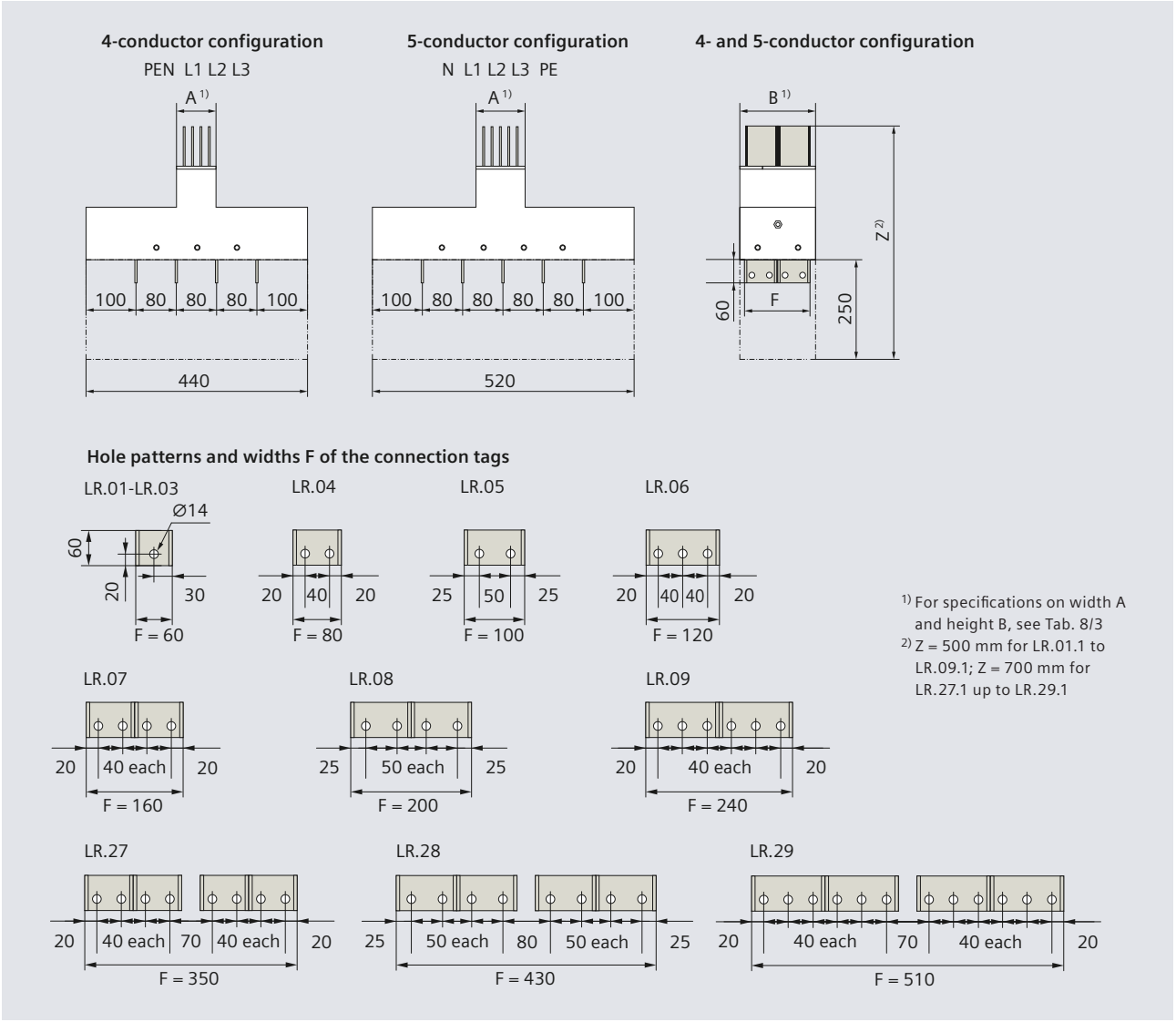


Fig. 8/6: **Dimension drawings (dimensions in [mm) for the incoming cable connection elements LR....-.–KE and associated connection tags with hole patterns. Order example: Incoming cable connection element KE with Cu, 5-conductor configuration, 4,000 A: LRC2751-8-KE**

8.2 Additional Equipment

To join busbar runs and their fixing, there are:
- Joint blocks -KB
- Additional equipment for encapsulating the connection points with epoxy resin
- Fixing elements for horizontal and vertical busbar runs.

Joint blocks

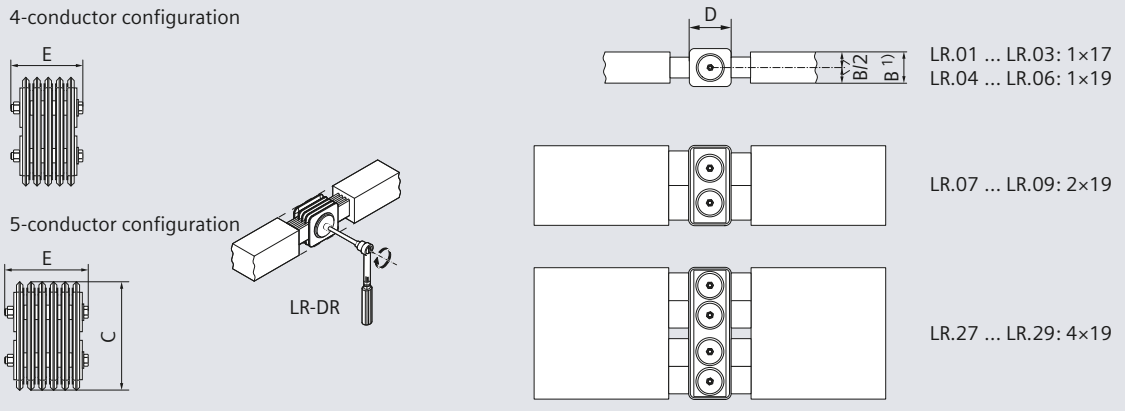
The joint block is used for the electrical and mechanical connection of trunking units (Tab. 8/12). The trunking elements LR are generally delivered without connecting elements (joint blocks, or also called monoblocks). Thus, the joint blocks must always be considered, planned, and ordered separately according to the number of trunking element connections.

To insert the joint blocks, the distance between the busbar ends must be about 30 mm. The type code depends on the conductor material, the size, and the conductor configuration (4- or 5-conductor configuration):

LR . . . . 1- . -KB

Order example: Joint block material Al, 2,000 A, 4-conductor configuration = LRA0841-0-KB

Note: For vertical installation edgewise to the wall, an additional space (minimum 10 mm between the wall and the epoxy enclosure of the trunking elements) must be provided, as the joint block must be mounted from the side.



Type code for 4-conductor configuration	Number of bolts	Height C in mm	Width D in mm	Depth E in mm	Type code 5-conductor configuration	Number of bolts	Height C in mm	Width D in mm	Depth E in mm
LR . 0141-6-KB	1	110	120	80	LR . 0151-6-KB	1	110	120	100
LR . 0241-6-KB	1	110	120	85	LR . 0251-6-KB	1	110	120	95
LR . 0341-6-KB	1	110	120	95	LR . 0351-6-KB	1	110	120	110
LR . 0441-8-KB	1	120	140	120	LR . 0451-8-KB	1	120	140	140
LR . 0541-0-KB	1	140	120	120	LR . 0551-0-KB	1	120	140	140
LR . 0641-2-KB	1	140	120	120	LR . 0651-2-KB	1	140	120	140
LR . 0741-8-KB	2	190	120	120	LR . 0751-8-KB	2	190	120	140
LR . 0841-0-KB	2	230	120	120	LR . 0851-0-KB	2	230	120	140
LR . 0941-2-KB	2	270	120	120	LR . 0951-2-KB	2	270	120	140
LR . 2741-8-KB	4	380	120	120	LR . 2751-8-KB	4	380	120	140
LR . 2841-0-KB	4	460	120	120	LR . 2851-0-KB	4	460	120	140
LR . 2941-2-KB	4	540	120	120	LR . 2951-2-KB	4	540	120	140

[1] For specifications on width B, see Tab. 8/3

Tab. 8/12: **Joint blocks for the different sizes; torque wrench LR-DR as mounting accessories (dimensions in mm)**

Casting shells

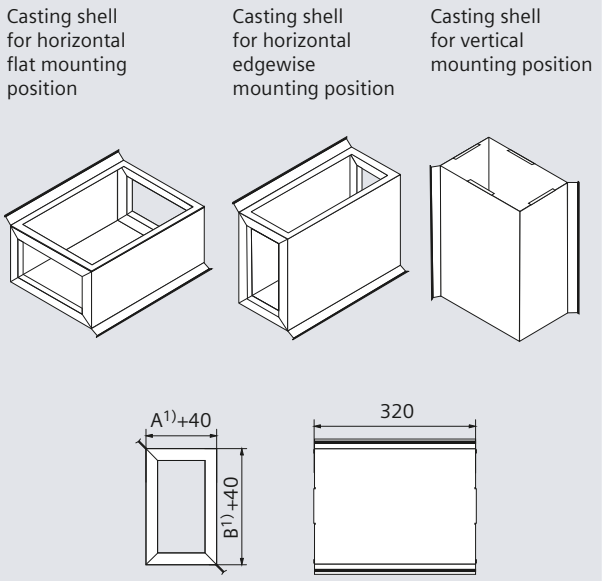
The connection point with the joint block muss be encapsulated with epoxy resin. As additional equipment for this, there are casting shells (vertical, horizontal with edgewise or flat busbar position), casting compound (resin and curing agent), release agent (for pre-treatment of the casting shell), and various tools (e.g., for mixing, filling, grinding). According to Tab. 8/13, the dimensions for the connection points are about 20 mm larger than the busbar dimensions. Different casting shells are available specifically to the number of conductors, the size, and the mounting position (type codes in Tab. 8/13).

Note: For 4 connection points, one casting shell is delivered as standard without needing an order (for ≤ 8 connection points, 2 casting shells are always delivered; Tab. 8/14). If more casting shells are required for installation, these have to be ordered additionally. There are 3 different sets available: casting shell for horizontal flat or edgewise mounting position, as well as casting shell for vertical mounting position (see Tab. 8/13).

Number of connection points	Number of casting shell sets
≤ 8	2
9 - 12	3
13 - 16	4
17 - 20	5
21 - 24	6
25 - 28	7
29 - 32	8
33 - 36	9
37 - 40	10
41, 44	11
45 - 48	12
49 - 52	13
53 - 56	14
57 - 60	15

Tab. 8/14: **Casting shells delivered according to the number of connection points**

LR	- N	F	A	N/N	Views and dimensions (in mm)
System LRA / LRC (number of conductors)					
LR . 0141 - LR . 0341 (4-conductor configuration) and LR . 0151 - LR . 0351 (5-conductor configuration)	5 [2]				
LR . 0441 - LR . 2941 (4-conductor configuration)	4				
LR . 0451 - LR . 2951 (5-conductor configuration)	6				
Mounting position					
Horizontal edgewise			D		
Horizontal flat			F [2]		
Vertical			V		
Size					
01 up to 03				8 / 10-N	
04				11 / 13-N	
05				13 / 17-N	
06				16 / 19-N	
07				17 / 20-N	
08				20 / 25-N	
09				24 / 31-N	
27				34 / 40-N	
28				40 / 50-N	
29				49 / 63-N	



[1] For specifications on width A and height B, see Tab. 8/3
[2] For LR . 01 .1 to LR . 03 . 1 with square cross-section, there are only casting shells "D" available (horizontal edgewise mounting position) and "V" (vertical mounting position)

Tab. 8/13: **Type code structure, views, and dimensional drawings for casting shells (dimensions in mm)**

Fixing

Fixing brackets are available for horizontal (edgewise or flat busbar position) and vertical installation (Fig. 8/7). The minimum distance from horizontal fixings to a busbar connection is 250 mm or more. A maximum permissible fixing distance of 1.5 m between two fixing points must be observed. For trunking elements with a length of 2 up to 3 m, it is advisable to use two fixing elements. The different weights of single and double bodies should be considered when selecting the fixing brackets.

Please observe that the so-called fixed point fixings can only be used for long busbar runs in connection with expansion compensation units. Fig. 8/8 shows the dimensions for the fixing elements. The sizes C, D, E, and F in Fig. 8/8, which depend on the busbar type, are summarized in Tab. 8/15. Distances and cut-outs that are already to be considered during the planning are summarized in Fig. 8/9.

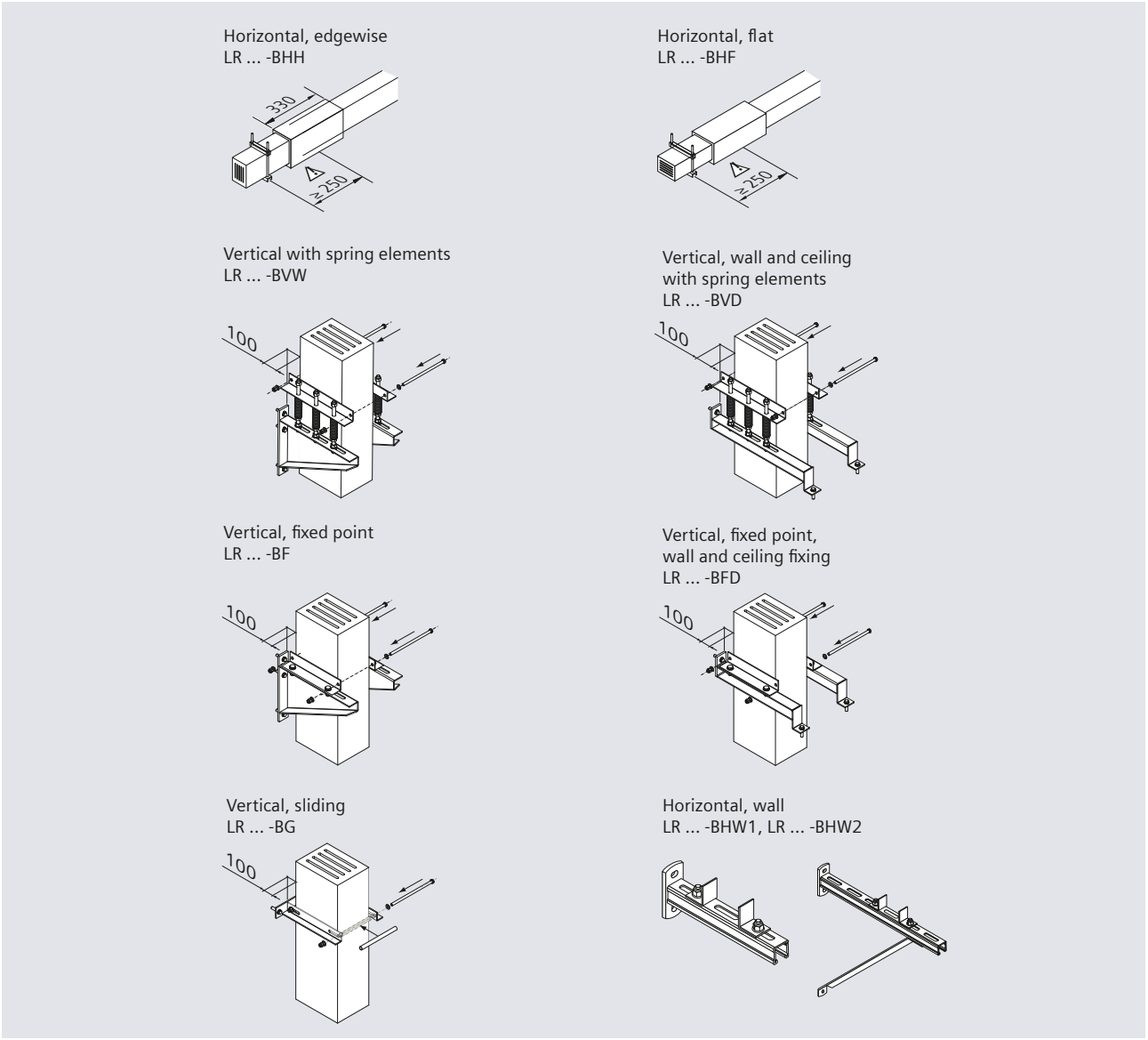
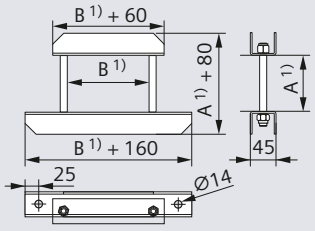
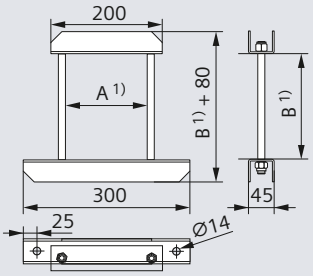


Fig. 8/7: **Fixing elements for LR system (dimensions in mm)**

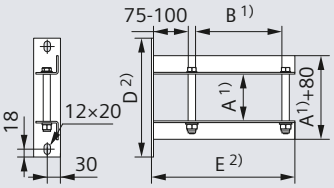
LR ... -BHF



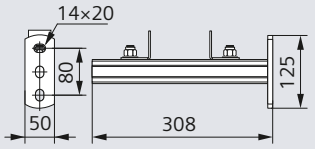
LR ... -BHH



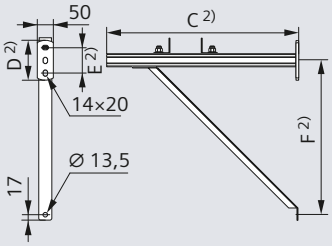
LR ... -BG



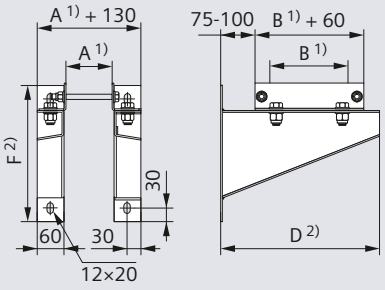
LR ... -BHW1



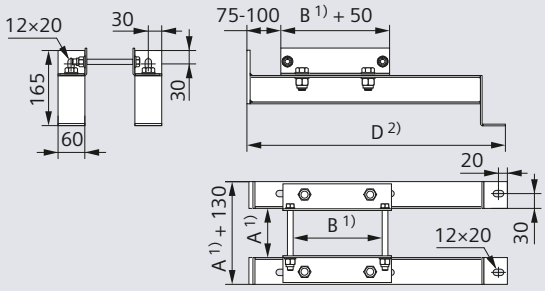
LR ... -BHW2



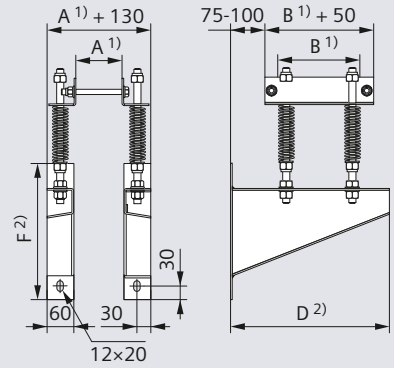
LR ... -BF



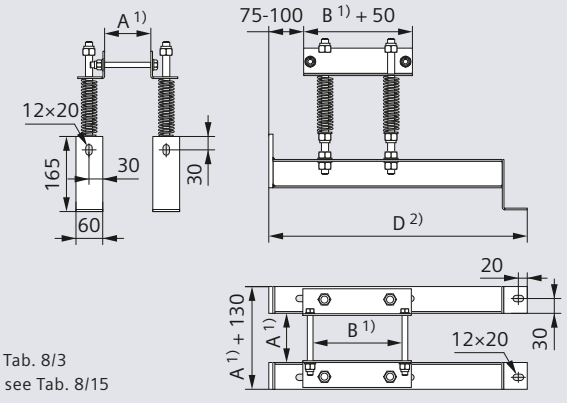
LR ... -BFD



LR ... -BVW



LR ... -BVD



1) For specifications on width A and height B, see Tab. 8/3
2) For specifications on dimensions C, D, E, and F, see Tab. 8/15

Fig. 8/8: **Fixing elements for LR system (dimensions in mm)**

Fixing type	LR system	C	D	E	F
BHW1	LR . 01.1 to LR . 07.1	308 mm	125 mm	80 mm	
BHW2	LR . 08.1 to LR . 09.1	458 mm	125 mm	80 mm	291 mm
	LR . 27.1 to LR . 29.1	758 mm	165 mm	120 mm	510 mm
BG	LR . 01.1 to LR . 03.1		265 mm	224 mm	
	LR . 0441 to LR . 064.1		265 mm	280 mm	
	LR . 0451 to LR . 065.1		285 mm	280 mm	
	LR . 0741		265 mm	320 mm	
	LR . 0751		285 mm	320 mm	
	LR . 0841 to LR . 094.1		265 mm	404 mm	
	LR . 0851 to LR . 095.1		285 mm	404 mm	
	LR . 2741		265 mm	510 mm	
	LR . 2751		285 mm	510 mm	
	LR . 2841		265 mm	590 mm	
	LR . 2851		285 mm	590 mm	
	LR . 2941		265 mm	670 mm	
	LR . 2951		285 mm	670 mm	
BF, BVW	LR . 01.1 to LR . 06.1		220 mm		220 mm
	LR . 07.1 to LR . 09.1		350 mm		300 mm
	LR . 27.1		480 mm		380 mm
	LR . 28.1		540 mm		380 mm
	LR . 29.1		600 mm		380 mm
BFD, BVD	LR . 01.1 to LR . 06.1		450 mm		
	LR . 07.1 to LR . 09.1		570 mm		
	LR . 27.1		680 mm		
	LR . 28.1 to LR . 29.1		840 mm		

Tab. 8/15: **Dimensions (in mm) for LR fixing elements to Fig. 8/8**

8.3 Distances, Positioning, and Cut-outs

As the fixing elements and fixing points, as well as the run layouts already have to be considered in the planning phase – and particularly for the "Building Information Modeling" (BIM) –, type-specific stipulations must be made regarding encapsulated connection points, distances from building elements, positioning of expansion compensations and fixed points, as well as the dimensions of cut-outs.

Connection points

For the joint blocks, a distance of two times 15 mm is to be provided between two trunking elements. Accordingly, 30 mm must be calculated for the length dimension of straight trunking elements. Fig. 8/9 shows a typical side view with the schematic dimensions for the casting point protruding 20 mm over the trunking elements.

Distances and cut-outs

Fig. 8/9 shows the distances from the trunking elements to the building elements for horizontal and vertical installation. To be able to establish the electromechanical connection and encapsulate the connection point, the minimum distances to the wall and ceiling must be observed. In case of vertical installation with busbar position edgewise to the wall, an additional space has to be considered for installation of the joint block from the side (corresponds to the system height matching the height of the joint block; Fig. 8/9).

Fig. 8/10 shows the dimensions for wall and ceiling cut-outs. Accordingly large openings must be provided in the masonry.

Note: As opposed to the other SIVACON 8PS busbar trunking systems, no end flange is provided for the LR system. The last trunking element in the run layout is encapsulated at the manufacturing plant specifically to the project or order.

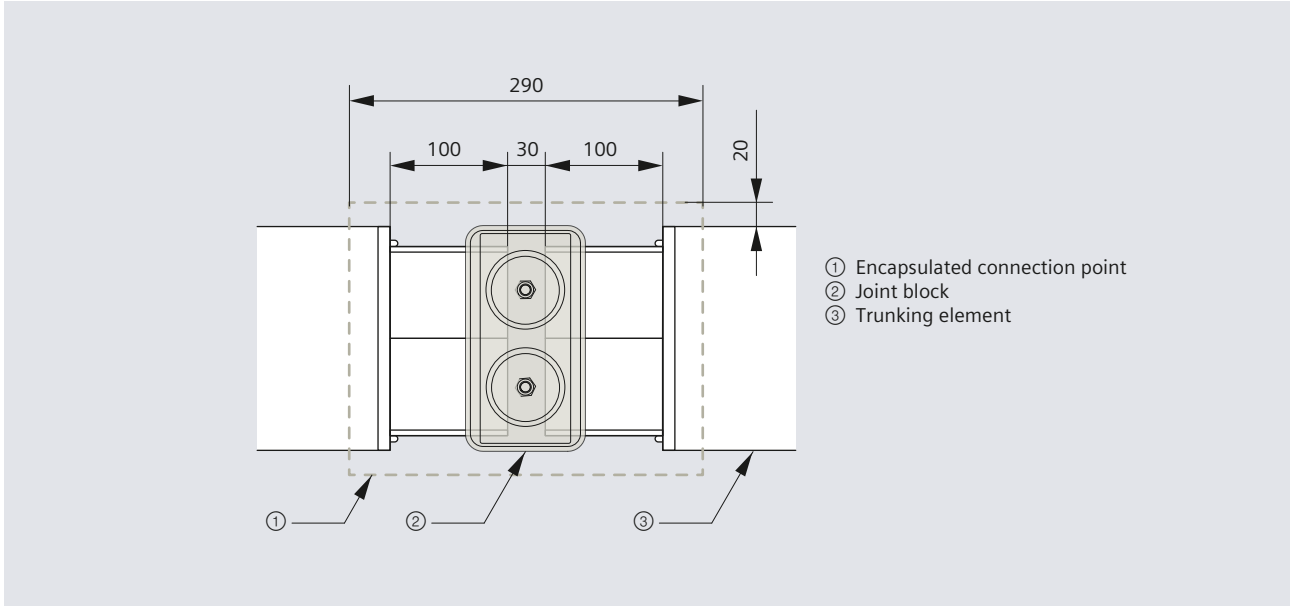


Fig. 8/9: **Dimensions for an encapsulated connection point (dimensions in mm)**

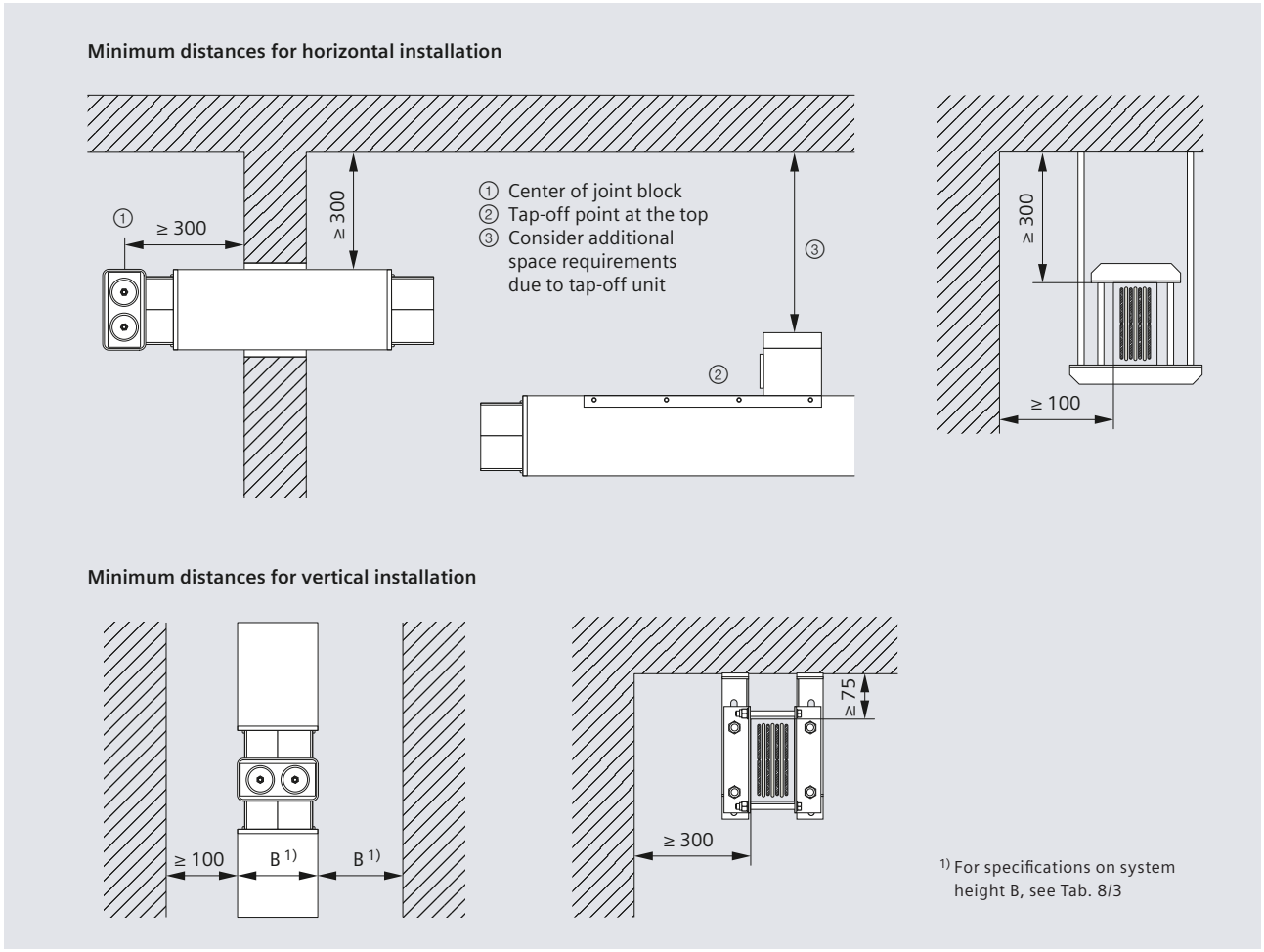


Fig. 8/10: **Distances from the trunking elements to the building elements (dimensions in mm)**

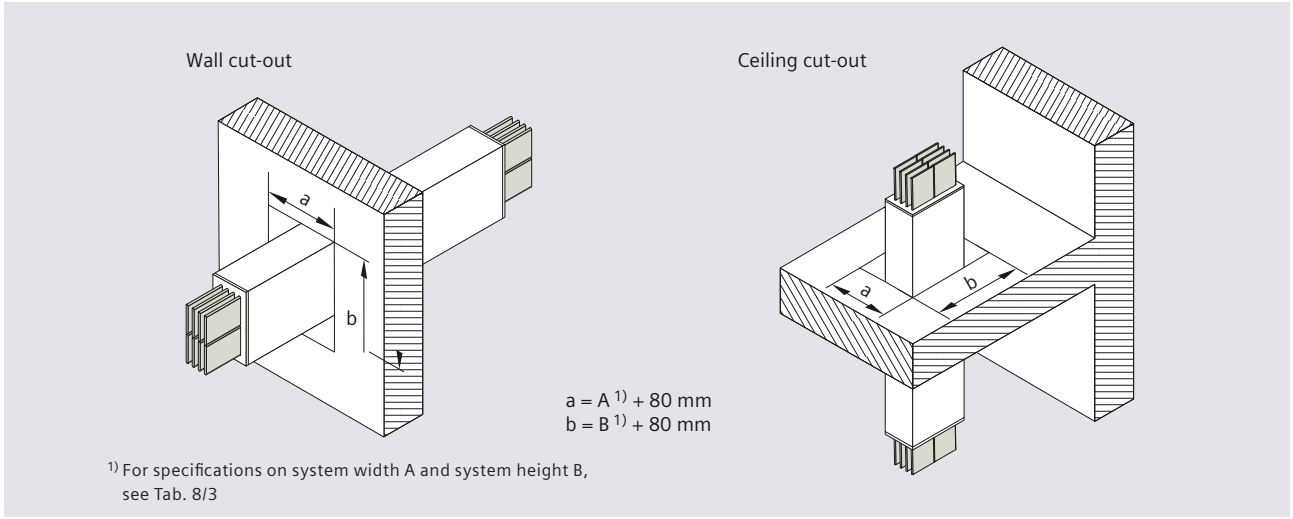


Fig. 8/11: **Dimensions (in mm) for wall cut-outs and ceiling cut-outs**

Expansion compensation and fixed points

The busbar assembly including the enclosure expand due to heat loss under load. Length expansion of the busbar assembly depends on:
- Conductor material of the busbar trunking system
- Run layout of the busbar trunking system (horizontal or vertical)
- Purpose of use (power transmission or power distribution).

A special trunking element with integrated expansion strips provides the necessary expansion compensation and must be positioned in conformity with the configuration rules for a horizontal or vertical run layout (Tab. 8/16). Within a defined area, expansion compensation can compensate for both compression and tensile forces.

Fixed points are special fixing brackets that permanently fix the trunking element rigidly with fixing material provided by the customer. They therefore ensure expansion compensation in a defined direction.

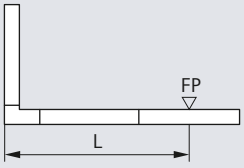
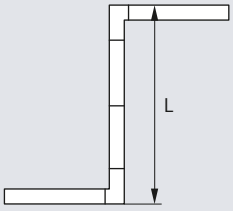
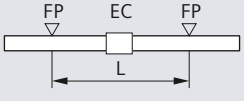
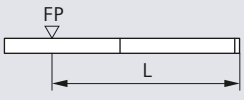
A distinction is made between fixed points for horizontal and vertical installation.

Attachment of a fixed point is necessary on the following system components:
- Distribution board connection elements
- Incoming cable connection elements
- Transformer connection elements.

Depending on the length and layout of the run, also on straight trunking elements and junction elements (Tab. 8/16).

Note: For ambient temperatures below –5 °C, the number of expansion compensation units must be increased. Please ask your Siemens contact partner in this context.

On a vertical run, the two lower fixings are designed as fixed points (interval 1.5 m). Then, sliding brackets and spring brackets are configured alternatively from bottom to top (interval 1.5 m). With just one further fixing, a spring bracket must be configured.

		Maximum run lengths L_{max} for							
	Purpose of use:	**power transmission**				**power distribution**			
	Run layout:	**horizontal**		**vertical**		**horizontal**		**vertical**	
	Conductor material:	**Al**	**Cu**	**Al**	**Cu**	**Al**	**Cu**	**Al**	**Cu**
L_{max} between a junction element and a configured fixed point FP without expansion compensation		15 m	15 m	12 m	12 m	15 m	15 m	12 m	12 m
L_{max} for a height offset between two junction elements without expansion compensation				12 m	12 m			12 m	12 m
L_{max} between two fixed points FP with an expansion compensation EC		30 m	40 m	25 m	35 m	30 m	40 m	25 m	35 m
L_{max} between a fixed point and an end flange without expansion compensation						40 m	40 m	40 m	40 m

Tab. 8/16: **Run lengths for using an expansion compensation (at an ambient temperature from –5 °C to +60 °C)**

8.4 Technical Specifications

Apart from the general technical specifications in Tab. 8/17, the derating factors regarding the temperature dependency and the site altitude above sea level (Tab. 8/17) must be observed. The system-dependent data is distinguished by conductor material, number of conductors, and rated current:

- Tab. 8/18: LRA0 . . 1
  (4- and 5-conductor configuration, Al)
- Tab. 8/19: LRC0 . . 1
  (4- and 5-conductor configuration, Cu).

General system data									
Type	**LR ...**								
Standards and specifications	IEC 61439-1 and -6								
Rated insulation voltage U_i	1,000 V AC / DC								
Rated operational voltage U_e	1,000 V AC								
Frequency	50 ... 60 [1] Hz								
Overvoltage category / pollution degree	III/3 (according to IEC 60947-1)								
Rated operational current [2] I_n • Al busbars • Cu busbars	 400 ... 5,000 A 630 ... 6,300 A								
Climatic resistance	• Steady state temperature / humidity, acc. to IEC 60068-2-78 • Cyclic temperature / humidity, acc. to IEC 60068-2-30								
Ambient temperature [3]	–5 °C ... +40 °C								
Degree of protection acc. to IEC 60529 • Trunking elements • Connection elements, tap-off units	 IP68 IP66								
Material • Busbars • Insulation	 Aluminum (Al) or copper (Cu) Epoxy resin								
Mounting position	• Horizontal, edgewise or flat • Vertical								
Color	Stone gray (similar to RAL 7030)								
Derating factor for rated current – temperature characteristic									
Ambient temperature in the 24-h mean	20 °C	25 °C	30 °C	35 °C	40 °C	45 °C	50 °C	55 °C	60 °C
Derating factor 20 °C ... 60 °C	1.15	1.10	1.05	1	0.96	0.89	0.84	0.78	0.72
Derating factor for rated current – altitude above sea level									
Altitude above sea level	0 ... 999 m	1,000 ... 1,999 m	2,000 ... 2,999 m	3,000 ... 3,999 m	above 4,000 m				
Derating factor for indoor installation	1	1	0.99	0.96	0.90				
Derating factor for outdoor installation	1	0.98	0.94	0.89	0.83				

[1] At a frequency of 60 Hz, a derating factor of 0.95 is to be considered according to IEC 61439-1 for currents > 800 A
[2] Temperature factor for minimum and maximum ambient temperature on request; depending on the mounting position, higher temperatures are also permissible (values on request)
[3] Ambient temperatures in the range from –60 °C to +60 °C are possible without restrictions regarding the insulation properties. According to IEC 61439-1 and -6, a mean or maximum daily temperature of +35 °C or +40 °C is taken as a basis. If the local conditions are different, the above derating factors must be applied to the maximum possible current

Tab. 8/17: **General system data of the LR system, temperature characteristic, and impact of the site altitude above sea level**

LRA . . . . (4-conductor configuration)			0141	0241	0341	0441	0541	0641
Rated current I_{nA}			**400 A**	**630 A**	**800 A**	**1,000 A**	**1,250 A**	**1,400 A**
With 50 Hz and +20 °C busbar temperature	R'_{20}	mΩ/m	0.149	0.118	0.078	0.060	0.048	0.040
	X'_{20}	mΩ/m	0.050	0.041	0.026	0.053	0.050	0.041
	Z_{20}	mΩ/m	0.157	0.125	0.082	0.080	0.069	0.057
With 50 Hz, final temperature rise of the busbars	R'_{warm}	mΩ/m	0.176	0.141	0.095	0.073	0.058	0.050
	X'_{warm}	mΩ/m	0.050	0.041	0.026	0.053	0.050	0.041
	Z'_{warm}	mΩ/m	0.183	0.147	0.098	0.091	0.077	0.065
In case of fault according to IEC 61439-6, Annex N	R'_F	mΩ/m	0.296	0.235	0.156	0.123	0.096	0.078
	X'_F	mΩ/m	0.174	0.158	0.154	0.146	0.116	0.096
	Z'_F	mΩ/m	0.344	0.284	0.219	0.190	0.151	0.124
Zero-sequence impedance (PEN) according to IEC 60909-0 (VDE 0102)	R'_0	mΩ/m	0.468	0.378	0.254	0.197	0.157	0.131
	X'_0	mΩ/m	0.606	0.503	0.422	0.349	0.280	0.235
	Z'_0	mΩ/m	0.766	0.629	0.493	0.401	0.321	0.269
Rated short-time withstand current	(t = 1 s) I_{cw}	kA	12	12	27	27	53	53
Rated peak withstand current	Peak value I_{pk}	kA	24	24	56	56	117	117
Conductor cross-section (active conductors, PEN)		mm²	178	237	352	472	592	736
Fire load		kWh/m	13.01	12.59	11.76	15.72	19.19	21.32
Weight (averaged for 2 m length with joint block)		kg/m	21.44	21.63	22.00	29.26	33.77	38.65
LRA . . . . (5-conductor configuration)			**0151**	**0251**	**0351**	**0451**	**0551**	**0651**
Rated current I_{nA}			**400 A**	**630 A**	**800 A**	**1,000 A**	**1,250 A**	**1,400 A**
With 50 Hz and +20 °C busbar temperature	R'_{20}	mΩ/m	0.149	0.118	0.078	0.060	0.048	0.040
	X'_{20}	mΩ/m	0.050	0.041	0.026	0.053	0.050	0.041
	Z'_{20}	mΩ/m	0.157	0.125	0.082	0.080	0.069	0.057
With 50 Hz, final temperature rise of the busbars	R'_{warm}	mΩ/m	0.176	0.141	0.095	0.073	0.058	0.050
	X'_{warm}	mΩ/m	0.050	0.041	0.026	0.053	0.050	0.041
	Z'_{warm}	mΩ/m	0.183	0.147	0.098	0.091	0.077	0.065
In case of fault according to IEC 61439-6, Annex N (PE, N)	R'_F	mΩ/m	0.296	0.235	0.156	0.123	0.096	0.078
	X'_F	mΩ/m	0.174	0.158	0.154	0.146	0.116	0.096
	Z'_F	mΩ/m	0.344	0.284	0.219	0.190	0.151	0.124
Zero-sequence impedance (PE, N) according to IEC 60909-0 (VDE 0102)	R'_0	mΩ/m	0.468	0.378	0.254	0.197	0.157	0.131
	X'_0	mΩ/m	0.606	0.503	0.422	0.349	0.280	0.235
	Z'_0	mΩ/m	0.766	0.629	0.493	0.401	0.321	0.269
Rated short-time withstand current	(t = 1 s) I_{cw}	kA	12	12	27	27	53	53
Rated peak withstand current	Peak value I_{pk}	kA	24	24	56	56	117	117
Conductor cross-section (active conductors, PE, N)		mm²	178	237	352	472	592	736
Fire load		kWh/m	12.70	12.17	11.13	18.69	22.84	25.33
Weight (averaged for 2 m length with joint block)		kg/m	21.78	22.02	22.49	34.61	40.34	45.68

Tab. 8/18: **Technical specifications for trunking elements of the LR system (aluminum)**

LRA . . . . (4-conductor configuration)			0741	0841	0941	2741	2841	2941
Rated current I_{nA}			**1,600 A**	**2,000 A**	**2,500 A**	**3,200 A**	**4,000 A**	**5,000 A**
With 50 Hz and +20 °C busbar temperature	R'_{20}	mΩ/m	0.030	0.023	0.020	0.015	0.012	0.010
	X'_{20}	mΩ/m	0.046	0.030	0.029	0.024	0.025	0.022
	Z'_{20}	mΩ/m	0.054	0.038	0.035	0.028	0.027	0.024
With 50 Hz, final temperature rise of the busbars	R'_{warm}	mΩ/m	0.035	0.029	0.025	0.019	0.015	0.013
	X'_{warm}	mΩ/m	0.046	0.030	0.029	0.024	0.025	0.022
	Z'_{warm}	mΩ/m	0.058	0.041	0.038	0.030	0.029	0.025
In case of fault according to IEC 61439-6, Annex N	R'_F	mΩ/m	0.060	0.048	0.040	0.029	0.021	0.018
	X'_F	mΩ/m	0.090	0.115	0.117	0.092	0.083	0.067
	Z'_F	mΩ/m	0.108	0.124	0.123	0.096	0.086	0.069
Zero-sequence impedance (PEN) according to IEC 60909-0 (VDE 0102)	R'_0	mΩ/m	0.096	0.079	0.067	0.050	0.040	0.033
	X'_0	mΩ/m	0.218	0.209	0.201	0.194	0.191	0.165
	Z'_0	mΩ/m	0.238	0.224	0.212	0.201	0.195	0.169
Rated short-time withstand current	(t = 1 s) I_{cw}	kA	65	65	65	100	100	100
Rated peak withstand current	Peak value I_{pk}	kA	143	143	143	220	220	220
Conductor cross-section (active conductors, PEN)		mm²	945	1,185	1,472	1,889	2,369	2,943
Fire load		kWh/m	27.51	32.05	36.68	55.01	64.11	73.36
Weight (averaged for 2 m length with joint block)		kg/m	48.43	58.06	68.07	94.92	114.93	134.63
LRA . . . . (5-conductor configuration)			**0751**	**0851**	**0951**	**2751**	**2851**	**2951**
Rated current I_{nA}			**1,600 A**	**2,000 A**	**2,500 A**	**3,200 A**	**4,000 A**	**5,000 A**
With 50 Hz and +20 °C busbar temperature	R'_{20}	mΩ/m	0.030	0.023	0.020	0.015	0.012	0.010
	X'_{20}	mΩ/m	0.046	0.030	0.029	0.024	0.025	0.022
	Z'_{20}	mΩ/m	0.054	0.038	0.035	0.028	0.027	0.024
With 50 Hz, final temperature rise of the busbars	R'_{warm}	mΩ/m	0.035	0.029	0.025	0.019	0.015	0.013
	X'_{warm}	mΩ/m	0.046	0.030	0.029	0.024	0.025	0.022
	Z'_{warm}	mΩ/m	0.058	0.041	0.038	0.030	0.029	0.025
In case of fault according to IEC 61439-6, Annex N (PE, N)	R'_F	mΩ/m	0.060	0.048	0.040	0.029	0.021	0.018
	X'_F	mΩ/m	0.090	0.115	0.117	0.092	0.083	0.067
	Z'_F	mΩ/m	0.108	0.124	0.123	0.096	0.086	0.069
Zero-sequence impedance (PE, N) according to IEC 60909-0 (VDE 0102)	R'_0	mΩ/m	0.096	0.079	0.067	0.050	0.040	0.033
	X'_0	mΩ/m	0.218	0.209	0.201	0.194	0.191	0.165
	Z'_0	mΩ/m	0.238	0.224	0.212	0.201	0.195	0.169
Rated short-time withstand current	(t = 1 s) I_{cw}	kA	65	65	65	100	100	100
Rated peak withstand current	Peak value I_{pk}	kA	143	143	143	220	220	220
Conductor cross-section (active conductors, PE, N)		mm²	945	1,185	1,472	1,889	2,369	2,943
Fire load		kWh/m	32.71	38.04	43.48	65.43	76.08	86.96
Weight (averaged for 2 m length with joint block)		kg/m	57.73	69.20	81.05	113.21	137.29	160.60

Tab. 8/18: **Technical specifications for trunking elements of the LR system (aluminum)** (continued)

LRC . . . . (4-conductor configuration)			0141	0241	0341	0441	0541	0641
Rated current I_{nA}			**630 A**	**800 A**	**1,000 A**	**1,350 A**	**1,600 A**	**1,700 A**
With 50 Hz and +20 °C busbar temperature	R'_{20}	mΩ/m	0.096	0.074	0.049	0.039	0.031	0.025
	X'_{20}	mΩ/m	0.103	0.085	0.069	0.051	0.046	0.038
	Z'_{20}	mΩ/m	0.141	0.113	0.084	0.064	0.055	0.045
With 50 Hz, final temperature rise of the busbars	R'_{warm}	mΩ/m	0.118	0.091	0.060	0.048	0.039	0.031
	X'_{warm}	mΩ/m	0.103	0.085	0.069	0.051	0.046	0.038
	Z'_{warm}	mΩ/m	0.156	0.125	0.091	0.070	0.060	0.049
In case of fault according to IEC 61439-6, Annex N	R'_F	mΩ/m	0.164	0.124	0.095	0.076	0.058	0.048
	X'_F	mΩ/m	0.227	0.188	0.158	0.135	0.114	0.097
	Z'_F	mΩ/m	0.280	0.225	0.185	0.155	0.128	0.108
Zero-sequence impedance (PEN) according to IEC 60909-0 (VDE 0102)	R'_0	mΩ/m	0.269	0.215	0.170	0.141	0.113	0.094
	X'_0	mΩ/m	0.262	0.223	0.191	0.162	0.137	0.118
	Z'_0	mΩ/m	0.376	0.310	0.256	0.214	0.177	0.151
Rated short-time withstand current	(t = 1 s) I_{cw}	kA	23	23	38	38	65	65
Rated peak withstand current	Peak value I_{pk}	kA	48	48	80	80	140	140
Conductor cross-section (active conductors, PEN)		mm²	178	237	352	472	592	736
Fire load		kWh/m	13.01	12.59	11.76	15.72	19.19	21.32
Weight (averaged for 2 m length with joint block)		kg/m	25.88	27.55	30.89	41.00	48.42	56.23
LRC . . . . (5-conductor configuration)			**0151**	**0251**	**0351**	**0451**	**0551**	**0651**
Rated current I_{nA}			**630 A**	**800 A**	**1,000 A**	**1,350 A**	**1,600 A**	**1,700 A**
With 50 Hz and +20 °C busbar temperature	R'_{20}	mΩ/m	0.096	0.074	0.049	0.039	0.031	0.025
	X'_{20}	mΩ/m	0.103	0.085	0.069	0.051	0.046	0.038
	Z'_{20}	mΩ/m	0.141	0.113	0.084	0.064	0.055	0.045
With 50 Hz, final temperature rise of the busbars	R'_{warm}	mΩ/m	0.118	0.091	0.060	0.048	0.039	0.031
	X'_{warm}	mΩ/m	0.103	0.085	0.069	0.051	0.046	0.038
	Z'_{warm}	mΩ/m	0.156	0.125	0.091	0.070	0.060	0.049
In case of fault according to IEC 61439-6, Annex N (PE, N)	R'_F	mΩ/m	0.164	0.124	0.095	0.076	0.058	0.048
	X'_F	mΩ/m	0.227	0.188	0.158	0.135	0.114	0.097
	Z'_F	mΩ/m	0.280	0.225	0.185	0.155	0.128	0.108
Zero-sequence impedance (PE, N) according to IEC 60909-0 (VDE 0102)	R'_0	mΩ/m	0.269	0.215	0.170	0.141	0.113	0.094
	X'_0	mΩ/m	0.262	0.223	0.191	0.162	0.137	0.118
	Z'_0	mΩ/m	0.376	0.310	0.256	0.214	0.177	0.151
Rated short-time withstand current	(t = 1 s) I_{cw}	kA	23	23	38	38	65	65
Rated peak withstand current	Peak value I_{pk}	kA	48	48	80	80	140	140
Conductor cross-section (active conductors, PE, N)		mm²	178	237	352	472	592	736
Fire load		kWh/m	12.70	12.17	11.13	18.69	22.84	25.33
Weight (averaged for 2 m length with joint block)		kg/m	27.33	29.42	33.60	49.27	58.66	67.67

Tab. 8/19: **Technical specifications for trunking elements of the LR system (copper)**

LRC . . . . (4-conductor configuration)			0741	0841	0941	2741	2841	2941
Rated current I_{nA}			**2,000 A**	**2,500 A**	**3,200 A**	**4,000 A**	**5,000 A**	**6,300 A**
With 50 Hz and +20 °C busbar temperature	R'_{20}	mΩ/m	0.019	0.016	0.014	0.010	0.008	0.006
	X'_{20}	mΩ/m	0.034	0.031	0.029	0.014	0.012	0.011
	Z'_{20}	mΩ/m	0.039	0.035	0.032	0.017	0.015	0.012
With 50 Hz, final temperature rise of the busbars	R'_{warm}	mΩ/m	0.024	0.019	0.018	0.013	0.010	0.008
	X'_{warm}	mΩ/m	0.034	0.031	0.029	0.014	0.012	0.011
	Z'_{warm}	mΩ/m	0.041	0.037	0.034	0.019	0.016	0.013
In case of fault according to IEC 61439-6, Annex N	R'_F	mΩ/m	0.038	0.030	0.023	0.017	0.014	0.010
	X'_F	mΩ/m	0.083	0.070	0.059	0.052	0.044	0.038
	Z'_F	mΩ/m	0.091	0.076	0.064	0.055	0.046	0.039
Zero-sequence impedance (PEN) according to IEC 60909-0 (VDE 0102)	R'_0	mΩ/m	0.077	0.062	0.052	0.045	0.037	0.030
	X'_0	mΩ/m	0.099	0.083	0.071	0.065	0.056	0.047
	Z'_0	mΩ/m	0.125	0.104	0.088	0.079	0.067	0.056
Rated short-time withstand current	(t = 1 s) I_{cw}	kA	80	80	100	100	125	125
Rated peak withstand current	Peak value I_{pk}	kA	176	176	220	220	275	275
Conductor cross-section (active conductors, PEN)		mm²	945	1,185	1,472	1,889	2,369	2,943
Fire load		kWh/m	27.51	32.05	36.68	55.01	64.11	73.36
Weight (averaged for 2 m length with joint block)		kg/m	71.88	87.37	103.24	141.82	173.55	204.98
LRC . . . . (5-conductor configuration)			**0751**	**0851**	**0951**	**2751**	**2851**	**2951**
Rated current I_{nA}			**2,000 A**	**2,500 A**	**3,200 A**	**4,000 A**	**5,000 A**	**6,300 A**
With 50 Hz and +20 °C busbar temperature	R'_{20}	mΩ/m	0.019	0.016	0.014	0.010	0.008	0.006
	X'_{20}	mΩ/m	0.034	0.031	0.029	0.014	0.012	0.011
	Z'_{20}	mΩ/m	0.039	0.035	0.032	0.017	0.015	0.012
With 50 Hz, final temperature rise of the busbars	R'_{warm}	mΩ/m	0.024	0.019	0.018	0.013	0.010	0.008
	X'_{warm}	mΩ/m	0.034	0.031	0.029	0.014	0.012	0.011
	Z'_{warm}	mΩ/m	0.041	0.037	0.034	0.019	0.016	0.013
In case of fault according to IEC 61439-6, Annex N (PE, N)	R'_F	mΩ/m	0.038	0.030	0.023	0.017	0.014	0.010
	X'_F	mΩ/m	0.083	0.070	0.059	0.052	0.044	0.038
	Z'_F	mΩ/m	0.091	0.076	0.064	0.055	0.046	0.039
Zero-sequence impedance (PE, N) according to IEC 60909-0 (VDE 0102)	R'_0	mΩ/m	0.077	0.062	0.052	0.045	0.037	0.030
	X'_0	mΩ/m	0.099	0.083	0.071	0.065	0.056	0.047
	Z'_0	mΩ/m	0.125	0.104	0.088	0.079	0.067	0.056
Rated short-time withstand current	(t = 1 s) I_{cw}	kA	80	80	100	100	125	125
Rated peak withstand current	Peak value I_{pk}	kA	176	176	220	220	275	275
Conductor cross-section (active conductors, PE, N)		mm²	945	1,185	1,472	1,889	2,369	2,943
Fire load		kWh/m	32.71	38.04	43.48	65.43	76.08	86.96
Weight (averaged for 2 m length with joint block)		kg/m	87.37	105.84	125.02	171.65	210.57	248.54

Tab. 8/19: **Technical specifications for trunking elements of the LR system (copper)** (continued)

8.5 Fire Barrier for LR system

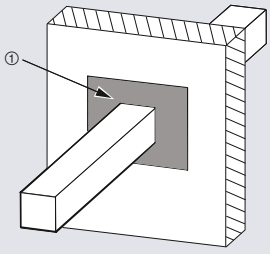
All trunking elements of the LR busbar trunking system can be equipped with a fire barrier, thus fulfilling the provisions of EN 1366-3 (fire behavior of building materials and building components). The fire barrier is delivered as a stand-alone type for customer assembly, with the fire resistance class EI 120. The fire barrier is assembled on the busbars on site. Then, they reach the fire resistance duration of 120 minutes according to the international standards ISO 834-1 and IEC 61439-6.

To install the trunking elements with a permissible fire barrier for classification EI 60 or EI 120 (according to EN 13501-2), a difference is made between a solid wall, a solid ceiling, or a lightweight partition wall:

- The solid wall must be made of masonry, concrete, ferroconcrete, or autoclaved aerated concrete with a density of ≥ 600 kg/m³.
- The solid ceiling must be made of concrete, ferroconcrete, or autoclaved aerated concrete with a density of ≥ 600 kg/m³
- The lightweight partition wall must be erected in post-type construction with steel sub-structure, and cladded on both sides with at least 2 layers of cement- or plaster-bound structural panels with a thickness of 12.5 mm and with fire behavior class A1 or A2 according to EN 13501-1. The wall thickness must be 100 mm or more. The space between the cladding of the wall and the post or the barrier must be solidly filled at least 50 mm deep with mineral wool of the fire resistance class A1 or A2 according to EN 13501-1. A Promat wall shroud with a width of 100 mm and a thickness of 20 mm must be provided on both sides.

The wall or ceiling must be classified for the desired fire resistance duration according to EN 13501-2 (EI 60, EI 90 or EI 120). If the fire barrier for LR is used within Germany, the optional approval kit LRA(C)-S120-ZUL-D must be inquired at the Siemens product management. Fig. 8/12 shows the constructional measures required for the respective fire resistance class. The dimensions and the positioning of the fire barrier and the fixing are shown in Fig. 8/13.

Fire resistance class
EI 60
Standard system closed with mortar ① by the customer



Fire resistance class
EI 90 / EI 120
Fire resistance class EI 90 / EI 120
Standard system closed with mortar ① by the customer, and fire barrier ② with 4 "PROMATECT®-200" plates (thickness 20 mm, length 550 mm)

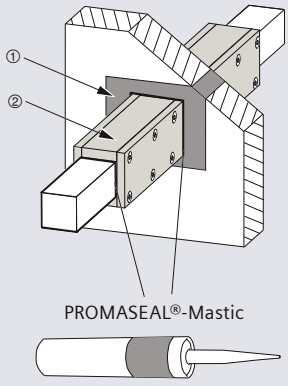
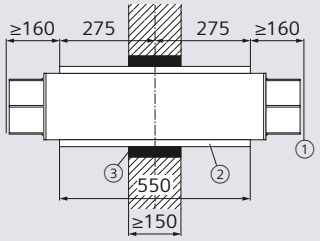


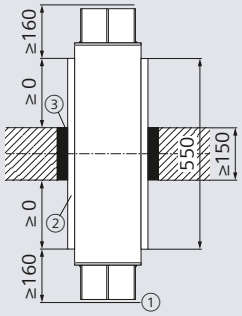
Fig. 8/12: **Constructional measures for the fire resistance classes EI 60 or EI 90 / EI 120**

Detailed specifications about fire barrier installation can be found in the installation instructions.
Link to AWA: https://support.industry.siemens.com/cs/ww/en/view/109806356

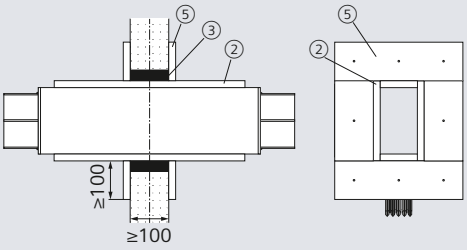
Straight length, horizontal



Straight length, vertical



Fire barrier block for lightweight partition walls



Legend

① Center of joint block
② Fire barrier block (“PROMATECT®-200” plates)
③ Mortar
④ Fixing element
⑤ Sleeve (“PROMATECT®-200” plates, thickness: 20 mm)

Fig. 8/13: **Dimensions (in mm) and positioning of fire barrier blocks and fixings**

8.6 Functional Endurance of LR system

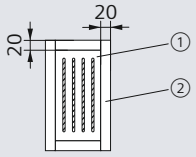
The busbar trunking units of the type LRC ... can be equipped with a 4-side duct for functional endurance by the customer, and therefore fulfill the specifications of DIN 4102-12.

The general building inspectorate certificate (German: abP = allgemeines bauaufsichtliches Prüfzeugnis) with the approval number P-3289/229/08-MPA BS describes the design for suspended ducts guided on 4 sides with horizontal installation for the functional endurance class E 90.

Please contact your Siemens partner for more information on functional endurance. Due to the protective enclosure, the heat dissipation of the system is restricted, which means that a derating factor of 0.8 must be considered for the rated current. Busbar trunking systems with functional endurance may be suspended from or fixed to:

- Walls (minimum thickness 100 mm) made of masonry, concrete, ferroconcrete, or autoclaved aerated concrete
- Ceilings (minimum thickness 150 mm) made of concrete, ferroconcrete, or autoclaved aerated concrete

Cross-section for LR system
with "PROMATECT®-200" plates



Legend

① LR system (dimension acc. to rated current)

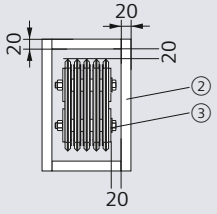
② "PROMATECT®-200" plates with a thickness of 20 mm

③ Connection point with joint block (dimensions acc. to rated current)

④ LR system with "PROMATECT®-200" plates

⑤ Connection point with "PROMATECT®-200" plates (dimensions acc. to rated current)

Cross-section for connection points
with "PROMATECT®-200" plates



View and length of a connection point
with "PROMATECT®-200" plates

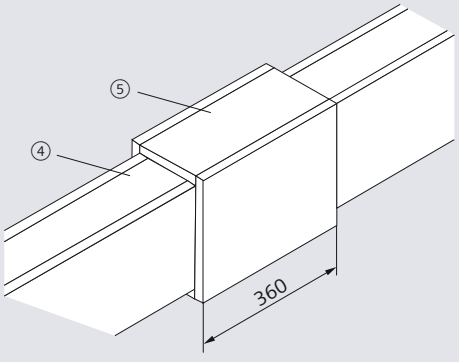
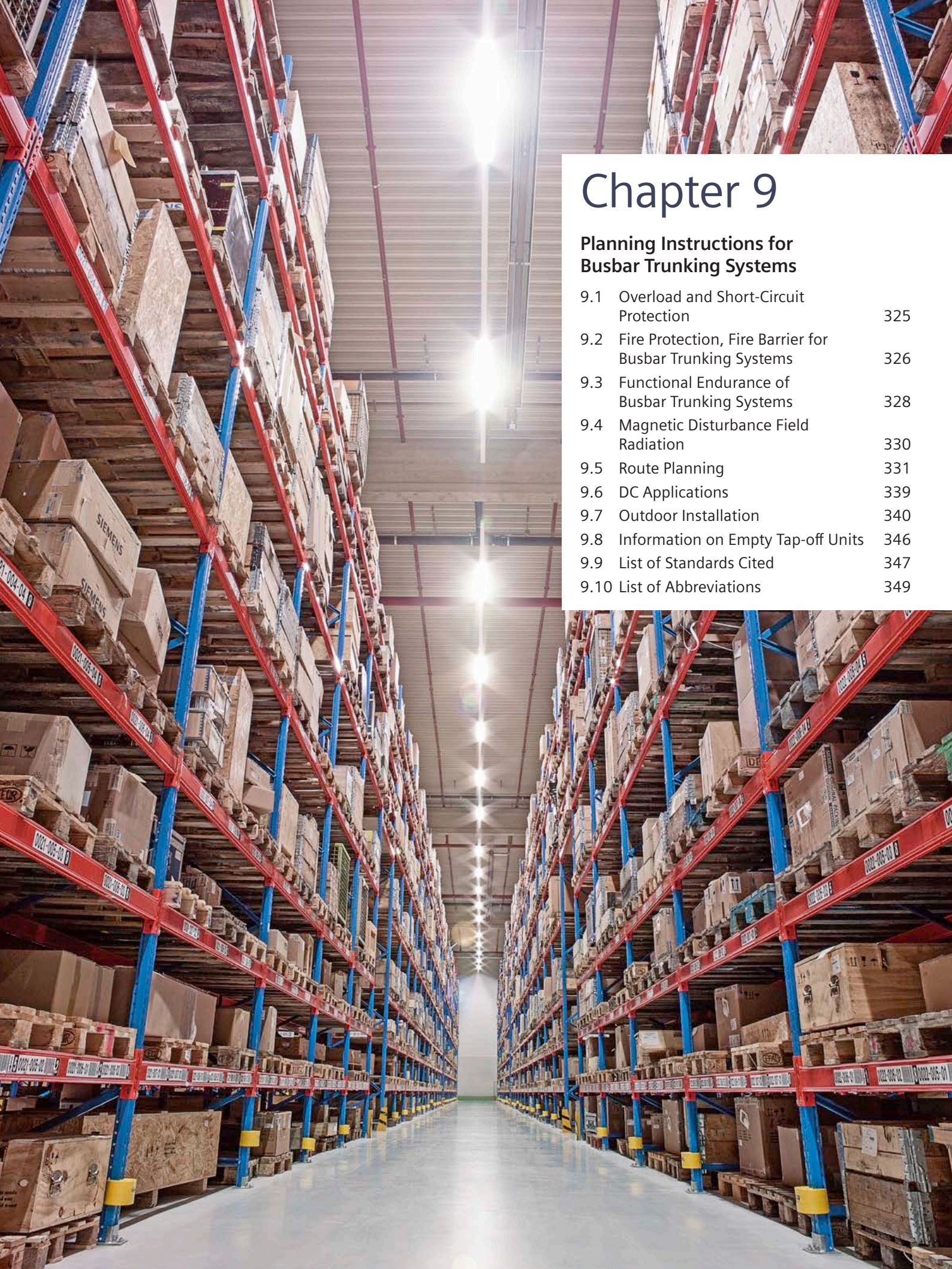


Fig. 8/14: **Dimensions (in mm) and views for the functional endurance measures of the LR system**



Chapter 9

Planning Instructions for Busbar Trunking Systems

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9 Planning Instructions for Busbar Trunking Systems

9.1 Overload and Short-Circuit Protection

Busbar trunking systems must be protected against short circuit and overload. Fuses and circuit breakers are used as protection devices. For selection, the level of expected short-circuit currents, the selectivity requirements, and the mandatory operating and signaling functions can be decisive factors.

When circuit breakers are used, the thermally delayed overload release is set to the rated current value of the busbar trunking system. This way, the busbar trunking system can be loaded to 100%. When determining the short-circuit protection with fuses and circuit breakers, the specified short-circuit withstand strengths of the busbar trunking systems must not be exceeded.

It depends on the magnitude of the expected short-circuit current whether a current-limiting protection device is required and which short-circuit breaking capacity the protection device needs to have. Several circuit breakers that are suitable for the short-circuit and overload protection (400 V and 50 Hz) are listed in Tab. 9/1.

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

with

I_k'' = expected short-circuit current at the mounting location

I_{cc} = rated conditional short-circuit current of the combination between busbar run and circuit breaker

I_{cu} = rated short-circuit breaking capacity of the circuit breaker

The tripping characteristic of the protection device is to be selected according to the short-circuit withstand strength of the busbar trunking systems, the network configuration, type and number of loads, as well as country-specific requirements and type series. Tab. 9/1 serves as recommendation. Generally, we recommend to perform a dimensioning using the planning tool SIMARIS design in order to determine the suitable protection. In this context, please contact your TIP partner.

Type	Rated current I_e	Circuit breaker with standard switching capacity S	I_{cc}	Circuit breaker with medium switching capacity M	I_{cc}	Circuit breaker with high switching capacity H	I_{cc}	Circuit breaker with very high switching capacity C	I_{cc}
BD2.-160	160 A	3VA1116-4EF32 ...	34 kA	3VA1116-5EF32 ...	34 kA	3VA1116-4EF32 ...	34 kA		
BD2.-250	250 A	3VA1225-4EF32 ...	36 kA	3VA1225-5EF32 ...	55 kA	3VA1116-4EF32 ...	70 kA		
BD2.-400	400 A			3VA2340-5HL32 ...	55 kA	3VA2340-6HL32 ...	85 kA	3VA2340-7HL32 ...	110 kA
BD2.-630	630 A			3VA2463-5HL32 ...	55 kA	3VA2463-6HL32 ...	85 kA	3VA2463-7HL32 ...	110 kA
BD2.-800	800 A			3VA2580-5HL32 ...	55 kA	3VA2580-6HL32 ...	85 kA	3VA2580-7HL32 ...	100 kA
BD2.-1000	1,000 A			3VA2510-5HL32 ...	55 kA	3VA2510-6HL32 ...	85 kA	3VA2510-7HL32 ...	110 kA
BD2C-1250	1,250 A			3VA2510-5HL32 ...	55 kA	3VA2510-6HL32 ...	85 kA	3VA2510-7HL32 ...	110 kA
The values for the rated conditional short-circuit current I_{cc} apply to the busbar trunking systems without consideration of the tap-off units									

Tab. 9/1: **Examples for molded case circuit breakers regarding short-circuit and overload protection (400 V and 50 Hz)**

9.2 Fire Protection, Fire Barrier for Busbar Trunking Systems

In buildings, busbar trunking systems often run through several fire zones. To prevent the spread of fire in the event of a fire, fire barriers are required at these transitions. They serve to maintain the structural fire zone boundaries and are an essential component of preventive fire protection. A professionally executed fire barrier ensures that the fire resistance duration of the penetrated wall or ceiling is not impaired when a busbar trunking unit is passed through.

The busbar trunking systems BD01, BD2, LD, LI, and LR can be equipped with a fire barrier. Fire barriers are described in the IEC 61439-6 equipment standard for busbar trunking systems, and are always subject to the country-specific regulations, which may be different. For this reason, we recommend to contact your Siemens partner in the planning phase.

The systems meet the requirements for verification of the fire resistance duration in accordance with the respective fire resistance class of IEC 61439-6 (ISO 834-1 accordingly).

In contrast to cable installations, busbar trunking systems to be equipped in conformity with the conditions shown in Fig. 9/1 are delivered ex works with a fire barrier. Depending on the busbar trunking system, the fire barrier may consist of an internal and external fire barrier, or only of an external fire barrier.

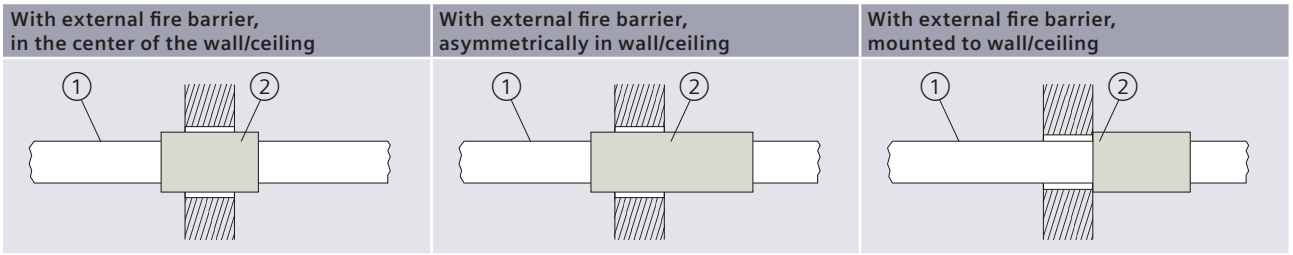
Overview of fire resistance classes according to DIN 4102-2 and the new designations for fire resistance according to the administrative regulation MVV TB Edition 2017/1*

Previous short designation of the fire resistance classes acc. to DIN 4102-2 (abZ)	New short designation German building authority designations acc. to MVV TB* fire resistance of walls (aBG)	Fire resistance duration
F30	Fire retardant (German abbreviation: fh)	at least 30 minutes
F60	Highly flame-retardant (German abbreviation: hfh)	at least 60 minutes
F90	Fire-resistant (German abbreviation: fb)	at least 90 minutes
F120	Fire resistance 120 minutes (no abbreviation)	at least 120 minutes

Tab. 9/2: **Overview of fire resistance classes**

For clarification when used in Germany:

The general type approval (aBG) serves as approval for installation. It can be obtained via the Siemens contact partner and is intended, among other things, for the installer and the processor (specialist company that produces wall/ceiling closures). It regulates the installation of busbar components with fire barriers in walls and ceilings, and must also be available at the "point of use" (= construction site).



① Busbar trunking system
② External fire barrier
Note: The fire barrier for the LR system is mounted on site after closing the wall or ceiling with filler. Normally, there is no external fire barrier for the LR system in the wall or ceiling

Fig. 9/1: **Fire barrier versions for busbar trunking systems**

The installation of a fire barrier depends on the design of the busbar trunking system and the requested fire resistance class, as shown in the overview Tab. 9/3 (the minimum distances between the fire barrier and the wall, as well as the fire barrier mortar are ignored in the illustrations). The recommended dimensions for the cut-outs in solid walls/ceilings or lightweight partition walls can be found in the system-specific descriptions.

	Fire resistance class		
System	EI 60	EI 90	EI 120
BD01	1	1	-
BD2	2	2	2
LD	2	2	2
LI	2 and 3	2 and 3	2 and 3
LR	4	2	2

Tab. 9/3: **Fire barrier versions and classification of fire resistance classes for busbar trunking systems**

Legend:

1: Fire barrier kit for EI 90 to be mounted on site in solid/lightweight partition wall or solid ceiling
2: Fire barrier for EI 90 and EI 120, mounted on the system in the factory, for installation in solid wall/ceiling
3: Fire barrier kit for EI 90 and EI 120 to be mounted on site in solid wall/ceiling
4: EI 60 as standard, without system-specific fire barrier

Validity for Germany:

In the course of an amendment of the technical administrative regulations, new designations for the fire resistance of walls and ceilings were introduced. The overview of fire resistance classes according to DIN 4102-2 and the new designations for fire resistance are provided in the administrative regulation MVV TB Edition 2017/1. The fire barrier versions described in here are tested in accordance with DIN 4102-9 or EN 1366-3.

In Germany, fire barriers must additionally have a general approval from the local building inspectorate. In case of deviations from the approval, it must be clarified in advance whether consent must be applied for from the competent state building authority in the individual case. To install fire barriers in lightweight walls for the systems BD01 (see Chapter 3), BD2, LD, and LI, fire barrier tests were carried out and passed.

Further details on versions and approvals can be obtained from your Siemens contact person.

9.3 Functional Endurance of Busbar Trunking Systems

Functional endurance of electrical installations is an important component of modern safety concepts in building technology and contributes significantly to the safety of people and property. It describes the ability of electrical installations to remain operational even under fire conditions over a defined period of time.
In safety-relevant areas of buildings, this is necessary to ensure that systems such as emergency lighting, fire alarm systems, and smoke extraction systems continue to be supplied with energy. Busbar trunking systems with functional endurance are a reliable solution for this purpose.

The following basic requirements apply:
- Temperature resistance: The systems must remain functional at temperatures up to 1,000 °C over a period of up to 90 minutes (Fig. 9/2)
- Mechanical stability: Even under thermal and mechanical stress, no interruption of the power supply may occur
- Certification: The functional endurance is verified by tests in accordance with DIN 4102-12 (E30, E60, E90). The following points must be considered when planning a busbar trunking system with functional endurance:
  – Early coordination with the fire protection concept
  – Use of certified components.

The busbar trunking systems BD2, LD, LI, and LR offer tested solutions for the functional endurance. Depending on the design, E30, E60 and E90 are achievable.

9.3.1 Normative Basis

The requirements for functional endurance are regulated in Germany in the DIN 4102-12 standard. This defines three classes of functional endurance:
- E30 – functional endurance for at least 30 minutes
- E60 – functional endurance for at least 60 minutes
- E90 – functional endurance for at least 90 minutes

Classification is carried out according to standardized fire tests, in which the systems are tested under realistic conditions. In particular, not only the temperature resistance is tested, but also the mechanical stability under thermal stress.

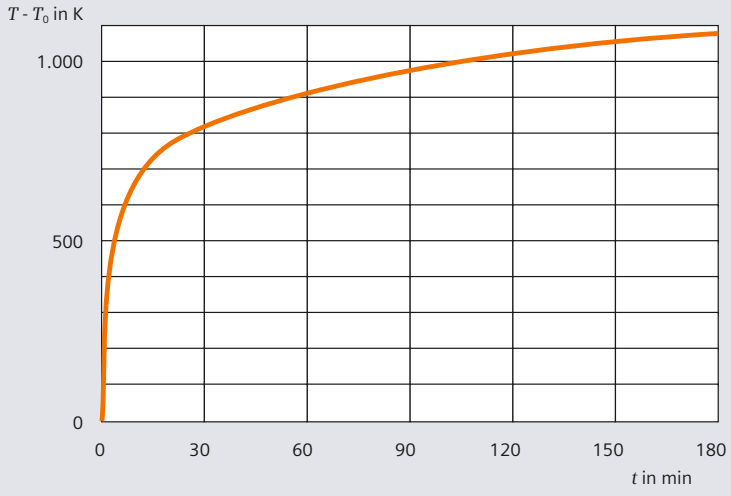


Fig. 9/2: **Standard temperature curve (STC) according to DIN 4102-2 to test the functional endurance**

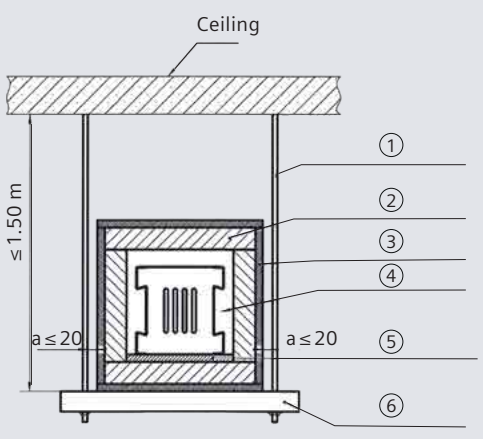
9.3.2 Design Versions

To comply with the functional endurance, special components are required for the functional endurance duct as well as for the carrier construction for the duct and the busbar trunking systems BD2, LD, LR, and LI. Depending on the ambient conditions, different versions of the duct (e.g., barriers on 4 or 3 sides) and the carrier construction (fixing with threaded rods or wall beams) are possible. The stipulations from the general building inspectorate certificates must be observed here:

Use only fixing accessories and barrier material – including barrier accessories – approved by the building inspectorate. This material must be provided by the customer and is not included in the scope of supply of the busbar trunking system.

Typical design options are sketched in Fig. 9/3. The corresponding materials and dimensions are described in the individual chapters. There, you will also find the derating factors required for the permissible currents. The derating factors conditional on the ambient temperature must be additionally observed. These are also given in the respective chapters, matching with the corresponding type of busbar trunking system.

Details on barriers, building elements, and carrier constructions are described in the general building inspectorate certificates (German: abP = allgemeines bauaufsichtliches Prüfzeugnis). Before planning, these abP can be inquired at your Siemens contact partner.



1 Threaded rods ≥ M12;
E90: Tensile stress ≤ 6 N/mm²
E30/E60: Tensile stress ≤ 9 N/mm²

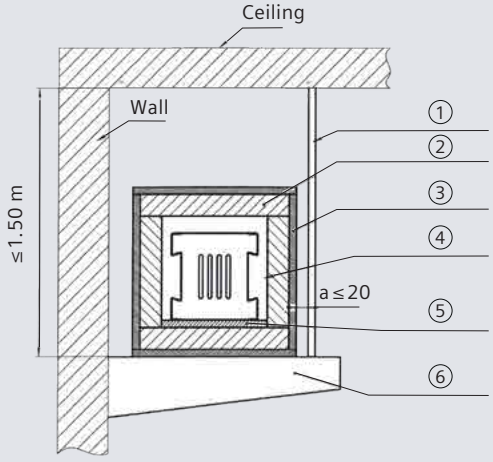
2 PROMATECT L500 plates
t = 20 mm or 40 mm

3 Cladding of the lateral connection (bushing) with PROMATECT H-plates
t ≥ 15 mm l = 400 mm

4 LDA / LDC busbar trunking system

5 PROMATECT H-plate
t = 15 mm 1 = 400 mm
inner load distribution plate

6 Carrier construction



1 Threaded rods ≥ M12;
E90: Tensile stress ≤ 6 N/mm²
E30/E60: Tensile stress ≤ 9 N/mm²

2 PROMATECT L500 plates
t = 20 mm or 40 mm

3 Cladding of the lateral connection (bushing) with PROMATECT H-plates
t ≥ 15 mm l = 400 mm

4 LDA / LDC busbar trunking system

5 PROMATECT H-plate
t = 15 mm 1 = 400 mm
inner load distribution plate

6 Carrier construction

Fig. 9/3: **Design options for functional endurance of busbar trunking systems, example LD system**

9.4 Magnetic Disturbance Field Radiation

For the first planning phases, an estimation of the magnetic radiated disturbance according to the distance to the busbar run is sufficient. The decisive issues are the conductor configurations and the geometry of conductors and enclosures. Fig. 9/4 schematically illustrates the overlapping of the magnetic field lines for the LD system with double conductor configuration, resulting in lower disturbance field values.

As the measurements described in IEC 61439-6 only cover a distance of 1 m to each side horizontally and vertically to the busbar run, the values for larger distances must be extrapolated.

The finite element method delivers similarly accurate results. Using the SIEMENS TIP toolbox, not only the magnetic field strength (radiated interference) – as a function of the current flow –, but also load-distance profiles for various Tesla limit values can be determined for all SIVACON 8PS systems individually on a project-specific basis. For this you only need to register on the SIEMENS TIP website and enter the project-specific data.

Note: In the SIMARIS suite, the magnetic disturbance field radiation for all systems can be determined with the help of the EMC tool (see Chapter 1.3.1).

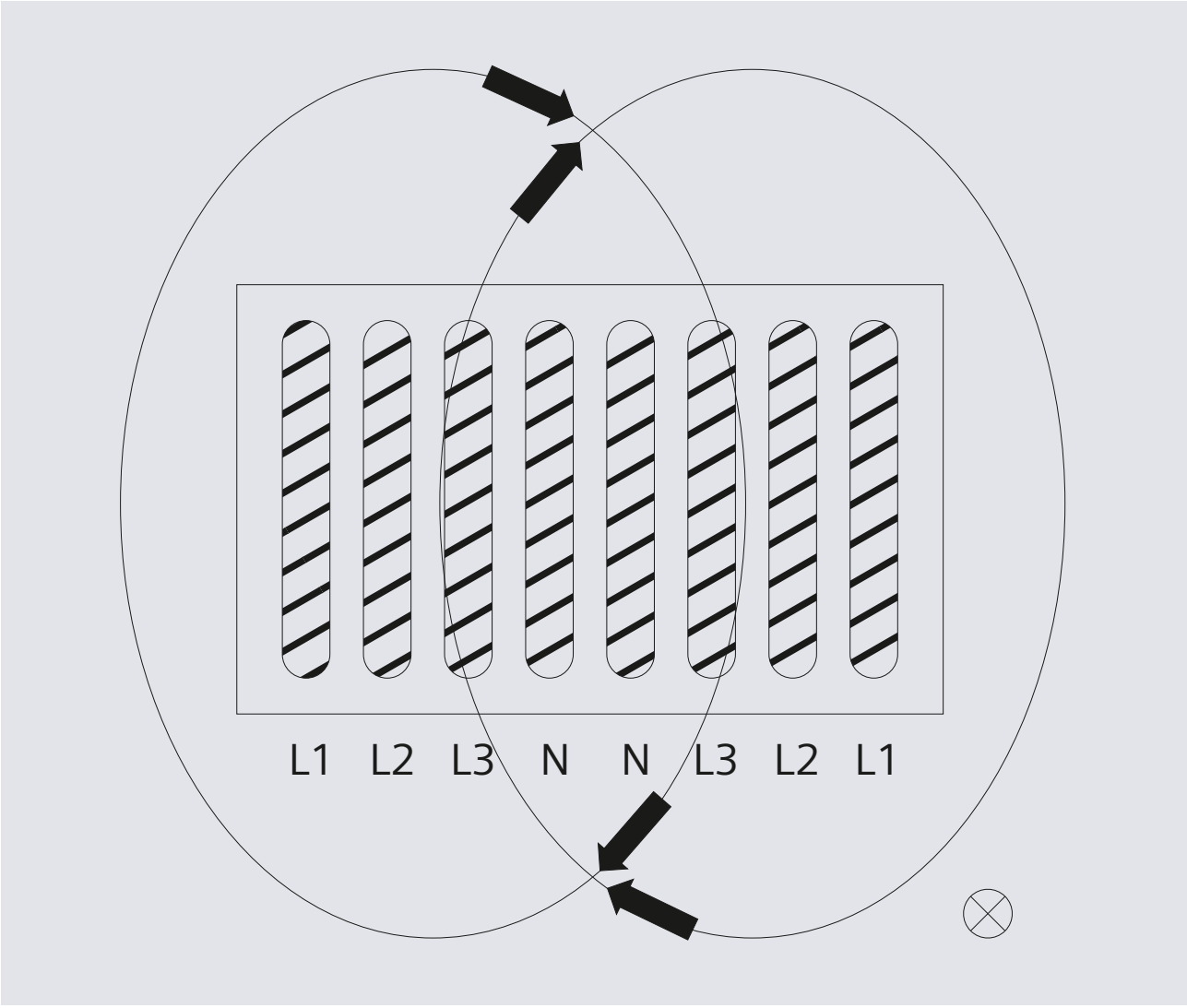


Fig. 9/4: **Overlapping of the magnetic field lines for LD systems with 2 busbars per phase**

9.5 Route Planning

For the routing of busbar trunking systems, the respective mounting positions of the different systems are decisive due to the different dimensions per mounting position as well as the pluggability of the tap-off unit.

With the exception of the small BD01 system, there are the following specifications for the systems, which depend on the conductor position in the system.

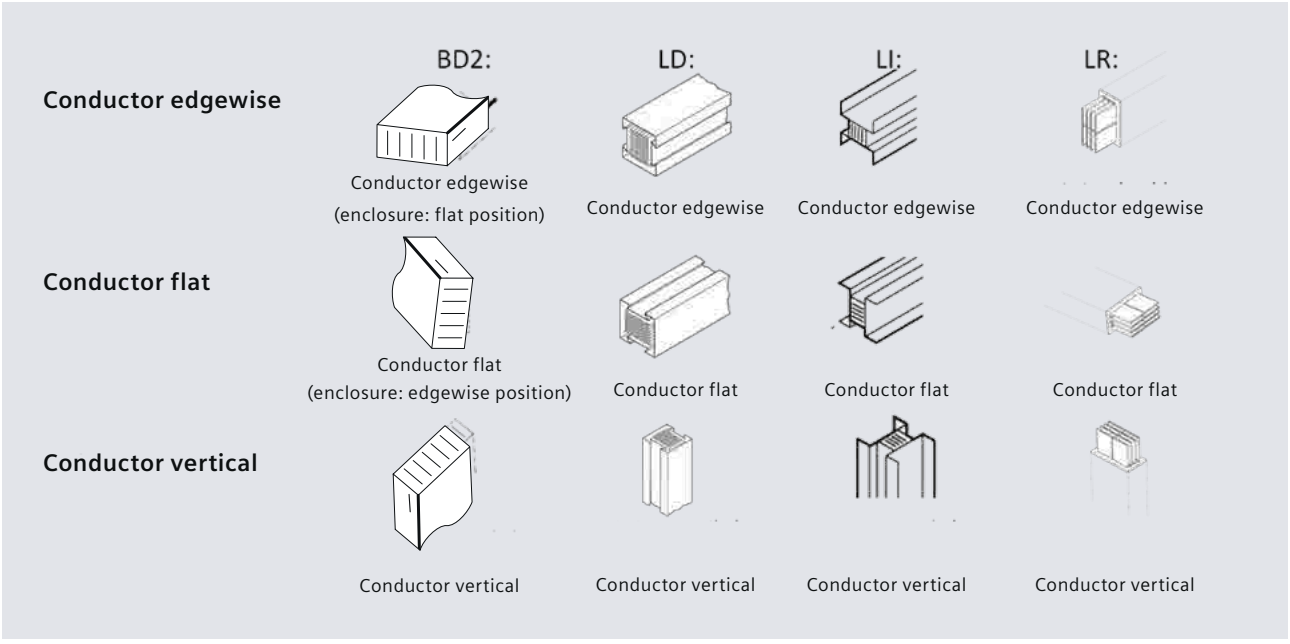
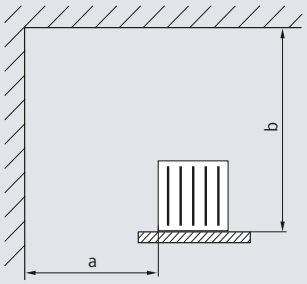


Fig. 9/5: **Identification of the phase position for configuration**

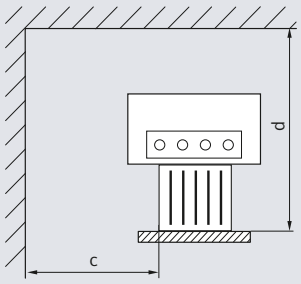
9.5.1 Horizontal Installation

As the mounting position can be selected freely, there are two installation methods for horizontal run layouts:
- Horizontal, conductor edgewise
- Horizontal, conductor flat.

To ensure easy installation of the trunking units and tap-off units, minimum distances to the building elements (Tab. 9/4) have to be observed when the route is planned. A difference must be made between:
- Busbar trunking system without tap-off units
- Busbar trunking system with tap-off units.



without tap-off unit



with tap-off unit

System		Clearances [1] a in cm	b [2] in cm	c in cm	d [3] in cm	System		Clearances [1] a in cm	b [2] in cm	c in cm	d [3] in cm
LI-A . 0800	LI-C . 1000	10	21 (26)	38	121	BD2A(160 ... 400)	BD2C(160 ... 400)	10	28 (24)	30	67
LI-A . 1000		10	23 (26)	38	123	BD2A(630 ... 1000)	BD2C(630 ... 1250)	10	21 (26)	30	73
	LI-C . 1250	10	22 (26)	38	122	LDA1 ... 3	LDC2 ... 3	10	36	35	780
LI-A . 1250	LI-C . 1600	10	25 (26)	38	125	LDA4 ... 8	LDC6 ... 8	10	36	38	780
LI-A . 1600		10	28 (26)	38	128	LRA01 ... 03	LRC01 ... 03	10	59 (62)	– [4]	– [4]
	LI-C . 2000	10	27 (26)	38	127	LRA04 ...	LRC04 ...	10	62 (62)	– [4]	– [4]
LI-A . 2000		10	33 (26)	38	133	LRA05 ...	LRC05 ...	10	65 (62)	– [4]	– [4]
	LI-C . 2500	10	32 (26)	38	132	LRA01 ... 03	LRC01 ... 03	10	69 (62)	– [4]	– [4]
LI-A . 2500		10	40 (26)	38	140	LRA04 ...	LRC04 ...	10	72 (62)	– [4]	– [4]
	LI-C . 3200	10	38 (26)	38	138	LRA05 ...	LRC05 ...	10	74 (62)	– [4]	– [4]
LI-A . 3200		10	28 (51)	38	128	LRA06 ...	LRC06 ...	10	88 (62)	– [4]	– [4]
	LI-C . 4000	10	27 (51)	38	127	LRA07 ...	LRC07 ...	10	94 (62)	– [4]	– [4]
LI-A . 4000		10	33 (51)	38	133	LRA08 ...	LRC08 ...	10	98 (62)	– [4]	– [4]
	LI-C . 5000	10	31 (51)	38	131						
LI-A . 5000		10	40 (51)	38	140	LDATA-1000	LDATA-1000	23	360	– [4]	– [4]
	LI-C . 6300	10	38 (51)	38	138	LDATA(1250 ... 2250)	LDATA(1250 ... 2250)	23	400	– [4]	– [4]

[1] Clearances for horizontal edgewise mounting position without taking the enclosure dimensions of incoming cable connection units into account
[2] Dimensions in brackets for horizontal flat mounting position without taking the enclosure dimensions of incoming cable connection units into account
[3] The clearance d takes into account tap-off units from 250 A with an average height of 40 cm and corresponds to a recommended minimum distance of 60 cm between the top edge of the tap-off unit and the ceiling, so that proper installation for the cable connection is possible
Smaller clearances for lower currents as well as laterally plugged tap-off units are available on request
[4] The clearances depend on the dimensions of the tap-off units. The dimensions are available on request

Tab. 9/4: **Space requirements for busbar trunking systems in horizontal installation**

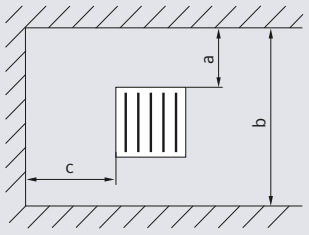
9.5.2 Vertical Installation

When vertical busbar runs are planned, the floor height from ceiling center to ceiling center is the decisive dimension for selecting the busbar lengths.

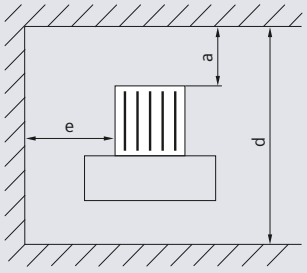
Same as for horizontal installation, minimum distances to the building elements (Tab. 9/5) have to be observed when the route for vertical installation is planned. Again, a difference must be made between:
- Busbar trunking system without tap-off units
- Busbar trunking system with tap-off units.

9.5.3 Fixing Brackets

System-specific fixing brackets must be used for fixing the trunking units (Tab. 9/6 to Tab. 9/8).



without tap-off unit

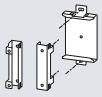
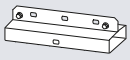
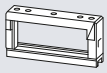
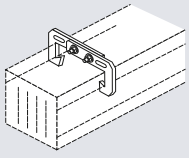


with tap-off unit

System		Clearances [1] a [2] in cm	b [2] in cm	c in cm	d [3] in cm	e in cm	System		Clearances [1] a [2] in cm	b [2] in cm	c in cm	d [3] in cm	e in cm
LI-A . 0800	LI-C . 1000	10	21	15	131	38	BD2A (160 ... 400)	BD2C (160 ... 400)	3–8	19	10	116	30
LI-A . 1000		10	23	15	133	38	BD2A (630...1000)	BD2C (630...1250)	5–8	31	10	120	30
	LI-C . 1250	10	22	15	132	38	LDA1 ... 3	LDC2 ... 3	2–12	46	10	146	35
LI-A . 1250	LI-C . 1600	10	25	15	135	38	LDA4 ... 8	LDC6 ... 8	2–12	46	10	146	38
LI-A . 1600		10	28	15	138	38	LRA01 ... 03	LRC01 ... 03	10	69	10	– [4]	– [4]
	LI-C . 2000	10	27	15	137	38	LRA04 ...	LRC04 ...	10	72	10	– [4]	– [4]
LI-A . 2000		10	33	15	143	38	LRA05 ...	LRC05 ...	10	75	10	– [4]	– [4]
	LI-C . 2500	10	31	15	141	38	LRA01 ... 03	LRC01 ... 03	10	79	10	– [4]	– [4]
LI-A . 2500		10	40	15	150	38	LRA04 ...	LRC04 ...	10	82	10	– [4]	– [4]
	LI-C . 3200	10	38	15	148	38	LRA05 ...	LRC05 ...	10	84	10	– [4]	– [4]
LI-A . 3200		10	28	15	138	38	LRA06 ...	LRC06 ...	10	98	10	– [4]	– [4]
	LI-C . 4000	10	27	15	137	38	LRA07 ...	LRC07 ...	10	104	10	– [4]	– [4]
LI-A . 4000		10	33	15	143	38	LRA08 ...	LRC08 ...	10	108	10	– [4]	– [4]
	LI-C . 5000	10	31	15	141	38							
LI-A . 5000		10	40	15	150	38							
	LI-C . 6300	10	38	15	148	38							

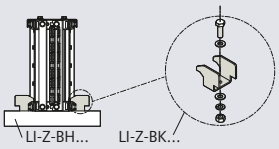
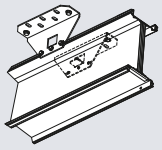
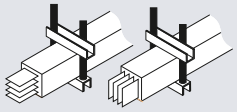
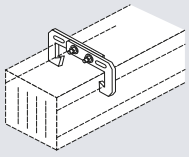
[1] The enclosure dimensions of incoming cable connection units are not taken into account
[2] Clearances apply as minimum dimensions when using vertical fixing brackets without taking into account the recommended cut-out dimensions for the fire barrier in the ceiling, which require larger clearances depending on national approval and design
[3] The clearances depend on the dimensions of the tap-off units. The dimensions specified apply to the available tap-off units of maximum size. Specifications for the use of smaller sizes are available on request
[4] The clearances depend on the dimensions of the tap-off units. The dimensions are available on request

Tab. 9/5: **Space requirements for busbar trunking systems in vertical installation**

System	Type of bracket	Function	Fixing distance x [2]
BD01 [1]	 Universal fixing bracket (BD01-B)	• For wall mounting • For ceiling mounting	For flat mounting position: x ≤ 1.5 m For edgewise mounting position: x ≤ 3 m (At higher mechanical stress: An intermediate support with an additional fixing bracket at the trunking unit is recommended)
	 Suspension bracket (BD01-BA)	• For wall mounting • For ceiling mounting • Suitable for suspension	For flat mounting position: x ≤ 1.5 m For edgewise mounting position: x ≤ 3 m
	 Hanger bracket (BD01-BAP)	• For suspension of trunking units in flat position	For flat mounting position: x ≤ 1.5 m For edgewise mounting position: x ≤ 3 m
BD2 [1]	 Fixing bracket (BD2-400-BB, BD2-1250-BB)	• Supporting the weight of the busbar run • For wall mounting • For wall mounting using spacers • For fixing on wall and tubular beams • For ceiling mounting using suspended supports (on request)	Up to 630 A: x ≤ 3.25 m (one fixing per trunking unit) Up to 1,000 A: x ≤ 2.5 m For further information, see Chapter 4
LD [1]	 Suspension bracket (LD-B1, LD-B2)	• Supporting the weight of the busbar run • For fixing to suspended supports • LD-B1 for LD . 1 ... to LD . 3 • LD-B2 for LD . 4 ... to LD . 8	Distance x • For LDA1 to LDA3: x ≤ 6 m • For LDA4 to LDA8: x ≤ 5 m • For LDC2: x ≤ 5 m • For LDC3 and LDC6: x ≤ 4 m • For LDC7: x ≤ 3 m • For LDC8: x ≤ 2 m
	 Terminal clamp (provided by the customer)	• For fixing on wall and tubular beams	Same as for suspension bracket

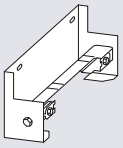
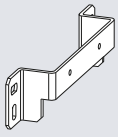
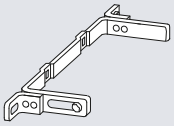
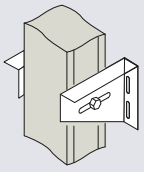
[1] Fixed point brackets are not required due to the system design
[2] The dimensions are recommendations for planning. Max. permissible fixing distances are given in the technical specification tables

Tab. 9/6: **Fixing brackets for horizontal fixing of the busbar trunking systems**

System	Type of bracket	Function	Fixing distance x [2]
LI	 Fixing bracket with weight-bearing capacity	• Supporting the weight of the busbar run • Permitting proper movement • For ceiling mounting using threaded rods • For wall mounting using wall and tubular beams	For flat mounting position of the conductor: x ≤ 2 m For edgewise mounting position of the conductor: x ≤ 3 m
	 Fixed point bracket	• Fixing the busbar run to the building element • For wall and ceiling mounting • For fixing (-K) to fixed point consoles	Depending on local conditions and configuration
LR	 Fixing bracket with weight-bearing capacity	• Supporting the weight of the busbar run • Permitting proper movement • For wall mounting • For ceiling mounting	x ≤ 1.5 m
	Fixed point bracket	• Fixing the busbar run to the building element • For wall mounting • For ceiling mounting	Depending on local conditions and configuration
LDATA	 Suspension bracket (LDATA-ZB1)	• Supporting the weight of the busbar run • For fixing to suspended supports	LDATA-1000 to LDATA-1600: 6 m LDATA-2000 to LDATA-2250: 5 m

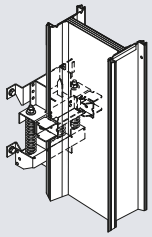
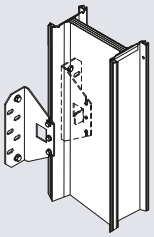
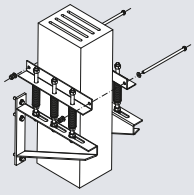
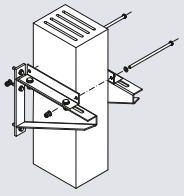
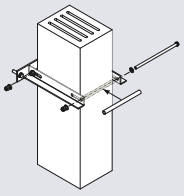
[1] Fixed point brackets are not required due to the system design
[2] The dimensions are recommendations for planning. Max. permissible fixing distances are given in the technical specification tables

Tab. 9/5: **Fixing brackets for horizontal fixing of the busbar trunking systems** (continued)

System	Type of bracket	Function	Fixing distance x [2]
BD2 [1]	 Fixing bracket with weight-bearing capacity (BD2-BVW)	• Supporting the weight of the busbar run • For wall mounting • For ceiling mounting (BD2-BDV)	Up to 400 A: x ≤ 7.5 m 630 A: x ≤ 5 m 800 to 1,000 A: x ≤ 4 m 1,250 A: x ≤ 3.25 m
	 Fixing bracket with weight-bearing capacity (BD2-BVF)	• Supporting the weight of the busbar run • For wall mounting	At every connecting flange of the joint block (x ≤ 3.25 m)
	 Spacer bracket (BD2-BD) for routing the busbar run and for distance compensation  Spacer (BD2-DSB)	• Fixing the distance to the building element • For wall mounting	Depending on local conditions and configuration
LD [1]	 Fixing bracket with weight-bearing capacity (LD-BV)	• Supporting the weight of the busbar run • For wall mounting	At every trunking unit (x ≤ 3.20 m)

[1] Fixed point brackets are not required due to the system design
[2] The dimensions are recommendations for planning. Max. permissible fixing distances are given in the configuration guidelines

Tab. 9/7: **Fixing brackets for vertical fixing of the BD2 and LD systems**

System	Type of bracket	Function	Fixing distance [1]
LI	 Fixing bracket with weight-bearing capacity (LI-Z-BV...)	• Supporting the weight of the busbar run • Permitting proper movement • For wall mounting • For ceiling mounting	At an average floor height from 3.40 m to 3.90 m, 1 set of brackets per floor
	 Fixed point bracket	• Fixing the busbar run to the building element • For wall mounting	Depending on local conditions and configuration
LR	 Fixing bracket with weight-bearing capacity (LR...-BVW)	• Supporting the weight of the busbar run • Permitting proper movement • For wall mounting • For wall/ceiling mounting (LR...-BVD)	At an average floor height from 3.40 m to 3.90 m, 1 set of brackets per floor
	 Fixed point bracket (LR...-BF)	• Fixing the busbar run to the building element • For wall mounting • For wall/ceiling mounting (LR...-BFD)	Depending on local conditions and configuration
	 Sliding bracket (LR...-BG)	• Fixing the distance to the building element • Permitting proper movement • For wall mounting	Depending on local conditions and configuration

[1] The dimensions are recommendations for planning. Max. permissible fixing distances are given in the configuration guidelines

Tab. 9/8: **Fixing brackets for vertical fixing of the LI and LR systems**

9.5.4 Carrier Construction

The variety of local structural conditions is reflected in the large number of different carrier constructions. Fig. 9/6 shows common versions for ceilings, walls, or floors.

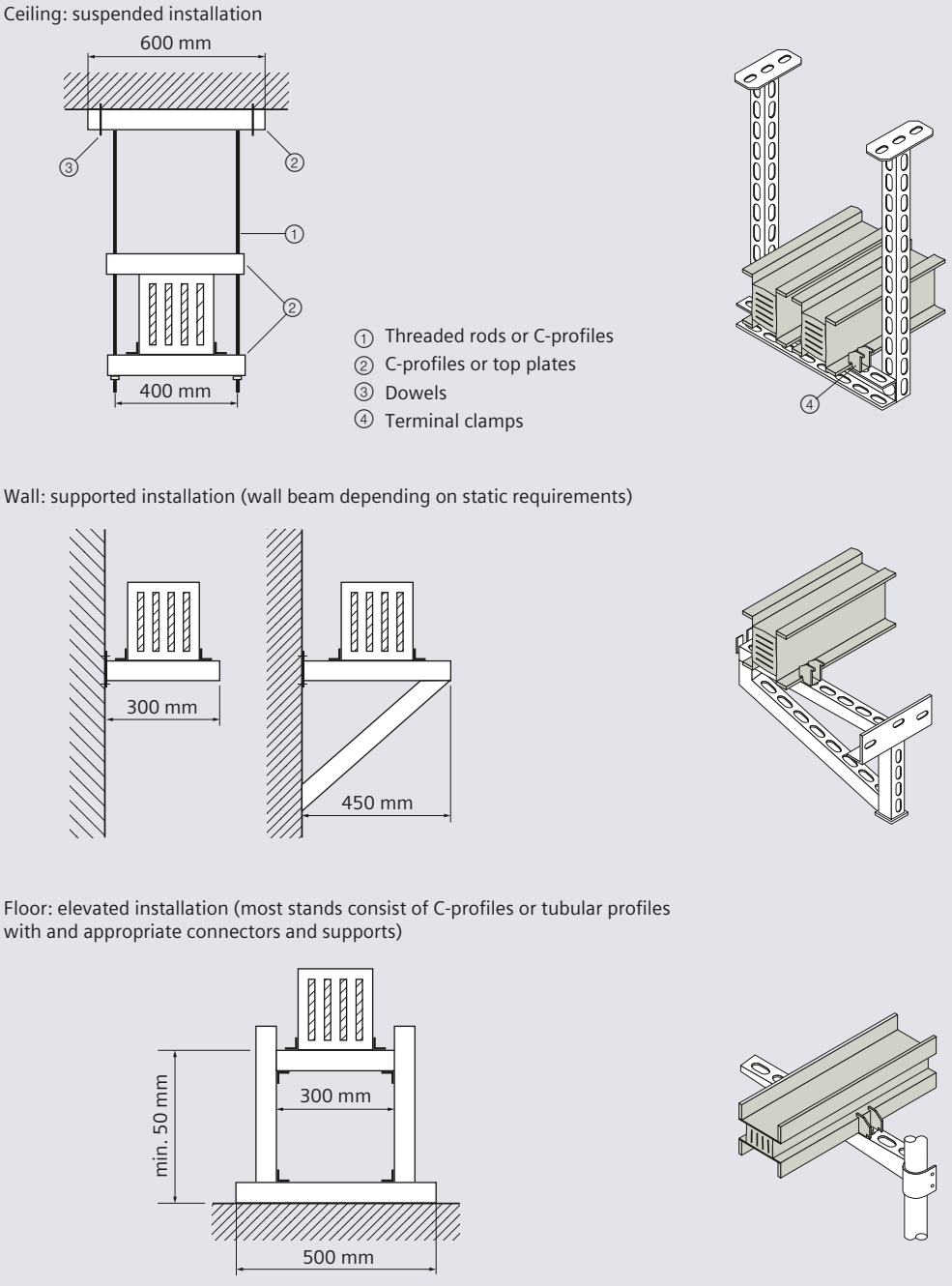


Fig. 9/6: **Schematic representation of exemplary carrier constructions for suspended, supported, and elevated installation**

9.6 DC Applications

Busbar trunking units without tap-off points and junction units are suitable for power transmission for use in both three-phase and DC applications.
For use in DC applications, the corresponding "DC" feeding elements must be used. The rated currents for DC are given in the technical specifications.

In case of short circuit, the power is limited either by the power supply unit, the thyristor, or the battery. These short-circuit currents are usually clearly below the three-phase short-circuit currents.

It has to be observed that a possible arcing short circuit cannot extinguish by itself, because DC currents do not have a zero crossing. Depending on the length of the busbar run, it has to be verified if the selected switching and protection device trips correctly.

If used in DC applications, it is recommended to label the components. The separately orderable adhesive "DC label" serves this purpose, for example.

Power distribution

The standard tap-off units are intended for use in three-phase applications. They are not suitable for use in DC applications.

For power distribution in DC networks, special energy units with suitable components and interconnection have been developed. More details can be obtained from your Siemens contact partner.

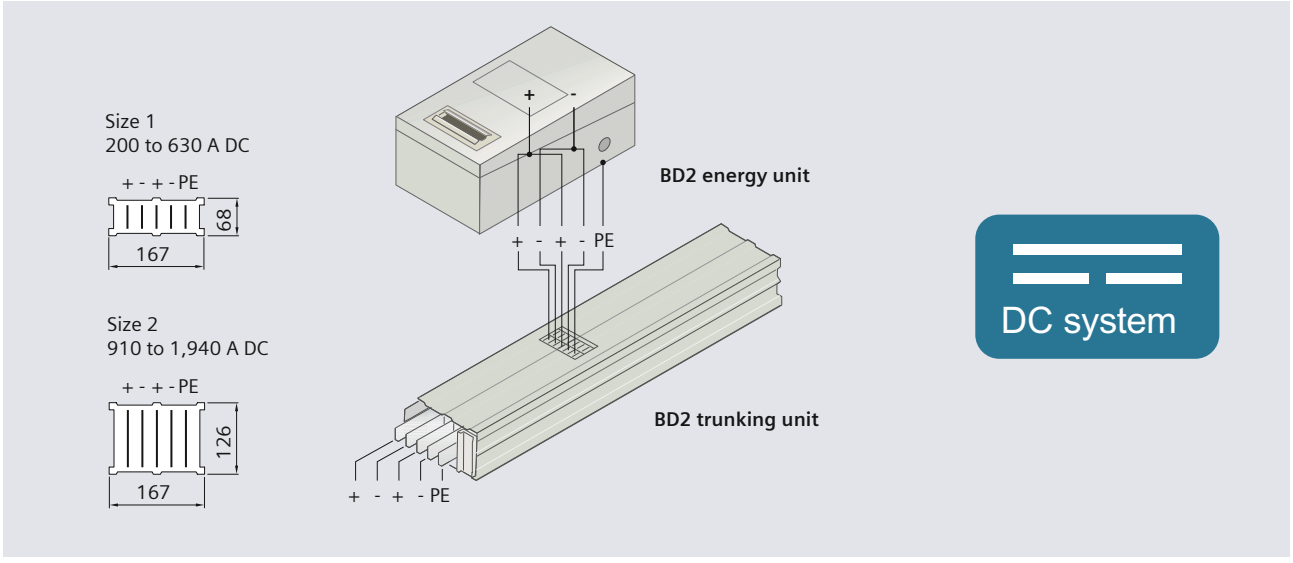


Fig. 9/7: **Arrangement of conductors for DC applications of the BD2 busbar trunking system, and adhesive labels for identification of DC systems (dimensions in mm)**

9.7 Outdoor Installation

The SIVACON 8PS systems can also be used outside closed air-conditioned areas. In practice, these are applications with busbar trunking systems as they are frequently encountered, for example, for electric power distribution in open parking garages (e-mobility) or for power transmission between the LVMD and outside the building.

In this case, the busbar trunking systems are exposed to the climate of the place of installation. Thus, additional requirements for outdoor installation according to the standards IEC 61439 Part 1 and Part 6 must be considered and fulfilled:

Requirements	BD01	BD2	LD	LI	LR
Degree of protection min. IP23	✓	✓	✓	✓	✓
Lower limit of ambient air temperature –25 °C	✓	✓	✓	✓	✓
Relative humidity up to 100%	✓	✓	✓	✓	✓
Condensation	✓	✓	✓	✓	✓
Wind-borne precipitation	1)	1)	1)	1)	✓
Formation of ice	✓	✓	✓	✓	✓
Resistance against UV radiation	1)	1)	1)	1)	✓

1) To protect against wind-borne precipitation and direct solar radiation, weather protection must be available on site in the installation environment of the system

Tab. 9/9: **Technical requirements for outdoor installation of SIVACON 8PS busbar trunking systems**

Systems BD01, BD2, LD, and LI for use in weather-protected locations

For outdoor applications, the respectively available system-specific product range can be used at weather-protected locations as follows:

- BD01 system: degree of protection IP54, mounting positions horizontal and vertical
- BD2 system: degree of protection IP55, mounting positions horizontal and vertical
- LD system
  - Trunking units: degree of protection IP34, mounting positions horizontal edgewise and vertical
  - Tap-off units: degree of protection IP54 (IP3X on request)
- LI system
  - Trunking units: degree of protection IP55 (IP66), mounting positions horizontal edgewise/flat and vertical
  - Tap-off units: IP54, IP55 (IP40 on request).

Note on the usability of tap-off units:
The use of devices and electrical accessories in tap-off units must be checked individually for the respectively applicable ambient temperature. The technical data sheets of the components used must be consulted and observed.
For example, specific electronic components may possibly only be used at temperatures down to –5 °C or require a specific parameterization for use at lower temperatures.

Note on ambient temperature according to the technical specifications of the systems BD01, BD2, LD, and LI for operating conditions:
The ambient temperature is defined according to the standard EN 61439-1 Chapter 7.3.1 for indoor installation at +40 °C for the upper limit and down to –5 °C for the lower limit. With the qualification for outdoor installation, the lower limit of the ambient temperature for use in weather-protected locations can be reduced to –25 °C.

Classification of the systems BD01, BD2, LD, and LI according to climatic conditions defined in IEC 60721

In principle, the classification 3K24 according to IEC 60721-3-3 for outdoor use is not prescribed for manufacturers of busbar trunking systems, but provides an optimal framework to evaluate, plan, and use the systems outside of closed air-conditioned indoor areas for power distribution and transmission with regard to their functionality. With the help of the limit value specifications from the following table, the systems are to be designed to withstand and remain operational in various environments with different climatic conditions.

Properties (environmental influencing factor)	Unit	3K24
Low air temperature High air temperature	°C °C	-25 +55
Low relative air humidity High relative air humidity	% %	5 100
Low absolute air humidity High absolute air humidity	g/m^3 g/m^3	0.5 29
Speed of temperature change	K/min	0.5
Low atmospheric pressure High atmospheric pressure	kPa kPa	106 yes
Condensation Formation of ice	not determined not determined	yes yes

Tab. 9/10: **3K24 classification of climatic conditions (excerpt of IEC 60721-3-3 Table 1)**

Weather-protected locations for SIVACON 8PS busbar trunking systems

Weather-protected locations are either buildings, building extensions, or structural building connections with closed ceilings and walls, which due to the corresponding openings or due to their construction, do not offer self-contained air-conditioned interior spaces for the installation of the listed systems. If no closed ceilings or walls exist for on-site installation, either minimum distances from the systems to the building openings or an additional protection (protective plates or complete protective enclosures) must be provided. Further information on the designs can be found in the sections for protective enclosures and protective plates. For outdoor installation without weather protection, the use of LR systems is required (further information on the LR system can be found in Chapter 8).

Suitable weather protection for the systems BD01, BD2, LD, and LI to protect against solar radiation [1)], rain [2)] and other influencing factors [3)] must thus be ensured by the building, a building extension, or by an additional protective enclosure.

[1)] The UV exposure from solar radiation: Direct effects over longer periods during the day must be prevented by additional measures.

[2)] This also applies to dripping water from leaky building parts (e.g., ceilings), and/or spray and jet water from defective water pipes: Impairments to the systems from water must generally be prevented, e.g., through additional measures or through safety distances – to be defined by the customer – between the components of the busbar trunking system and the outer edge of the roof / weather protection. Safety distances can be eliminated by using a suitable lateral weather protection that extends 10 cm beyond the lower edge of the system.

[3)] Impairment caused by insects and small animals: The need for protective measures must be evaluated by the customer on a case-by-case basis, and the corresponding measures must be defined.

Protective enclosure

If any weather protection is missing at or on the building for outdoor installation of the systems, additional protective enclosures must be provided for this purpose. An additional protective enclosure of the busbar trunking system must be dimensioned so that – particularly with ventilated systems – sufficient air can circulate around the system in order to prevent the accumulation of heat (current-carrying capacity, see Fig. 9/8). Protective enclosures are not part of the product range and must be provided by external partners/suppliers.

The following examples (Fig. 9/8) show three examples of possible protective enclosures for horizontal busbar runs.

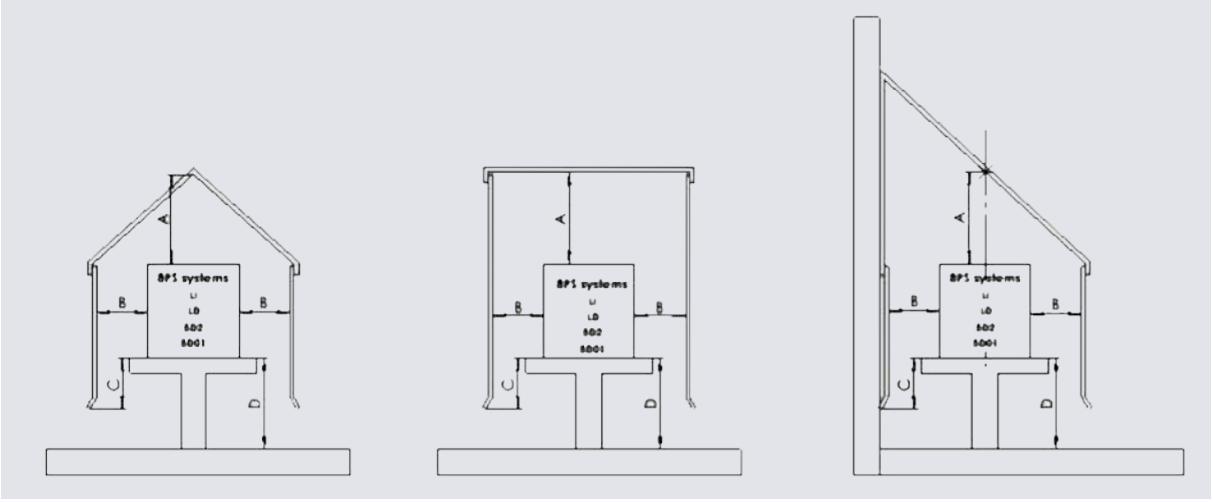


Fig. 9/8: **Three design examples: protective enclosure with angled roof for outdoor installation (left); protective enclosure with flat roof for outdoor installation (center); protective enclosure with sloping roof for installation along an exterior wall (right)**

Explanations on Fig. 9/8:

- The examples on the left side and in the center each show an angled and flat roof construction for open terrain or on the building roof
- The example on the right shows a sloping roof construction along a building
- The fixing of the protective enclosure must not be attached to the busbar trunking system, but must be specifically designed for the enclosure and mechanically decoupled from the system.

Load factors for protective enclosure

For the minimum distances A = 180 mm, B = 100 mm, C = 100 mm, and D = 180 mm, the same load factors apply as for closed interior areas. With smaller distances to the roof of the enclosure (distance A), correspondingly lower load factors apply according to the following diagram.

When using tap-off units and feeding units, their dimensions and space requirements must be considered in terms of installation and accessibility for operation.

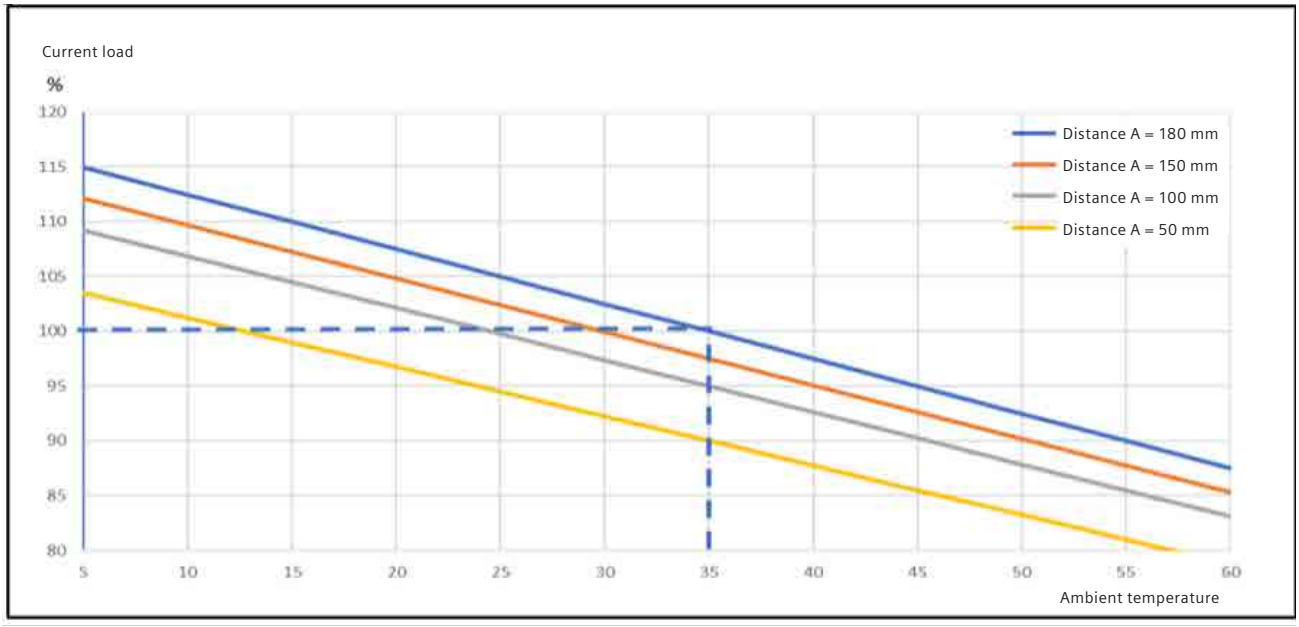


Fig. 9/9: **Load diagram for protective enclosure**

Protective plates

Inadmissible contamination of busbar trunking elements by leaky roofs, ceilings, water pipes, or drain pipes, etc. must be prevented. If this cannot be ruled out by the customer, we recommend the use of protective plates on site.

Implementation of protective plates

- The protective plates are to be implemented with lateral drainage and drip edges and to avoid inadmissible water exposure.
- Protective plates are not part of the product range and must be provided by external partners/suppliers (dimensional drawings for a possible design on request).
- Fastening of protective plates for BD01, BD2, and LD must be clarified by the customer. In contrast to the protective enclosure, with LI the use of spacers for double systems is possible (see below).

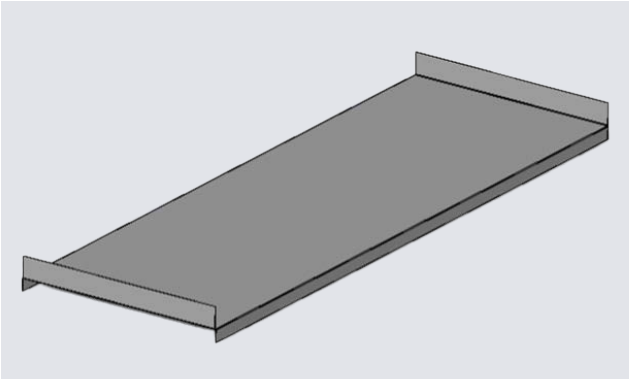


Fig. 9/10: **Protective plate with drip edge and water barrier**

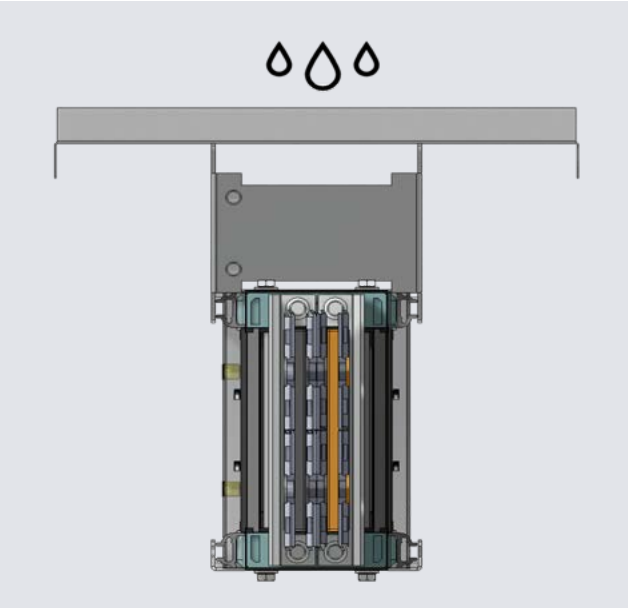


Fig. 9/11: **Protective plate for horizontal edgewise LI system**

9.8 Information on Empty Tap-off Units

The availability and sales of empty tap-off units is regionally limited. Further information is available on request.

The buyer solely bears the responsibility and the risks when using empty tap-off units. The buyer has to observe all applicable regulations in the respective countries. In particular, the buyer must comply with the Product Safety Act on his own responsibility.

The buyer is solely responsible for the final routine test of the finally equipped tap-off unit and the warranty claims regarding the tap-off unit.

The buyer undertakes to indemnify Siemens AG against all third-party claims arising from tap-off units equipped by the buyer.

For every tap-off unit, the scope of supply includes equipping instructions for device installation as well as installation instructions for plugging onto the busbar trunking system.

Warning: Non-observance of the maximum permissible system data can cause serious injury or death. For safety reasons, the stipulations in the equipping instructions must be observed.

9.9 List of Standards Cited

International	National	German title	English title
IEC 60068-2-1	VDE 0468-2-1	Umgebungseinflüsse – Teil 2-1: Prüfverfahren – Prüfung A: Kälte	Environmental testing – Part 2-1: Tests – Test A: Cold
IEC 60068-2-14	VDE 0468-2-14	Umgebungseinflüsse – Teil 2-14: Prüfverfahren – Prüfung N: Temperaturwechsel	Environmental testing – Part 2-14: Tests – Test N: Change of temperature
IEC 60068-2-30		Umgebungseinflüsse – Teil 2-30: Prüfverfahren – Prüfung Db: Feuchte Wärme, zyklisch (12 + 12 Stunden)	Environmental testing – Part 2-30: Tests – Test Db: Damp heat, cyclic (12 h + 12 h cycle)
IEC 60068-2-52	VDE 0468-2-52	Umgebungsprüfungen – Teil 2-52: Prüfverfahren – Prüfung Kb: Salznebel, zyklisch (Natriumchloridlösung)	Environmental testing – Part 2-52: Tests – Test Kb: Salt mist, cyclic (sodium chloride solution)
IEC 60068-2-78	VDE 0468-2-78	Umgebungseinflüsse – Teil 2-78: Prüfverfahren – Prüfung Cab: Feuchte Wärme, konstant	Environmental testing – Part 2-78: Tests – Test Cab: Damp heat, steady state
IEC 60228	VDE 0295	Leiter für Kabel und isolierte Leitungen	Conductors of insulated cables
IEC 60269-1	VDE 0636-1	Niederspannungssicherungen – Teil 1: Allgemeine Anforderungen	Low-voltage fuses – Part 1: General requirements
IEC 60269-2	VDE 0636-2	Niederspannungssicherungen – Teil 2: Zusätzliche Anforderungen an Sicherungen zum Gebrauch durch Elektrofachkräfte bzw. elektrotechnisch unterwiesene Personen (Sicherungen überwiegend für den industriellen Gebrauch)	Low-voltage fuses – Part 2: Supplementary requirements for fuses for use by authorized persons (fuses mainly for industrial application) – Examples of standardized systems of fuses A to K
IEC 60331-1	VDE 0482-331-1	Prüfungen an Kabeln und isolierten Leitungen im Brandfall – Isolationserhalt – Teil 1: Prüfverfahren für Brand mit Erschütterung bei einer Temperatur von mindestens 830 °C für Kabel und isolierte Leitungen mit Nennspannungen bis einschließlich 0,6/1 kV und mit einem Außendurchmesser größer 20 mm	Tests for electric cables under fire conditions – Circuit integrity – Part 1: Test method for fire with shock at a temperature of at least 830 °C for cables of rated voltage up to and including 0,6/1,0 kV and with an overall diameter exceeding 20 mm
IEC 60364-4-41	VDE 0100-410	Elektrische Anlagen von Gebäuden – Teil 4-41: Schutzmaßnahmen – Schutz gegen elektrischen Schlag	Low-voltage electrical installations – Part 4-41: Protection for safety – Protection against electric shock
IEC 60364-7-710	VDE 0100-710	Elektrische Anlagen von Gebäuden – Teil 7-710: Anforderungen für Betriebsstätten, Räume und Anlagen besonderer Art; Medizinisch genutzte Bereiche	Electrical installations of buildings – Part 7-710: Requirements for special installations or locations; Medical locations
IEC 60529	VDE 0470-1	Schutzarten durch Gehäuse (IP-Code)	Degrees of protection provided by enclosures (IP Code)
IEC 60721	VDE 0468-721	Normenreihe: Klassifizierung von Umweltbedingungen	Series of standards: Classification of environmental conditions
IEC 60909-0	VDE 0102	Kurzschlussströme in Drehstromnetzen – Teil 0: Berechnung der Ströme	Short-circuit currents in three-phase a.c. systems – Part 0: Calculation of currents
IEC 60947-3	VDE 0660-107	Niederspannungsschaltgeräte – Teil 3: Lastschalter, Trennschalter, Lasttrennschalter und Schalter-Sicherungs-Einheiten	Low-voltage switchgear and controlgear – Part 3: Switches, disconnectors, switch-disconnectors and fuse-combination units
IEC 61140	VDE 0140-1	Schutz gegen elektrischen Schlag – Gemeinsame Anforderungen für Anlagen und Betriebsmittel	Protection against electric shock – Common aspects for installations and equipment
IEC 61439-1	VDE 0660-600-1	Niederspannungs-Schaltgerätekombinationen – Teil 1: Allgemeine Festlegungen	Low-voltage switchgear and controlgear assemblies – Part 1: General rules
IEC 61439-1 Beiblatt 1	VDE 0660-600-1 Bbl 1	Niederspannungs-Schaltgerätekombinationen – Teil 1: Allgemeine Festlegungen Beiblatt 1: Leitfaden für die Spezifikation von Schaltgerätekombinationen	Low-voltage switchgear and controlgear assemblies – Part 1: General rules; Supplement 1: Guidance to specifying assemblies
IEC 61439-6	VDE 0660-600-6	Niederspannungs-Schaltgerätekombinationen – Teil 6: Schienenverteiler-Systeme	Low-voltage switchgear and controlgear assemblies – Part 6: Busbar trunking systems

International	National	German title	English title
IEC TR 61641	VDE 0660-600-2 Bbl 1	Niederspannungs-Schaltgerätekombinationen in geschlossener Bauform – Leitfaden für die Prüfung unter Störlichtbogenbedingungen durch einen inneren Fehler	Enclosed low-voltage switchgear and controlgear assemblies – Guide for testing under conditions of arcing due to internal faults
IEC 62262	VDE 0470-100	Schutzarten durch Gehäuse für elektrische Betriebsmittel (Ausrüstung) gegen äußere mechanische Beanspruchungen (IK-Code)	Degrees of protection provided by enclosures for electrical equipment against external mechanical impacts (IK code);
ISO 834	comparable to DIN 4102-2	Normenreihe: Feuerwiderstandsprüfungen – Bauteile	Series of standards: Fire-resistance tests – Elements of building construction
ISO 50001		Energiemanagementsysteme – Anforderungen mit Anleitung zur Anwendung	Energy management systems – Requirements with guidance for use
EN 206		Beton – Festlegung, Eigenschaften, Herstellung und Konformität	Concrete – Specification, performance, production and conformity
EN 998-2		Festlegungen für Mörtel im Mauerwerksbau – Teil 2: Mauermörtel	Specification for mortar for masonry – Part 2: Masonry mortar
EN 1363-1	comparable to DIN 4102-9	Feuerwiderstandsprüfungen – Teil 1: Allgemeine Anforderungen	Fire resistance tests – Part 1: General requirements
EN 1366-3		Feuerwiderstandsprüfungen für Installationen – Teil 3: Abschottungen	Fire resistance tests for service installations – Part 3: Penetration seals
EN 1366-11	DIN 4102-12	Feuerwiderstandsprüfungen für Installationen – Teil 11: Brandschutzsysteme für Kabelanlagen und zugehörige Komponenten	Fire resistance tests for service installations – Part 11: Fire protective systems for cable systems and associated components
EN 13501-1		Klassifizierung von Bauprodukten und Bauarten zu ihrem Brandverhalten – Teil 1: Klassifizierung mit den Ergebnissen aus den Prüfungen zum Brandverhalten von Bauprodukten	Fire classification of construction products and building elements – Part 1: Classification using data from reaction to fire tests
EN 13501-2		Klassifizierung von Bauprodukten und Bauarten zu ihrem Brandverhalten – Teil 2: Klassifizierung mit den Ergebnissen aus den Feuerwiderstandsprüfungen, mit Ausnahme von Lüftungsanlagen	Fire classification of construction products and building elements – Part 2: Classification using data from fire resistance tests, excluding ventilation services
EN 50110-1	VDE 0105-1	Betrieb von elektrischen Anlagen – Teil 1: Allgemeine Anforderungen	Operation of electrical installations – Part 1: General requirements
EN 50274	VDE 0660-514	Niederspannungs-Schaltgerätekombinationen – Schutz gegen elektrischen Schlag – Schutz gegen unabsichtliches direktes Berühren gefährlicher aktiver Teile	Low-voltage switchgear and controlgear assemblies – Protection against electric shock – Protection against unintentional direct contact with hazardous live parts
	DIN 4102-2	„Brandverhalten von Baustoffen und Bauteilen; Bauteile, Begriffe, Anforderungen und Prüfungen (Anmerkung: vergleichbar mit Normenreihe ISO 834)“	„Fire Behaviour of Building Materials and Building Components; Building Components; Definitions, Requirements and Tests (Note: comparable to series of standards ISO 834)“
	DIN 4102-3	Brandverhalten von Baustoffen und Bauteilen; Brandwände und nichttragende Außenwände, Begriffe, Anforderungen und Prüfungen (Nachfolge: EN 1363-2)	Fire Behaviour of Building Materials and Building Components; Fire Walls and Non-load-bearing External Walls; Definitions, Requirements and Tests
	DIN 4102-4	Brandverhalten von Baustoffen und Bauteilen – Teil 4: Zusammenstellung und Anwendung klassifizierter Baustoffe, Bauteile und Sonderbauteile	Fire behaviour of building materials and building components – Part 4: Synopsis and application of classified building materials, components and special components
	DIN 4102-9	Brandverhalten von Baustoffen und Bauteilen; Kabelabschottungen; Begriffe, Anforderungen und Prüfungen	Fire behaviour of building materials and elements; seals for cable penetrations; concepts, requirements and testing
	DIN 4102-12	Brandverhalten von Baustoffen und Bauteilen – Teil 12: Funktionserhalt von elektrischen Kabelanlagen; Anforderungen und Prüfungen (Nachfolge: EN 1366-11)	Fire behaviour of building materials and building components – Part 12: Circuit integrity maintenance of electric cable systems; requirements and testing
	DIN 43671	Stromschienen aus Kupfer; Bemessung für Dauerstrom	Copper bus bars; design for continuous current

9.10 List of Abbreviations

A

AbP	Allgemeines bauaufsichtliches Prüfzeugnis (general building inspectorate certificate)
AC	Alternating Current
AK	Tap-off unit (German: Abgangskasten)
AS	Simple bus system in automation technology with unshielded 2-wire connection between actuator and sensor
ATAM	Adjustable Thermal Adjustable Magnetic Trip Unit
ATFM	Adjustable Thermal Fixed Magnetic Trip Unit

B

BACnet	Building Automation and Control networks
BIM	Building Information Modeling
BS	British Standards

C

CEE	Commission on the Rules for the Approval of the Electrical Equipment

D

DALI	Digital Addressable Lighting Interface
DC	Direct Current
DIBt	Deutsches Institut für Bautechnik (German Institute for Structural Engineering)
DIN	Deutsches Institut für Normung (German Institute for Standardization)
DNV	Det Norske Veritas (since 2013, DNV GL)

E

EAC	Identification of conformity of the customs union of Russia, Belarus, and Kazakhstan
EEG	Electroencephalogram
EIB	European Installation Bus and protocol for building automation
ECG	Electrocardiogram
EMC	ElectroMagnetic Compatibility
EN	European Standard
STC	Standard Temperature Curve
ETU	Electronic Trip Unit

F

RCD	Residual Current-operated protective Device

I

IEC	International Electrotechnical Commission
IEC TR	International Electrotechnical Commission Technical Report
IK	Degree of protection against impacts (specified according to IEC 62262)
IK	Degree of protection against impacts (specified according to IEC 60529)
ISO	International Organization for Standardization

K

KNX	Field bus and protocol for building automation (successor of EIB)
KT	Cable grommet (German: Kabeltülle)

M

MCB	Miniature circuit breaker
MLFB	Machine-readable product designation (German: maschinenlesbare Fabrikatebezeichnung) – product number systematics from Siemens
Modbus	Communication protocol with "Master-Slave" or "Server-Client" architecture
Modbus RTU	Modbus protocol for binary data transmission (RTU: Remote Terminal Unit)
Modbus TCP	Modbus protocol with TCP/IP data transmission

N

NH	Low-voltage high-rupturing capacity (for identification of fuse links) (German: Niederspannung-Hochleistung)
LVMD	Low-Voltage Main Distribution

P

PE	Polyethylene (or also Protective Earth)
PE / PEN	Protective Earth / Protective Earth Neutral
PROFIBUS	PROcess FIeld BUS (field bus standard for automation technology with the standard communication protocol PROFIBUS DP)
PROFINET	PROcess FIeld NETwork (industrial Ethernet standard for automation technology, particularly for linking industrial technology with information technology)
PVC	Polyvinylchloride

R

RAL	Organization in Germany that defines color standards and publishes them accordingly in color catalogs and other media
RH	Relative Humidity

S

Schuko	Plug and socket system with protective contacts for domestic use
SCPD	Short-Circuit Protection Device

T

TCP	Transmission Control Protocol
MW	Modular Width
TM	Thermal-Magnetic trip unit

V

VDE	Association for Electrical, Electronic and Information Technologies (German: Verband der Elektrotechnik, Elektronik und Informationstechnik)

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