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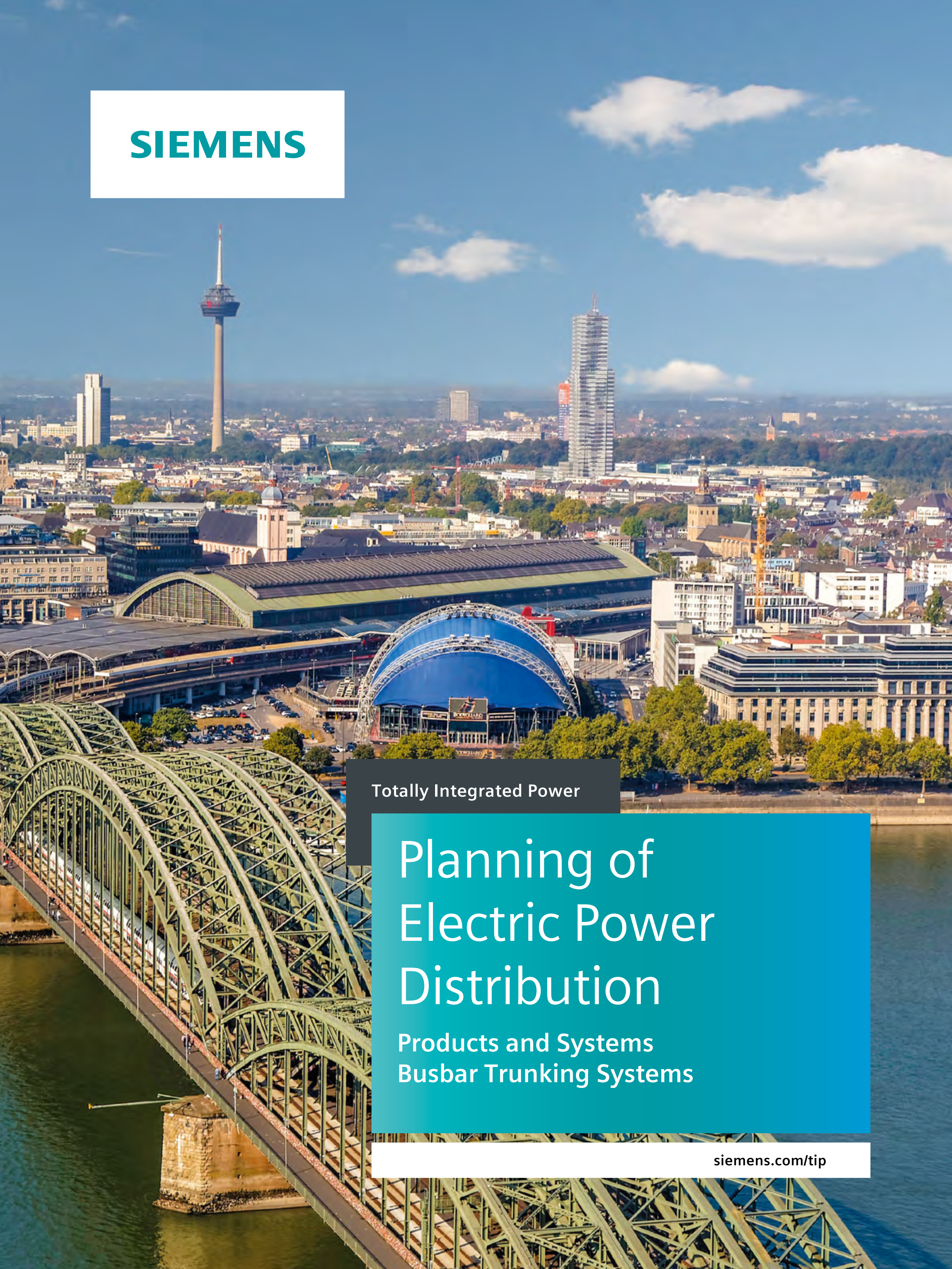

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Planning of Electric Power Distribution

Products and Systems
Busbar Trunking Systems

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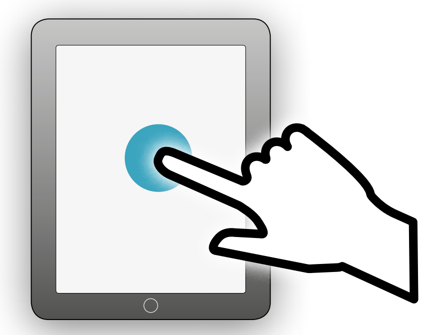

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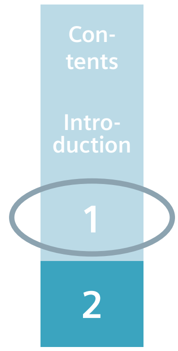

Navigation bar

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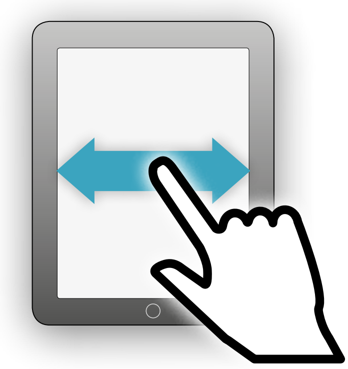

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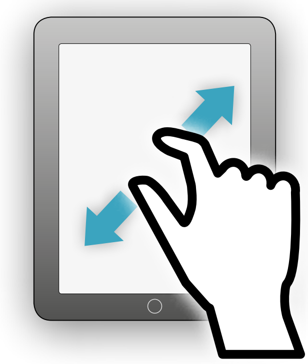
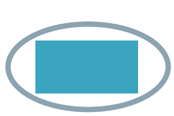


Pinch or stretch to zoom

References to figures and tables

... ancillary equipment units, and in Tab. 3/3 and Tab. 3/4 for tap-off units. For the accessories, the type codes ...

If a figure (Fig.) or table (Tab.) from another page is referred to in the text, click on the reference to skip to the corresponding Fig./Tab.



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

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Introduction

Features of Design Verified Busbar Trunking Systems

Features of Design Verified Busbar Trunking Systems

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. Apart from that, 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 its "Sustainability Information 2017" [pdf download via *www.siemens.com/sustainability*], is to assure access to affordable, reliable, sustainable, and modern energy for everybody. This also includes the development of technologies leading to permanent improvement of the energy efficiency, and thus contributing to fight climate change. Goal 7 of the "Agenda 2030" (Resolution: A/Res/70/1), passed by the United Nations in 2015 [pdf download *https://sustainabledevelopment.un.org/content/documents/21252030 Agenda for Sustainable Development web.pdf*] is taken as a reference. Among others, notable efficiency increases in power transmission and distribution shall contribute to achieving the goal.

Busbar trunking systems from Siemens, which 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, certainly help to reach the goals. The technical features which are commonly relevant according to IEC 61439-1 Supplement 1 (VDE 06060-600-1 Supplement 1) for the planning of busbar trunking systems are specified in Tab. 1.

For planning, the tabular values on individual parts and components are not important, but the specifications on the system. In the following, it is presented how appropriate system data for planning can be created from single values in order to ultimately generate configuration data. For the first planning steps, it is easier to use the results of planning tools such as the freely available Windows tool SIMARIS design (Fig. 1). The present planning manual is therefore an important link between planning tools and configuration for the planner's system understanding.

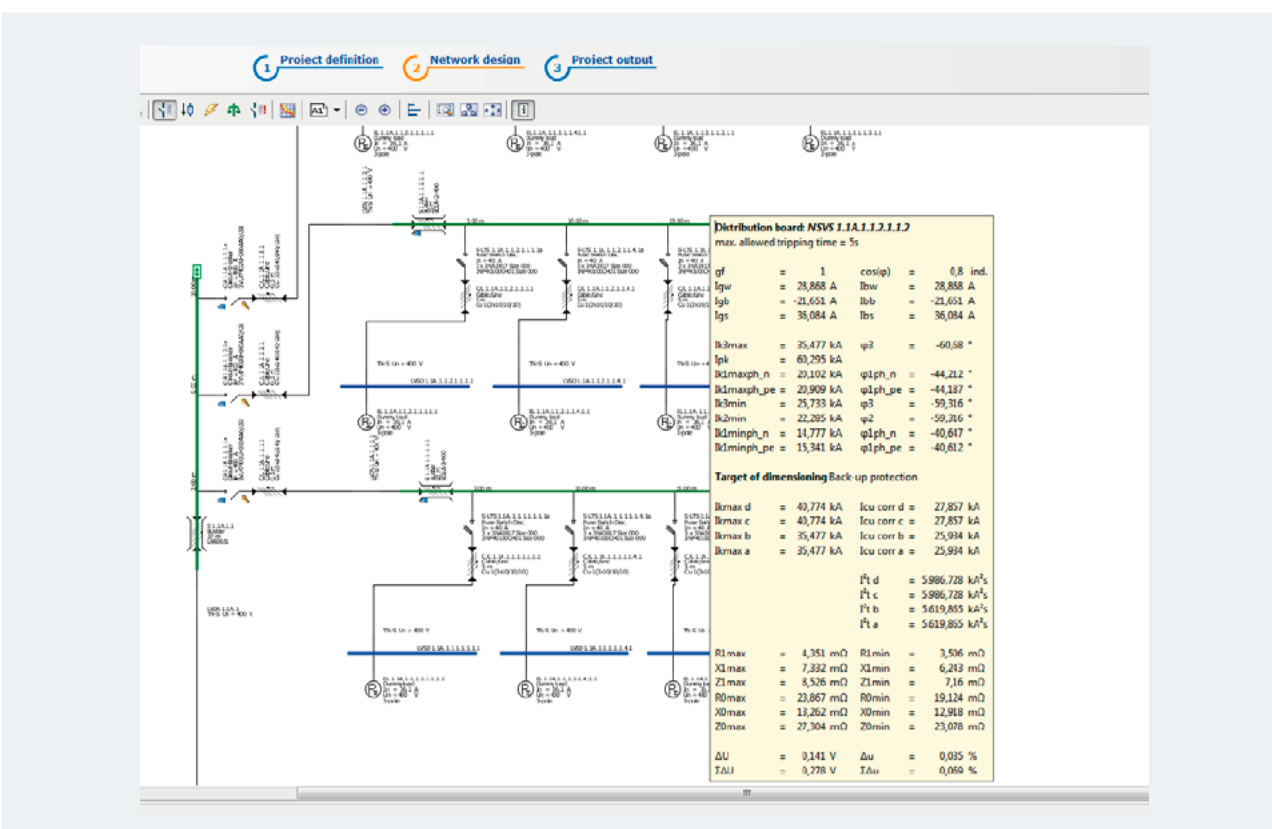


Fig. 1: **Representation of busbar trunking systems and display of planning values in a screenshot of SIMARIS design**

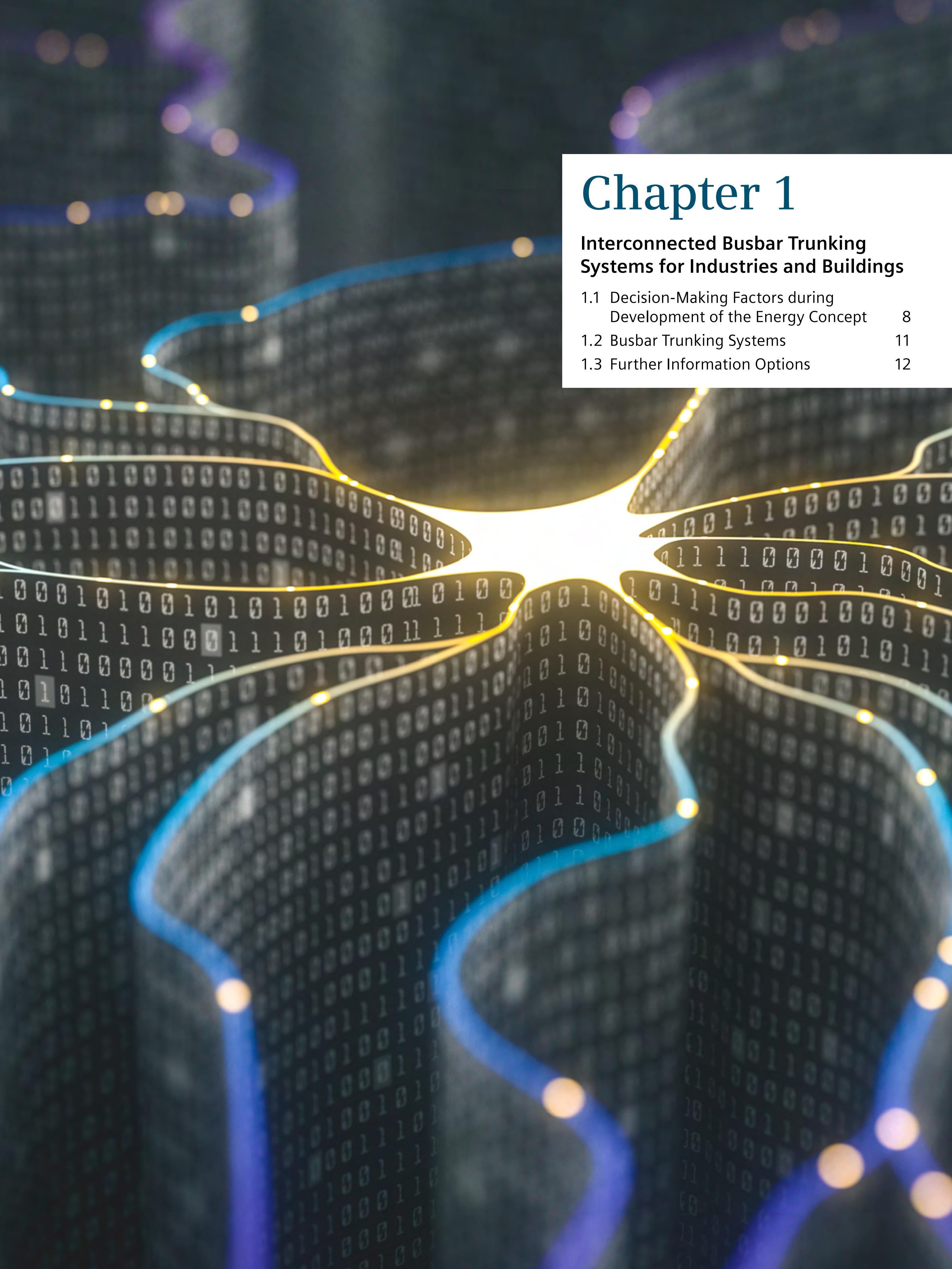
Electrical network	Versions according to IEC 61439-6
System according to the type of earth connection	TT / TN-C / TN-C-S / TN-S / IT
Nominal voltage in V	max. 1,000 V AC or 1,500 V DC
Transient overvoltages	Overvoltage categories III / IV
Temporary overvoltages	To be specified
Rated frequency in Hz	DC / 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: **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 operating conditions	To be specified
Details about packing	To be specified
Operability	
Disconnection of outgoing circuits	No particularities
Maintenance and extension	
Accessibility in service by ordinary persons; requirement to operate devices or change components while the busbar trunking system is energized	No particularities
Accessibility for inspection and similar operations	No particularities
Accessibility for maintenance in service by authorized persons	No particularities
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 conductors’ cross-section: phase conductor up to and including 16 mm^2	To be specified
Ratio of the neutral conductor’s cross-section to the phase conductors’ cross-section: phase conductor greater than 16 mm^2	To be specified

Chapter 1

Interconnected Busbar Trunking Systems for Industries and Buildings



1 Interconnected Busbar Trunking Systems for Industries and Buildings

Busbar trunking systems can show their strengths when a combination of transmission, distribution, operation, and protection of electrical energy is required. The integration options of Siemens busbar trunking systems into automation and building systems technology complete the package of services, and constitute one more advantage regarding the versatility of these systems. By making the combination of standard trunking units with standard tap-off units and/or standard ancillary equipment units easy, on the one hand, planning and installation are simplified and, on the other hand, safe operation is ensured.

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
- Integration in standard planning tools like SIMARIS.

Advantages of the system solution during commissioning:
- Fast and easy installation
- Possibility to commission step by step
- Flexibility in the event of changes and extensions.

Advantages of the system solution during operation:
- Transparency regarding switching states
- Increase of switchgear availability, as the fault location and type of fault can be detected immediately
- Preventive maintenance enabled by recording of operating hours and operating cycles.

1.1 Decision-Making Factors during Development of the Energy 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 must also be 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 distribution can be met easily and simply by employing suitable busbar trunking systems (Fig. 1/1 and Fig. 1/2). Siemens offers busbar trunking systems from 40 up to 6,300 A:
- Busbar trunking system BD01 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).

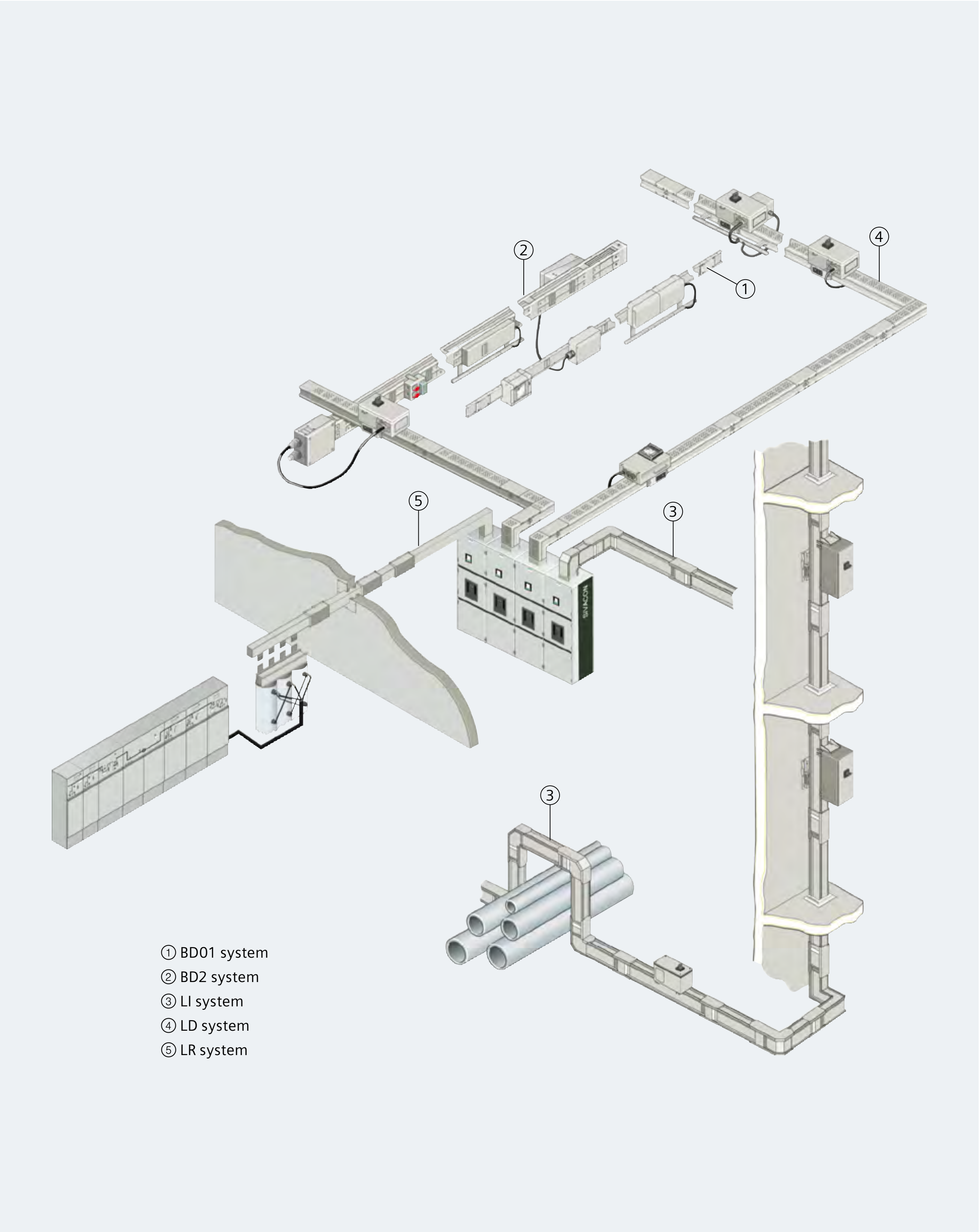


Fig. 1/1: **Overview for SIVACON 8PS busbar trunking systems**

Power transmission

For power transmission via the connection between the transformer and the low-voltage switchboard, or from the main distribution board to the subdistribution 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 plug-on/-off tap-off units. The result is a variable distribution board 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 guaranteed for installation and removal
- Local regulations allow modifications while energized.

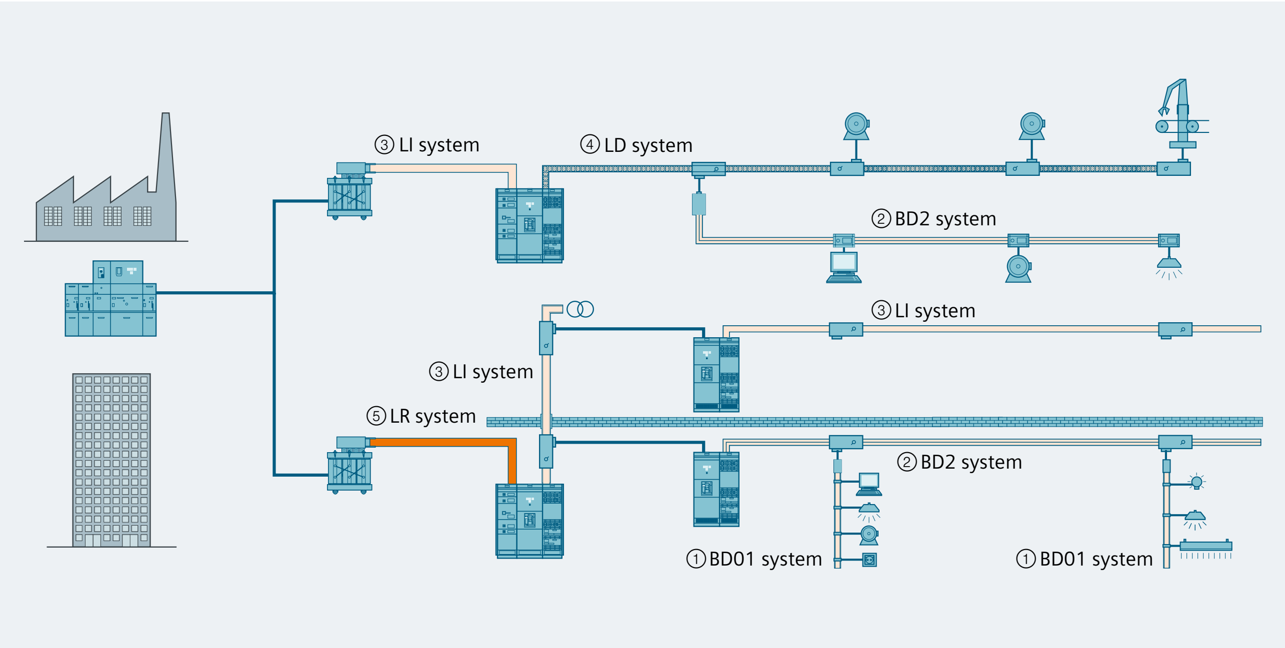


Fig. 1/2: **Application of busbar trunking systems in the industrial and infrastructure sectors**

1.2 Busbar Trunking Systems

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
- Suitable for application in warehouses
- Variable junction units
- Versatile tap-off units
- Compulsory opening and closing of the tap-off-point.

BD2 system up to 1,250 A

The busbar trunking system for application in the harsh industrial sector:
- 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 any type of application
- Early planning of power distribution without exact knowledge of load locations
- Quickly ready for service due to fast and easy installation
- Innovative design: Compensation units are not required for extension compensation
- Tap-off units and tap-off points can be coded at the factory
- Fully sealable.

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 also for harsh industrial applications
- 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 optimal power distribution in the industrial sector:
- Degree of protection up to IP54
- 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
- Design verified connection to distribution boards and transformers.

LR system

The busbar trunking system for power transmission in extreme ambient conditions (IP68):
- Reliable and safe in operation
- Fast and easy installation
- 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 Further Information Options

SIVACON 8PS busbar trunking systems on the Internet

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

Configurator for SIVACON 8PS busbar trunking systems

The product configurator (selection aid) allows for orders of busbar trunking systems up to 1,250 A.

The following configurators are available:
- SIVACON 8PS busbar trunking system BD01, 40 ... 160 A
- SIVACON 8PS busbar trunking system BD2, 160 ... 1,250 A.

The selection aid can be accessed via Siemens Industry Mall and is included in the interactive catalog CA 01 on a DVD which is available free of charge.

Catalog BD01, BD2

Product catalog for selecting the suitable system components of BD01 or BD2:
- German: Article No. E86060-K1870-A101-A9
- English: Article No. E86060-K1870-A101-A9-7600.

Brochures

For safe power flows – SIVACON 8PS busbar trunking systems:
- German: Article No. IC1000-G320-A158-V1
- English: Article No. IC1000-G320-A158-V1-7600.

An integrated solution for safe and efficient power supply – LI busbar trunking system:
- German: Article No. IC1000-G320-A194-V1
- English: Article No. IC1000-G320-A194-V1-7600.

Comfortable planning: with the SIMARIS tools

Planning electric power distribution for industrial plants, infrastructure, and buildings is becoming more and more complex. To help you, as an electrical planning engineer, to work faster and better under existing conditions, the innovative SIMARIS software tools effectively support your planning process.

SIMARIS design
Dimensioning electric grids, and automatically selecting components

SIMARIS project
Determining space requirements and budget for power distribution systems

SIMARIS sketch
Designing three-dimensional routing diagrams for the busbar trunking systems BD01, BD2, LD, and LI.

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Technical experts from TIP Consultant Support offer support, especially for planning and conception of electric power distribution systems.

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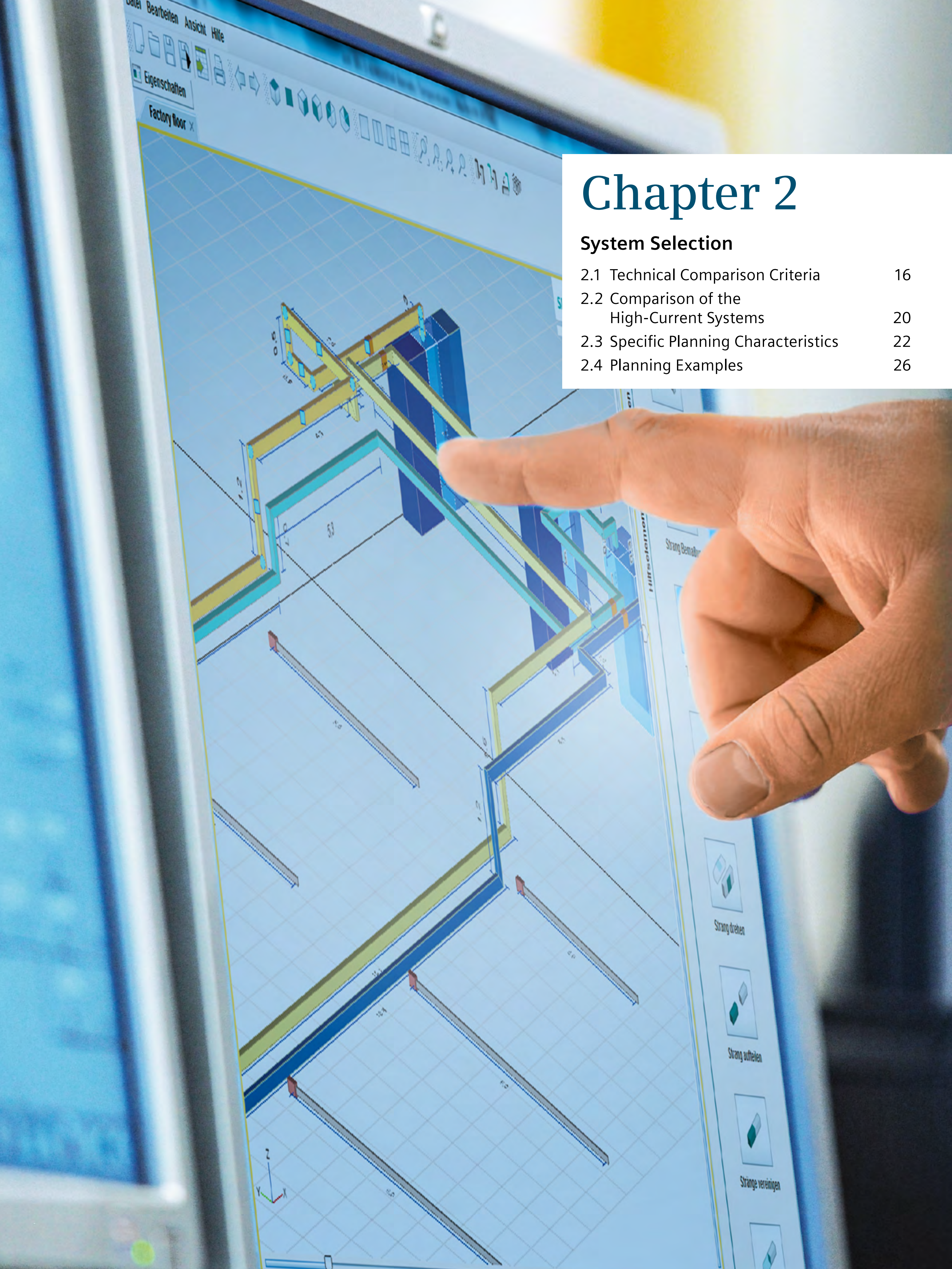
Chapter 2

System Selection



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%)

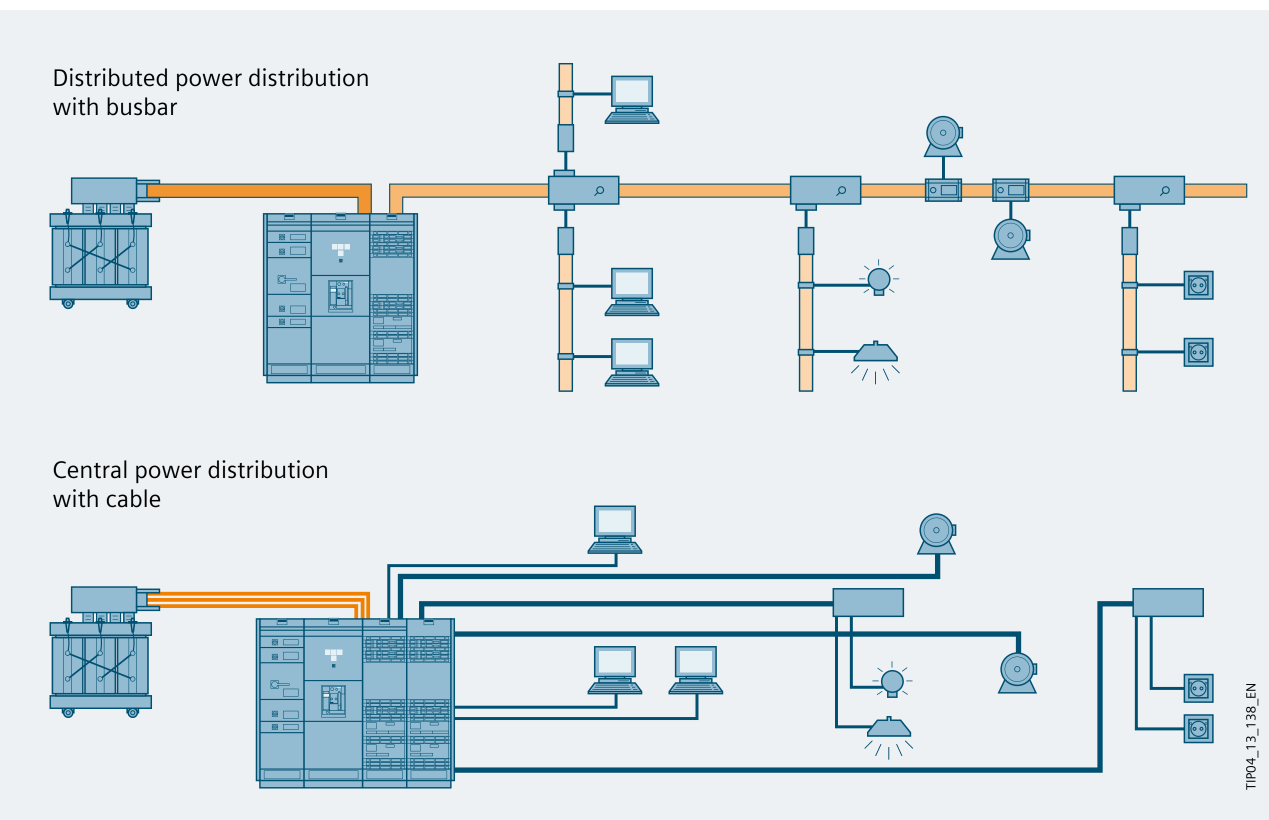


Fig. 2/1: **Comparison of line routings for cable installation and busbar trunking systems**

Feature	Busbar trunking system	Cable installation
Security of operation	Design verification 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 capacity and standard angle and offset components	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 and fast using computer-aided 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 barriers	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	Relatively high for standard cables
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)**

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).

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 fire load, 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 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 power in kVA	**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

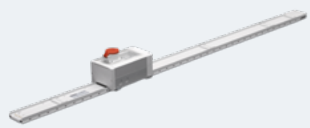
[1)] The prospective initial symmetrical short-circuit current of the transformer when connecting to a network with unlimited short-circuit power is calculated considering the voltage factor and the impedance correction factor for the transformer according to IEC 60909-0 (VDE 0102)

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

			System				
Conductor configuration			**BD01**	**BD2**	**LD**	**LI**	**LR**
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, 2N, PE=busbar			–	–	–	×	–
L1, L2, L3, N, (PE) [1], PE=enclosure			–	–	–	×	–
L1, L2, L3, 2N, (PE) [1], PE=enclosure			–	–	–	×	–
Dimensions: width x height							
Al systems	for 40 A	mm x 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 [4]	155 × 132	120 × 110
	for 2,000 A		–	–	240 × 180	155 × 230	120 × 230
	for 4,000 A		–	–	240 × 180	410 × 230	120 × 460
Cu systems	for 40 A	mm x 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 2,000 A		–	–	180 × 180	155 × 174	120 × 190
	for 4,000 A		–	–	240 × 180	410 × 174	120 × 380
	for 5,000 A		–	–	240 × 180	410 × 213	120 × 460
	for 6,300 A		–	–	–	410 × 280	120 × 540
Voltage drop			[2]	[2]	[3]	[2]	[3]
Al systems	for 40 A	mV per m and A	5.437	–	–	–	–
	for 160 A		0.925	0.737	–	–	–
	for 400 A		–	0.292	–	–	0.303
	for 1,000 A		–	0.101	0.148 [4]	0.093	0.147
	for 2,000 A		–	–	0.079	0.041	0.064
	for 4,000 A		–	–	0.037	0.020	0.040
	for 5,000 A		–	–	–	0.015	0.034
Cu systems	for 40 A	mV per m and A	5.404	–	–	–	–
	for 160 A		0.920	0.490	–	–	–
	for 400 A		–	0.258	–	–	–
	for 1,000 A		–	0.089	–	0.082	0.139
	for 2,000 A		–	–	0.085	0.037	0.059
	for 4,000 A		–	–	0.030 [5]	0.019	0.028
	for 5,000 A		–	–	0.029	0.014	0.023
	for 6,300 A		–	–	–	0.010	0.019
Max. fixing distance							
Al systems		m	1.5 … 3.1	2.5 … 4.0	5.0 … 6.0	2.0 … 3.0	1.5 … 3.0
Cu systems		m	1.5 … 3.0	1.5 … 1.0	2.0 … 3.0	2.0 … 3.0	1.5 … 3.0

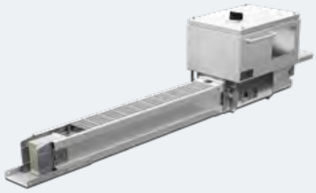
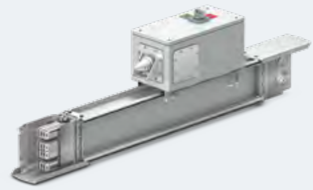
[1] (PE) = additionally isolated PE conductor (Clean Earth)
[2] Voltage drop at 3-phase 50 Hz, cos φ = 0.9, symmetrical load, distributed load tap-off, and one-sided infeed (k = 0.75)
[3] Voltage drop at 3-phase 50 Hz, cos φ = 0.9, symmetrical load, concentrated load tap-off, and one-sided infeed (k = 1)
[4] For LDA1 (I_{nA} = 1,100 A)
[5] For LDC7 (I_{nA} = 4,400 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)]
		
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**
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
Rated insulation voltage U_i	400 V AC / 400 V DC	690 V AC / 800 V DC
Rated operational voltage U_e	400 V AC	690 V AC
Degree of protection	IP54, IP55	IP52, IP54, IP55
Rated current I_{nA}	40 A to 160 A	160 A to 1,250 A
Rated peak withstand current I_{pk}	Up to 15.3 kA	Up to 90 kA
Rated short-time withstand current I_{cw} (1 s)	Up to 2.5 kA	Up to 34 kA
Conditional short-circuit withstand strength I_{cf} / I_{cc} for TOU [5)] up to 630 A	[7)]	[7)]
Conditional short-circuit withstand strength I_{cf} for TOU [5)] from 800 A	–	–
Number of conductors	4 (PE = enclosure)	5
Fire load	Max. 0.76 kWh/m (incl. tap-off point)	1.32 - 2.0 kWh/m (incl. tap-off point)
Fire load (per tap-off point)	–	–
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)
Tap-off unit	Up to 63 A	Up to 530 A
Connection technology	Connecting flanges with joint block and integrated expansion compensation	With integrated expansion compensation, bolt joint block
Conductor material	Aluminum or copper	Aluminum or copper
Enclosure material	Galvanized and painted sheet steel	Galvanized and painted sheet steel
Mounting position	Horizontal (edgewise, flat) (tap-off points downwards)	Horizontal (edgewise, flat) 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: **Overview of technical data for SIVACON 8PS busbar trunking systems**

	LD [1), 2)]	LI [1)]	LR [1)]
			
	The safe busbar for industrial production lines, for exhibition halls, in wind turbines, and for ships	**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**
	• Automotive industry • Manufacturing industry • Food industry • Exhibition halls • Wind turbines • Semiconductor production	• 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
	1,000 V AC / 1,000 V DC	1,000 V AC	1,000 V AC
	1,000 V AC	1,000 V AC	1,000 V AC
	IP34, IP54 [3)]	IP55, IP66 [4)]	IP68
	1,100 A to 5,000 A	800 A to 6,300 A	400 A to 6,150 A
	Up to 286 kA	Up to 330 kA	Up to 220 kA
	Up to 116 kA	Up to 150 kA	Up to 100 kA
	120 kA / 100 kA	120 kA / 100 kA	[6)]
	100 kA	100 kA	[6)]
	4, 5	3-7 conductors incl. Clean Earth and 200 % N conductor	3 and PEN or 3, N, and PE
	4.16 - 8.83 kWh/m	2.13 - 15.54 kWh/m	13.01 - 86.96 kWh/m
	7.8 - 10.8 kWh	0.89 kWh	[6)]
	Every 1 m on one side Max. 3 nos. up to 630 A, max. 2 nos. up to 1,250 A	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	One side, trunking elements with tap-off point (1.5 to 3 m long)
	Up to 1,250 A	Up to 1,250 A	Up to 630 A
	Clamped connection with hook and bolt	Clamped bolt connection with shear-off nut	Joint block
	Aluminum or copper	Aluminum or copper	Aluminum or copper
	Painted sheet steel	Painted Al	Epoxy resin
	Horizontal (edgewise) and vertical	Horizontal (edgewise, flat) and vertical	Horizontal (edgewise) and vertical

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 on 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 for 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.

<table>
<tr><th rowspan="2">Place of use</th><th rowspan="2" colspan="2">Application areas</th><th colspan="3">System</th></tr>
<tr><th>LI</th><th>LD</th><th>LR</th></tr>
<tr><td rowspan="6">Public buildings</td><td rowspan="6">• Banks
• Insurances
• Internet providers
• Data centers
• Broadcasting stations
• Shopping centers
• Furniture stores
• Fairs
• Airports
• Hospitals
• Clinics
• Office buildings</td><td>For power distribution in multi-floor buildings with predominantly vertical busbar run</td><td>×</td><td>–</td><td>–</td></tr>
<tr><td>To avoid neutral conductor overload due to electronic loads affected by harmonics</td><td>×</td><td>–</td><td>–</td></tr>
<tr><td>To prevent disturbance potentials in the busbar enclosure from negatively impacting the operability of loads</td><td>×</td><td>–</td><td>–</td></tr>
<tr><td>In case of a high density of load tap-offs on minimum space</td><td>×</td><td>×</td><td>–</td></tr>
<tr><td>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</td><td>

×
–</td><td>

–
×</td><td>

–
–</td></tr>
<tr><td>In case of power distribution with predominantly horizontal busbar run and degree of protection IP34</td><td>–</td><td>×</td><td>–</td></tr>
<tr><td rowspan="6">Industrial buildings</td><td rowspan="6">• Industrial buildings
• Production
• Warehouses
• Testing centers</td><td>If arc-resistant load tap-offs are required</td><td>–</td><td>×</td><td>–</td></tr>
<tr><td>If the degree of protection IP34 is sufficient</td><td>–</td><td>×</td><td>–</td></tr>
<tr><td>If the degree of protection IP55 is required</td><td>×</td><td>–</td><td>–</td></tr>
<tr><td>If the degree of protection IP6X is required</td><td>– 1)</td><td>–</td><td>×</td></tr>
<tr><td>For power transmission in extreme production conditions</td><td>–</td><td>–</td><td>×</td></tr>
<tr><td>For power transmission outside closed buildings</td><td>–</td><td>–</td><td>×</td></tr>
<tr><td colspan="6">1) For power transmission and indoor installation only</td></tr>
</table>

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

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 (IP54 / IP55)		LR (IP68)	
				Size	Rated current I_{rA}	Size	Rated current I_{rA}	Size	Rated current I_{rA}
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 = rated 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 = 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 distance between the infeed and the tap-off at the end of the busbar trunking system (it usually corresponds approximately to the total length l):

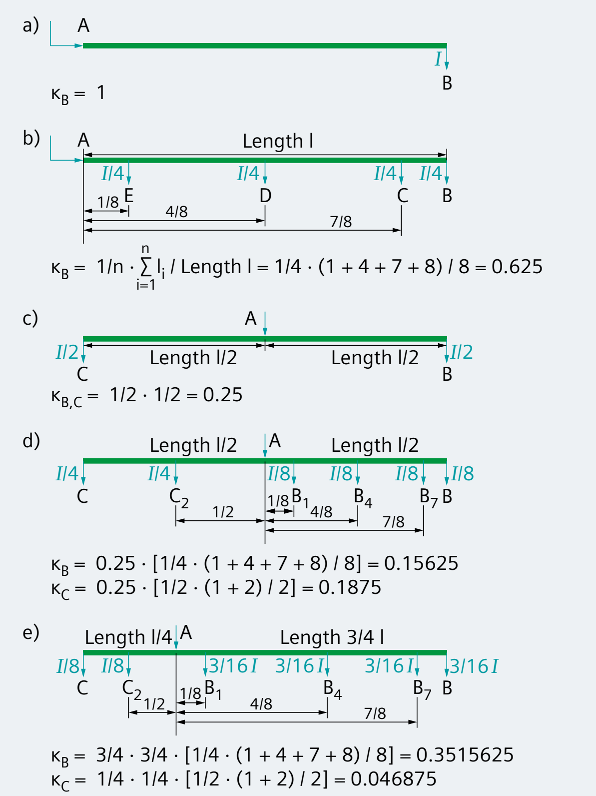
$$k = \frac{1}{n} \cdot \sum_{i=1}^{n} \frac{l_i}{l}$$

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. 2/3c). 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 during 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 protection/switching 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 and circuit-breakers. The easiest way to determine a suitable protection is by calculating it 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 disturbances between multi-core cables and wires of the power installations (conductor cross-section > 185 mm^2) and the patient spaces to be protected is definitely undershot if the minimum distance of 9 m recommended by IEC 60364-7-710 (VDE 0100-710) is observed. 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 CS.

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 in 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 busbar trunking system LD with degree of protection IP34 and the corresponding tap-off units with degree of protection IP54 were sprinkled both in horizontal and vertical busbar routing 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.

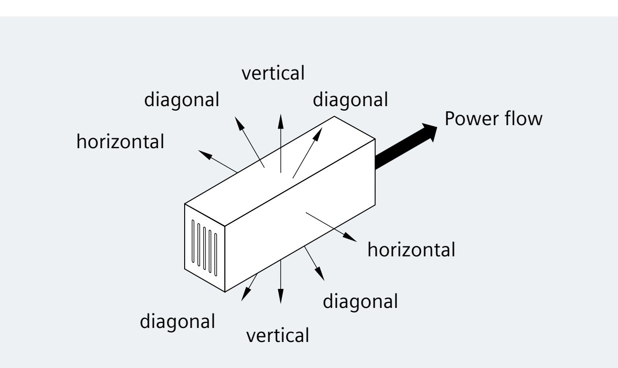


Fig. 2/4: **Coordinate system of the magnetic field measurements**

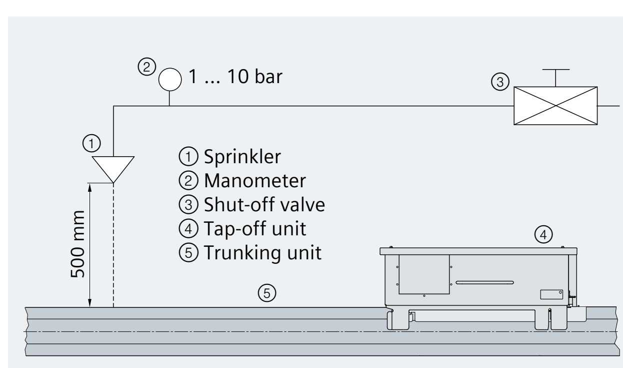


Fig. 2/5: **Schematic design of the sprinkler test**

With the busbar trunking system LD, 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 470-1).

Degree of protection	1st characteristic numeral		2nd characteristic numeral
	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 are 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 = 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 mm^2
- Installed power of the 4 production lines:
  200, 182, 118, 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

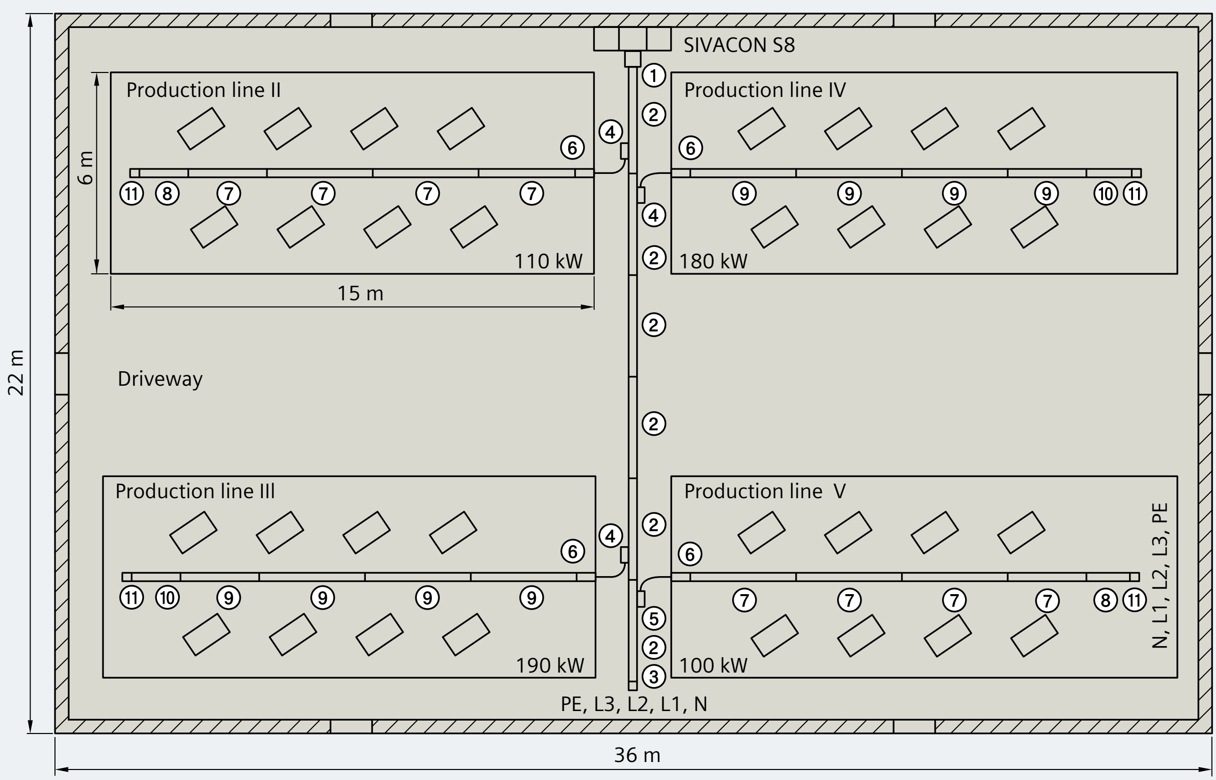
I_B (V) = 100 kW · 0.8 · 1 / (√3 · 400 V · 0.9)
= 128.3 A

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 busbar trunking system BD2 (see chapter 4) is suitable for the calculated currents both for the room infeed as well as 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 no.	BD2A-2-160-SB-3
⑧	Trunking unit	2 nos.	BD2A-2-160-SB-1
⑨	Trunking unit	8 no.	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:

$$30\ \text{m} \cdot 80\ \text{m} = 2{,}400\ \text{m}^2$$

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:

$$0.8 \cdot 2{,}400\ \text{m}^2 \cdot 50\ \text{W/m}^2 = 96\ \text{kW}$$

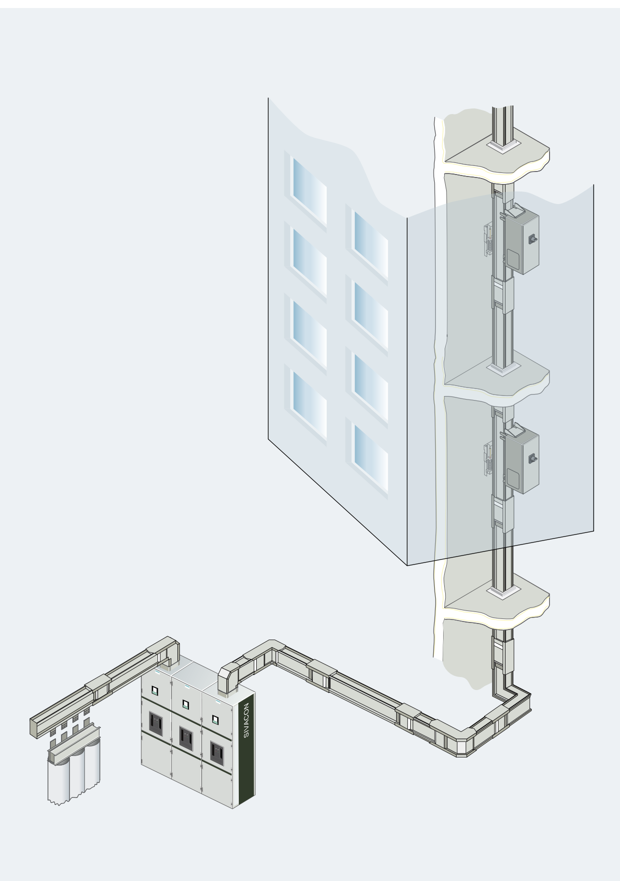


Fig. 2/7: **Floor distribution for a high-rise office building with a busbar trunking system**

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

$$0.2 \cdot 2{,}400\ \text{m}^2 \cdot 10\ \text{W/m}^2 = 4.8\ \text{kW}$$

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:

$$I_B = 15 \cdot 100.8\ \text{kW} \cdot 0.6 \cdot 1 / (\sqrt{3} \cdot 400\ \text{V} \cdot 0.9) = 1{,}455\ \text{A}$$

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:

Type codes LI-A . 1600 ... (see chapter 6)

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 6)

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 BD01 System – 40 to 160 A

The busbar trunking system BD01 (Fig. 3/1) is designed for applications from 40 A to 160 A. In the BD01 system, five different rated currents can be selected for only one size. This means that all additional system components can generally be used for all five rated currents.

Since there is no direct connection to the switching device in a switchboard and thus only an infeed with a cable connection unit remains as an option, the busbar trunking system BD01 is inappropriate for power transmission. It is often used in workshops, warehouses, and shopping centers.

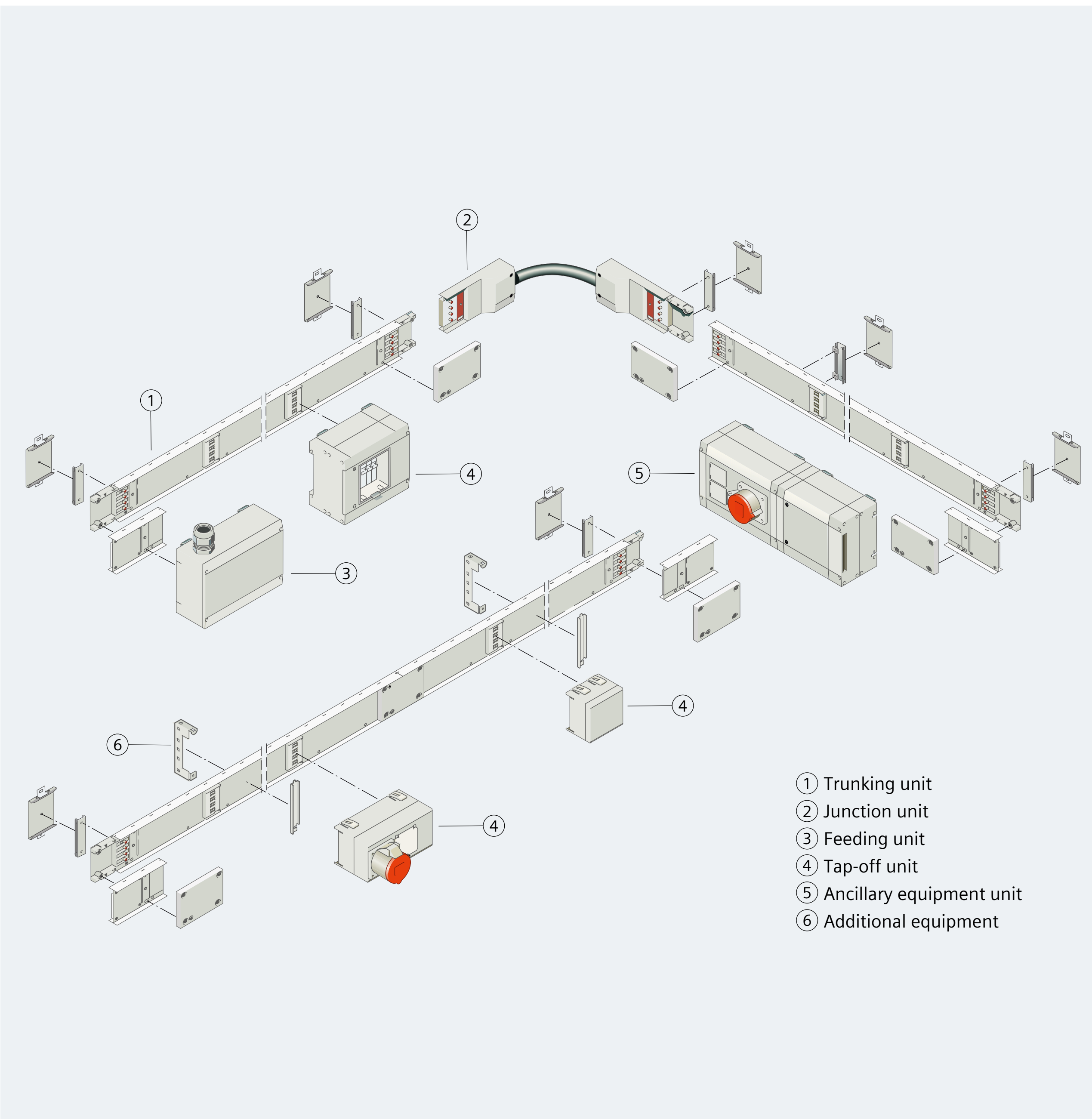


Fig. 3/1: **Overview of busbar trunking system BD01**

Versions

- Design verified low-voltage switchgear and controlgear assembly in accordance with IEC 61439-1/-6
- Standard degree of protection IP52 for trunking units and junction units as well as IP54 for feeding units and tap-off units
- High degree of protection IP54 for lateral tap-off points and tap-off points directed downwards
- Degree of protection IP50 for tap-off points directed upwards
- Higher 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 installation, possible edgewise or flat
- Enclosure color RAL 7035, light gray (painted).

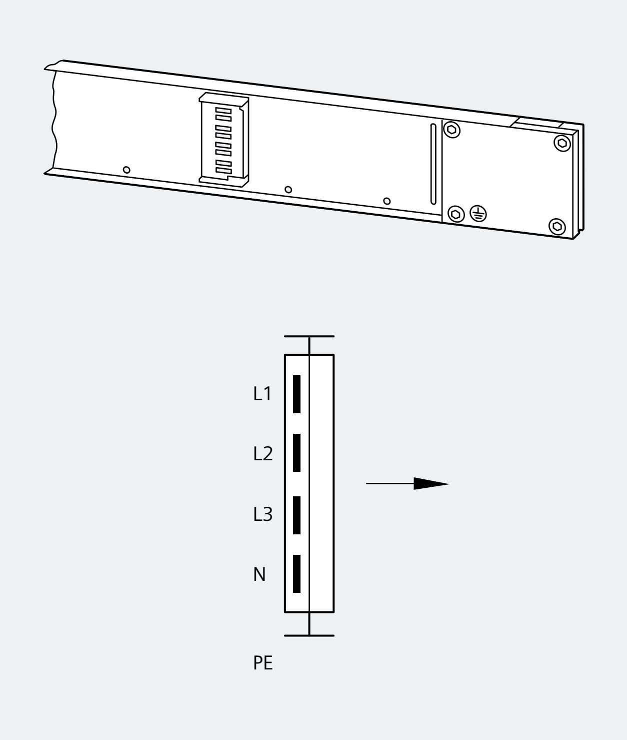


Fig. 3/2: **Design of the BD01 trunking unit**

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
- 100 A and 160 A versions, each in lengths of 0.5 m and 1 m (0.5 m is recommended for right angles, and 1 m for bypassing obstacles or coping with height offsets).

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 on 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 8 modular widths (mw; 1 mw corresponds to 18 mm)
- Without or with device installation unit
- Without or with socket outlets.

Additional equipment

- Assembly kits for degree of protection IP55
- Fixing brackets
- Coding set
- Fire barrier kit S 90.

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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 section 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 with joint block for BD01	Order number	
	BD01-	...
Rated current I_n up to 125 A; length 0.5 m		R1
Rated current I_n up to 125 A; length 1 m		R2
Rated current I_n up to 160 A; length 0.5 m		160-R1
Rated current I_n up to 160 A; length 1 m		160-R2

Feeding units for BD01	Order number	
	BD01-	...
Rated current I_n up to 125 A		E
Rated current I_n up to 160 A		160-E

Tab. 3/1: **Type codes 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		GK1X/	4SD163
	With 3-pole CEE socket outlet 16 A U_e = 230 V, I_n = 16 A		GK1X/	CEE163
	With 5-pole CEE socket outlet 16 A U_e = 400 V, I_n = 16 A		GK1X/	CEE165
	With 5-pole CEE socket outlet 32 A U_e = 400 V, I_n = 32 A		GK1X/	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), 8 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		GK2X/	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		GK2X/	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		GK2X/	CEE163CEE165
Aluminum enclosure, size 2 with device installation unit	For free arrangement of components (P_V maximum 16 W), 8 mw, with integrated DIN rail U_e = 400 V		GK2M/	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 codes 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 x 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 x 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 x D01, U_e = 400 V, I_n = 16 A	[2]		S14
	With 3-pole fuse-base 3 x 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 x 1-pole miniature circuit-breaker 10 A, characteristic B, U_e = 400 V, I_n = 10 A		AK1M1/	A101
	With 3 x 1-pole miniature circuit-breaker 16 A, characteristic B, U_e = 400 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 codes for tap-off units size 01 (AK01), size 02 (AK02), and size 1 (AK1)**

BD01 tap-off units		Order number		
Material and size	**Version**	**BD01-**	**...**	**...**
Aluminum enclosure, size 2 (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 x 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 x 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 x 1-pole fuse-base D02, U_e = 400 V, I_n = 32 A	[1]		CEE325S18
	With 4 Schuko socket outlets and 2 x 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), 8 modular widths (mw), with integrated DIN rail, U_e = 400 V, I_n = 35 A	[1]		F
Aluminum enclosure, size 2 (AK2) with I_n = 63 A	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), 8 modular widths (mw), with integrated DIN rail, U_e = 400 V, I_n = 63 A	[1]		F
Aluminum enclosure, size 2 (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 2 (AK2) with device installation unit (more usable space)	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), 8 mw, with integrated DIN rail, U_e = 400 V, I_n = 35 A			F
Aluminum enclosure, size 2 (AK2) with I_n = 63 A and device installation unit (more usable space)	For free arrangement of components (P_V maximum 22.5 W), 8 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 codes for tap-off units size 2 (AK2)**

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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 mm^2 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 mm^2 2)	1.400 kg	Cable entry from 2 sides	

Use plastic cable glands with strain relief (not included in scope of supply).
1) Use M32, M40, or M50 cable glands
2) Use M63 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	Insulating material	01 / without	Fuse-base for 3 cylindrical fuses 10 mm x 38 mm
BD01-AK02X/ ZS3	BVP: 085090	32 A	400 V	0.400 kg	Insulating material	02 / without	Fuse-base for 3 cylindrical fuses 10 mm x 38 mm
BD01-AK02M2/ A163	BVP: 085089	16 A	400 V	0.800 kg	Insulating material	02 / with	3-pole miniature circuit-breaker 16 A, characteristic B
BD01-AK02M2/ CEE165A163	BVP: 085092	16 A	400 V	0.980 kg	Insulating material	02 / with	3-pole miniature circuit-breaker 16 A, characteristic B / with 5-pole CEE socket outlet 16 A
BD01-AK02M2/ A323	BVP: 085094	32 A	400 V	0.800 kg	Insulating material	02 / with	3-pole miniature circuit-breaker 32 A, characteristic C
BD01-AK02M2/ 2SD163A161	BVP: 085096	16 A	230 V	0.700 kg	Insulating material	02 / with	1-pole miniature circuit-breaker 16 A, characteristic B / 2 Schuko socket outlets 16 A
BD01-AK02M2/ CEE163A161	BVP: 090170	16 A	230 V	0.700 kg	Insulating material	02 / with	1-pole miniature circuit-breaker 16 A, characteristic B / 3-pole CEE socket outlet 16 A
BD01-AK02M2/ 2SD163FIA161	BVP: 090168	16 A	230 V	0.950 kg	Insulating material	02 / with	1-pole miniature circuit-breaker 16 A, characteristic B / 2-pole RCCB 16 A / 30 mA and 2 Schuko socket outlets 16 A
BD01-AK02M2/ 2SD163S14	BVP: 085095	16 A	230 V	0.800 kg	Insulating material	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	Insulating material	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	Insulating material	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 x D01
BD01-AK1X/ S18	BVP: 034265	35 A	400 V	1.400 kg	Aluminum	1 / without	3-pole fuse-base 3 x D02
BD01-AK1X/ 2SD163A161	BVP: 034269	16 A	230 V	1.470 kg	Aluminum	1 / without	1-pole miniature circuit-breaker 16 A, characteristic 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, characteristic 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 x 1-pole miniature circuit-breaker 10 A, characteristic B
BD01-AK1M1/ A161	BVP: 034266	16 A	400 V	1.600 kg	Aluminum	1 / with	3 x 1-pole miniature circuit-breaker 16 A, characteristic B
BD01-AK1M1/ A323	BVP: 034267	32 A	400 V	1.600 kg	Aluminum	1 / with	3-pole miniature circuit-breaker 32 A, characteristic 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**

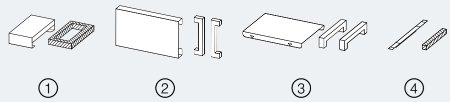
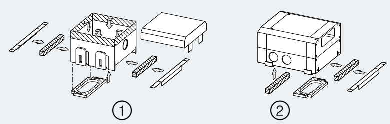
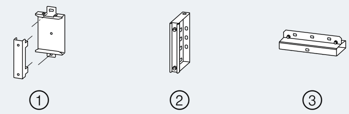
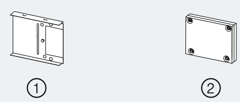
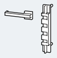
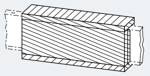
Tap-off units							
Type	Article No.	Rated current I_n	Rated operational voltage U_e	Weight	Material	Size / device installation unit	Description
BD01-AK2X/ S27	BVP: 034274	25 A	400 V	1.700 kg	Aluminum	2 / without	3-pole fuse-base S27, screw adapter system
BD01-AK2X/ S33	BVP: 233568	63 A	400 V	1.700 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 x 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 x 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 x 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 x 1-pole miniature circuit-breaker 16 A, characteristic 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), 8 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), 8 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, characteristic B / 2-pole RCCB 16 A / 30 mA and 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, characteristic 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, characteristic 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, characteristic 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, characteristic 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), 8 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), 8 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 current I_n	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), 8 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), 8 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**

Accessories 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
BD01-AK02X-IP55	BVP: 610366	0.050 kg		① For tap-off units size 02
BD01-AK1X-IP55	BVP: 610367	0.050 kg		② For tap-off units size 1
BD01-AK2X-IP55	BVP: 610368	0.050 kg		② For tap-off units size 2
Fixing				
BD01-B	BVP: 034262	0.167 kg		① Universal fixing bracket
BD01-BA	BVP: 081945	0.167 kg		② Suspension bracket
BD01-BAP	BVP: 203522	0.576 kg		③ Hanger bracket for cable, pendant, or chain suspension at the connection point
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 only for Germany [1])

[1] Approval papers for Europe in preparation

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

Con-tents
Intro-duction
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3.3 Technical Specifications and Configuration Data

Apart from the general technical specifications for the BD01 system in Tab. 3/5, the specific data for trunking units are specified here in Tab. 3/10, and for conductor cross-sections of feeding units and tap-off units in Tab. 3/11.

In addition, the busbar trunking systems must be protected against overload and short circuit. Fuses and miniature circuit-breakers must be selected in such a way that the permissible current-carrying capacity corresponding to the ambient conditions is not exceeded. Fuses are not suitable for overload protection due to their high response threshold (1.3 to 1.6 times the rated current) and their long pre-arcing times in the case of small overcurrents. For overload and short-circuit protection, we therefore recommend using motor protecting switches or circuit-breakers (Tab. 3/12).

Trunking units		BD01-40	BD01-63	BD01-100	BD01-125	BD01-160
Rated current I_n		40 A	63 A	100 A	125 A	160 A
Impedance per unit length of conducting paths with 50 Hz and 20 °C ambient temperature (cold bars)						
• Resistance	R_{20}	3.960 mΩ/m	1.936 mΩ/m	0.938 mΩ/m	0.910 mΩ/m	0.578 mΩ/m
• Reactance	X_{20}	0.280 mΩ/m	0.324 mΩ/m	0.286 mΩ/m	0.300 mΩ/m	0.273 mΩ/m
• Impedance	Z_{20}	3.970 mΩ/m	1.968 mΩ/m	0.994 mΩ/m	1.000 mΩ/m	0.642 mΩ/m
Impedance per unit length of conducting paths in the event of a fault						
• Resistance	R_F	5.991 mΩ/m	4.128 mΩ/m	2.841 mΩ/m	2.420 mΩ/m	2.189 mΩ/m
• Reactance	X_F	1.396 mΩ/m	1.248 mΩ/m	1.186 mΩ/m	0.940 mΩ/m	0.973 mΩ/m
• Impedance	Z_F	6.151 mΩ/m	4.312 mΩ/m	3.078 mΩ/m	2.600 mΩ/m	2.395 mΩ/m
Zero-sequence impedance according to IEC 60909-0 (VDE 0102)						
Phase to N	R_0	15.904 mΩ/m	7.911 mΩ/m	4.115 mΩ/m	3.810 mΩ/m	3.167 mΩ/m
Phase to N	X_0	2.128 mΩ/m	2.058 mΩ/m	1.797 mΩ/m	1.630 mΩ/m	1.656 mΩ/m
Phase to N	Z_0	16.045 mΩ/m	8.175 mΩ/m	4.490 mΩ/m	4.140 mΩ/m	3.574 mΩ/m
Phase to PE	R_0	10.086 mΩ/m	8.565 mΩ/m	6.648 mΩ/m	5.430 mΩ/m	5.343 mΩ/m
Phase to PE	X_0	2.909 mΩ/m	3.338 mΩ/m	3.067 mΩ/m	2.320 mΩ/m	2.355 mΩ/m
Phase to PE	Z_0	10.498 mΩ/m	9.183 mΩ/m	7.322 mΩ/m	5.910 mΩ/m	5.839 mΩ/m
Short-circuit withstand strength						
• Rated peak withstand current I_{pk}		2.55 kA	6.30 kA	15.30 kA	15.30 kA	15.30 kA
• Rated short-time withstand current I_{cw}	t = 1 s	0.58 kA	1.15 kA	2.50 kA	2.50 kA	2.50 kA
	t = 0.1 s	1.70 kA	4.20 kA	9.00 kA	9.00 kA	9.00 kA
Conductor cross-section	L1, L2, L3, N	7.9 mm²	15.7 mm²	34.1 mm²	34.1 mm²	34.1 mm²
	PE (copper cross-section according to the enclosure cross-section)	20.0 mm²	20.0 mm²	20.0 mm²	20.0 mm²	20.0 mm²
Conductor material		Al	Al	Al	Al	Cu
Fire load		0.76 kWh/m	0.76 kWh/m	0.76 kWh/m	0.76 kWh/m	0.76 kWh/m
Maximum thermal load (I^2t value)		0.29×10^6 A²s	1.76×10^6 A²s	8.10×10^6 A²s	8.10×10^6 A²s	8.10×10^6 A²s
Max. fixing distance of the trunking units normal mechanical load						
• Edgewise		3 m	3 m	3 m	3 m	3 m
• Flat		1.5 m	1.5 m	1.5 m	1.5 m	1.5 m
• Flat, with BD01-BAP hanger bracket		3 m	3 m	3 m	3 m	3 m

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

Version	Type	L1, L2, L3 connection				N connection				PE connection			
		min. in mm^2		max. in mm^2		min. in mm^2		max. in mm^2		min. in mm^2		max. in mm^2	
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. 3/11: **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 circuit-breakers 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 (Tab. 3/13).

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. 3/12: **Possible overcurrent protection devices for the BD01 system**

Temperature characteristic						
Ambient temperature (24-h mean)	5°C	15°C	25°C	35°C	45°C	55°C
Conversion factor for the rated current	1.38	1.27	1.15	1.00	0.825	0.62

Tab. 3/13: **Temperature characteristic of the BD01 system**

3.4 Fire Barrier

The optional BD01 fire barrier corresponds to the fire resistance class EI 90 according to EN 1363-1. The requirements to verify the fire resistance duration of 90 min according to ISO 834 (DIN 4102-2) and IEC 61439-6 (VDE 0660-600-6) are fulfilled. The following points must be observed when 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. 3/3)
- 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
- Fire barriers for installation in lightweight partition walls are available on request.

Observe the following when installing the trunking units:

- Mounting of the fire barrier part on the system component unit by the customer (see Fig. 3/16)
- The space (for dimensions, see Fig. 3/3) between the system component and the building element must be filled with mineral-based mortar or a fire barrier sealant which conform to the applicable regulations for establishing the fire resistance class or for construction of the wall or ceiling
- The installation must be carried out according to the specifications on the approval papers. Those papers can be ordered separately (BD01-S90-ZUL-D).

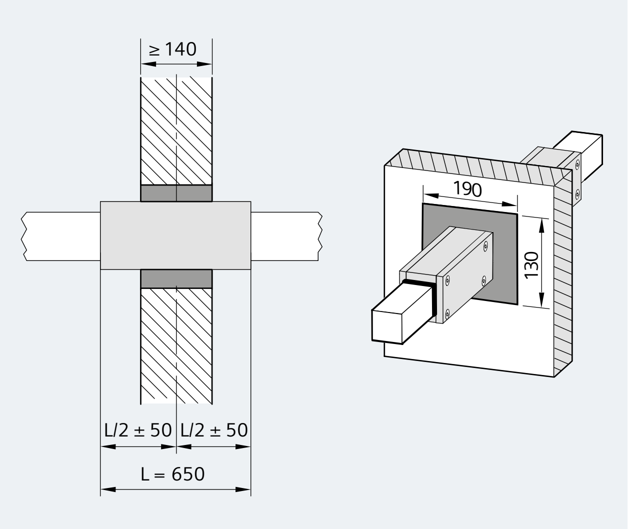
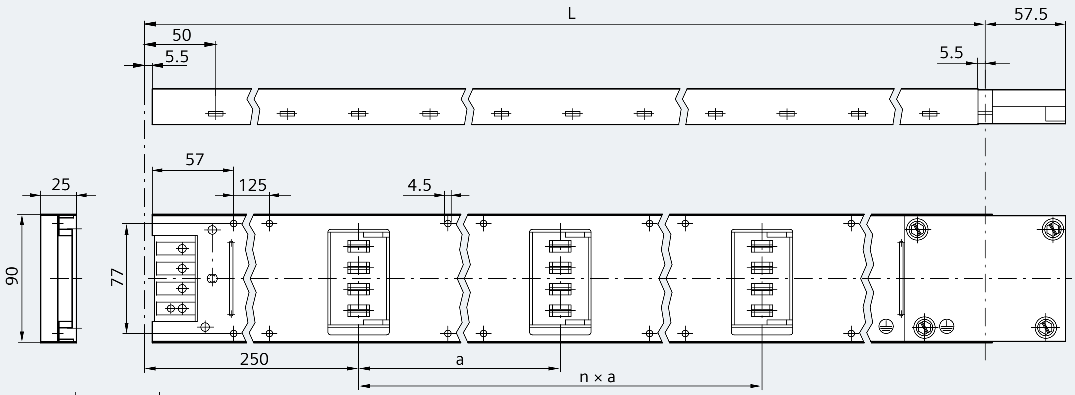


Fig. 3/3: **Positioning of the fire barriers (left) and dimensions of the wall cut-outs (right); dimensions in mm**

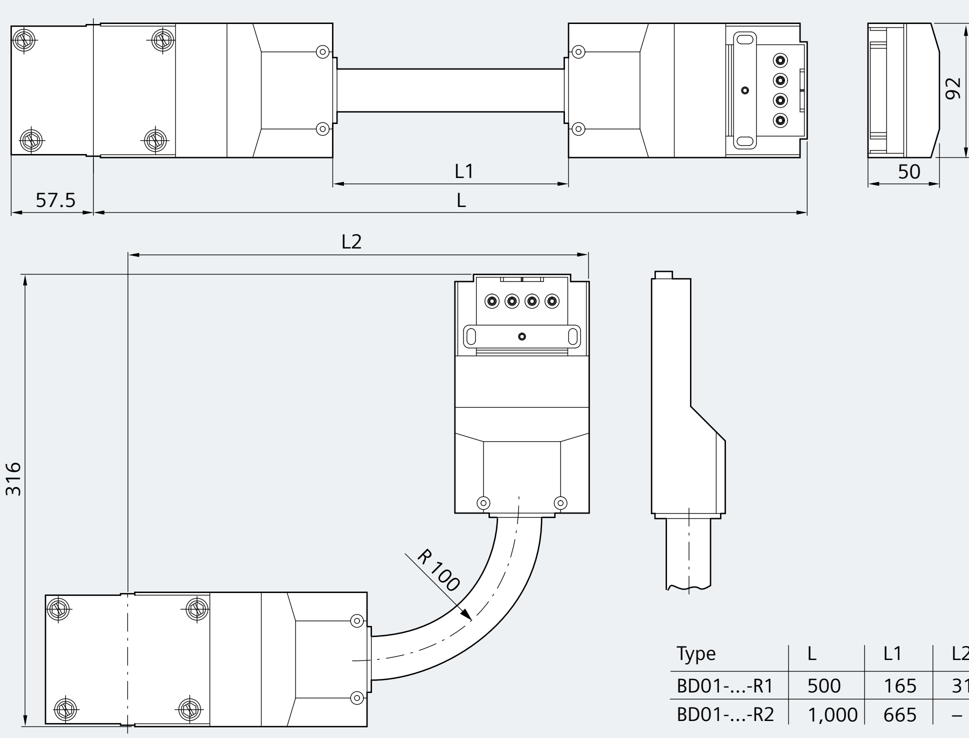
3.5 Dimensional Drawings and Dimensions

For the types of the selection tables Tab. 3/5 to Tab. 3/9, the dimensional drawings are summarized in Fig. 3/4 to Fig. 3/16. Specifications for wall and ceiling mounting with BD01-B are given in Fig. 3/17, and in Fig. 3/18 for pendant suspension. Mounting examples with BD01-B and BD01-BA are summarized in Fig. 3/19.



L	a	Number of tap-off points
2,000	500	4 (n = 3)
	1,000	2 (n = 1)
3,000	500	6 (n = 5)
	1,000	3 (n = 2)

Fig. 3/4: **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. 3/5: **Dimensional drawings for BD01-R1, BD01-160-R1, BD01-R2 and BD01-160-R2 junction units (dimensions in mm)**

Con-
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Intro-
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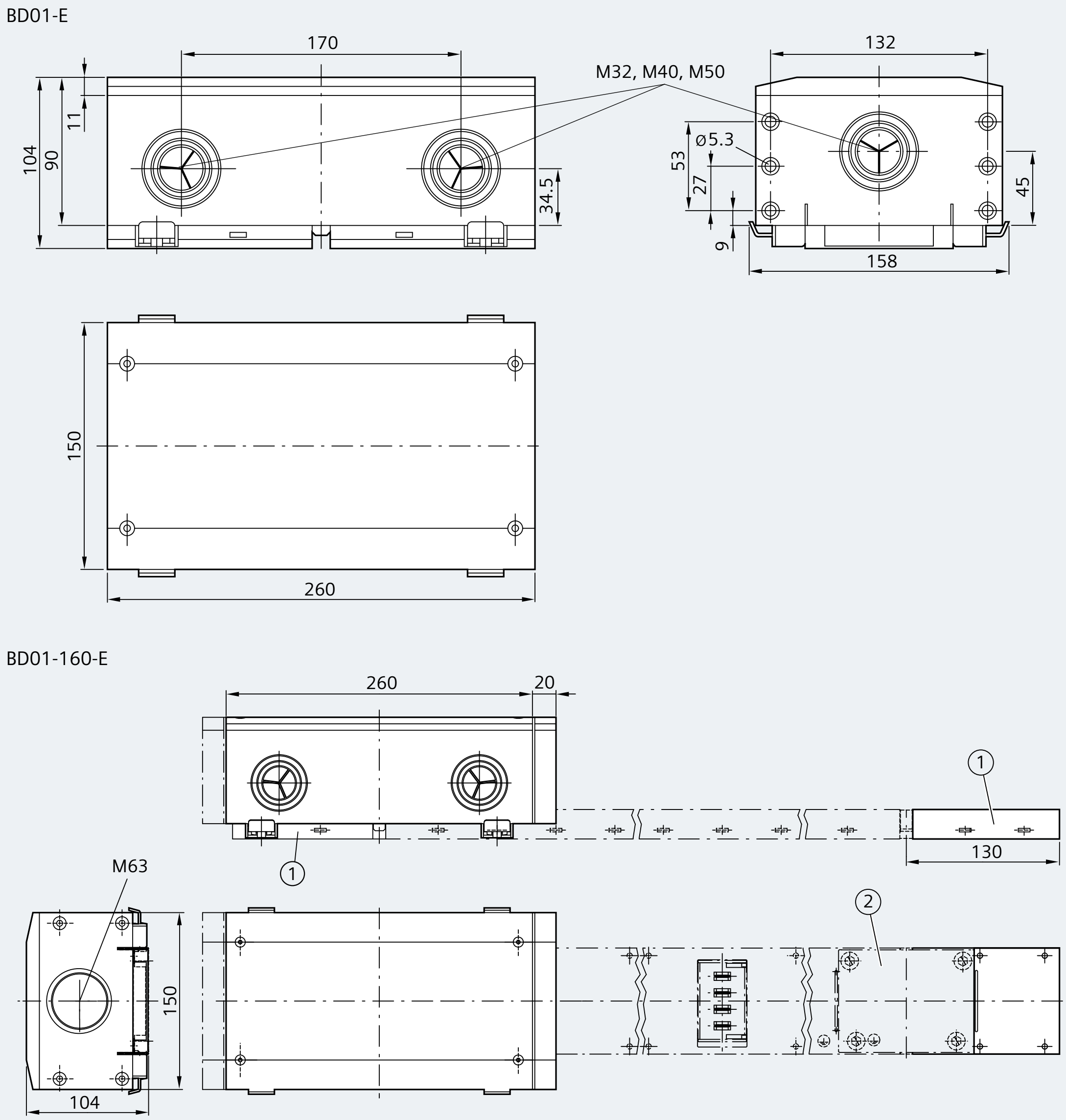
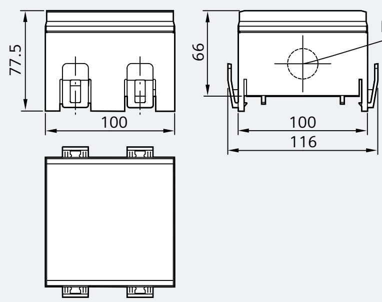


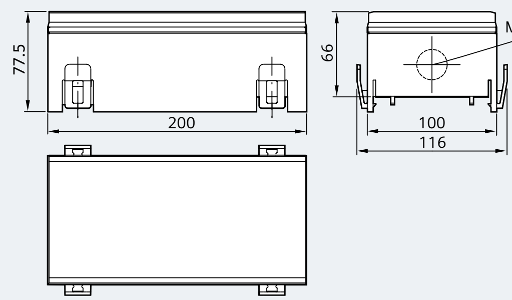
1 End flange BD01-EF
2 Joint block BD01-...-KB

Fig. 3/6: **Dimensional drawings for BD01-E and BD01-160-E feeding units (dimensions in mm)**

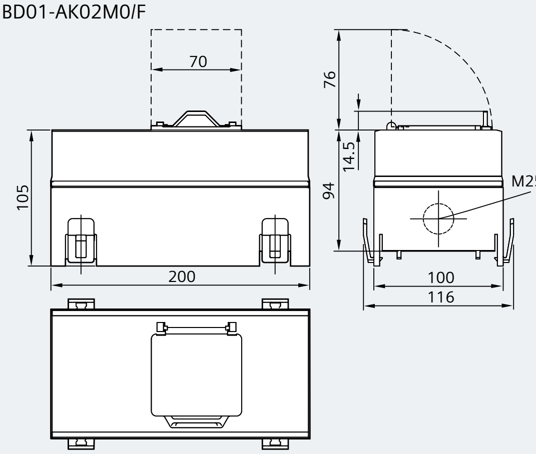
Tap-off unit size 01
BD01-AK01X/ZS



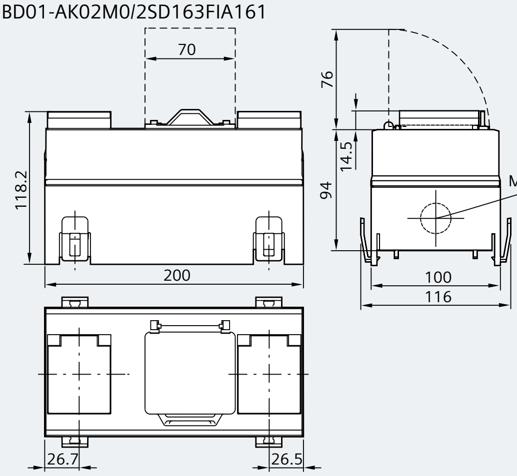
Tap-off unit size 02
BD01-AK02X/ZS3



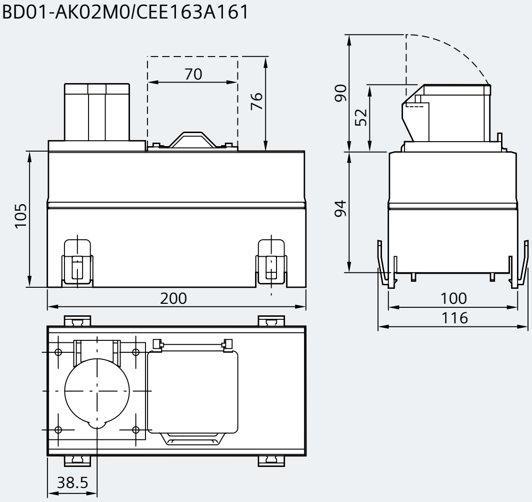
Tap-off units size 02, with device installation unit
BD01-AK02M0/A163
BD01-AK02M0/A323
BD01-AK02M0/F



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



BD01-AK02M0/CEE163S14
BD01-AK02M0/CEE163A161



BD01-AK02M0/CEE165A163

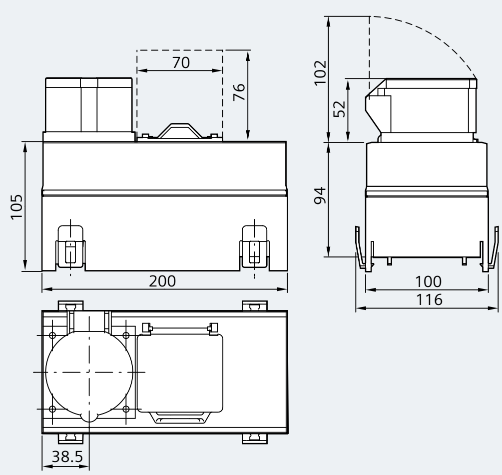
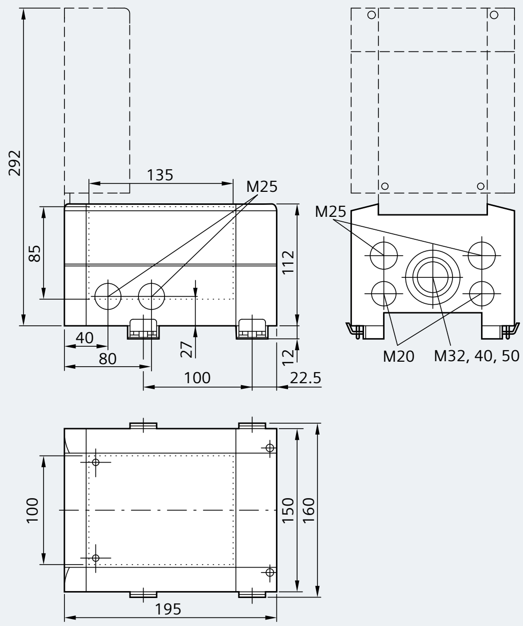
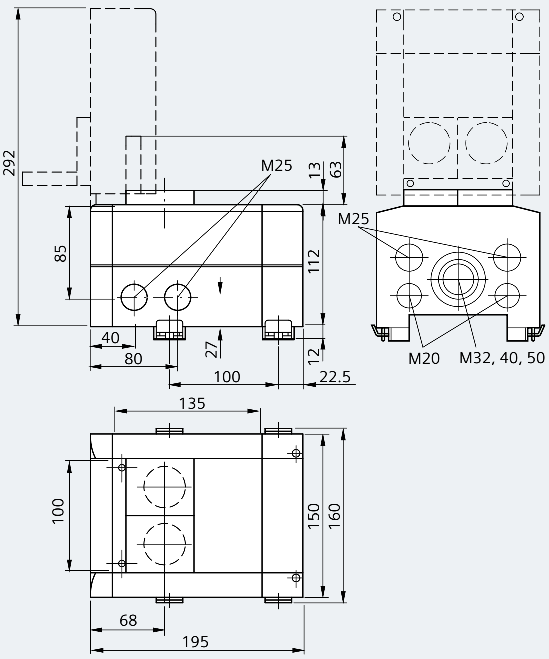


Fig. 3/7: **Dimensional drawings for tap-off units size 01 and size 02 (dimensions in mm; dashed lines: free space for opening the flap)**

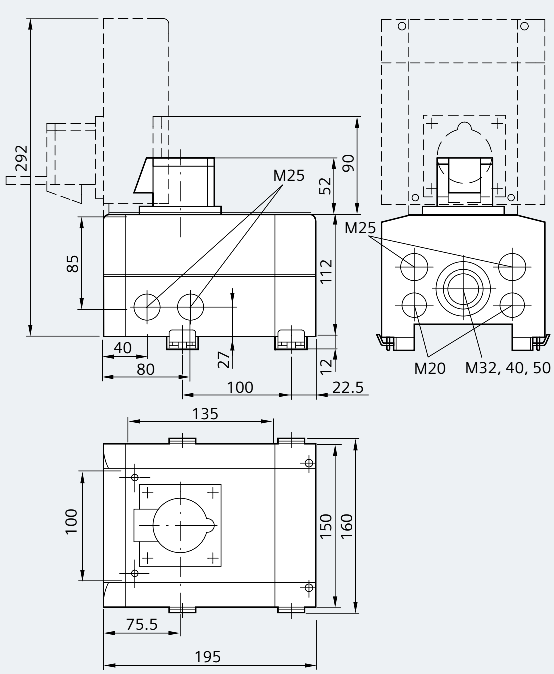
Tap-off units size 1
BD01-AK1X/S...
BD01-AK1X/F



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

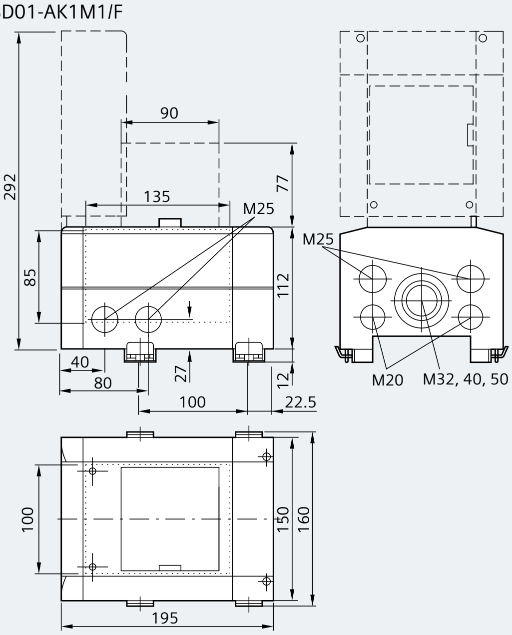
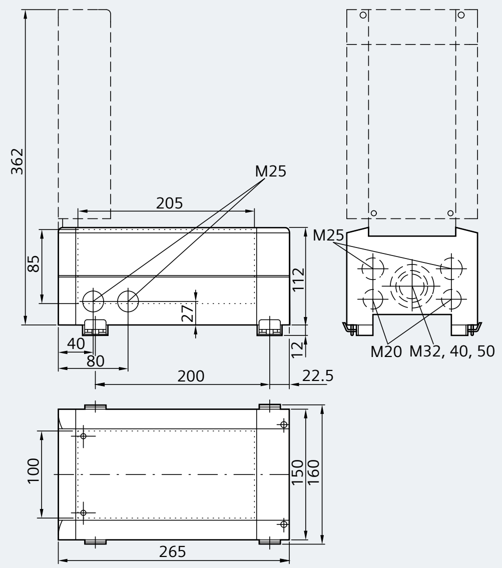


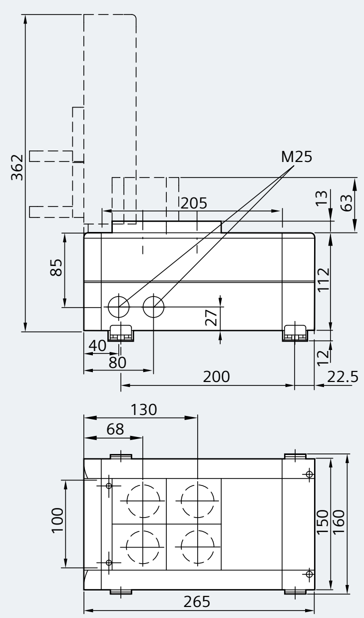
Fig. 3/8: **Dimensional drawings for tap-off units size 1 (dimensions in mm; dashed lines: free space for opening the flap; dotted lines: usable component fitting space)**

Tap-off units size 2, without device installation unit

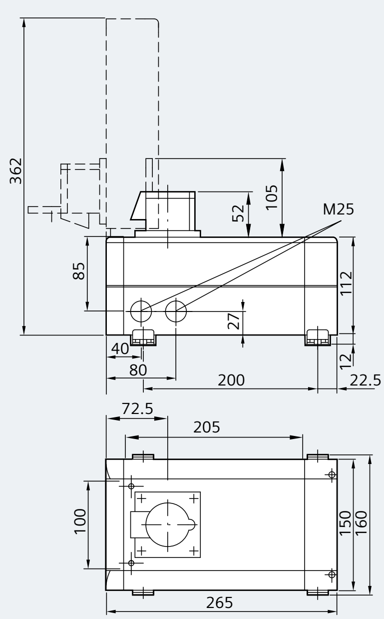
BD01-AK2X/F..., BD01-AK2HX/F...
BD01-AK2X/S..., BD01-AK2HX/S...



BD01-AK2X/4SD...



BD01-AK2X/CEE165...



BD01-AK2X/CEE325...

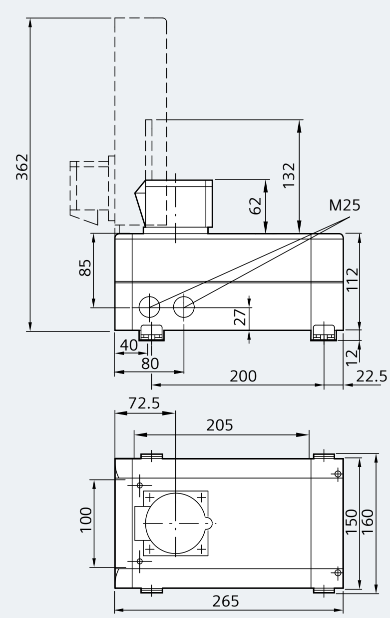


Fig. 3/9: **Dimensional drawings for tap-off units size 2, without device installation unit (dimensions in mm; dashed lines: free space for opening the flap; dotted lines: usable component fitting space)**

Tap-off units size 2, with device installation unit

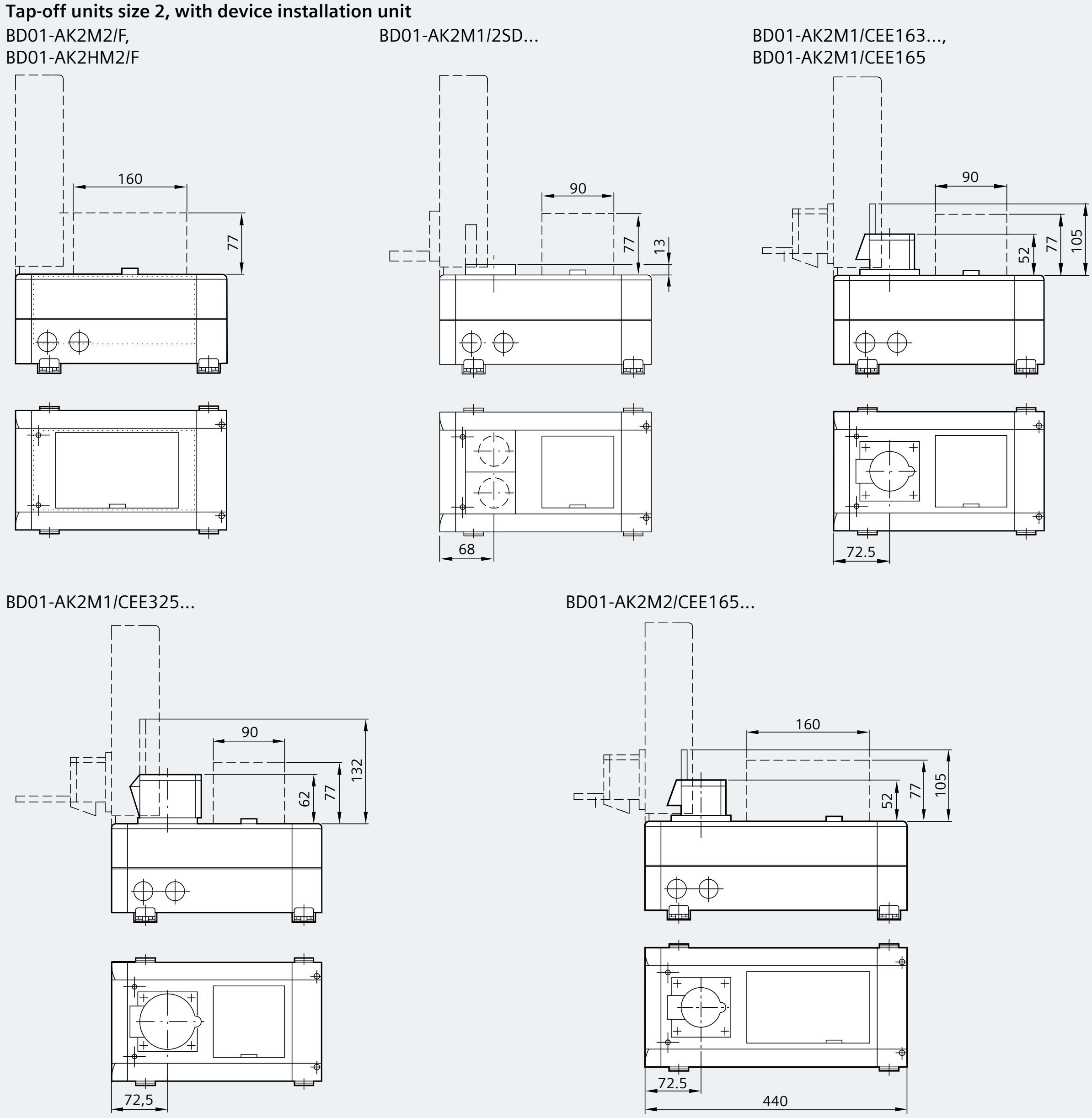
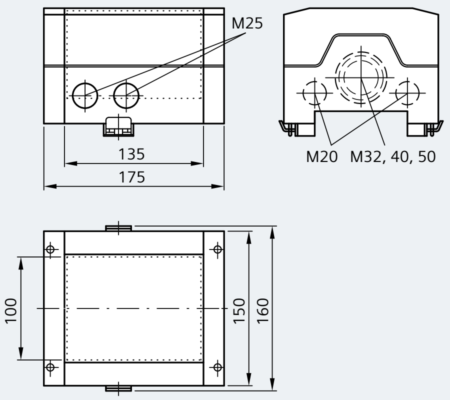


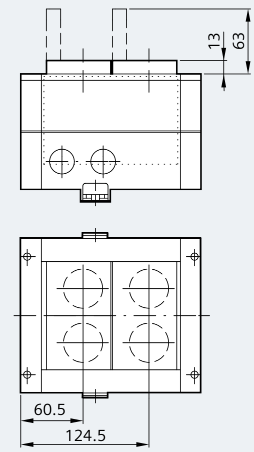
Fig. 3/10: **Dimensional drawings for tap-off units size 2, with device installation unit (dimensions in mm; dashed lines: free space for opening the flap; dotted lines: usable component fitting space)**

Ancillary equipment units size 1

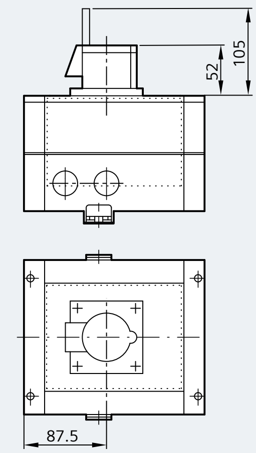
BD01-GK1X/F



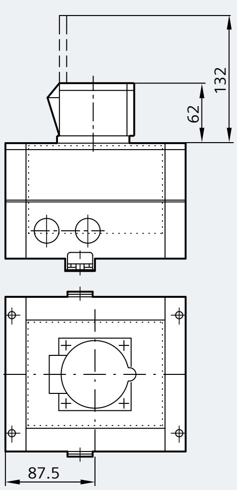
BD01-GK1X/4SD163



BD01-GK1X/CEE163
BD01-GK1X/CEE165



BD01-GK1X/CEE325



Ancillary equipment unit size 1, with device installation unit

BD01-GK1M1/F

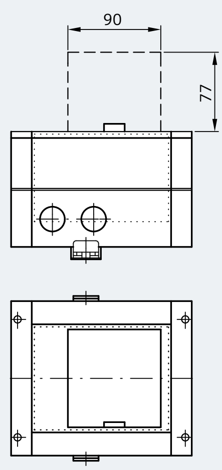


Fig. 3/11: **Dimensional drawings for ancillary equipment units size 1 (dimensions in mm; dashed lines: free space for opening the flap; dotted lines: usable component fitting space)**

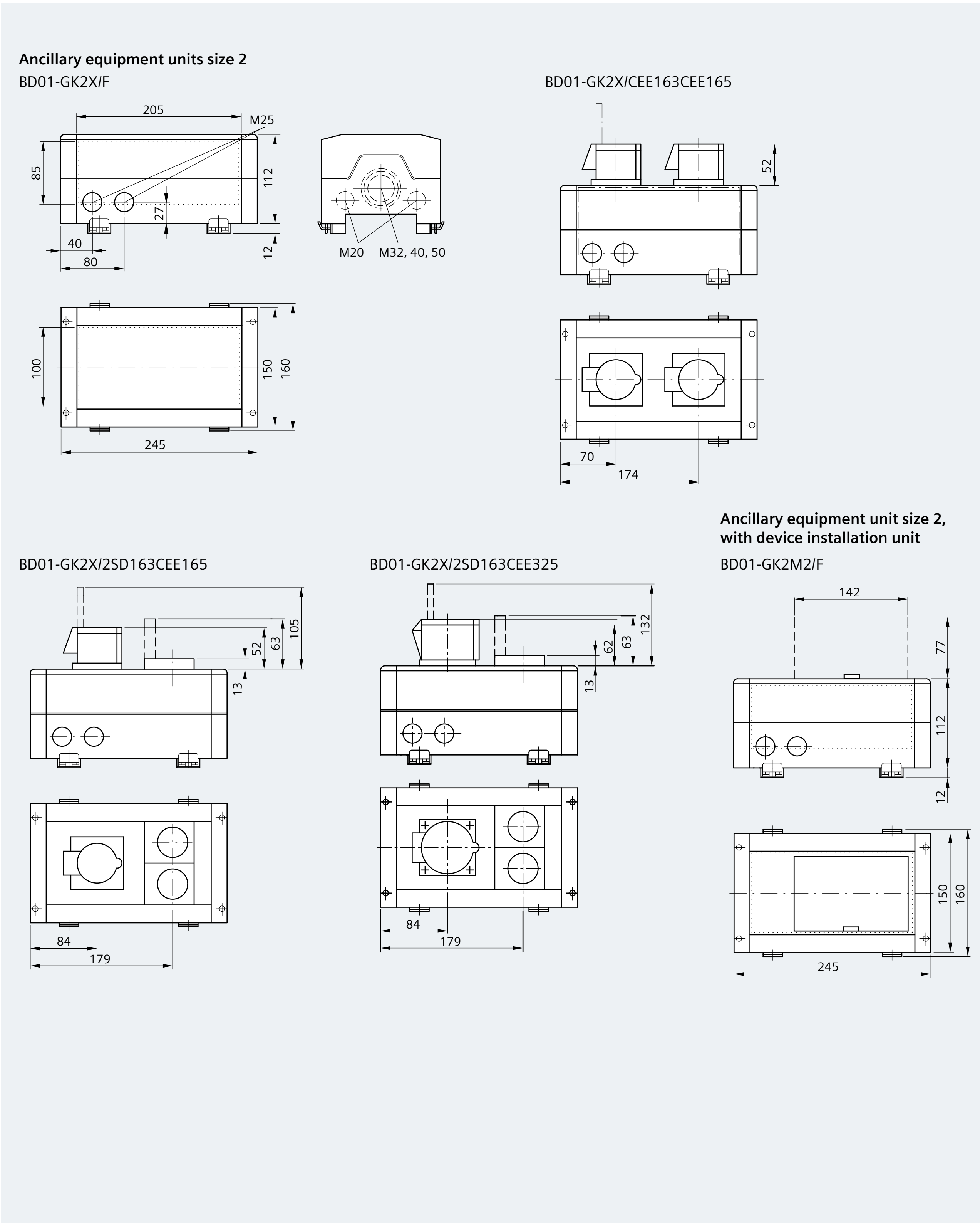
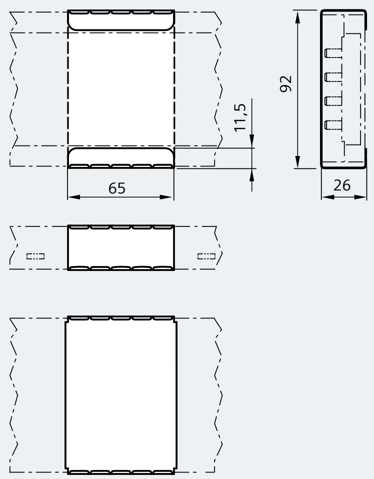
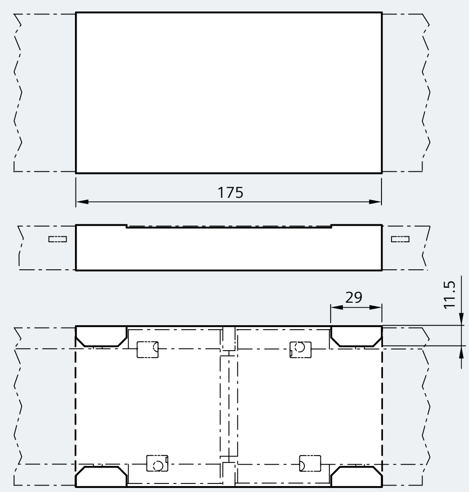


Fig. 3/12: **Dimensional drawings for ancillary equipment units size 2 (dimensions in mm; dashed lines: free space for opening the flap; dotted lines: usable component fitting space)**

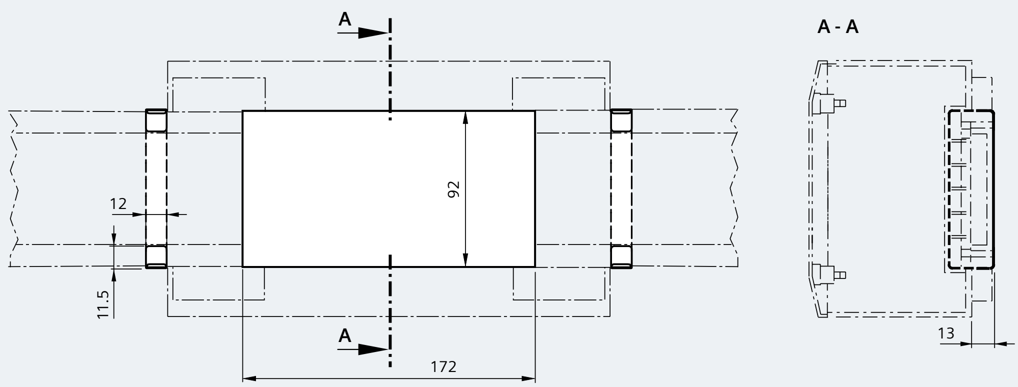
For tap-off point
BD01-FAS



For connection point
BD01-FS



For feeding point at bottom
BD01-FES



For feeding point at side, top
BD01-KS

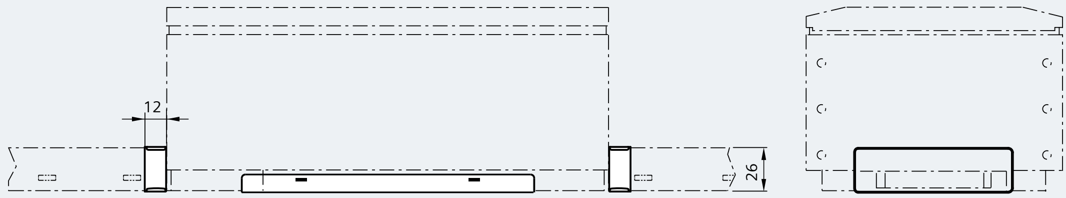
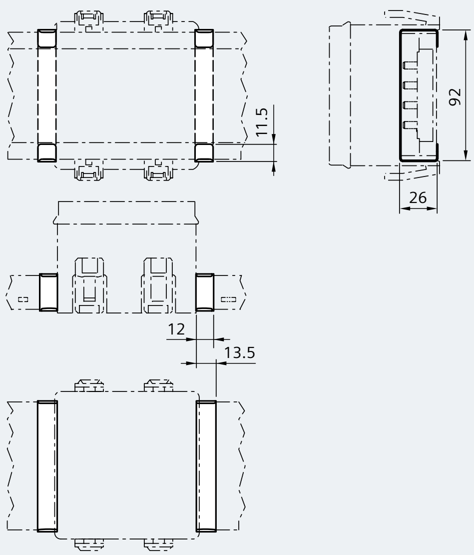


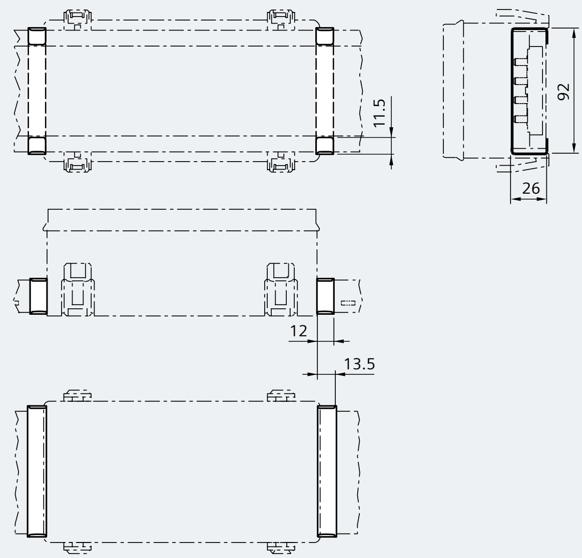
Fig. 3/13: **Dimensional drawings for IP55 protective covers for tap-off points, connection points, and feeding points (dimensions in mm)**

For tap-off units

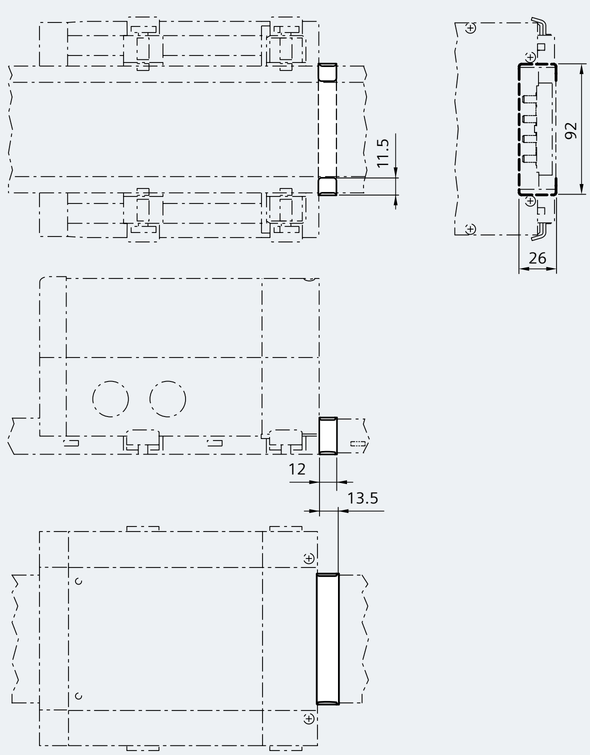
BD01-AK01X-IP55



BD01-AK02X-IP55



BD01-AK1X-IP55



BD01-AK2X-IP55

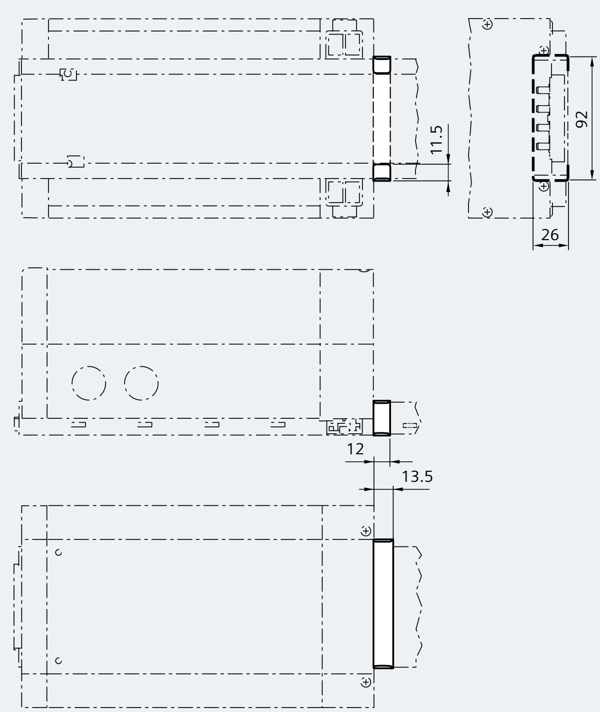
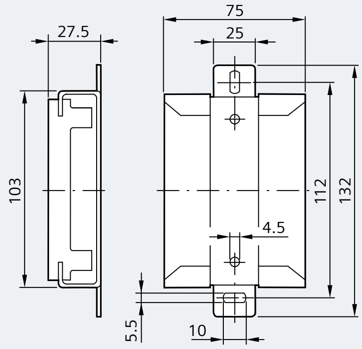
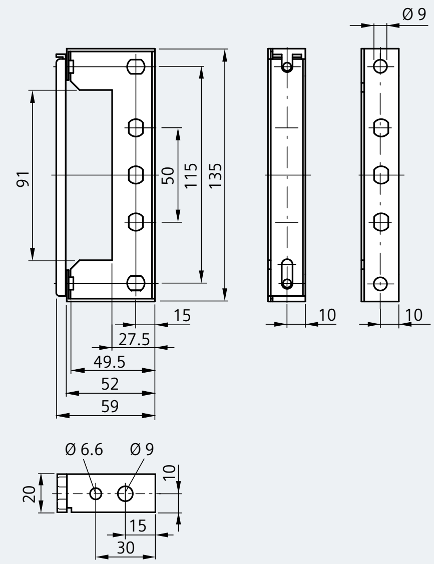


Fig. 3/14: **Dimensional drawings for protective covers IP55 for tap-off units (dimensions in mm)**

Universal fixing bracket
BD01-B



Suspension bracket
BD01-BA



Hanger bracket
BD01-BAP

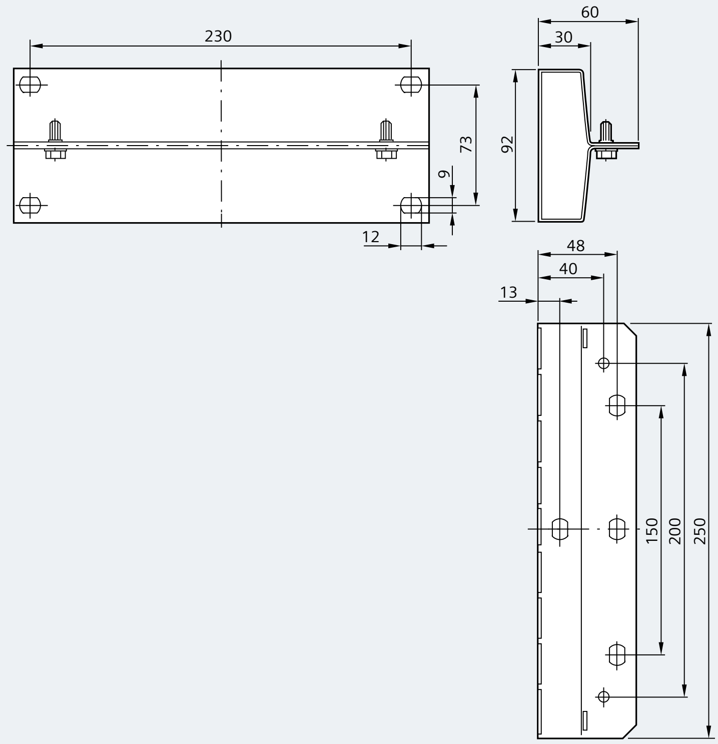


Fig. 3/15: **Dimensional drawings for fixing elements of the BD01 system (dimensions in mm)**

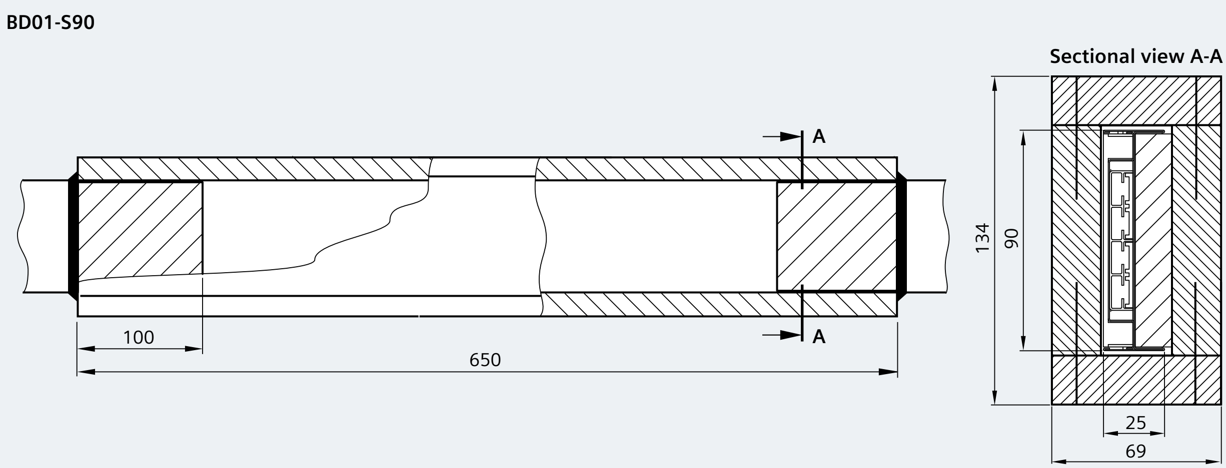


Fig. 3/16: **Dimensional drawing for BD01-S90 fire barrier kit (dimensions in mm; dimensions of the cut-outs for the fire barrier, see Fig. 3/4)**

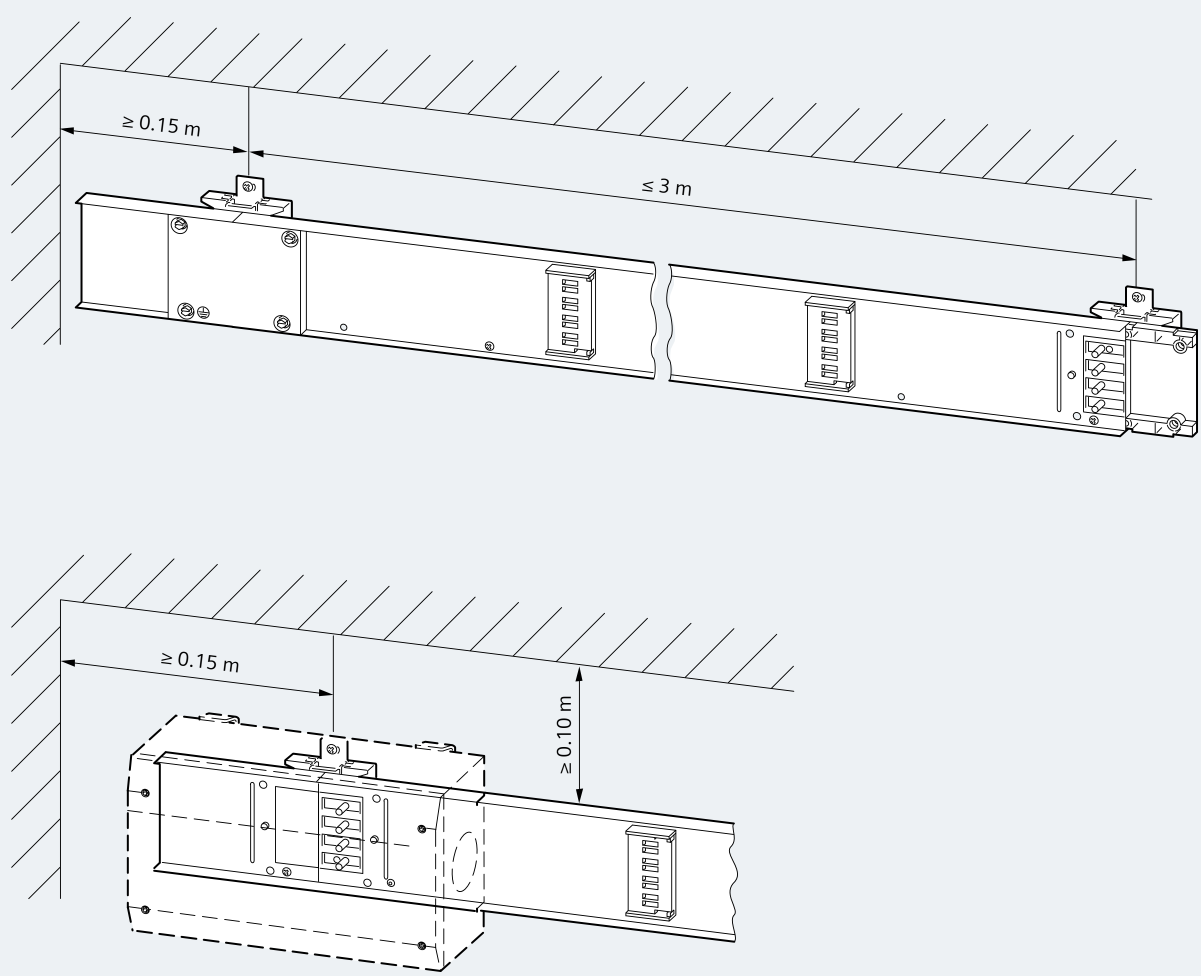


Fig. 3/17: **Wall or ceiling mounting with BD01-B**

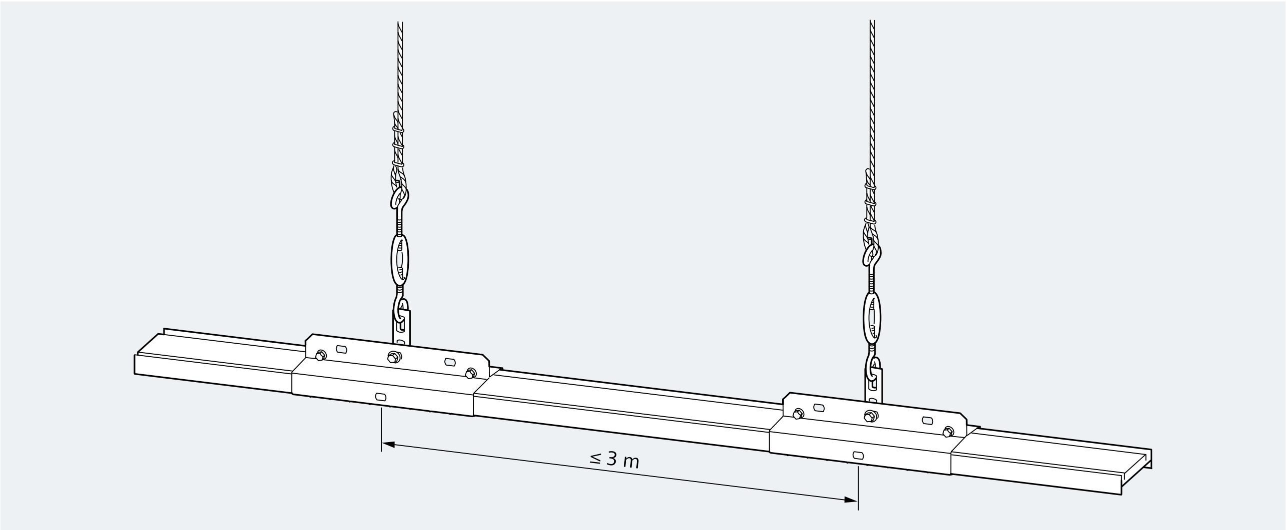


Fig. 3/18: **Pendant suspension with BD01-BAP**

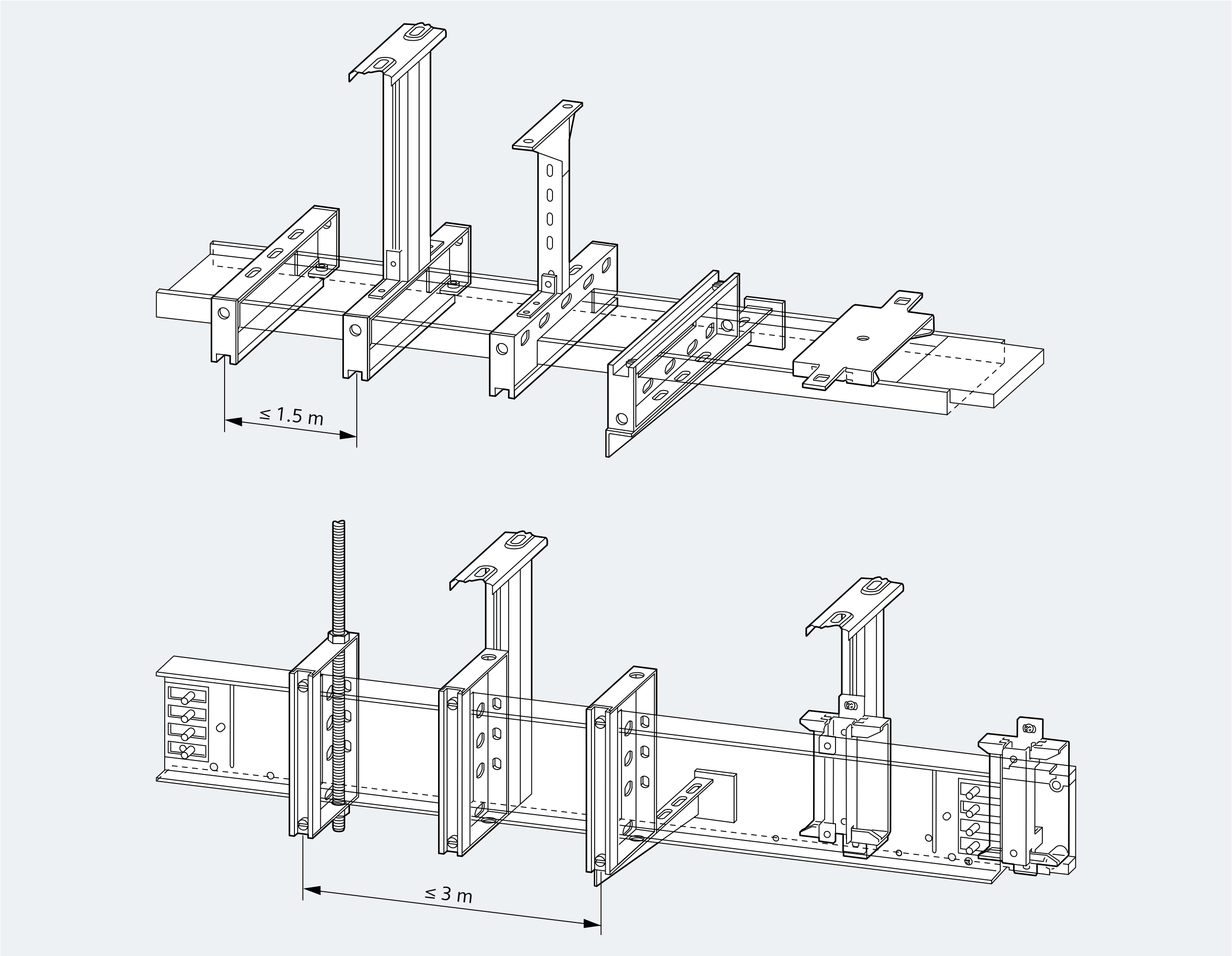


Fig. 3/19: **Fixing examples with BD01-B and BD01-BA**

Chapter 4

BD2 System – 160 to 1,250 A

Con-
tents

Intro-
duction

1

2

3

4

5

6

7

8

4 BD2 System – 160 to 1,250 A

The busbar trunking system BD2 (Fig. 4/1) can be used universally. It is designed for fields of application of flexible power supply and distribution in industry, trade and infrastructure, and it is also suitable for power transmission between two points of supply. Moreover, the busbar trunking system BD2 is used as rising main busbar in high-rise buildings.

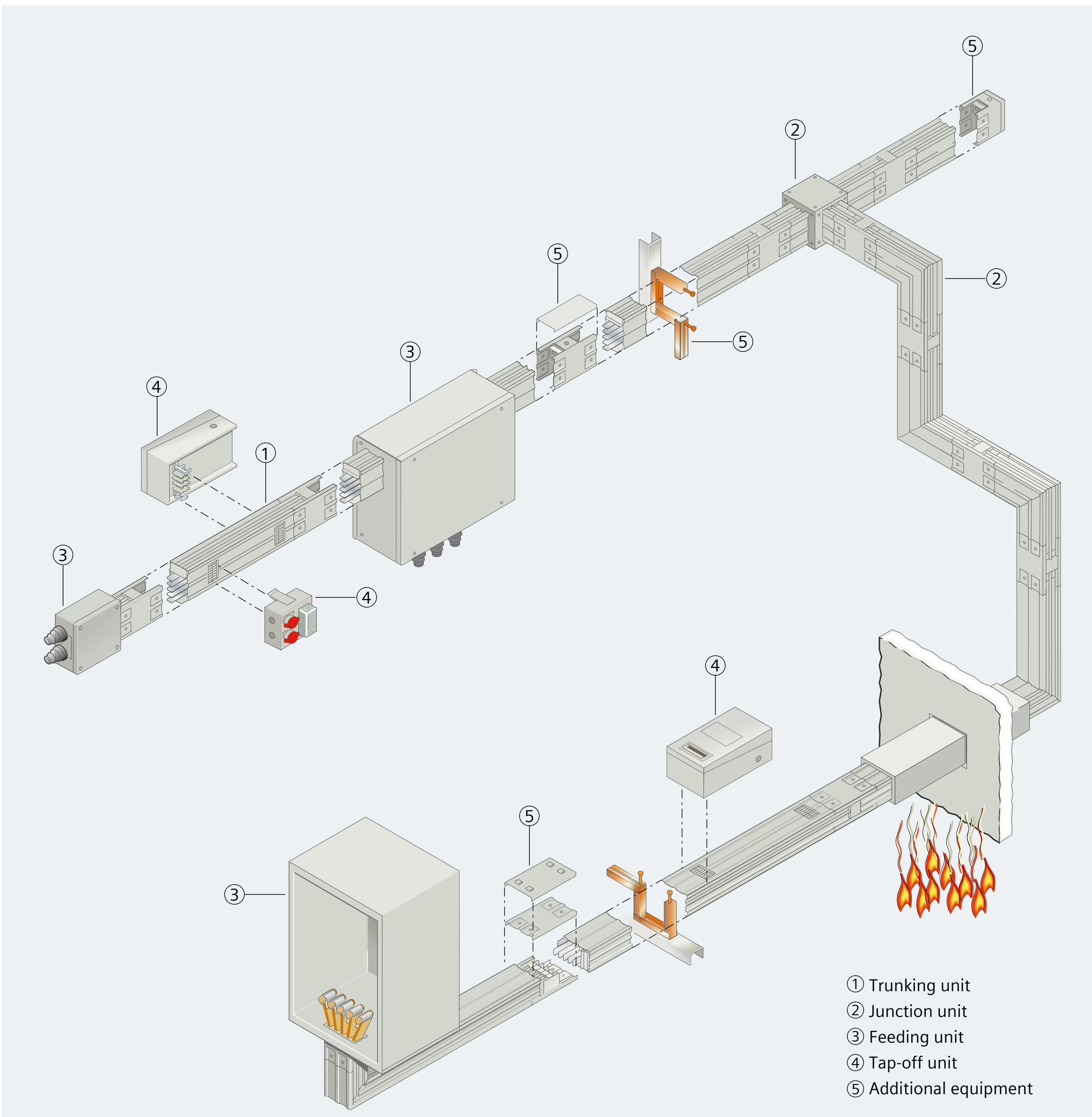


Fig. 4/1: **Overview of busbar trunking system BD2**

Versions

- Design verified low-voltage switchgear and controlgear assembly in accordance with IEC 61439-1/-6
- Standard degree of protection IP52 for trunking units and junction units as well as IP54 for feeding units and tap-off units
- Higher degree of protection IP54 or IP55 with additional equipment for harsh industrial applications
- Enclosure dimensions (Fig. 4/2):
  Size 1: 68 x 167 mm I_n from 160 to 400 A
  Size 2: 126 x 167 mm I_n from 630 to 1,250 A
- 5-conductor configuration; all conductors nickel-plated and tinned; conductor material copper or aluminum
- Interconnection of the system components via quick connection terminals
- Horizontal and vertical installation possible
- Enclosure color RAL 7035, light gray (painted)
- For DC applications (see chapter 4.4), special feeding units are available. Busbars without tap-off points as well as junction units are identical for AC (alternating current) and DC (direct current)
- Expansions due to joule heat are compensated by the integrated expansion compensation, and no additional compensation units are needed
- Independently of the mounting position and the degree of protection, the busbar trunking system BD2 can always be loaded with 100% of the rated current (the derating factor of 0.9 is only necessary for power transmission in edgewise mounting position).

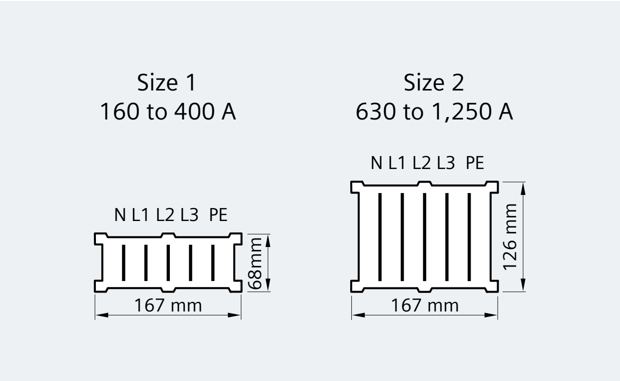


Fig. 4/2: **Overview of busbar trunking system BD2**

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
  - None or on two sides offset every 0.25 m or 0.5 m
  - Sealable
  - The leading or delayed PE contact at the tap-off unit provides positive opening or closing of the tap-off point
  - Can be coded together with the tap-off unit at the factory on request
- Without or with fire barrier: fire resistance class S 90 and S 120 (DIN 4102 Sheet 2 to 4); EI 90 and EI 120 in accordance with EN 1363-1.

Junction units

- Edgewise or flat position
- L-units without or with configurable angle
- Z- and T-units
- Flexible junction units with flexible copper cables.

Infeeds

- Entry/end feeding units
- Center feeding units
- Infeed of single-core or multi-core cables possible
- End feeding units with switch-disconnector
- Distribution board infeeds
- Bolt terminal
- Cable entry from 1, 2, or 3 sides.

Tap-off units (AK)

- Pluggable in energized condition, in accordance with EN 50110-1; national specifications/standards are to be observed)
- Double anti-rotation feature
- Power pick-up through silver-plated lyra contacts
- Cable entry is possible from 3 sides
- Up to 25 A (-AK1)
  - Molded-plastic enclosure, color light gray (RAL 7035)
  - Utilization category AC-22B (for removal/installation)
  - Cable grommet and integrated strain relief
- Up to 125 A with "cover-integrated switch-disconnector" (-AK2, -AK3)
  - Switch-disconnector integrated into the cover (AC-22B up to 63 A, AC-21B for 125 A)
  - Sheet-steel enclosure, hot-galvanized, powder-coated cover (color light gray similar to RAL 7035)
  - The unit can only be mounted or removed with its cover open
- Up to 125 A without "cover-integrated switch-disconnector" (-AK02, -AK03)
  - Sheet-steel enclosure, hot-galvanized, powder-coated cover (color light gray similar to RAL 7035)
  - The unit can be mounted and removed with its 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
- More than 125 A (-AK04, -AK05, -AK06)
  - Sheet-steel enclosure, hot-galvanized, powder-coated cover (color light gray similar to RAL 7035)
  - The unit can only be mounted or removed with its cover open
  - AK05 and AK06 can only be mounted on trunking units size 2
  - Connections for multi-core or single-core cables are possible.

Empty tap-off units (for AK04 and AK05)

- Prepared for installation of circuit-breakers SENTRON 3VA2
- Prepared for rotary operating mechanism (cover cut-out available)
- Sheet-steel enclosure, hot-galvanized, powder-coated cover (color light gray similar to RAL 7035)
- Important notes in chapter 8 must absolutely be observed.

Ancillary equipment units (GK)

- For 8 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.

Additional equipment

- End flange
- For degree of protection IP55
- For fixing
  - Universal fixing bracket (edgewise, flat)
  - Fastening elements for vertical runs, for wall or ceiling mounting
- Joint block
  - Even holding pressure ensures secure connection of all 5 busbars (Fig. 4/3).
  - Conventional tools can be used, and fast mounting with single-bolt terminal
  - The integrated expansion compensation absorbs the heat expansion of the busbars.

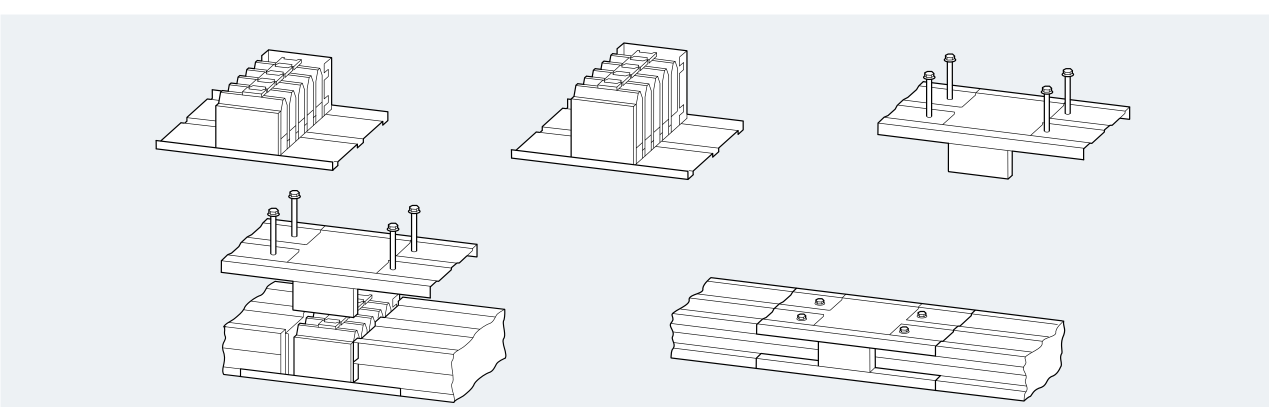


Fig. 4/3: **Connection technology for busbar trunking system BD2. Top: joint block BD2-400-EK (left), joint block BD2-1250-EK (center), flange cover (right). Bottom: joint block for the connection of trunking units and for fastening the flange cover**

4.1 Type Codes

For better clarity about available system components, the type codes are summarized in this section for trunking units, junction units, infeeds, tap-off units, and ancillary equipment units. For the additional equipment, the type codes are specified in section 4.3 at the corresponding dimensional drawings.

BD2 trunking units		Order number											
		Basic type						Fire barrier					
		BD2	.	3	- …	- ..	- …	+ BD2	- …	- BX	…	- M	…
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				1000								
	1,250 A				1250								
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													
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*						
Standard length 1.25 m adaptable by the customer, can be shortened to as much as 0.5 m, without tap-off points (only complete PE and 400 A for Al and Cu, as well as 1,000 A or 1,250 A for Cu available)		BD2	A	-3	-400 -1000	-WO	-AL						
		BD2	C	-3	-400 -1250	-WO	-AL						
Fire resistance class													
S 90 for Al									S90				
S 120 for Al, Cu									S120				
BX: dimension in m from center of joint block to center of fire wall or fire ceiling											… **		
M: wall or ceiling thickness in m													… **
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**

Junction units BD2		Order number											
		Basic type								Fire barrier (L-units only)			
		BD2	.	- ...	- .	.	- X.../Y...	- G...		+ BD2	- ...	- B...	- M...
Conductor material													
Aluminum Al			A										
Copper Cu			C										
Rated current I_n													
Al	Cu												
400 A	400 A			400									
1,000 A				1000									
	1,250 A			1250									
Type of junction unit (see Fig. 4/5)													
L-units					L								
Z-units					Z								
T-units [1)]					T								
Direction description for junction units													
Rear						H							
Front						V							
Left						L							
Right						R							
Standard/optional lengths for L-units													
Without: standard length X = 0.36 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} to 1.25 m [2)]							X*/Y*/Z*						
Fire barrier for L-units (optionally, for Z-units on request) [3)]													
EI 90 for Al in X-limb											S90	BX*	M*
EI 90 for Al in Y-limb											S90	BY*	M*
EI 120 for Al, Cu in X-limb											S120	BX*	M*
EI 120 for Al, Cu in Y-limb											S120	BY*	M*
Flexible trunking units in direction X/Y/Z (special lengths up to 3.25 m are possible; 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 joint block (for BX* side without joint block) to center of fire wall or fire ceiling; M*: wall or ceiling thickness

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

Infeeds BD2				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 infeeds	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 infeeds of the BD2 system**

	Type	I_n	U_e	Version
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 x 1-pole fuse-bases D01 / without socket outlet
	BD2-AK1/S18	25 A	400 V	3 x 1-pole fuse-bases D02 / without socket outlet
	BD2-AK1/2CEE163S14	16 A	230 V	2 x 1-pole fuse-bases D01 / 2 x 3-pole CEE socket outlets 16 A
	BD2-AK1/CEE165S14	16 A	400 V	3 x 1-pole fuse-bases D01 / 1 x 5-pole CEE socket outlet 16 A
	BD2-AK1/3SSD163S14	16 A	230 V	3 x 1-pole fuse-bases 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 x 1-pole MCB 16 A, characteristic B / 2 x 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 x 1 MCB 16 A, characteristic B / 3 Schuko socket outlet 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 P_v 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-bases 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 x 3-pole fuse-base D01 / 2 x 5-pole CEE socket outlets 16 A
	BD2-AK2X/2CEE165S27/FORMP	16 A	400 V	2 x 3-pole fuse-base S27 screw adapter system / 2 x 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 8 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 16 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 x 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 x 3-pole MCB 16 A, characteristic B / 2 x 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 8 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	LV HRC fuse-base size 00, bolt terminal
With fuse-switch-disconnector	BD2-AK3X/GSTZ00	125 A	690 V	LV 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 x 8 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 x 38 mm
	BD2-AK02X/F1038-3N	25 A	400 V	4-pole fuse-base SP38 for cylindrical fuses 10 x 38 mm
	BD2-AK02X/F1451-3	32 A	400 V	3-pole fuse-base SP51 for cylindrical fuses 14 x 51 mm
	BD2-AK02X/F1451-3N	32 A	400 V	4-pole fuse-base SP51 for cylindrical fuses 14 x 51 mm
	BD2-AK02X/F2258-3	63 A	400 V	3-pole fuse-base SP58 for cylindrical fuses 22 x 58 mm
	BD2-AK02X/F2258-3N	63 A	400 V	4-pole fuse-base SP58 for cylindrical fuses 22 x 58 mm
For free arrangement of components	BD2-AK02X/F	63 A	690 V	For free arrangement of components (power P_v maximum 22.5 W), integrated DIN rail, mounting space 8 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 8 mw [1)]
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 x 58 mm
	BD2-AK03X/F2258-3N	100 A	690 V	4-pole fuse-base SP58 for cylindrical fuses 22 x 58 mm
With fuse-switch-disconnector	BD2-AK03X/GSTA00	125 A	690 V	LV HRC 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 8 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 8 mw [1)]

[1)] mw = modular width (1 mw corresponds to 18 mm)

Tab. 4/5: **Type code structure for tap-off units type AK02 and 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 units GK, sheet-steel 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 8 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 8 mw [1)]
[1)] mw = modular width (1 mw corresponds to 18 mm)				

Tab. 4/6: **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 (only size AK03)				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	
Release / empty tap-off units								
Thermal-magnetic: TM240 (3VA11 - 3VA14 only)								TM240
Electronic: ETU350 (only 3VA21 - 3VA25)								ET350
Empty tap-off units, prepared for 3VA installation (sizes AK03, AK04 or A05 only)								F

Tab. 4/7: **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 current 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	Release	D / M [1]	I_r range	Weight
BD2-AK03/LSD-3VA11-S-40-3-TM240	40 A	36 kA	3-pole	TM240	D	28 ... 40 A	9.0 kg
BD2-AK03/LSD-3VA11-S-63-3-TM240	63 A	36 kA	3-pole	TM240	D	44 ... 63 A	9.0 kg
BD2-AK03/LSD-3VA11-S-80-3-TM240	80 A	36 kA	3-pole	TM240	D	56 ... 80 A	9.0 kg
BD2-AK03/LSD-3VA11-S-100-3-TM240	100 A	36 kA	3-pole	TM240	D	70 ... 100 A	9.0 kg
BD2-AK03/LSD-3VA11-S-125-3-TM240	125 A	36 kA	3-pole	TM240	D	88 ... 125 A	9.0 kg
BD2-AK03/LSD-3VA11-M-40-3-TM240	40 A	55 kA	3-pole	TM240	D	28 ... 40 A	9.0 kg
BD2-AK03/LSD-3VA11-M-63-3-TM240	63 A	55 kA	3-pole	TM240	D	44 ... 63 A	9.0 kg
BD2-AK03/LSD-3VA11-M-80-3-TM240	80 A	55 kA	3-pole	TM240	D	56 ... 80 A	9.0 kg
BD2-AK03/LSD-3VA11-M-100-3-TM240	100 A	55 kA	3-pole	TM240	D	70 ... 100 A	9.0 kg
BD2-AK03/LSD-3VA11-M-125-3-TM240	125 A	55 kA	3-pole	TM240	D	88 ... 125 A	9.0 kg
BD2-AK03/LSD-3VA21-M-40-3-ET350	40 A	55 kA	3-pole	ETU350	D	16 ... 40 A	10.5 kg
BD2-AK03/LSD-3VA21-M-63-3-ET350	63 A	55 kA	3-pole	ETU350	D	25 ... 63 A	10.5 kg
BD2-AK03/LSD-3VA21-M-100-3-ET350	100 A	55 kA	3-pole	ETU350	D	40 ... 100 A	10.5 kg
BD2-AK03/LSD-3VA21-M-125-3-ET350	125 A	55 kA	3-pole	ETU350	D	63 ... 125 A	10.5 kg
BD2-AK03/LSD-3VA21-M-40-4-ET350	40 A	55 kA	4-pole	ETU350	D	16 ... 40 A	11.0 kg
BD2-AK03/LSD-3VA21-M-63-4-ET350	63 A	55 kA	4-pole	ETU350	D	25 ... 63 A	11.0 kg
BD2-AK03/LSD-3VA21-M-100-4-ET350	100 A	55 kA	4-pole	ETU350	D	40 ... 100 A	11.0 kg
BD2-AK03/LSD-3VA21-M-125-4-ET350	125 A	55 kA	4-pole	ETU350	D	63 ... 125 A	11.0 kg
BD2-AK04/LSD-3VA12-S-160-3-TM240	160 A	36 kA	3-pole	TM240	D	112 ... 160 A	27.0 kg
BD2-AK04/LSD-3VA12-S-200-3-TM240	200 A	36 kA	3-pole	TM240	D	140 ... 200 A	27.0 kg
BD2-AK04/LSD-3VA12-S-250-3-TM240	225 A	36 kA	3-pole	TM240	D	175 ... 250 A	27.0 kg
BD2-AK04/LSM-3VA12-S-160-3-TM240	160 A	36 kA	3-pole	TM240	M	112 ... 160 A	27.5 kg
BD2-AK04/LSM-3VA12-S-200-3-TM240	200 A	36 kA	3-pole	TM240	M	140 ... 200 A	27.5 kg
BD2-AK04/LSM-3VA12-S-250-3-TM240	225 A	36 kA	3-pole	TM240	M	175 ... 150 A	27.5 kg
BD2-AK04/LSD-3VA12-M-160-3-TM240	160 A	55 kA	3-pole	TM240	D	112 ... 160 A	27.0 kg
BD2-AK04/LSD-3VA12-M-200-3-TM240	200 A	55 kA	3-pole	TM240	D	140 ... 200 A	27.0 kg
BD2-AK04/LSD-3VA12-M-250-3-TM240	225 A	55 kA	3-pole	TM240	D	175 ... 250 A	27.0 kg
BD2-AK04/LSM-3VA12-M-160-3-TM240	160 A	55 kA	3-pole	TM240	M	112 ... 160 A	27.5 kg
BD2-AK04/LSM-3VA12-M-200-3-TM240	200 A	55 kA	3-pole	TM240	M	140 ... 200 A	27.5 kg
BD2-AK04/LSM-3VA12-M-250-3-TM240	225 A	55 kA	3-pole	TM240	M	175 ... 250 A	27.5 kg
BD2-AK04/LSD-3VA22-M-160-3-ET350	160 A	55 kA	3-pole	ETU350	D	63 ... 160 A	28.0 kg
BD2-AK04/LSD-3VA22-M-250-3-ET350	215 A	55 kA	3-pole	ETU350	D	100 ... 250 A	28.0 kg
BD2-AK04/LSM-3VA22-M-160-3-ET350	160 A	55 kA	3-pole	ETU350	M	63 ... 160 A	28.5 kg
BD2-AK04/LSM-3VA22-M-250-3-ET350	215 A	55 kA	3-pole	ETU350	M	100 ... 250 A	28.5 kg
BD2-AK04/LSD-3VA22-M-160-4-ET350	160 A	55 kA	4-pole	ETU350	D	63 ... 160 A	29.0 kg
BD2-AK04/LSD-3VA22-M-250-4-ET350	215 A	55 kA	4-pole	ETU350	D	100 ... 250 A	29.0 kg
BD2-AK04/LSM-3VA22-M-160-4-ET350	160 A	55 kA	4-pole	ETU350	M	63 ... 160 A	29.5 kg
BD2-AK04/LSM-3VA22-M-250-4-ET350	215 A	55 kA	4-pole	ETU350	M	100 ... 250 A	29.5 kg

[1] D: rotary operating mechanism, M: motor operating mechanism

Tab. 4/8: **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 current 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 busbar trunking systems BD2 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**	**Release**	**D / M 1)**	I_r **range**	**Weight**
BD2-AK05/LSD-3VA13-S-400-3-TM240		36 kA	3-pole	TM240	D		on request
BD2-AK05/LSD-3VA13-S-400-4-TM240		36 kA	4-pole	TM240	D		on request
BD2-AK05/LSM-3VA13-S-400-3-TM240		36 kA	3-pole	TM240	M		on request
BD2-AK05/LSM-3VA13-S-400-4-TM240		36 kA	4-pole	TM240	M		on request
BD2-AK05/LSD-3VA13-M-400-3-TM240		55 kA	3-pole	TM240	D		on request
BD2-AK05/LSD-3VA13-M-400-4-TM240		55 kA	4-pole	TM240	D		on request
BD2-AK05/LSM-3VA13-M-400-3-TM240		55 kA	3-pole	TM240	M		on request
BD2-AK05/LSM-3VA13-M-400-4-TM240		55 kA	4-pole	TM240	M		on request
BD2-AK05/LSD-3VA24-M-400-3-ET350	380 A	55 kA	3-pole	ETU350	D	160 ... 400 A	45.0 kg
BD2-AK05/LSD-3VA24-M-400-4-ET350	380 A	55 kA	4-pole	ETU350	D	160 ... 400 A	46.0 kg
BD2-AK05/LSM-3VA24-M-400-3-ET350	380 A	55 kA	3-pole	ETU350	M	160 ... 400 A	45.5 kg
BD2-AK05/LSM-3VA24-M-400-4-ET350	380 A	55 kA	4-pole	ETU350	M	160 ... 400 A	46.5 kg
BD2-AK06/LSD-3VA14-S-630-3-TM240		36 kA	3-pole	TM240	D		on request
BD2-AK06/LSD-3VA14-S-630-4-TM240		36 kA	4-pole	TM240	D		on request
BD2-AK06/LSM-3VA14-S-630-3-TM240		36 kA	3-pole	TM240	M		on request
BD2-AK06/LSM-3VA14-S-630-4-TM240		36 kA	4-pole	TM240	M		on request
BD2-AK06/LSD-3VA14-M-630-3-TM240		55 kA	3-pole	TM240	D		on request
BD2-AK06/LSD-3VA14-M-630-4-TM240		55 kA	4-pole	TM240	D		on request
BD2-AK06/LSM-3VA14-M-630-3-TM240		55 kA	3-pole	TM240	M		on request
BD2-AK06/LSM-3VA14-M-630-4-TM240		55 kA	4-pole	TM240	M		on request
BD2-AK06/LSD-3VA25-M-630-3-ET350	520 A	55 kA	3-pole	ETU350	D	250 ... 630 A	56.0 kg
BD2-AK06/LSD-3VA25-M-630-4-ET350	520 A	55 kA	4-pole	ETU350	D	250 ... 630 A	59.0 kg
Empty tap-off units for the installation of molded-case circuit-breakers SENTRON 3VA, 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 are only suitable for busbar trunking systems BD2 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)**		**Weight**
BD2-AK03/LSD-3VAXX-M-125-3-F	125 A	M	3-pole		D		6.5 kg
BD2-AK03/LSD-3VAXX-M-125-4-F	125 A	M	4-pole		D		7.0 kg
BD2-AK04/LSD-3VA12-M-250-3-F	250 A	M	3-pole		D		25.0 kg
BD2-AK04/LSD-3VA12-M-250-4-F	250 A	M	4-pole		D		25.5 kg
BD2-AK04/LSD-3VA22-M-250-3-F	250 A	M	3-pole		D		25.0 kg
BD2-AK04/LSD-3VA22-M-250-4-F	250 A	M	4-pole		D		25.5 kg
BD2-AK05/LSD-3VA13-M-400-3-F	400 A	M	3-pole		D		40.0 kg
BD2-AK05/LSD-3VA13-M-400-4-F	400 A	M	4-pole		D		40.5 kg
BD2-AK05/LSD-3VA24-M-400-3-F	400 A	M	3-pole		D		40.0 kg
BD2-AK05/LSD-3VA24-M-400-4-F	400 A	M	4-pole		D		40.5 kg

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

Tab. 4/9: **Type code structure for tap-off units type AK03 and AK04 with molded-case circuit-breaker SENTRON 3VA and empty tap-off units AK03, AK04, and AK05, prepared for installation of circuit-breakers SENTRON 3VA**

4.2 Technical Specifications

Besides the general technical Specifications for the BD2 system in Tab. 4/10, further data are given especially for trunking units (with Al conductors in Tab. 4/11 and with Cu conductors in Tab. 4/12), feeding units (Tab. 4/13), tap-off units (Tab. 4/14 and Tab. 4/15), for the temperature characteristic of the system (Tab. 4/16), as well as for fire loads and weights of the trunking units (Tab. 4/17) and further important system components (Tab. 4/18).

General system data	
Type	**BD2-...**
Standards and specifications	IEC 61439-1 and -6
Rated insulation voltage U_i	690 V AC / 800 V DC
Rated operational voltage U_e	690 V AC
Frequency	50 ... 60 Hz 1)
Overvoltage category / pollution degree	III/3 (according to IEC 60947-1)
Rated current I_n alternating current AC / direct current DC • Al busbars • Cu busbars	 160 ... 1,000 A / 200 ... 1,490 A 160 ... 1,250 A / 200 ... 1,940 A
Climatic resistance • Constant temperature / humidity, acc. to IEC 60068-2-78 • Cyclic temperature / humidity, acc. to IEC 60068-2-30 • Cold acc. to IEC 60081-2-1 • Temperature change acc. to IEC 60068-2-14 • Salt spray test acc. to IEC 60068-2-25 • Ice formation acc. to IEC 60068-2-52C	 40 °C / 93 % RH over 56 days 56 times (25 ... 40 °C in 3 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 classes acc. to IEC 60721 derived from climatic resistance tests • Climatic environmental conditions • Chemical impact • Biological environmental conditions • Mechanical impact	 1K5 (storage) = 3K7L (operation without exposure to the sun); 2K2 (transport) Salt spray (more contaminants opt.:) 1C2 (storage) = 3C2 (operation) = 2C2 (transport) Covered by IP degrees of protection and type of packaging 1B2 (storage) = 3B2 (operation) = 2B2 (transport) Covered by IP degrees of protection and type of packaging 1S2 (storage) = 3S2 (operation) = 2S2 (transport)
Degree of protection acc. to to IEC 60529 (for size 2) • Trunking units / with additional equipment on the busbar run • Feeding units, tap-off units / with additional equipment	 IP52 / IP55 IP54 / IP55
Material • Trunking units, feeding units, tap-off units • Exception: tap-off units BD2-AK1/ ... • Busbars Aluminum Copper	 Hot-galvanized, painted sheet steel, light gray (RAL 7035) Enclosure of hot-galvanized sheet steel, cover painted, color light gray (RAL 7035) Molded-plastic enclosure, light gray (RAL 7035) Nickel-plated and tinned Al busbars Tinned Cu busbars
Mounting position	Horizontal edgewise, horizontal flat, vertical

1) For a frequency of 60 Hz, a derating to 95 % has to be observed for currents > 800 A according to IEC 61439-1

Tab. 4/10: **General system data of the BD2 system**

Busbar trunking units with aluminum conductors							
Type		BD2A-3-160	BD2A-3-250	BD2A-3-400	BD2A-3-630	BD2A-3-800	BD2A-3-1000
Rated current AC I_n		160 A	250 A	400 A	630 A	800 A	1,000 A
Rated current DC I_n		277 A	390 A	630 A	910 A	1,150 A	1,490 A
Impedance per unit length of conducting paths with 50 Hz and 20 °C ambient temperature (cold bars)							
• Resistance	R_{20}	0.527 mΩ/m	0.315 mΩ/m	0.176 mΩ/m	0.093 mΩ/m	0.076 mΩ/m	0.048 mΩ/m
• Reactance	X_{20}	0.151 mΩ/m	0.112 mΩ/m	0.089 mΩ/m	0.041 mΩ/m	0.039 mΩ/m	0.055 mΩ/m
• Impedance	Z_{20}	0.548 mΩ/m	0.335 mΩ/m	0.197 mΩ/m	0.101 mΩ/m	0.085 mΩ/m	0.073 mΩ/m
Impedance per unit length of conducting paths with 50 Hz and 140 °C ambient temperature (operationally warm condition)							
• Resistance	R_{140}	0.780 mΩ/m	0.467 mΩ/m	0.260 mΩ/m	0.137 mΩ/m	0.112 mΩ/m	0.072 mΩ/m
• Reactance	X_{140}	0.151 mΩ/m	0.112 mΩ/m	0.1089 mΩ/m	0.041 mΩ/m	0.039 mΩ/m	0.055 mΩ/m
• Impedance	Z_{140}	0.794 mΩ/m	0.480 mΩ/m	0.275 mΩ/m	0.143 mΩ/m	0.119 mΩ/m	0.090 mΩ/m
• Warm resistance per pole DC	R'_{DCwarm}	0.377 mΩ/m	0.219 mΩ/m	0.118 mΩ/m	0.062 mΩ/m	0.050 mΩ/m	0.034 mΩ/m
Impedance per unit length of conducting paths in the event of a fault							
• Resistance	R_F	1.058 mΩ/m	0.634 mΩ/m	0.341 mΩ/m	0.187 mΩ/m	0.153 mΩ/m	0.105 mΩ/m
• Reactance	X_F	0.299 mΩ/m	0.220 mΩ/m	0.193 mΩ/m	0.079 mΩ/m	0.076 mΩ/m	0.069 mΩ/m
• Impedance	Z_F	1.099 mΩ/m	0.671 mΩ/m	0.392 mΩ/m	0.203 mΩ/m	0.171 mΩ/m	0.125 mΩ/m
Zero-sequence impedance according to IEC 60909 (VDE 0102):							
	R_0	2.166 mΩ/m	1.329 mΩ/m	0.789 mΩ/m	0.414 mΩ/m	0.348 mΩ/m	0.252 mΩ/m
	Phases to N X_0	0.918 mΩ/m	0.753 mΩ/m	0.639 mΩ/m	0.321 mΩ/m	0.300 mΩ/m	0.276 mΩ/m
	Z_0	2.353 mΩ/m	1.527 mΩ/m	1.015 mΩ/m	0.524 mΩ/m	0.459 mΩ/m	0.374 mΩ/m
	R_0	2.166 mΩ/m	1.329 mΩ/m	0.786 mΩ/m	0.411 mΩ/m	0.345 mΩ/m	0.252 mΩ/m
	Phases to PE X_0	0.897 mΩ/m	0.735 mΩ/m	0.624 mΩ/m	0.315 mΩ/m	0.297 mΩ/m	0.276 mΩ/m
	Z_0	2.344 mΩ/m	1.519 mΩ/m	1.004 mΩ/m	0.518 mΩ/m	0.455 mΩ/m	0.374 mΩ/m
Short-circuit withstand strength							
• Rated peak withstand current I_{pk}		17 kA	32 kA	40 kA	64 kA	84 kA	90 kA
• Rated short-time withstand current I_{cw}	t = 1 s	5.5 kA	10 kA	16 kA	26 kA	32 kA	34 kA
	t = 0.1 s	12 kA	22 kA	28 kA	45 kA	59 kA	63 kA
Conductor cross-section							
	L1, L2, L3, N, PE	63 mm²	108 mm²	205 mm²	381 mm²	446 mm²	699 mm²
Max. fixing distance of the trunking units at normal mechanical load							
• Edgewise		4 m	4 m	4 m	3.5 m	3.5 m	3.5 m
• Edgewise with BD2-BD [1]		4 m	4 m	4 m	1.75 m	1.75 m	1.5 m
• Flat		3.5 m	3.5 m	3.5 m	3 m	3 m	2.5 m

[1] When using BD2-BD spacer bracket

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 up to 1,000 A)

Please observe the following:
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.

Remark: For a frequency of 60 Hz, a derating to 95 % has to be observed for currents > 800 A according to IEC 61439-1

Tab. 4/11: **Technical specifications for trunking units of the BD2 system with aluminum conductors**

Busbar trunking units with copper conductors								
Type		**BD2C-3-160**	**BD2C-3-250**	**BD2C-3-400**	**BD2C-3-630**	**BD2C-3-800**	**BD2C-3-1000**	**BD2C-3-1250**
Rated current AC I_n		160 A	250 A	400 A	630 A	800 A	1,000 A	1,250 A
Rated current DC I_n		277 A	390 A	630 A	910 A	1,150 A	1,490 A	1,940 A
Impedance per unit length of conducting paths with 50 Hz and 20 °C ambient temperature (cold bars)								
• Resistance	R_{20}	0.311 mΩ/m	0.311 mΩ/m	0.139 mΩ/m	0.050 mΩ/m	0.050 mΩ/m	0.044 mΩ/m	0.030 mΩ/m
• Reactance	X_{20}	0.143 mΩ/m	0.143 mΩ/m	0.088 mΩ/m	0.038 mΩ/m	0.038 mΩ/m	0.038 mΩ/m	0.035 mΩ/m
• Impedance	Z_{20}	0.342 mΩ/m	0.342 mΩ/m	0.164 mΩ/m	0.063 mΩ/m	0.063 mΩ/m	0.058 mΩ/m	0.046 mΩ/m
Impedance per unit length of conducting paths with 50 Hz and 140 °C ambient temperature (operationally warm condition)								
• Resistance	R_{140}	0.460 mΩ/m	0.460 mΩ/m	0.206 mΩ/m	0.074 mΩ/m	0.074 mΩ/m	0.066 mΩ/m	0.045 mΩ/m
• Reactance	X_{140}	0.143 mΩ/m	0.143 mΩ/m	0.088 mΩ/m	0.038 mΩ/m	0.038 mΩ/m	0.038 mΩ/m	0.035 mΩ/m
• Impedance	Z_{140}	0.482 mΩ/m	0.482 mΩ/m	0.224 mΩ/m	0.083 mΩ/m	0.083 mΩ/m	0.076 mΩ/m	0.057 mΩ/m
Impedance per unit length of conducting paths in the event of a fault								
• Resistance	R_F	0.625 mΩ/m	0.625 mΩ/m	0.281 mΩ/m	0.101 mΩ/m	0.101 mΩ/m	0.090 mΩ/m	0.062 mΩ/m
• Reactance	X_F	0.281 mΩ/m	0.281 mΩ/m	0.169 mΩ/m	0.073 mΩ/m	0.073 mΩ/m	0.071 mΩ/m	0.065 mΩ/m
• Impedance	Z_F	0.685 mΩ/m	0.685 mΩ/m	0.327 mΩ/m	0.125 mΩ/m	0.125 mΩ/m	0.114 mΩ/m	0.090 mΩ/m
Zero-sequence impedance according to IEC 60909 (VDE 0102):								
	R_0	1.308 mΩ/m	1.311 mΩ/m	0.642 mΩ/m	0.243 mΩ/m	0.243 mΩ/m	0.219 mΩ/m	0.165 mΩ/m
Phases to N	X_0	0.879 mΩ/m	0.882 mΩ/m	0.621 mΩ/m	0.279 mΩ/m	0.279 mΩ/m	0.279 mΩ/m	0.258 mΩ/m
	Z_0	1.576 mΩ/m	1.580 mΩ/m	0.893 mΩ/m	0.370 mΩ/m	0.370 mΩ/m	0.355 mΩ/m	0.306 mΩ/m
	R_0	1.308 mΩ/m	1.311 mΩ/m	0.639 mΩ/m	0.243 mΩ/m	0.243 mΩ/m	0.219 mΩ/m	0.162 mΩ/m
Phases to PE	X_0	0.855 mΩ/m	0.861 mΩ/m	0.612 mΩ/m	0.279 mΩ/m	0.279 mΩ/m	0.276 mΩ/m	0.252 mΩ/m
	Z_0	1.563 mΩ/m	1.568 mΩ/m	0.885 mΩ/m	0.370 mΩ/m	0.370 mΩ/m	0.352 mΩ/m	0.300 mΩ/m
Short-circuit withstand strength								
• Rated peak withstand current	I_{pk}	17 kA	32 kA	40 kA	64 kA	84 kA	90 kA	90 kA
• Rated short-time withstand current I_{cw}	t = 1 s	5.5 kA	10 kA	16 kA	26 kA	32 kA	34 kA	34 kA
	t = 0.1 s	12 kA	22 kA	28 kA	45 kA	59 kA	63 kA	63 kA
Conductor cross-section								
	L1, L2, L3, N, PE	63 mm^2	63 mm^2	146 mm^2	415 mm^2	415 mm^2	468 mm^2	699 mm^2
Max. fixing distance of the trunking units at normal mechanical load								
• Edgewise		4 m	4 m	4 m	4 m	3.5 m	3 m	2 m
• Edgewise with BD2-BD [1)]		4 m	4 m	4 m	2 m	1.75 m	1.5 m	1 m
• Flat		3.5 m	3.5 m	3.5 m	3.5 m	3 m	2.5 m	1.5 m

1) When using BD2-BD spacer bracket

Tab. 4/12: **Technical specifications for trunking units of the BD2 system with copper conductors**

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) x 6 mm^2	1 x 150 mm^2, 2 x 70 mm^2	(1-3) x 6	1 x 150 mm^2, 2 x 70 mm^2	M10
	BD2.-400-EE	(1-3) x 10 mm^2 [2]	1 x 240 mm^2, 2 x 120 mm^2	(1-3) x 10 mm^2 [2]	1 x 240 mm^2, 2 x 120 mm^2	M12
	BD2.-1000-EE	(1-3) x 10 mm^2 [2]	3 x 240 mm^2	(1-3) x 10 mm^2 [2]	2 x 240 mm^2, 3 x 185 mm^2	M12
	BD2C-1250-EE	(1-4) x 10 mm^2 [2]	3 x 300 mm^2, 4 x 240 mm^2	(1-4) x 10 mm^2 [2]	3 x 300 mm^2, 4 x 240 mm^2	M12
End feeding units with switch-disconnector	BD2C-250-EESC	1 x 10 mm^2 [2]	1 x 240 mm^2	Armoring		M10
	BD2C-315-EESC	1 x 10 mm^2 [2]	1 x 240 mm^2	Armoring		M10
	BD2C-400-EESC	1 x 10 mm^2 [2]	1 x 240 mm^2, 2 x 120 mm^2	Armoring		M12
	BD2C-630-EESC	1 x 10 mm^2 [2]	2 x 240 mm^2	Armoring		M12
	BD2C-800-EESC	1 x 10 mm^2 [2]	2 x 240 mm^2	Armoring		M12
Center feeding units with bolt terminal	BD2.-400-ME	(1-3) x 10 mm^2 [2]	1 x 240 mm^2, 3 x 185 mm^2	(1-3) x 10 mm^2 [2]	1 x 240 mm^2, 3 x 185 mm^2	M12
	BD2.-1000-ME	(1-5) x 10 mm^2 [2]	(1-5) x 300 mm^2	(1-5) x 10 mm^2 [2]	(1-5) x 300 mm^2	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 x KT3 14 ... 54 mm	2 x KT4 14 ... 68 mm	3 x KT4 14 ... 68 mm	6 x KT4 14 ... 68 mm	3 x KT4 14 ... 68 mm	4 x KT4 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 x M32, 5 x M40	10 x M40	15 x M40, 6 x M50 and 4 x M40	20 x M40	12 x M40 and 3 x M32, 6 x M50 and 4 x M40	31 x M40, 16 x M50 and 4 x M40

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

Tab. 4/13: **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 x 120	10	2 x 120	10	2 x 120	M10
	BD2-AK05/FS ...	10	2 x 120	10	2 x 120	10	2 x 120	M10
	BD2-AK05/LS ...	10	2 x 120	10	2 x 120	10	2 x 120	M10
up to 530 A	BD2-AK06/SNH3	10	2 x 240	10	2 x 240	10	2 x 240	M12
	BD2-AK06/LS ...	10	2 x 240	10	2 x 240	10	2 x 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 x KT4 [2]	2 x 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 x 1.5 up to 5 x 4	5 x 1.5 up to 5 x 16	5 x 1.5 up to 5 x 25	-	-	-
- NYCWY ... [5] in mm²	4 x 1.5 up to 4 x 2.5	4 x 1.5 up to 4 x 16	4 x 1.5 up to 4 x 70	5 x 1.5 up to 4 x 150	2 x 5 x 1.5 up to 2 x 4 x 150	2 x 5 x 10 up to 2 x 4 x 240
Max. number of cable entries for cable entry plate in case of single-core cables (plates fitted, undrilled)	-	-	-	10 x M40	10 x M32, 5 x M40	10 x 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. 4/14: **Connection specifications for tap-off units**

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_{rms}: For higher prospective short-circuit currents, the “back-up protection” for the miniature circuit-breakers must be observed 25 kA_{rms}: 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 protection and switching devices (e.g., circuit-breakers).						

Tab. 4/15: **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. 4/16: **Temperature characteristic 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. 4/17: **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. 4/18)
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/h	Weight in kg
Infeeds, 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
Infeeds, 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

Type	Fire load kWh/h	Weight in kg
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

Type	Fire load kWh/h	Weight in kg
Tap-off units		
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
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
BD2-AK04/LS.- ... -TM240	17.0	27.50
BD2-AK04/LS.- ... -ET350	20.0	29.50
BD2-AK05/LS.- ... -TM240	on request	on request
BD2-AK05/LS.- ... -ET350	23.0	46.50
BD2-AK06/LS.- ... -TM240	on request	on request
BD2-AK06/LS.- ... -ET350	26.0	59.00

Tab. 4/18: **Fire loads and weights for feeding units, ancillary equipment units, and tap-off units, as well as for additional equipment of the BD2 system**

4.3 Dimensional Drawings and Dimensions

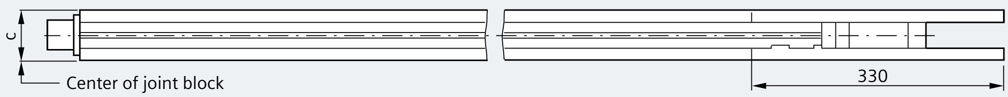
For a better overview, the figure captions of all following dimensional drawings from Fig. 4/4 to Fig. 4/21 are summarized in Tab. 4/17.

Numbering	Page	Table caption
Fig. 4/4	78	Dimensional drawings (dimensions in mm) for straight trunking units
Fig. 4/5	79	Dimensional drawings (dimensions in mm) for fixed junction units
Fig. 4/6	80	Dimensional drawings (dimensions in mm) for flexible junction units
Fig. 4/7	81	Dimensional drawings (dimensions in mm) for distribution board infeeds and end feeding units BD2.-250-E
Fig. 4/8	82	Dimensional drawings (dimensions in mm) for end feeding units 400 A up to 1,250 A and corresponding cabling boxes
Fig. 4/9	83	Dimensional drawings (dimensions in mm) for end feeding units with switch-disconnector
Fig. 4/10	84	Dimensional drawings (dimensions in mm) for center feeding units
Fig. 4/11	85	Dimensional drawings (dimensions in mm) for tap-off units size 1 and 02
Fig. 4/12	86	Dimensional drawings (dimensions in mm) for tap-off units size 2
Fig. 4/13	87	Dimensional drawings (dimensions in mm) for tap-off units size 03
Fig. 4/14	88	Dimensional drawings (dimensions in mm) for tap-off units size 3
Fig. 4/15	89	Dimensional drawings (dimensions in mm) for tap-off units size 04
Fig. 4/16	90	Dimensional drawings (dimensions in mm) for tap-off units size 05 and size 06
Fig. 4/17	91	Dimensional drawings (dimensions in mm) for ancillary equipment units and additional equipment
Fig. 4/18	92	Dimensional drawings (dimensions in mm) for fixing elements
Fig. 4/19	93	Dimensional drawings (dimensions in mm) for protective covers IP55
Fig. 4/20	94	Dimensional drawings for socket outlets of the BD2 system including accessories

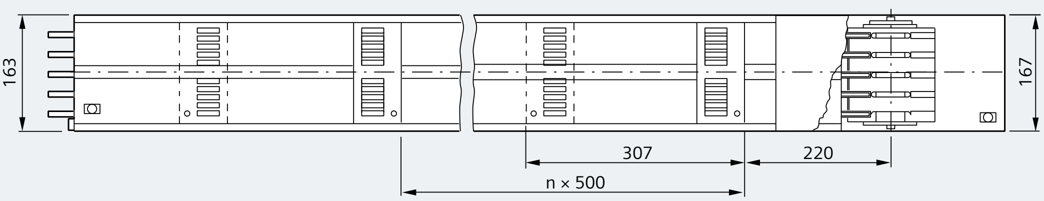
Tab. 4/19: **Overview table for the following dimensional drawings**

Straight trunking units

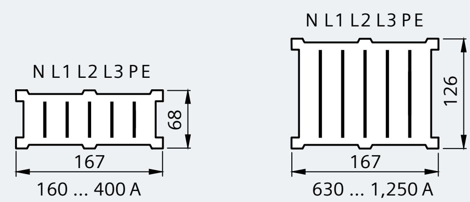
BD2.-3-...-



Standard lengths Type BD2.-.-...-SB-.



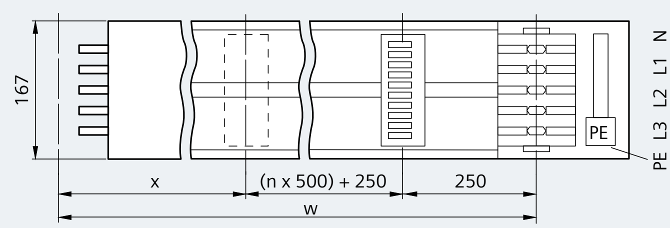
Type BD2.-3-...-	Length in m	Number of tap-off points on both sides	
SB-1	1.25	4	(n = 1)
SB-2	2.25	8	(n = 3)
SB-3	3.25	12	(n = 5)



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

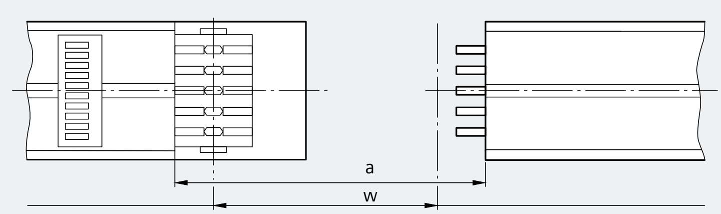
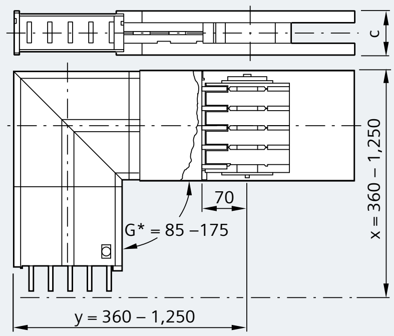


Fig. 4/4: **Dimensional drawings (dimensions in mm) for straight trunking units**

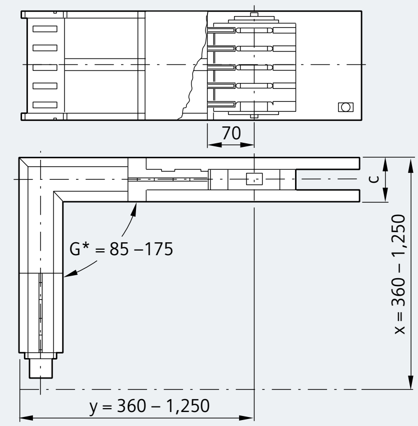
Junction units

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

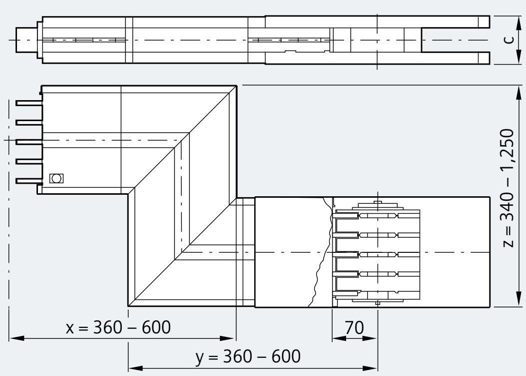


Rated current in A	c in mm
160 ... 400	68
630 ... 1,250	126

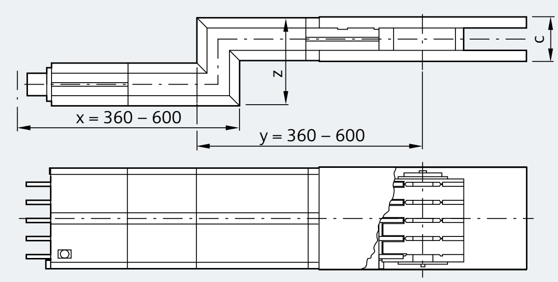
• BD2.-...-LV-...(-G*) • BD2.-...-LH-...(G*)



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

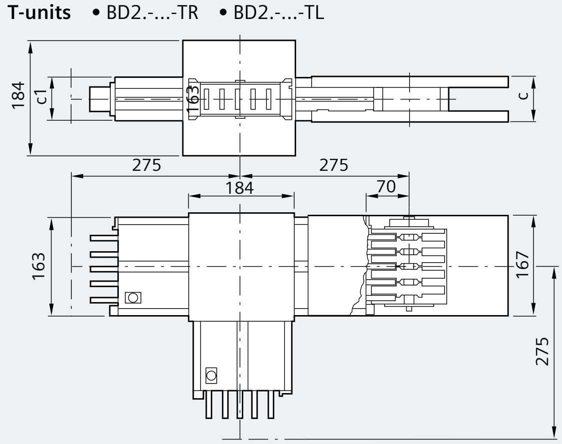


• BD2.-...-ZV-... • BD2.-...-ZH-...



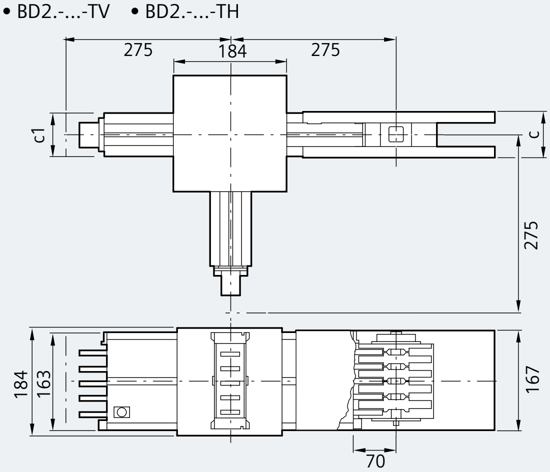
Rated current in A	z in mm
160 ... 400	140 ... 1,250
630 ... 1,250	260 ... 1,250

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

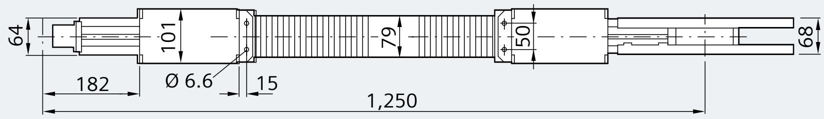
• BD2.-...-TV • BD2.-...-TH



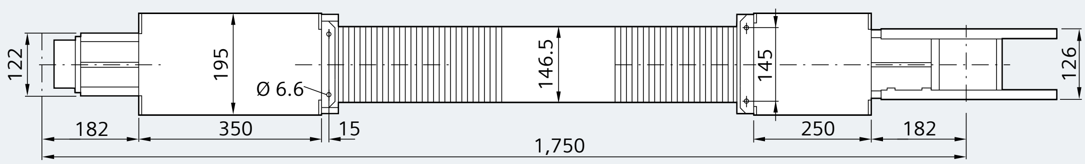
Rated current in A	c in mm	c1 in mm
160 ... 400	68	64
630 ... 1,250	126	122

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

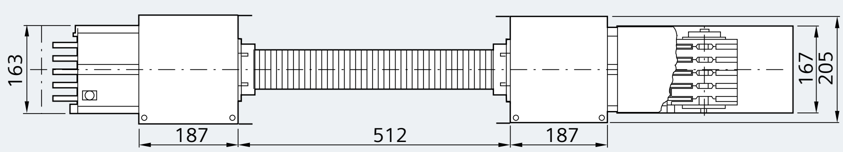
Side view:
BD2-400-R



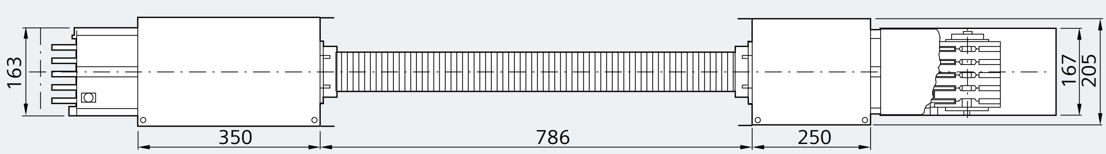
BD2-800-R



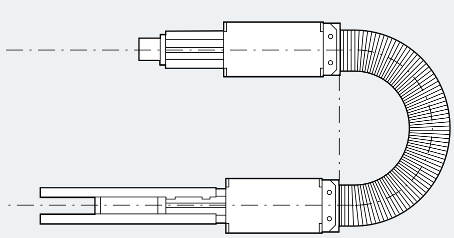
Top view:
BD2-400-R



BD2-800-R



U shape (as an example without dimensions)
Side view BD2-400-R



Z shape (as an example without dimensions)
Side view BD2-400-R

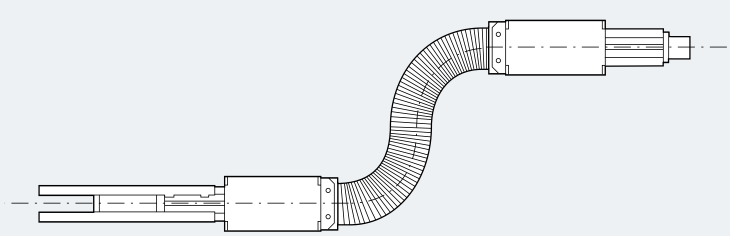
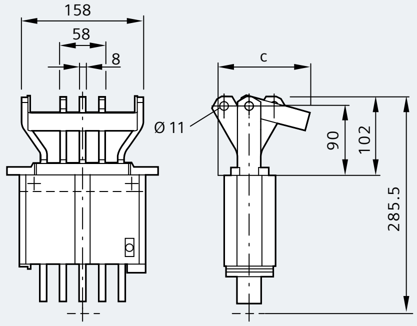
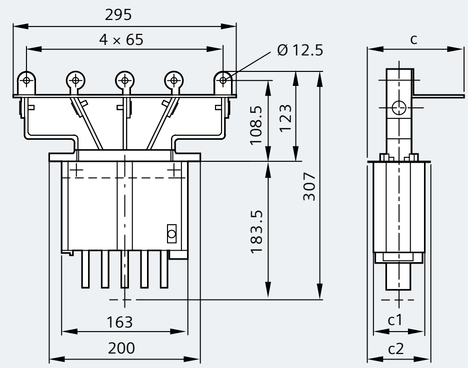


Fig. 4/6: **Dimensional drawings (dimensions in mm) for flexible junction units**

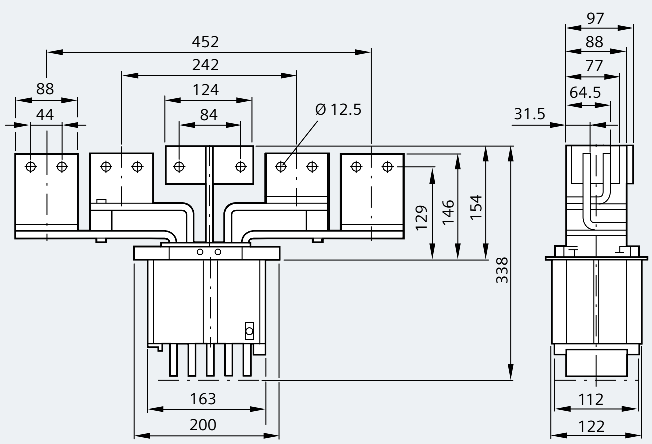
Distribution board infeeds
- BD2.-250-VE



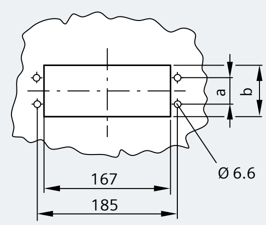
- BD2.-400-VE • BD2.-1000-VE



- 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

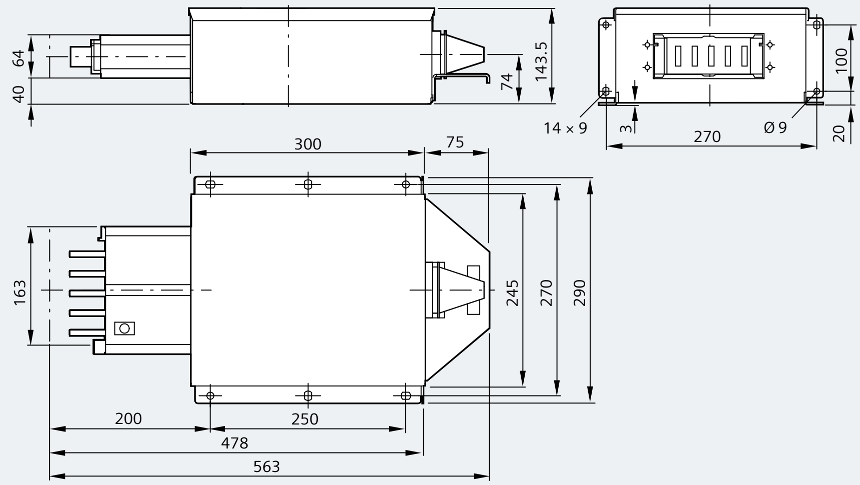


Fig. 4/7: **Dimensional drawings (dimensions in mm) for distribution board infeeds and end feeding units BD2.-250-EE**

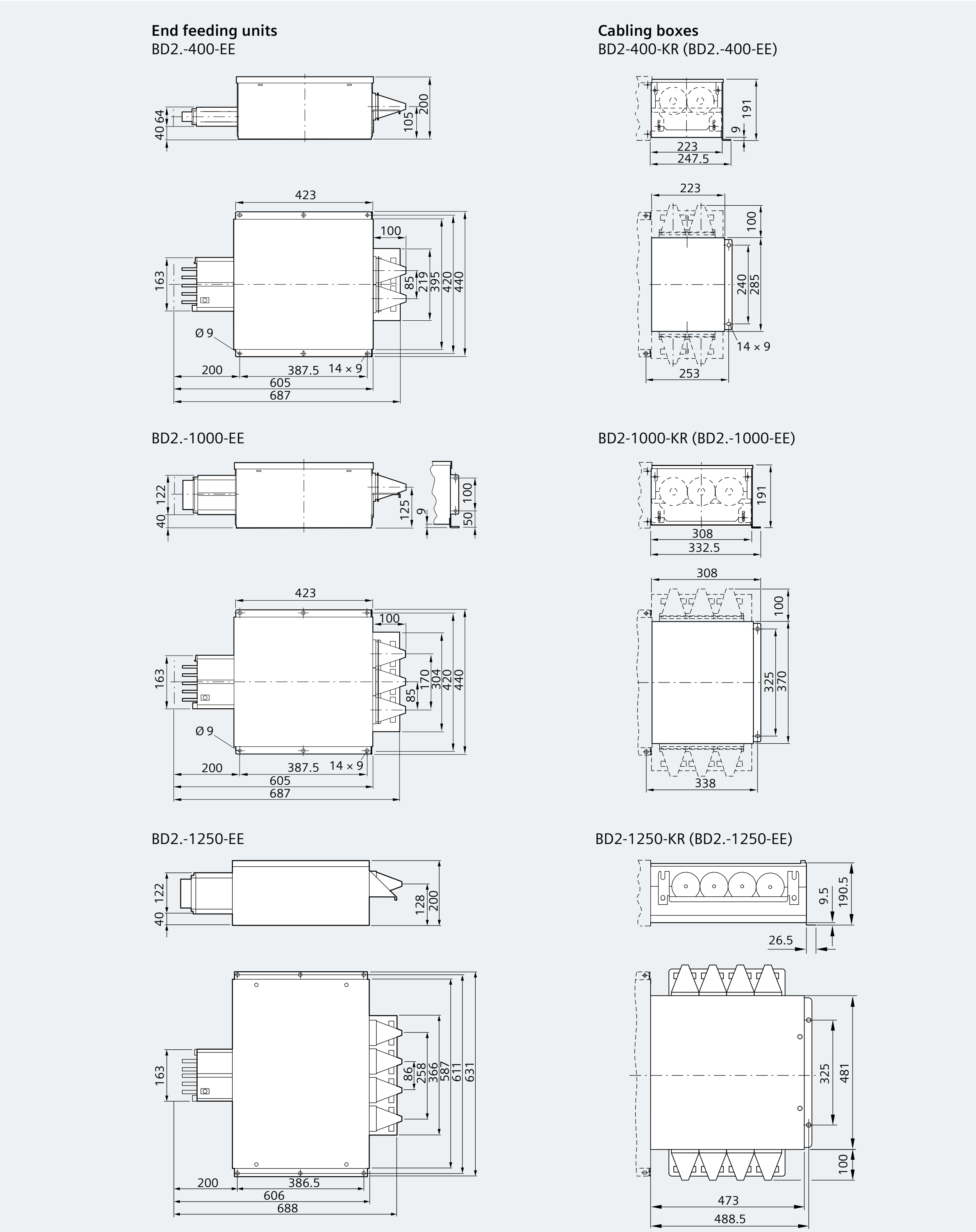
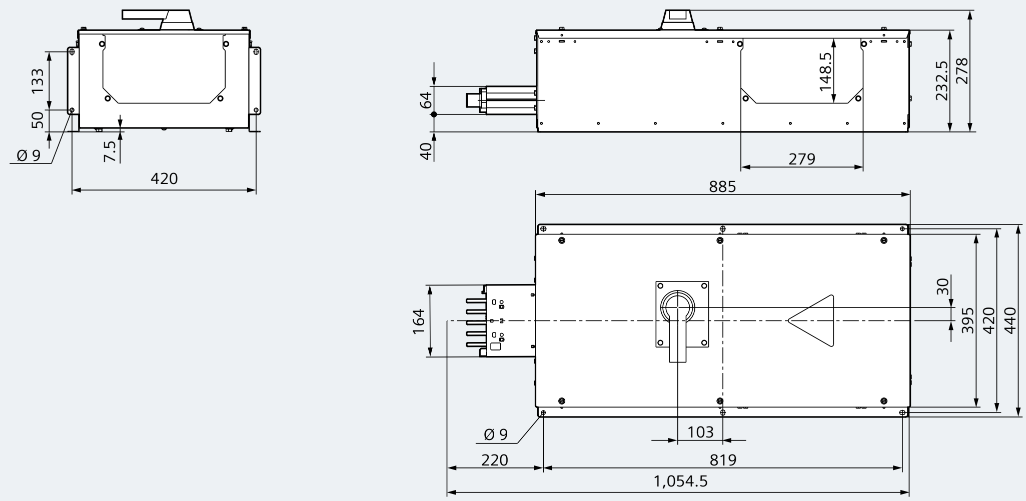
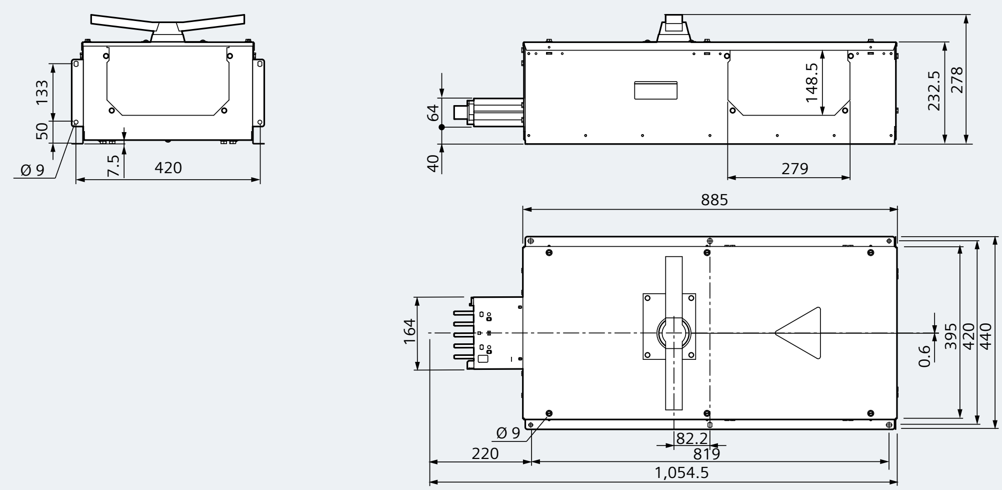


Fig. 4/8: **Dimensional drawings (dimensions in mm) for end feeding units 400 A up to 1,250 A and corresponding cabling boxes**

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



BD2C-400-EESC



BD2C-630-EESC. BD2C-800-EESC

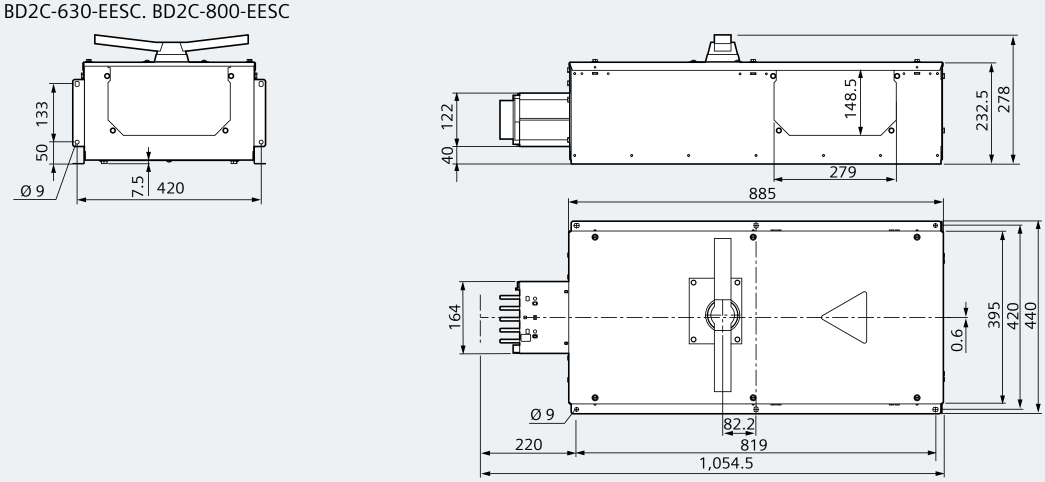
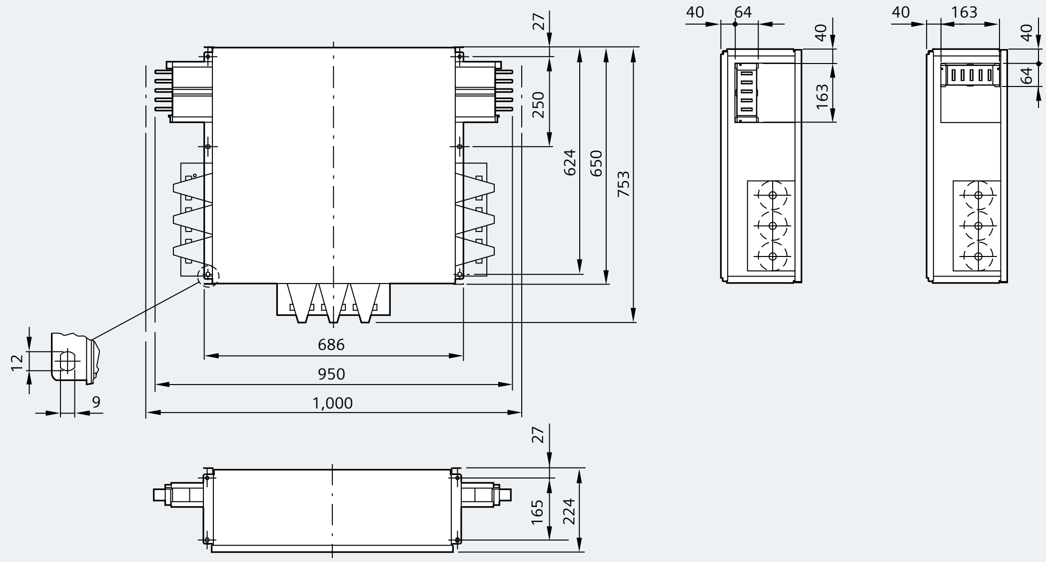


Fig. 4/9: **Dimensional drawings (dimensions in mm) for end feeding units with switch-disconnector**

Center feeding units
BD2.-400-ME



BD2.-1000-ME

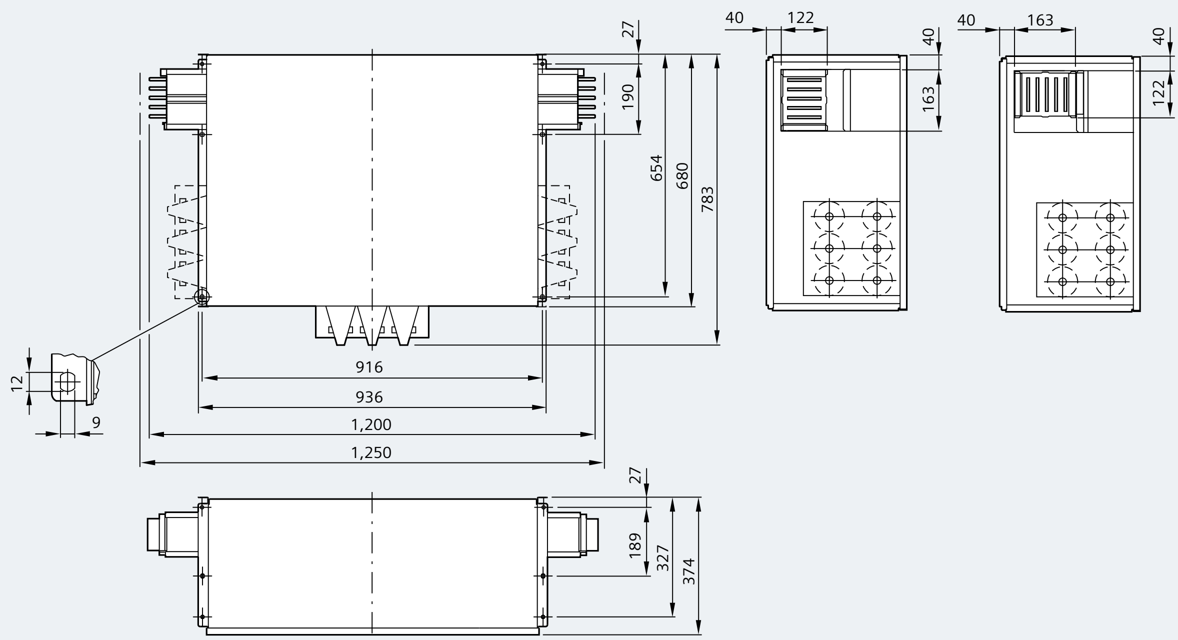
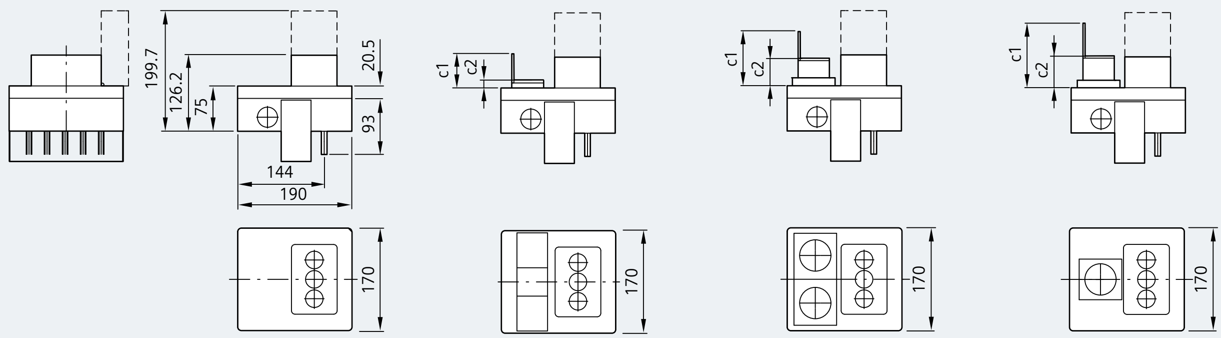


Fig. 4/10: **Dimensional drawings (dimensions in mm) for center feeding units**

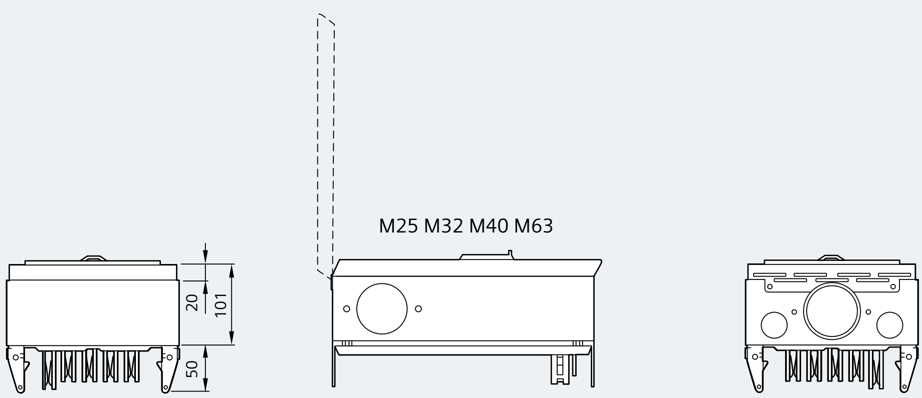
Tap-off units
Size 1 (up to 25 A)

BD2-AK1/... | BD2-AK1/2SD163..., BD2-AK1/3SD163..., | BD2-AK1/2CEE163... | BD2-AK1/CEE163..., BD2-AK1/CEE165...



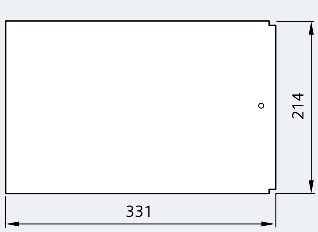
Type	c1 in mm	c2 in mm
BD2-AK1/2SD163..., 3SD163...	71	13
BD2-AK1/2CEE163..., CEE163...	88	44
BD2AK1/CEE165...	106	52

Size 02 (up to 63 A)



BD2-AK02X/F...
BD2-AK02X/GB...
BD2-AK02X/S...

BD2-AK02M2/A...
BD2-AK02M2/F...



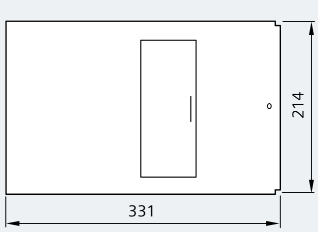
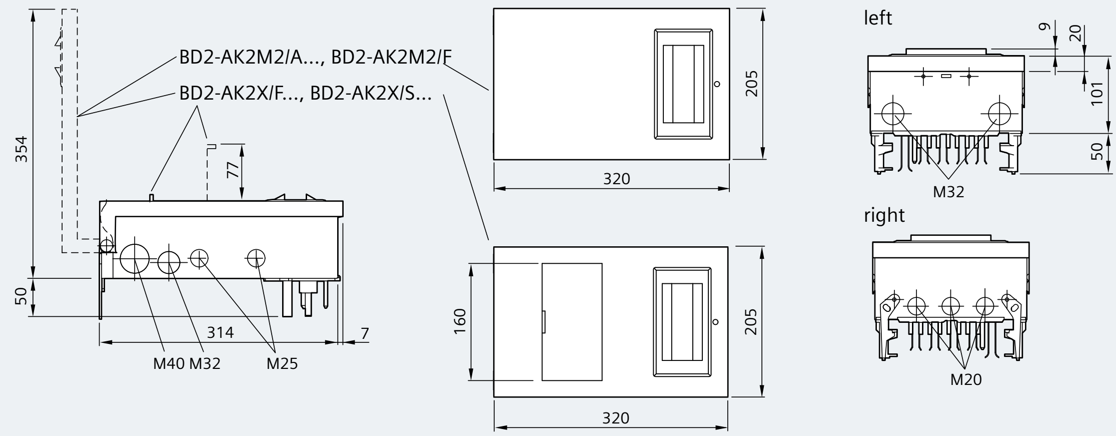


Fig. 4/11: **Dimensional drawings (dimensions in mm) for tap-off units size 1 and 02**

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



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

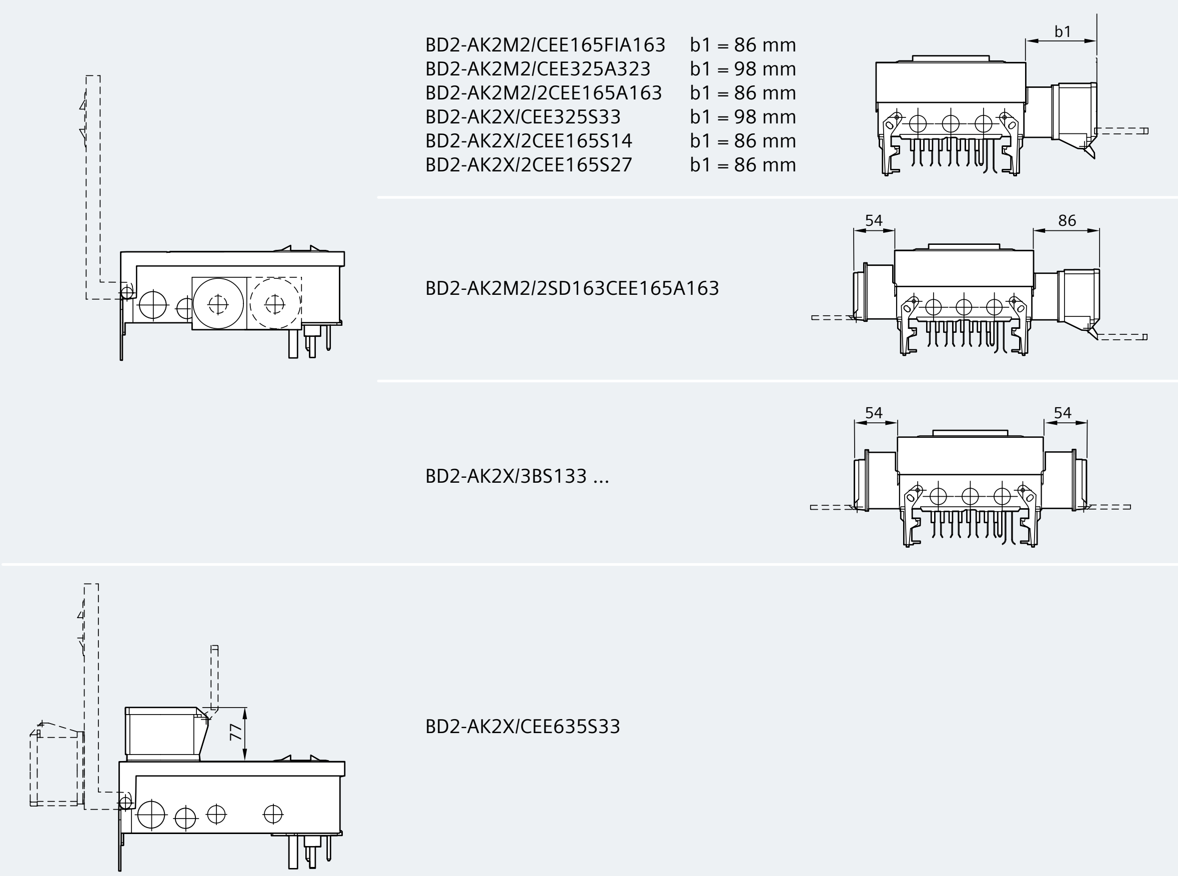


Fig. 4/12: **Dimensional drawings (dimensions in mm) for tap-off units size 2**

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Intro-
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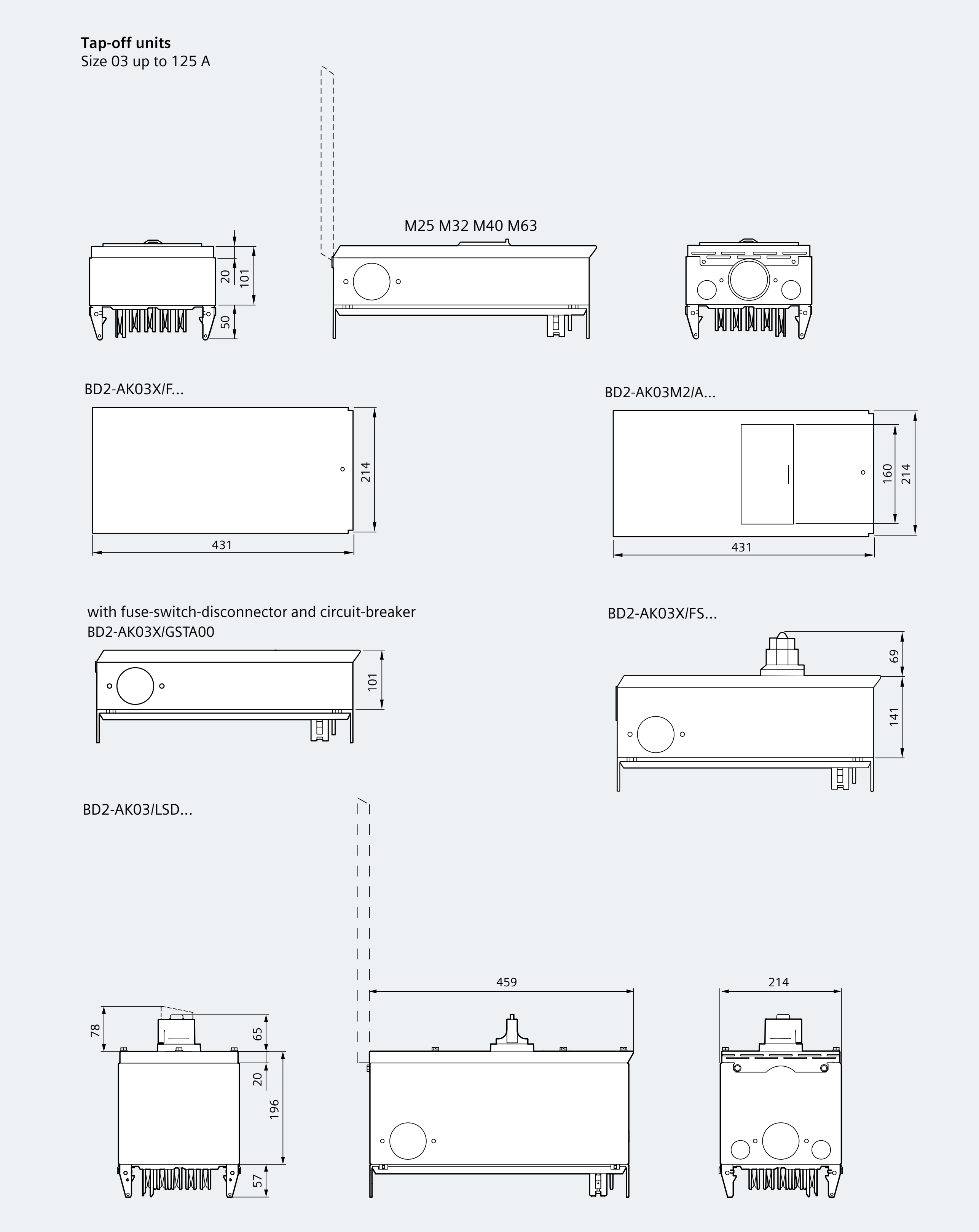


Fig. 4/13: **Dimensional drawings (dimensions in mm) for tap-off units size 03**

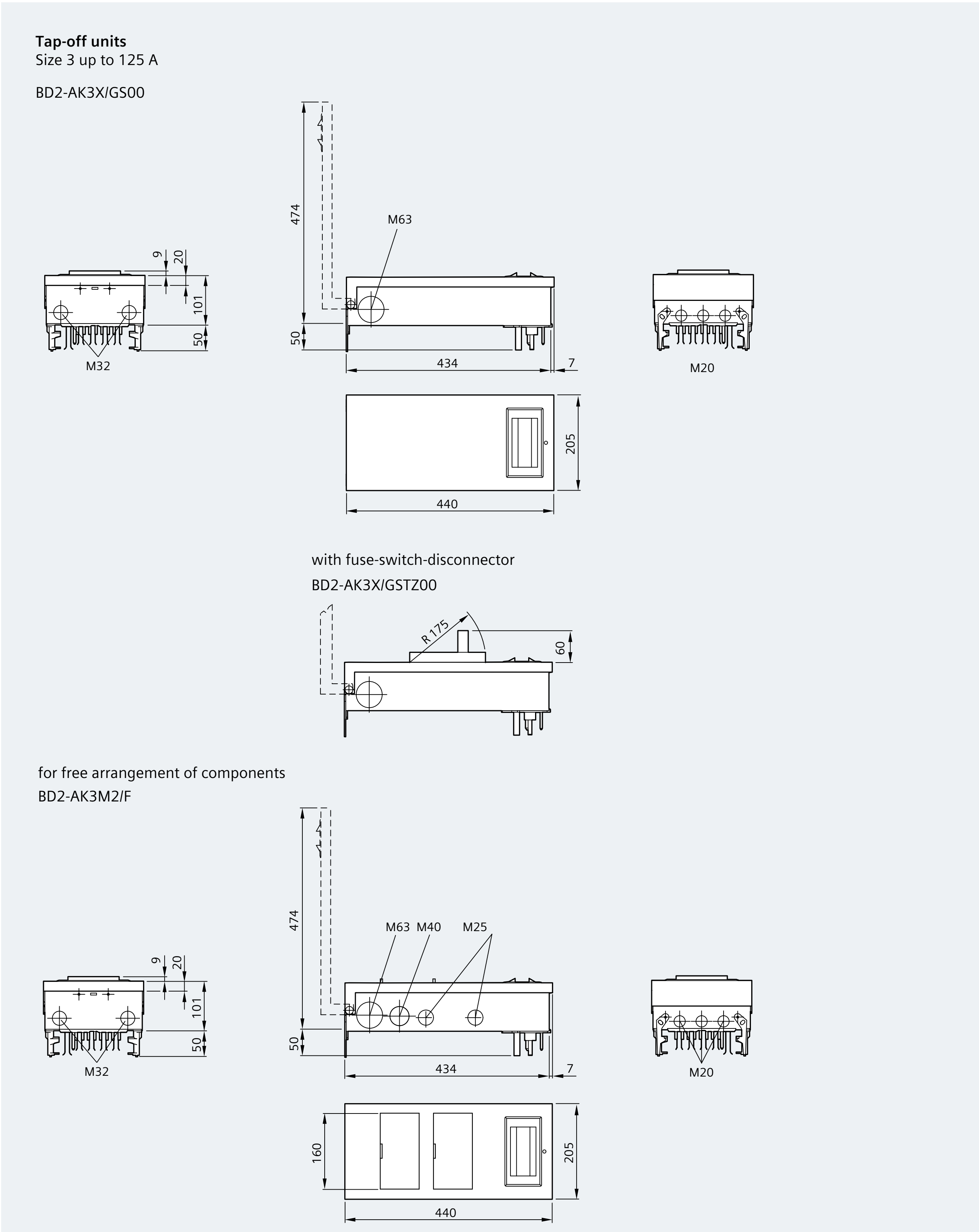


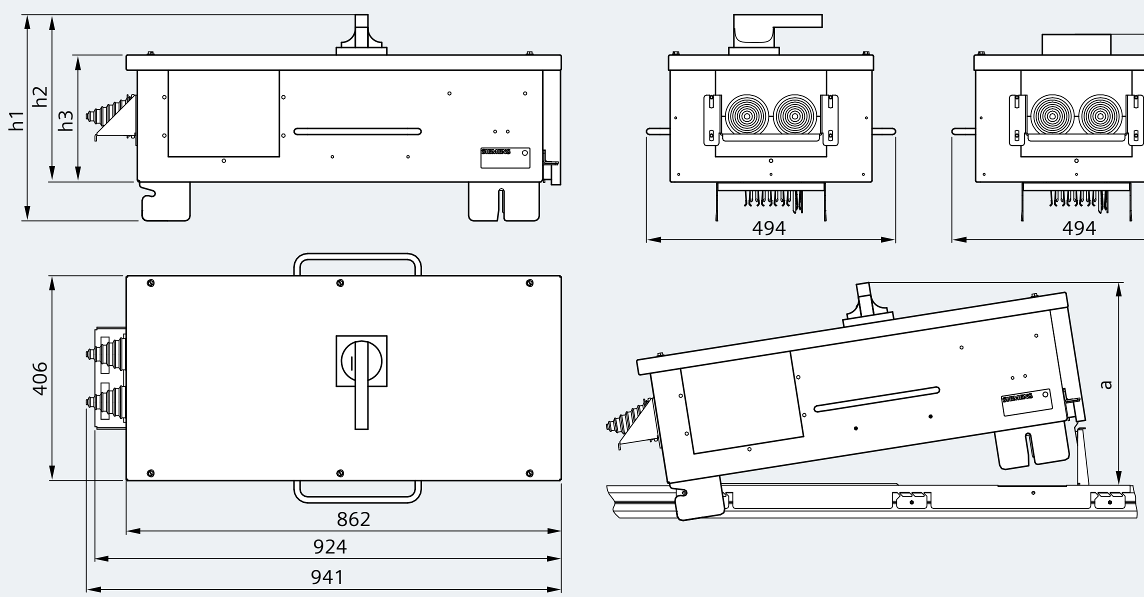
Fig. 4/14: **Dimensional drawings (dimensions in mm) for tap-off units size 3**

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 ...

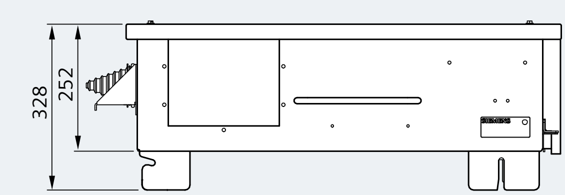
BD2-AK05/LSD... , AK06/LSD...

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...

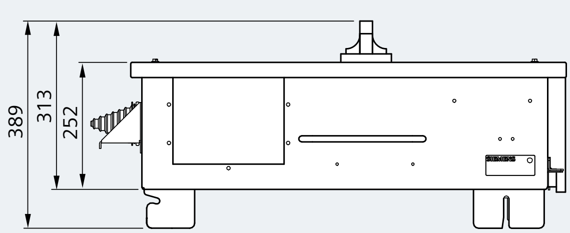
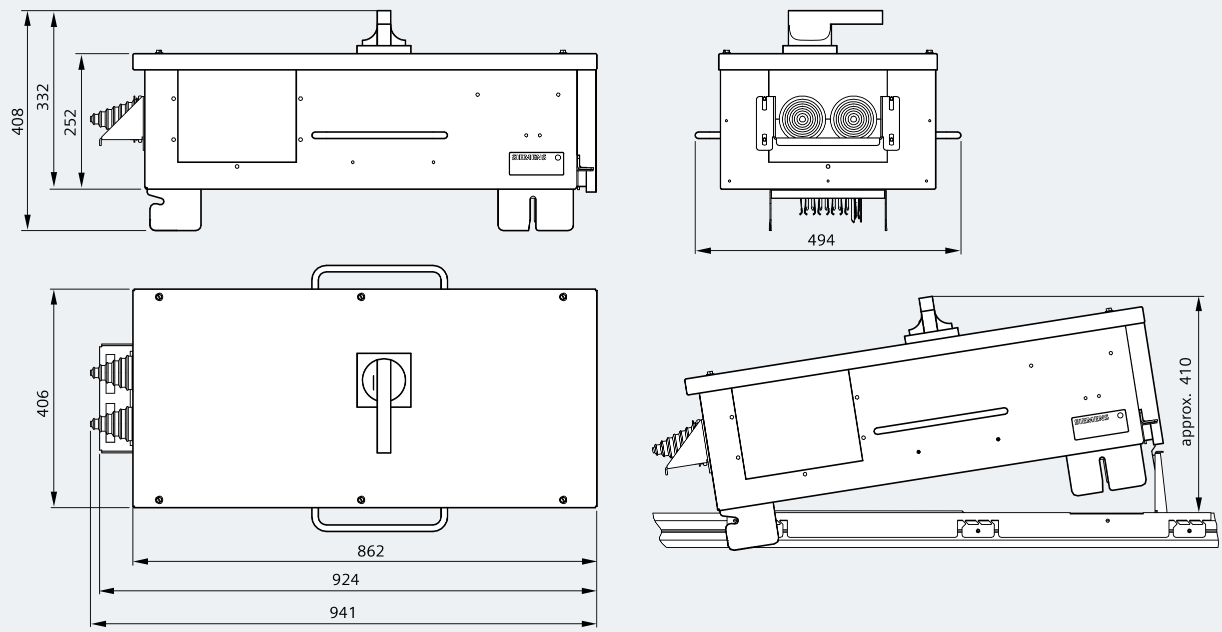


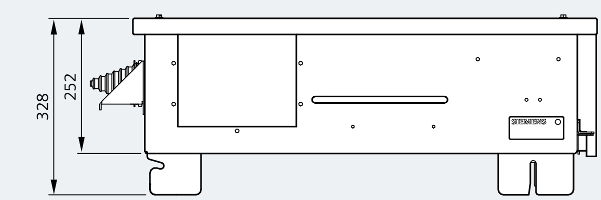
Fig. 4/15: **Dimensional drawings (dimensions in mm) for tap-off units size 04**

Tap-off units
Size 05 up to 400 A and size 06 up to 530 A

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



BD2-AK05/SNH2, BD2-AK06/SNH3



BD2-AK05/FS...

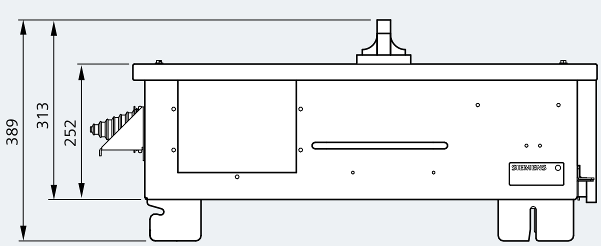
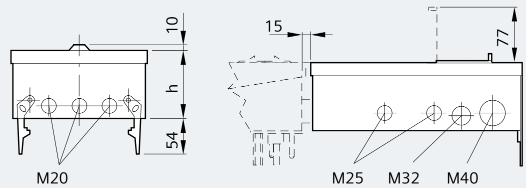


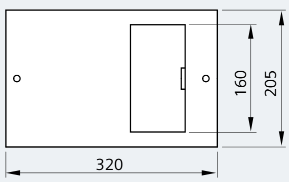
Fig. 4/16: **Dimensional drawings (dimensions in mm) for tap-off units size 05 and size 06**

Ancillary equipment units



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

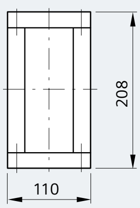
BD2-GKM2/F



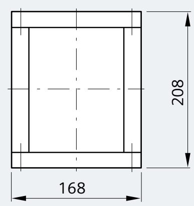
BD2-GKX/F

Protective sleeve

BD2-400-D

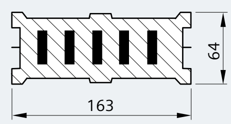


BD2-1250-D

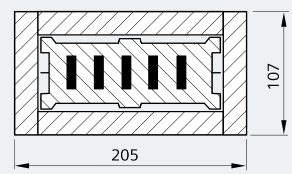


Fire barrier

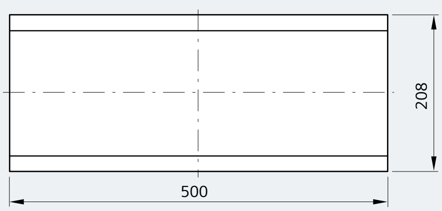
+BD2-S90 (S120)-...

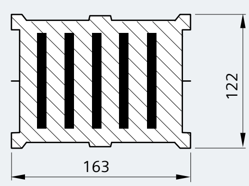


BD2.-160
(-250, -400) -...

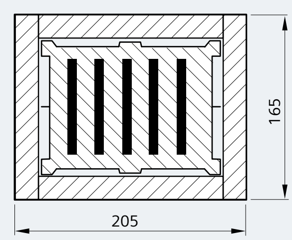


BD2-...-D



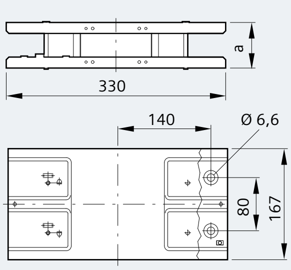


BD2.-630
(-800, -1000, -1250) -...



Joint block

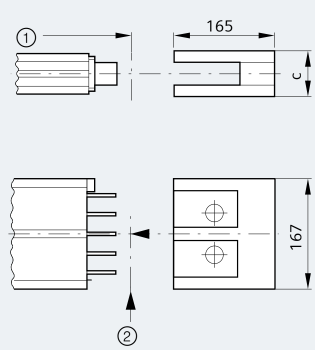
BD2-400-EK, BD2-1250-EK



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

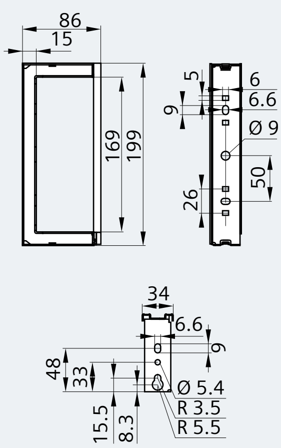
① Length of trunking unit
② End of end flange = center of joint block

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

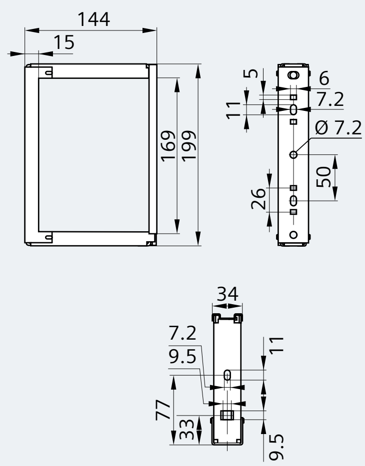
Fixing

Fixing brackets, flat and edgewise

BD2-400-BB

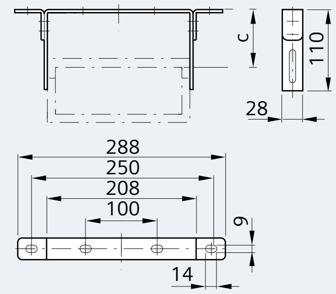


BD2-1250-BB



Spacer bracket

BD2-BD



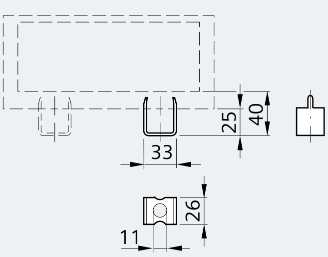
Type	c in mm
BD2-400-BD	30 ... 82
BD2-1250-BD	50 ... 82

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

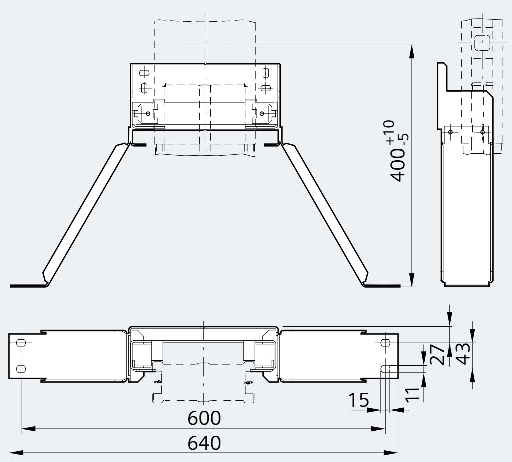
Spacer

BD2-DSB



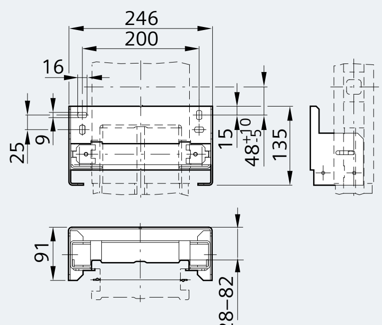
Vertical retaining element

BD2-BDV



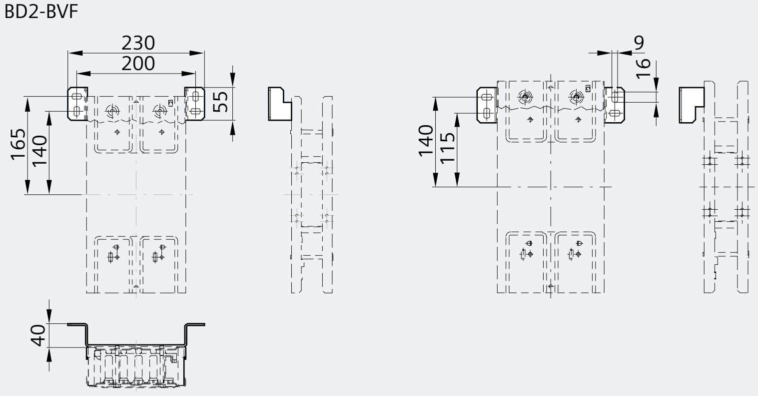
Vertical retaining element

BD2-BWV



Vertical fixing bracket

BD2-BVF



Fixing for mounting rails

BD2-BVC

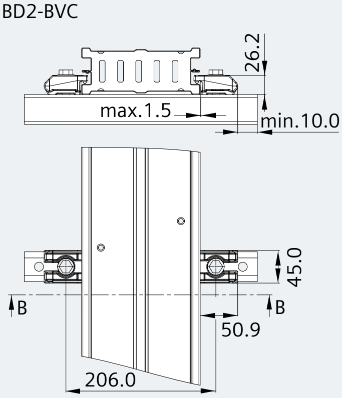
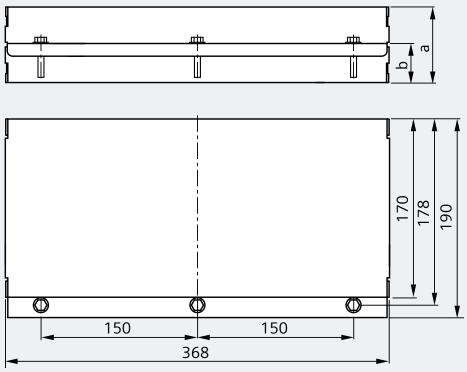
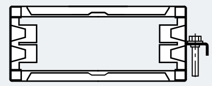


Fig. 4/18: **Dimensional drawings (dimensions in mm) for fixing elements**

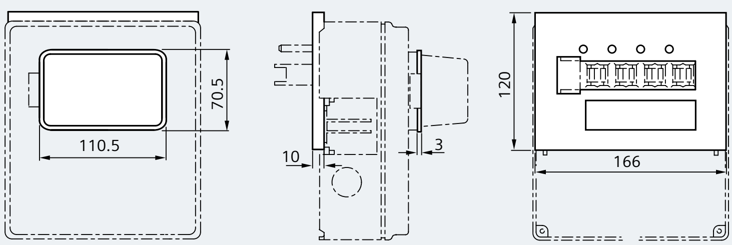
Protective covers for IP55
For connection point or end flange
BD2-400-FS, BD2-1250-FS, BD2-400-FSE, BD2-1250-FSE



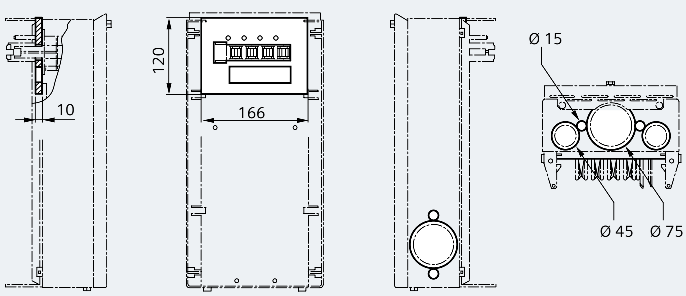


Type	a in mm	b in mm
BD2-400-FS	72	37
BD2-1250-FS	130	66
BD2-400-FSE	72	37
BD2-1250-FSE	130	66

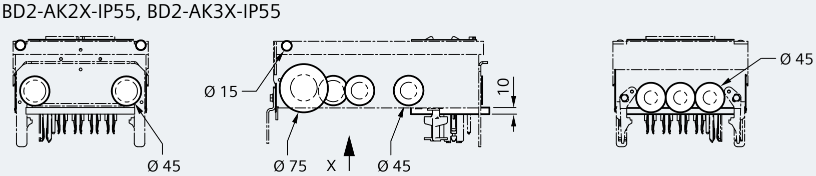
For tap-off units
BD2-AK1-IP55



BD2-AK02-IP55, BD2-AK03-IP55



BD2-AK2X-IP55, BD2-AK3X-IP55



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

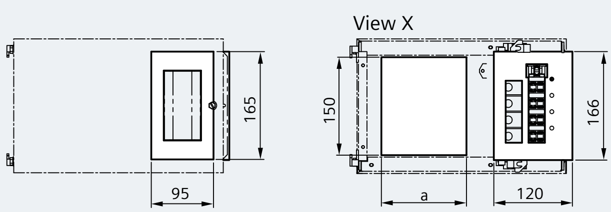
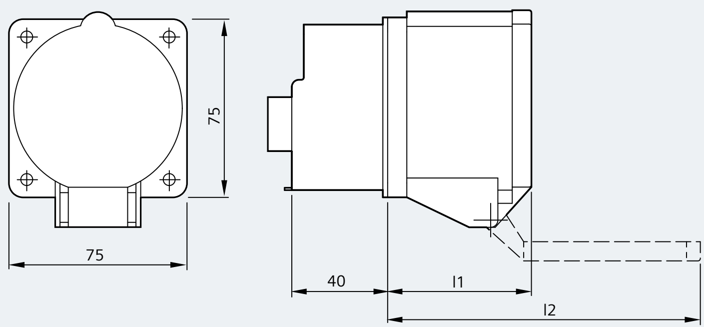


Fig. 4/19: **Dimensional drawings (dimensions in mm) for protective covers IP55**

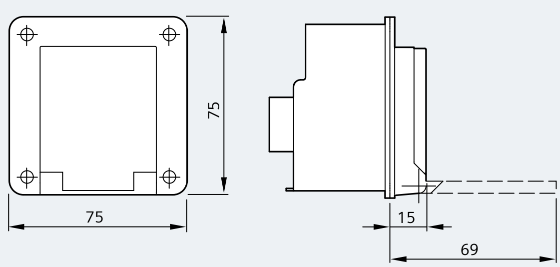
Socket outlets incl. accessories
Socket outlet with adapter enclosure

BD2-CEE



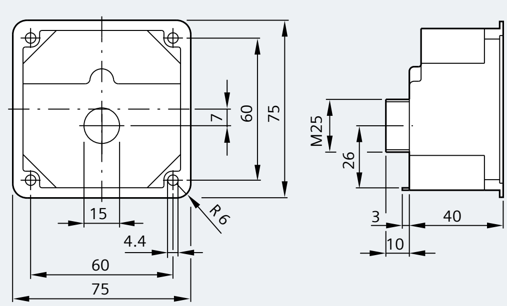
	l1	l2
BD2-CEE163	53	110
BD2-CEE165	54	110
BD2-CEE325	60	130

BD2-SD163



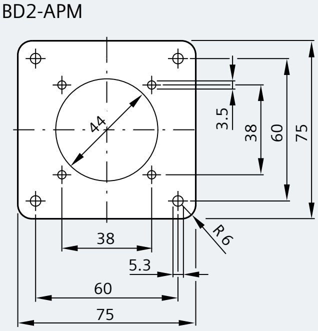
Adapter enclosure

BD2-AG



Adapter plate

BD2-APM



BD2-APO

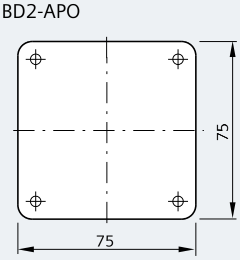


Fig. 4/20: **Dimensional drawings (dimensions in mm) for socket outlets of the BD2 system including accessories**

4.4 DC Applications

Trunking units without tap-off points and junction units of the two sizes 1 and 2 can also be used for DC applications. The arrangement of conductors is illustrated in Fig. 4/21. Corresponding rated currents as well as DC warm resistances are given in Tab. 4/9 and Tab. 4/10.

Modifications are only provided for feeding units due to phase marking, as well as for tap-off points and tap-off units which must be especially coded (on request). It is to be observed that an arc caused by a short circuit can basically not extinguish by itself (it extinguishes when the arcing distance increases due to material burning), because DC currents do not have a zero crossing. Depending on the cable length, it has to be verified if the upstream switching and protection device still trips.

To differentiate between DC busbar trunking systems and AC busbar trunking systems, we recommend to equip the DC busbars with the DC label (Fig. 4/21):

Type code: BD2-LABEL-DC

These labels are self-adhesive and do not detach from the parts of the busbar trunking systems even after a long time as well as with varying current/heat loads.

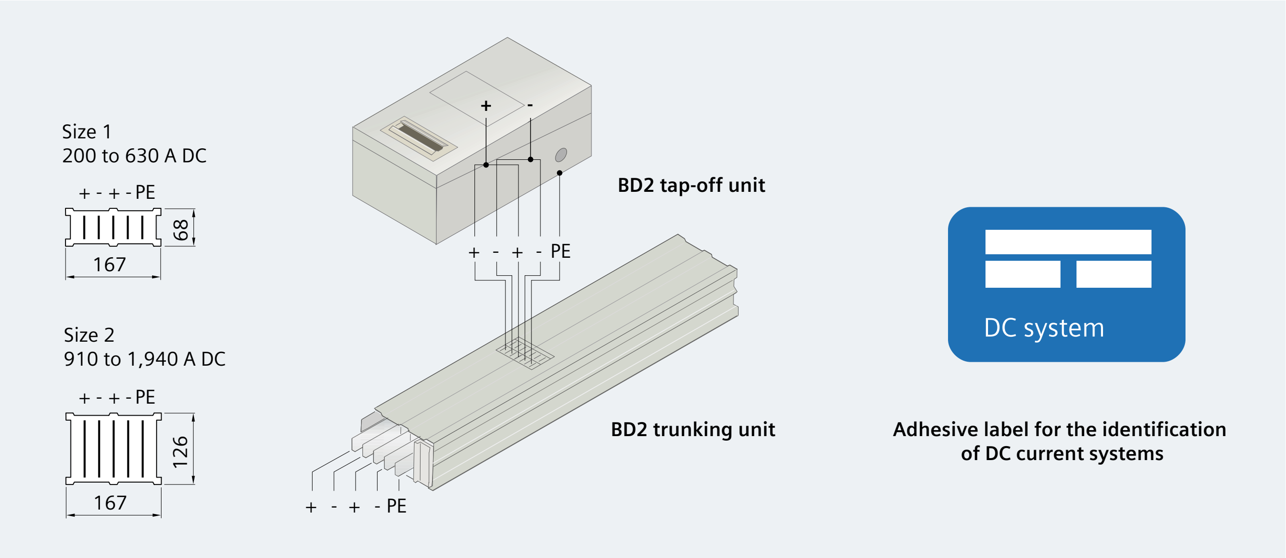


Fig. 4/21: **Arrangement of conductors for DC applications of the busbar trunking system BD2, and adhesive label for identification of DC systems (dimensions in mm)**

Con-
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Intro-
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4.5 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. 4/20.

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 strengths of the busbar trunking systems, the network configuration, type and number of loads, as well as country-specific requirements and type series. Tab. 4/20 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.

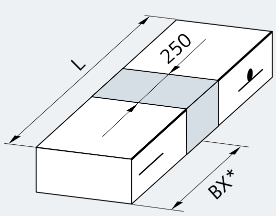
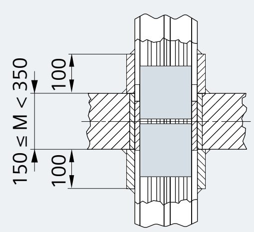
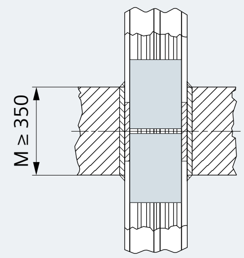
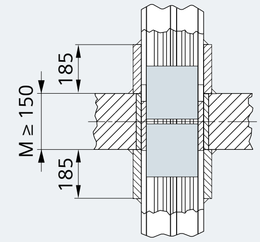
Type	Rated current I_e	Circuit-breaker with standard switching capacity S	I_{cu} 1)	Circuit-breaker with medium switching capacity M	I_{cu} 1)	Circuit-breaker with high switching capacity H	I_{cu} 1)	Circuit-breaker with very high switching capacity C	I_{cu} 1)
BD2.-160	160 A	3VA1116-4EF32 ...	36 kA 2)	3VA1116-5EF32 ...	55 kA 2)	3VA1116-4EF32 ...	70 kA 2)		
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 ...	110 kA 3)
BD2.-1000	1,000 A			3VA2510-5HL32 ...	55 kA	3VA2510-6HL32 ...	85 kA	3VA2510-7HL32 ...	110 kA
BD2C-1250	1,250 A			on request		on request		on request	

1) I_{cu} = rated ultimate short-circuit breaking capacity of the circuit-breaker
2) Rated conditional short-circuit current I_{cc} = 34 kA
3) Rated conditional short-circuit current I_{cc} = 100 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. 4/20: **Examples for molded-case circuit-breakers regarding short-circuit and overload protection (400 V and 50 Hz)**

4.6 Design of the Fire Barrier

An optional fire barrier equipment is available for standard lengths, optional lengths, and junction units. The system components are then provided with an internal and, if necessary, an external fire barrier at the factory. To ensure the fire resistance class S 90 or S 120, the fire barrier must already be considered during configuration and installation of the trunking units (Tab. 4/21) and junction units (Fig. 4/22).

BD2A-...-S(W).-. + BD2-S90-BX*-M* BD2A-...-S(W).-. + BD2-S120-BX*-M* BD2C-...-S(W).-. + BD2-S120-BX*-M*	**BD2A-...-S(W).-. + BD2-S90-BX*-M* BD2A-...-S(W).-. + BD2-S120-BX*-M***		**BD2C-...-S(W).-. + BD2-S120-BX*-M***
Fire barrier position, trunking unit	**Wall thickness 150 mm ≤ A < 350 mm**	**Wall thickness M ≥ 350 mm**	**Wall thickness M ≥ 150 mm**
			
Fire resistance class	S 90 / S 120	S 90 / S 120	S 120
Length L	720 mm ... 3,250 mm (L min. = 570 mm + M)	720 mm ... 3,250 mm (L min. = 370 mm + M)	900 mm ... 3,250 mm (L min. = 740 mm + M)
Width BX*min.	360 mm (BX*min. = 285 mm + M/2)	360 mm (BX*min. = 185 mm + M/2)	450 mm (BX*min. = 370 mm + M/2)
Width BX*max.	2,890 mm (BX*max. = L - BX*min.)	2,890 mm (BX*max. = L - BX*min.)	2,800 mm (BX*max. = L - BX*min.)

Tab. 4/21: **Positioning and dimensions (dimensions in mm) of the fire barrier for straight trunking units (standard length BD2.-...-S... or optional length BD2.-...-W...)**

Elbow:
BD2A-...-LL(LR)-X*(Y*) + BD2-S90(S120)-BX*(BY*)-M*
BD2C-...-LL(LR)-X*(Y*) + BD2-S120-B.*-M*

Knee:
BD2A-...-LV(LH)-X*(Y*) + BD2-S90(S120)-BX*(BY*)-M*
BD2C-...-LV(LH)-X*(Y*) + BD2-S120-BX*(BY*)-M*

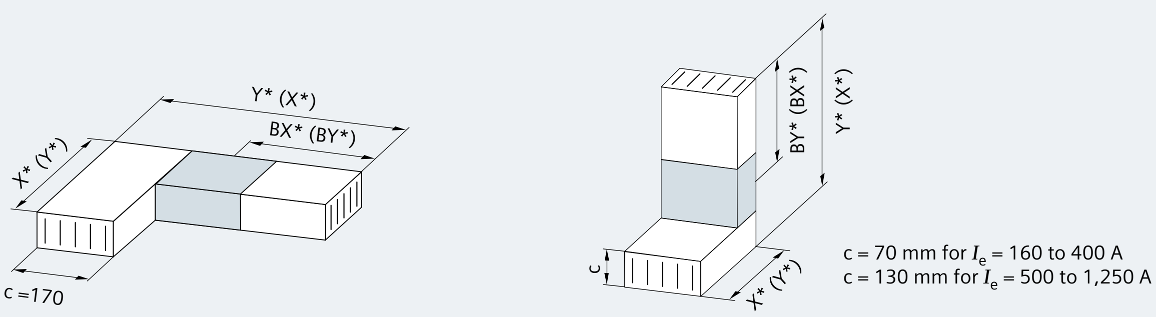
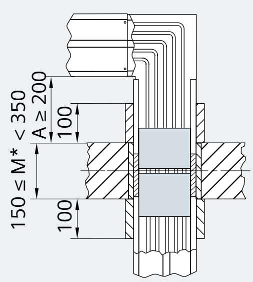
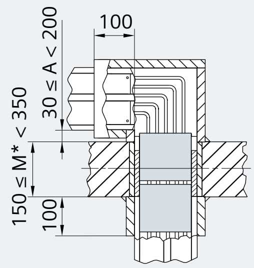
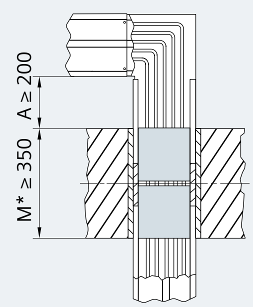
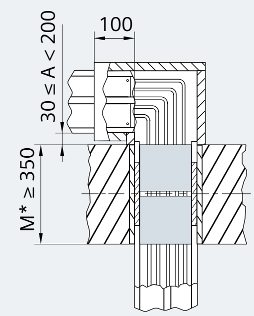
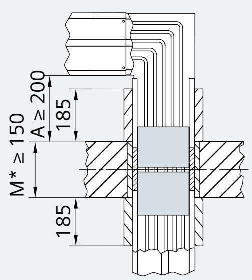
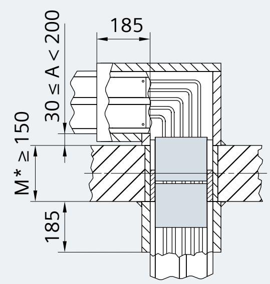


Fig. 4/22: **Arrangement of conductors for DC applications of the busbar trunking system BD2, and adhesive labels for identification of DC systems (dimensions in mm)**

BD2A-...-L ... + BD2-S90-BX*(BY*)-M* BD2A-...-L ... + BD2-S120-BX*(BY*)-M*			
Wall thickness 150 mm ≤ M* < 350 mm		**Wall thickness M* ≥ 350 mm**	
Distance from wall / inside corner: A ≥ 200 mm	**Distance from wall / inside corner: 30 mm ≤ A < 200 mm**	**Distance from wall / inside corner: A ≥ 200 mm**	**Distance from wall / inside corner: 30 mm ≤ A < 200 mm**
			
Junction units LL, LR			
X* (Y*) = 810 ... 1,250 mm	X* (Y*) = 640 ... 1,250 mm	X* (Y*) = 910 ... 1,250 mm	X* (Y*) = 740 ... 1,250 mm
(X*/Y* min. = M* + A + 455 mm)	(X*/Y* min. = M* + A + 455 mm) [1]	(X*/Y* min. = M* + A + 355 mm)	(X*/Y* min. = M* + A + 355 mm) [1]
BX* (BY*) min. = 360 mm	BX* (BY*) min. = 360 mm	BX* (BY*) min. = 360 mm	BX* (BY*) min. = 360 mm
(BX*/BY* min. = M*/2 + 285 mm)	(BX*/BY* min. = M*/2 + 285 mm)	(BX*/BY* min. = M*/2 + 185 mm)	(BX*/BY* min. = M*/2 + 185 mm)
BX* (BY*) max. = 360 ... 800 mm	BX* (BY*) max. = 360 ... 970 mm	BX* (BY*) max. = 360 ... 700 mm	BX* (BY*) max. = 360 ... 870 mm
(BX*/BY*max.=X*/Y*- A-M*/2-170 mm)	(BX*/BY*max.=X*/Y*- A-M*/2-170 mm)	(BX*/BY*max.=X*/Y*- A-M*/2-170 mm)	(BX*/BY*max.=X*/Y*- A-M*/2-170 mm)
Junction units LV, LH up to 400 A			
X* (Y*) = 710 ... 1,250 mm	X* (Y*) = 540 ... 1,250 mm	X* (Y*) = 810 ... 1,250 mm	X* (Y*) = 640 ... 1,250 mm
(X*/Y* min. = M* + A + 355 mm)	(X*/Y* min. = M* + A + 355 mm)	(X*/Y* min. = M* + A + 255 mm)	(X*/Y* min. = M* + A + 355 mm)
BX* (BY*) min. = 360 mm	BX* (BY*) min. = 360 mm	BX* (BY*) min. = 360 mm	BX* (BY*) min. = 360 mm
(BX*/BY* min. = M*/2 + 285 mm)	(BX*/BY* min. = M*/2 + 285 mm)	(BX*/BY* min. = M*/2 + 185 mm)	(BX*/BY* min. = M*/2 + 185 mm)
BX* (BY*) max. = 360 ... 900 mm	BX* (BY*) max. = 360 ... 1,070 mm	BX* (BY*) max. = 360 ... 800 mm	BX* (BY*) max. = 360 ... 970 mm
(BX*/BY*max.=X*/Y*- A-M*/2-70 mm)	(BX*/BY*max.=X*/Y*- A-M*/2-70 mm)	(BX*/BY*max.=X*/Y*- A-M*/2-70 mm)	(BX*/BY*max.=X*/Y*- A-M*/2-70 mm)
Junction units LV, LH up to 1,000 A			
X* (Y*) = 770 ... 1,250 mm	X* (Y*) = 600 ... 1,250 mm	X* (Y*) = 870 ... 1,250 mm	X* (Y*) = 700 ... 1,250 mm
(X*/Y* min. = M* + A + 415 mm)	(X*/Y* min. = M* + A + 415 mm)	(X*/Y* min. = M* + A + 315 mm)	(X*/Y* min. = M* + A + 315 mm)
BX* (BY*) min. = 360 mm	BX* (BY*) min. = 360 mm	BX* (BY*) min. = 360 mm	BX* (BY*) min. = 360 mm
(BX*/BY* min. = M*/2 + 285 mm)	(BX*/BY* min. = M*/2 + 285 mm)	(BX*/BY* min. = M*/2 + 185 mm)	(BX*/BY* min. = M*/2 + 185 mm)
BX* (BY*) max. = 360 ... 840 mm	BX* (BY*) max. = 360 ... 1,010 mm	BX* (BY*) max. = 360 ... 740 mm	BX* (BY*) max. = 360 ... 910 mm
(BX*/BY*max.=X*/Y*- A-M*/2-130 mm)	(BX*/BY*max.=X*/Y*- A-M*/2-130 mm)	(BX*/BY*max.=X*/Y*- A-M*/2-130 mm)	(BX*/BY*max.=X*/Y*- A-M*/2-130 mm)
[1] The dimension X* min. or Y* min. on the side with corner covering is 460 mm			

Tab. 4/22: **Dimensions and positioning (dimensions in mm) of the fire barrier for fire resistance class S 90 / S 120 for junction units LL, LR, LV, and LH with Al busbars (BD2A- ...)**
Note: For the additional specifications M, X, Y, BX, BY, the values for the asterisks (*) are to be entered in meters

BD2C-...-L ... + BD2-S120-BX*(BY*)-M*	
Wall thickness M* ≥ 150 mm	
Distance from wall / inside corner: A ≥ 200 mm	Distance from wall / inside corner: 30 mm ≤ A < 200 mm
	
Junction units LL, LR	
X* (Y*) = 890 ... 1,250 mm	X* (Y*) = 720 ... 1,250 mm
(X*/Y* min. = M* + A + 540 mm)	(X*/Y* min. = M* + A + 540 mm) [1)]
BX* (BY*) min. = 450 mm	BX* (BY*) min. = 450 mm
(BX*/BY* min. = M*/2 + 370 mm)	(BX*/BY* min. = M*/2 + 370 mm)
BX* (BY*) max. = 450 ... 800 mm	BX* (BY*) max. = 450 ... 970 mm
(BX*/BY*max.=X*/Y*-A-M*/2-170 mm)	(BX*/BY*max.=X*/Y*-A-M*/2-170 mm)
Junction units LV, LH up to 400 A	
X* (Y*) = 790 ... 1,250 mm	X* (Y*) = 620 ... 1,250 mm
(X*/Y* min. = M* + A + 440 mm)	(X*/Y* min. = M* + A + 440 mm)
BX* (BY*) min. = 450 mm	BX* (BY*) min. = 450 mm
(BX*/BY* min. = M*/2 + 370 mm)	(BX*/BY* min. = M*/2 + 370 mm)
BX* (BY*) max. = 450 ... 900 mm	BX* (BY*) max. = 450...1.070 mm
(BX*/BY*max.=X*/Y*- A-M*/2-70 mm)	(BX*/BY*max.=X*/Y*- A-M*/2-70 mm)
Junction units LV, LH up to 1,000 A	
X* (Y*) = 850 ... 1,250 mm	X* (Y*) = 600 ... 1,250 mm
(X*/Y* min. = M* + A + 500 mm)	(X*/Y* min. = M* + A + 415 mm)
BX* (BY*) min. = 450 mm	BX* (BY*) min. = 360 mm
(BX*/BY* min. = M*/2 + 370 mm)	(BX*/BY* min. = M*/2 + 285 mm)
BX* (BY*) max. = 450 ... 840 mm	BX* (BY*) max. = 360...1.010 mm
(BX*/BY*max.=X*/Y*-A-M*/2-130 mm)	(BX*/BY*max.=X*/Y*-A-M*/2-130 mm)
[1)] The dimension X* min. or Y* min. on the side with corner covering is 460 mm	

Tab. 4/23: **Dimensions and positioning (dimensions in mm) of the fire barrier for fire resistance class S 90 / S 120 for junction units LL, LR, LV, and LH with Cu busbars (BD2C- ...)**
Note: For the additional specifications M, X, Y, BX, BY, the values for the asterisks (*) are to be entered in meters

In this context, the following has to be observed:

- The center of the fire barrier in the trunking unit must be positioned in the center of the fire wall or ceiling
- Exception: With junction units, this may not be possible due to insufficient distance from the wall or ceiling, i.e., the center of the fire barrier may not coincide with the center of the fire wall or ceiling. In such cases, PROMATECT®-H(L) plates are added to achieve the actually required fire wall or ceiling thickness
- The following information must be provided: The position BX*, BY* or BZ* of the center of the fire barrier in the trunking unit (or the center of the fire wall or ceiling for junction units with insufficient distance from the wall or ceiling), the desired fire resistance class S 90 or S 120, and the thickness M* of the wall or 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
- The distance from the wall or ceiling opening to be closed to other openings or fittings must be at least 20 cm. As an exception to this, the distance between adjacent wall or ceiling openings for barriers can be reduced down to 10 cm (Fig. 4/23)
- Horizontally mounted busbar runs must be supported by a fixing bracket fitted approx. 50 mm before and after the building element they pass through
- When installing in a ceiling, the lower fire barrier shroud must be secured
- For the installation of a fire barrier through a ceiling, the following has to be observed regarding the positioning of busbar trunking systems with tap-off units, feeding units, and special fixing elements (Fig. 4/23):
  - 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.

- When changing the direction through a ceiling, the fire barrier shroud must be secured to the bottom of the ceiling by an additional suspension arrangement
- The trunking units must be installed by an approved fire barrier installation specialist
- The minimum dimensions applicable for positioning fire barriers on the limbs of junction units differ, depending on the busbar run and the distance from the fire wall to the inside edge of the trunking unit
- In Germany, the BD2-S90-ZUL-D or BD2-S120-ZUL-D fire barrier kit is required. For this, general approval from the German Institute for Building Engineering (Deutsches Institut für Bautechnik in Berlin DIBt) is available:
  BD2-S90: No. Z-19.15-1048,
  BD2-S120: No. Z-19.15-1046
- Mineral mortar or fire barrier sealant to seal any gaps between the system component and the building element must be provided by the customer. The mortar or fire barrier sealant must conform to the applicable regulations for establishing the fire resistance class of the wall or ceiling
- The gaps between “PROMATECT®-H(L) plates” and the system component as well as the building element must be sealed with fire barrier sealant (included in scope of supply if plates are required).

Note: The asterisk at the required specifications for the order numbers X, Y*, BX*, and/or BY* identifies the dimensions in mm for the parameters X, Y, BX, and BY.*

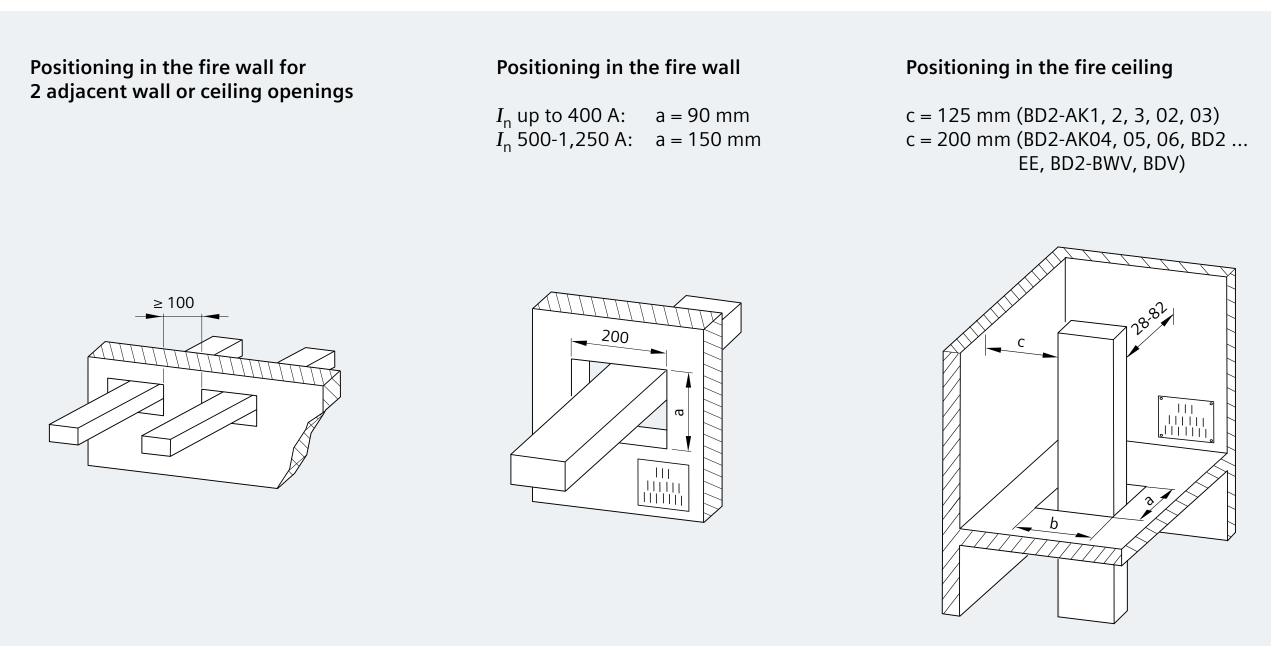


Fig. 4/23: **Marginal conditions for the positioning of the fire barriers (dimensions in mm)**

Con-
tents
Intro-
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1
2
3
4
5
6
7
8

4.7 Functional Endurance

The busbar trunking system BD2 can be upgraded with a functional endurance in accordance with the requirements of DIN 4102-12 (see also chap. 8). Promat plate types, dimensions, and derating factors for the rated currents in designs with 4 barriers can be found in Tab. 6/24.

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-hour mean

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

Chapter 5

LD System – 1,100 to 5,000 A

5 LD System – 1,100 to 5,000 A

The busbar trunking system LD (Fig. 5/1) 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 subdistribution 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 plug-on/-off tap-off units up to 1,250 A that meet extremely high safety standards are available for this purpose.

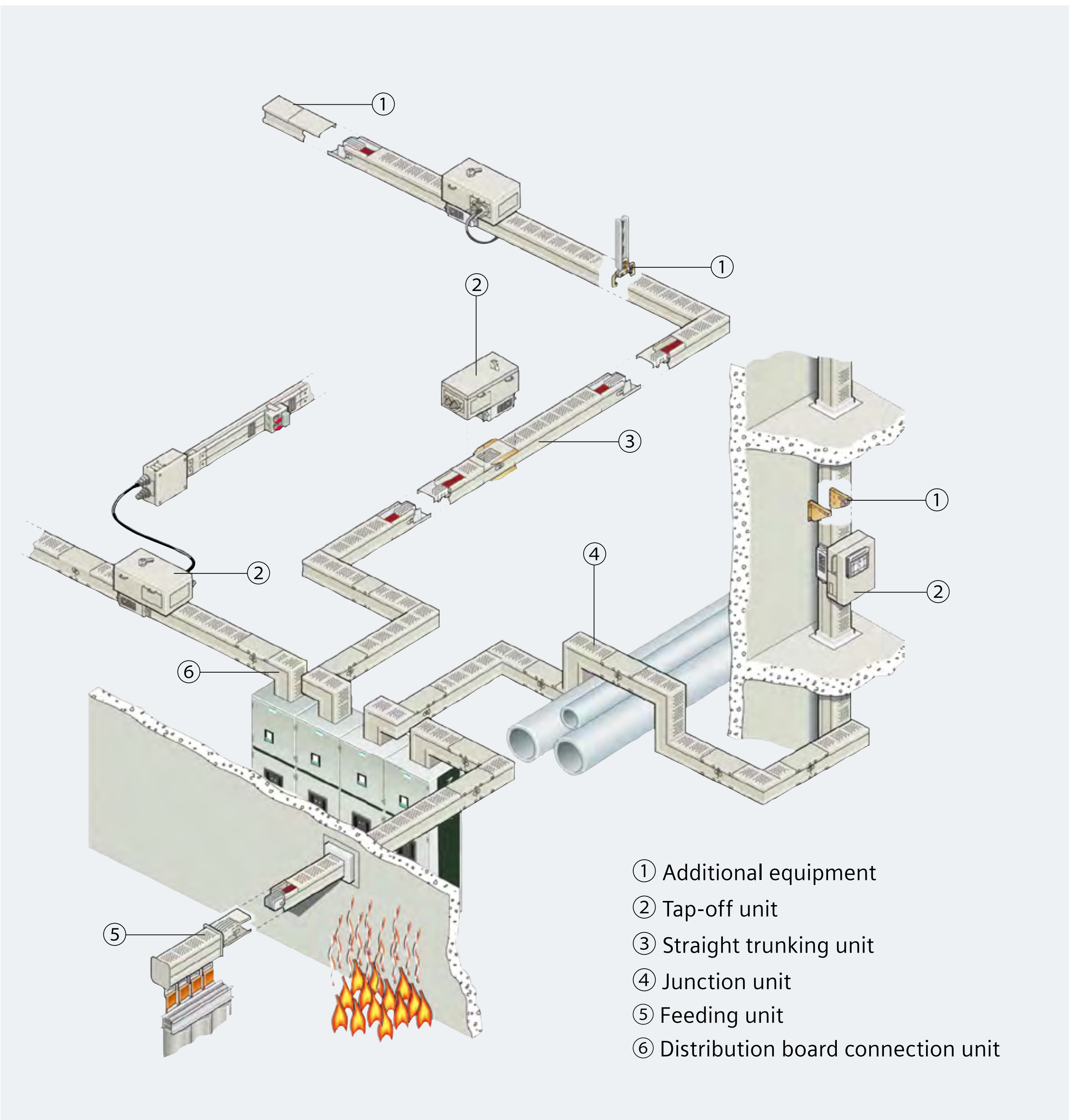


Fig. 5/1: **Overview of busbar trunking system LD**

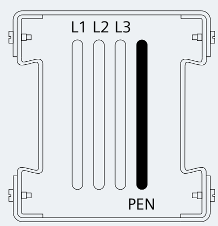
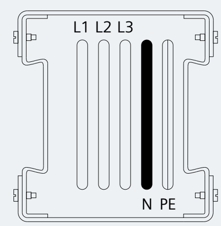
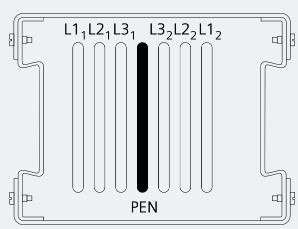
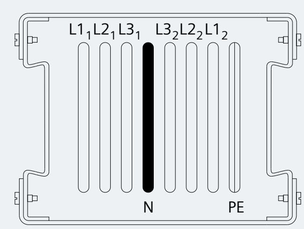
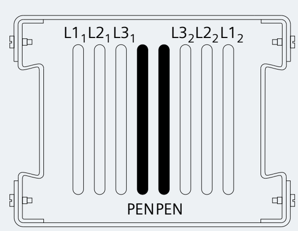
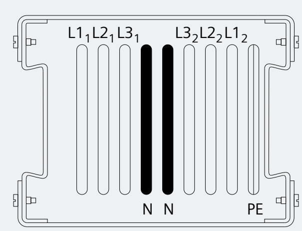
5.1 Versions and Properties

- Design verified low-voltage switchgear and controlgear assembly in accordance with IEC 61439-1/-6
- Steel-enclosed line or surface distribution system, ready to connect, as well as power transmission 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 resin coating of the current conductors for insulation and for protection against water (verification of sprinkler test)
- Integrated busbar insulators in intervals of 200 mm provide constant distance
- Hook and bolt connection with maintenance-free clamped bolt connection
- High 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
- Asbestos-free fire barrier, tested to the fire resistance classes up to EI 120 according to EN 13501-2 or up to S 120 according to DIN 4102-9, is 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 [1)]
  - 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 codability
  - Accessories such as suspension brackets, end flanges, and fixing brackets.

1) With trunking units for vertical installation, the expansion compensation is integrated. When planning horizontal busbar layouts, please observe the following: A straight busbar run without expansion compensation between two junction units must not exceed 10 m in length. A straight busbar run between a junction unit and the end cap must not exceed 25 m in length. For longer busbar runs, expansion compensation units must be planned accordingly.

5.2 Design and Rated Current

The busbar trunking system LD is available in two 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. 5/1).

Conductor configuration	4-pole	5-pole
180 mm x 180 mm	PEN = L	PE = N = L
LDA1.2. to LDA3.2. LDC2.2. to LDC3.2. [1)]		
240 mm x 180 mm	PEN = 1/2 L	PE = N = 1/2 L
LDA4.1. to LDA8.1. LDC6.1. to LDC8.1. [1)]		
240 mm x 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 5.3

Tab. 5/1: **Conductor configurations of the LD system**

Three mounting positions of the busbars are distinguished (Fig. 5/2):
• 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 of more than 1.3 m, the rated current is lower for thermal reasons.

For degree of protection IP54 with closed top covers, a derating of the rated current must also be observed for thermal reasons. However, no distinction between the horizontal/edgewise or 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.

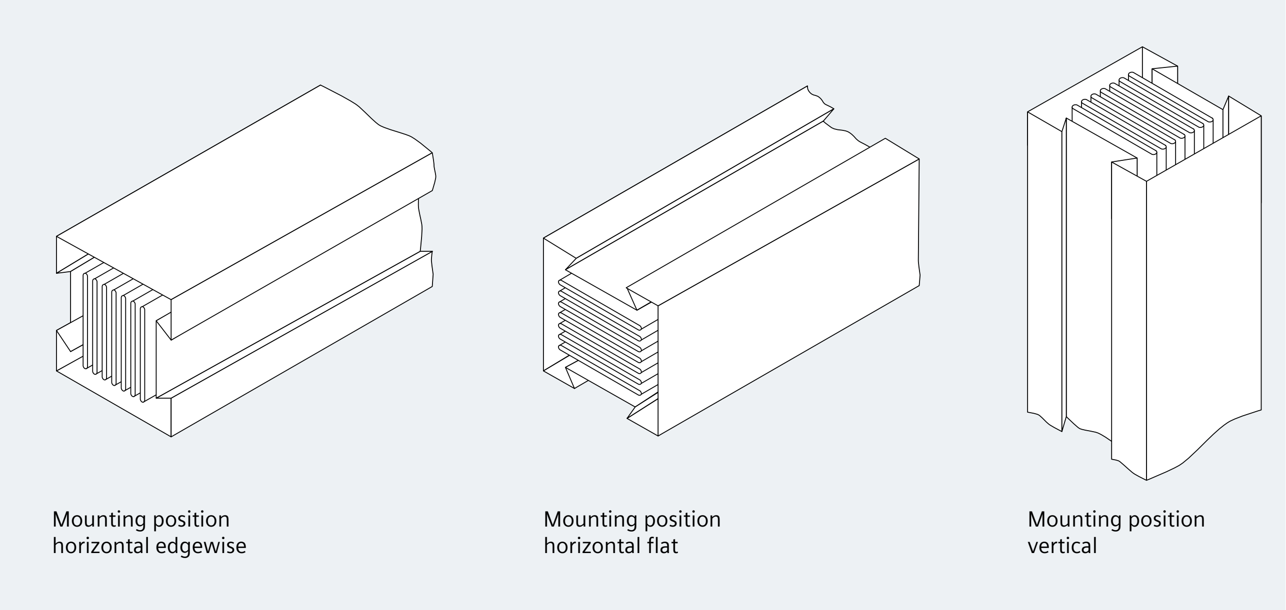


Fig. 5/2: **Schematic representation of the busbar mounting positions for the LD system**

5.3 Type Codes

For the busbar trunking system LD, the type code for trunking units, junction units, feeding units, and connections are 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 the more detailed specification of the selected system component and is attached to the type code.

For tap-off units, accessories, fire barrier elements, transport and installation equipment, own type codes are specified in chapter 5.3.3 and 5.3.4.

For the type codes, it must be observed that the dimensions * and ** must be added in Tab. 5/3 to Tab. 5/5. 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.

5.3.1 Basic Key

The system size is determined by the required rated current (Tab. 5/2). Among others, the rated current depends on the position of the busbars and the trunking

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. 5/2: **Basic keys for the type codes of the LD system** unit (for mounting position, see Fig. 5/2 and illustration of the direction of view in Fig. 5/3). Additionally, the conductor configuration and the degree of protection must be observed for the basic key.

5.3.2 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 additional specifications required must be added):

- Tab. 5/3 and Fig. 5/4 for straight trunking units plus the complete type code for transition units
- Tab. 5/4 for junction units and T-type trunking units
- Tab. 5/5 for distribution board connection units (non-Siemens distribution boards and power distribution boards SIVACON S8) and complete type code for distribution board connection flanges
- Tab. 5/6 for universal connection units, whereby the following applies for the basic key (see Tab. 5/2):
  - 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. 5/2.

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

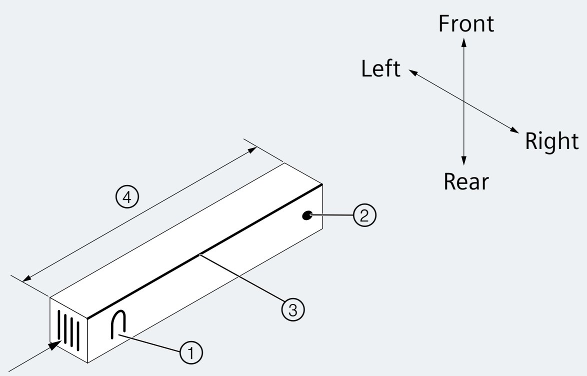
The length specifications given in the tables describing the type codes as well as in the corresponding graphics and dimensional drawings are summarized in the following:

– 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 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. 5/7 for incoming cable connection units with three enclosures of different sizes (with the respective adjustments for the basic key)

Tab. 5/8 for distribution board connection pieces to non-Siemens distribution boards and to power distribution boards SIVACON S8.



① Hook side (opening direction of the hook ∩ or U)
② Bolt side (nut of the clamped bolt connection – is always on the side of the PE, PEN, or $L1_2$ – see Tab. 5/1)
③ Position of the PE, PEN, or $L1_2$
④ Length (sheet dimension without flange cover)

Fig. 5/3: **Schematic representation of an LD trunking unit and determination of the viewing direction**

Con-
tents
Intro-
duction
1
2
3
4
5
6
7
8

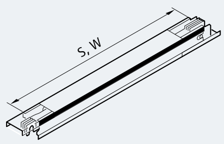
Straight trunking units, horizontal (Fig. 5/4)					
Without tap-off points	**Basis**	**Selection key**			
Standard length (3 lengths: 1.6 m; 2.4 m; 3.2 m) [1), 3)]	LD.....	-1,6	-2,4	-3,2	
Optional length single bolt (4 lengths: 0.5 m ... 0.89 m; 0.9 m ... 1.59 m; 1.61 m ... 2.39 m; 2.41 ... 3.19 m) [1), 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; 1.61 m ... 2.39 m; 2.41 ... 3.19 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 with1 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 units, vertical (always with expansion and fixed point) (Fig. 5/4)					
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. 5/4)					
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...				

* 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)

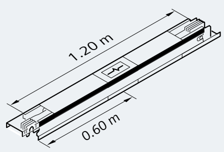
Tab. 5/3: **Type codes for straight trunking units and transition units of the LD system**

Straight trunking units, horizontal

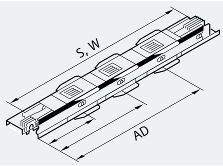
without tap-off points
and without expansion compensation
LD.....-1,6/-2,4/-3,2
LD.....-1W.../-2W.../-3W.../-4W...
LD.....-J-1W.../-J-2W.../-J-3W.../-J-4W...



with expansion compensation
LD.....-D



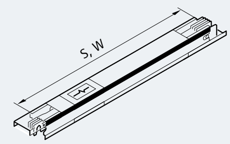
with tap-off points
LD.....-K-3,2-...
LD.....-K-1W.../-K-2W.../-K-3W...



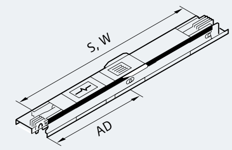
Straight trunking units, vertical with expansion compensation and fixed point

without tap-off points

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

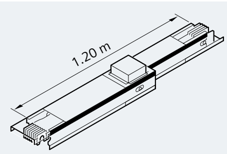


with one tap-off point
LD.....-K-V-3,2-.../-K-V-2,4-...
LD.....-K-V-1W.../-K-V-2W.../-K-V-3W...



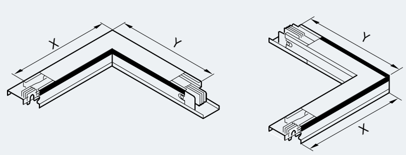
Transition units

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

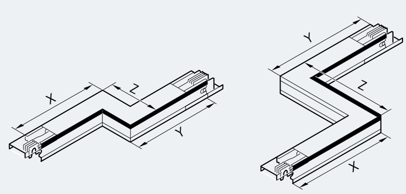


Angled trunking units, horizontal

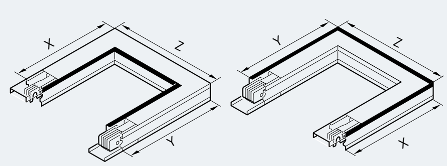
Elbow:
LD.....-LR...
LD.....-LL...



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

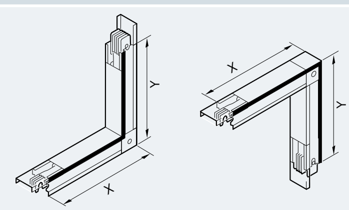


U-unit, flat:
LD.....-UR...
LD.....-UL...

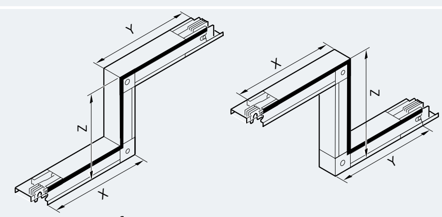


Angled trunking units, horizontal and vertical

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



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



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

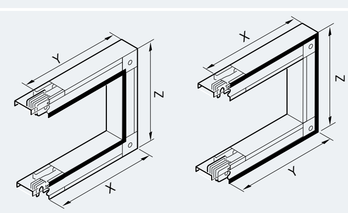


Fig. 5/4: **Illustration of the straight trunking unit types, transition units (for Tab. 5/3), and junction units (for Tab. 5/4)**

Leveled junction units (Fig. 5/4)					
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. 5/5)					
Z offset, fixed Z (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-type trunking units (Fig. 5/5)					
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 to 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. 5/4: **Type codes for junction units and T-type trunking units of the LD system**

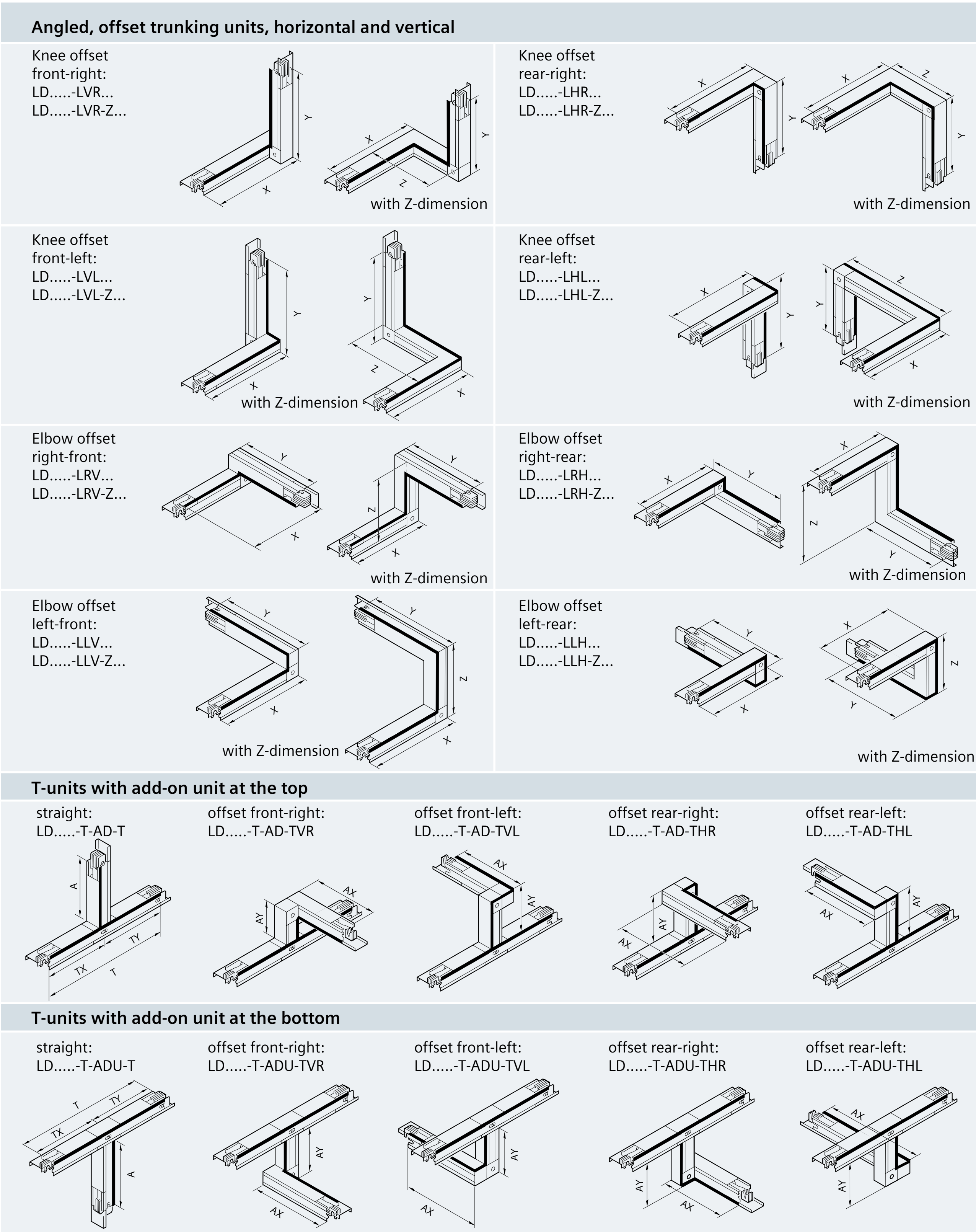


Fig. 5/5: **Illustration of junction units with offset and T-type units (for Tab. 5/4)**

Distribution board connection units for connection to power distribution boards SIVACON S8					
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*	
Knees 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*
Knees with 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**			
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*
Knees with Z-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					
Knees 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*		
Knees with 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**			
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*		
Knees with optional Z-offset (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				

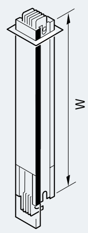
* Length of the limb or for the offset in m
1) Type suffix for fire barrier: +LD-L....-X*, +LD-L....-Y* or +LD-L....-Z* (L120A for basis LD.1... to LD.3... and L120B for LD.4... to LD.8...; * positioning in m)
2) Fire barrier from optional length: X0,86 for LD.1... to LD.7...; X1,06 for LD.8...
3) Fire 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..

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

Distribution board connection units

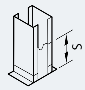
Straight trunking unit for

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



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

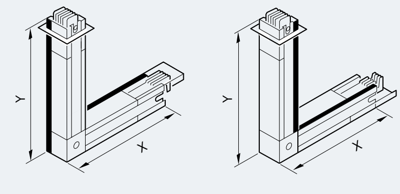
Distribution board connection [2]
LD-VEG1
LD-VEG2



Knee for

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

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



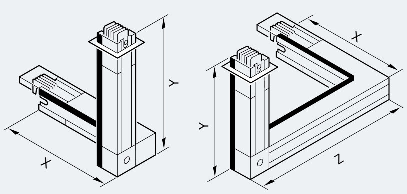
front

rear

Knee offset front-right for

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

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

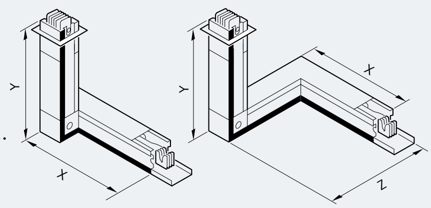


with Z-dimension

Knee offset rear-right for

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

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

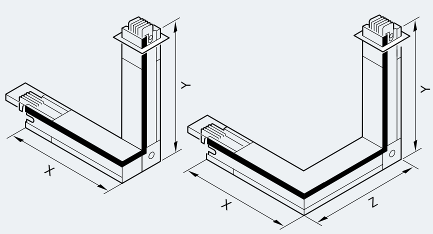


with Z-dimension

Knee offset front-left for

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

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

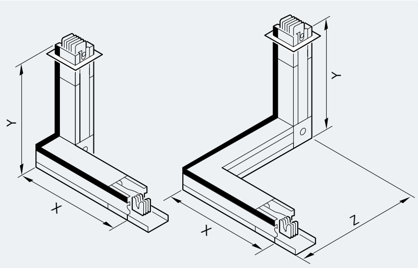


with Z-dimension

Knee offset rear-left for

SIVACON
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

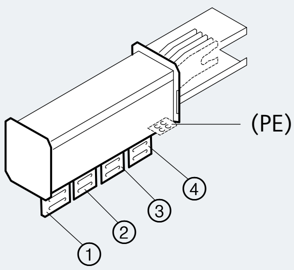
Fig. 5/6: **Illustration of the distribution board connection units described in Tab. 5/5**

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								

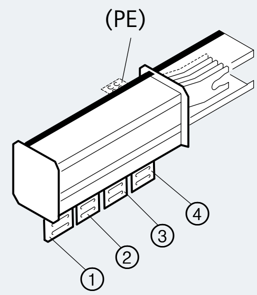
[1] In brackets: setting range for the tag distance between PEN(N) and L3 or L1
[2] The type suffix for offset (see Fig. 5/13) and phase sequence of the connection tags is required for a complete type code

Tab. 5/6: **Selection keys for universal connection units "AS" of the LD system (for basic key LD ..., see Tab. 5/2)**

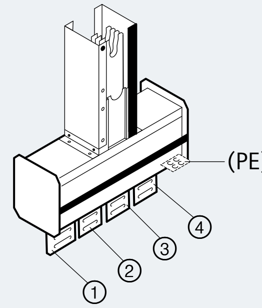
1


(PE)
1
2
3
4

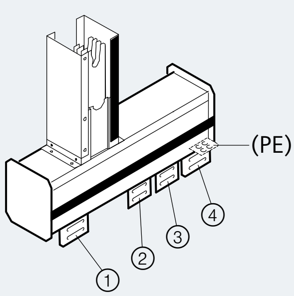
2


(PE)
1
2
3
4

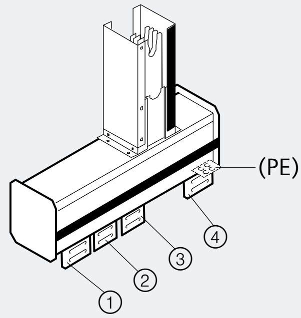
3


(PE)
1
2
3
4

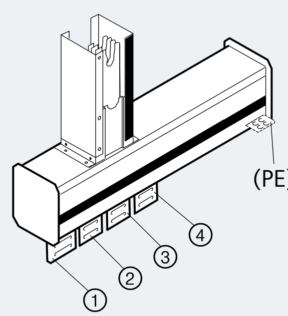
4


(PE)
1
2
3
4

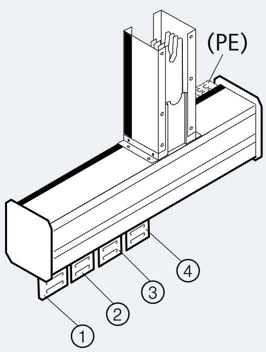
5


(PE)
1
2
3
4

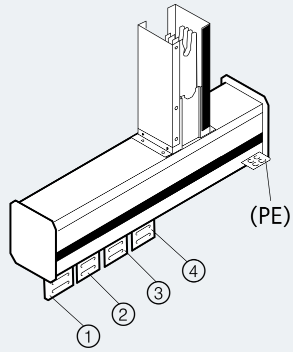
6


(PE)
1
2
3
4

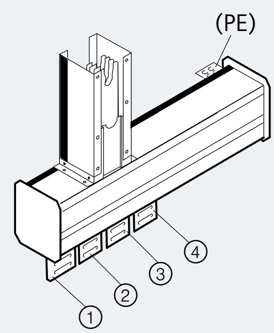
7

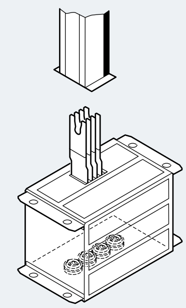
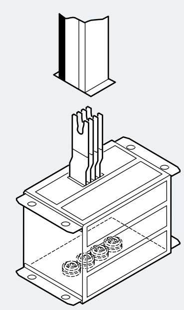

(PE)
1
2
3
4

8


(PE)
1
2
3
4

9


(PE)
1
2
3
4

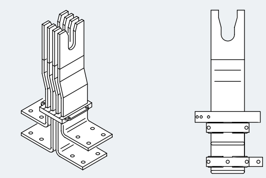
Incoming cable connection units											
Basic key: LD				**A**	**N**	**N**	**N**	**N**	**Selection key: phase sequence "-KE ." for transformer and LD connection**		**Type suffix "+LD-"[2]: aluminum base plate**
Conductor material											
Aluminum (Al)				A							
Copper (Cu)				C							
Rated current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

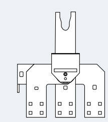
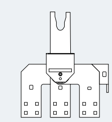
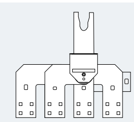
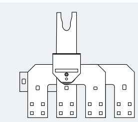
[1] N / PEN = 1/2 L is possible for basic keys LDA4.1. and LDA5.1
[2] Attention: For single-core cable entries, the type suffix "aluminum base plate" must always be specified

Tab. 5/7: **Type codes for incoming cable connection units "-KE" of the LD system**

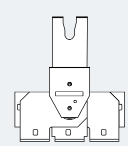
Connection pieces for non-Siemens distribution boards

Basic key: LD	A	N	N	N	N	Selection key:
Conductor material						
Aluminum (Al)	A					
Copper (Cu)	C					

Rated current I_n								
for LDA system		Key	for LDC system		Key	Selection key		
1,100 A	LDA1	2				-FA1		
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								
for LDA system		Key	for LDC system		Key	Selection key		
1,100 A	LDA1	3				-FA3	A	 LDC3420-FA3A
1,250 A	LDA2		2,000 A	LDC2	2		B	 LDC3420-FA3B
1,600 A	LDA3		2,600 A	LDC3	3			
2,000 A	LDA4	6				-FA4	A	 LDC3620-FA4A
2,500 A	LDA5						B	 LDC3620-FA4B
3,000 A	LDA6		3,400 A	LDC6	6			
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 power distribution boards SIVACON S8

Rated current I_n							
for LDA system		Key	for LDC system		Key	Selection key	
1,100 A	LDA1	3				-FA8PQ	
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			

	N	N	N
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 elements (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. 5/8: **Type codes for distribution board connection pieces "-FA" of the LD system**

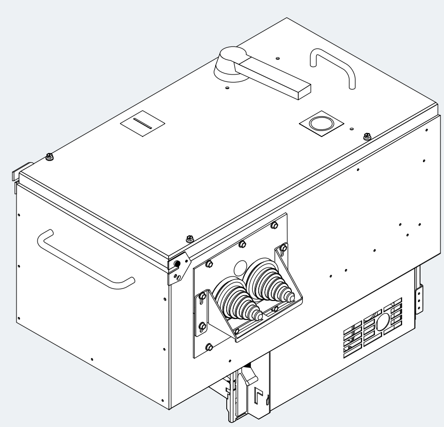
5.3.3 Type Codes for LD Tap-Off Units

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)
- Shock protection IP20 of the contact system during installation and removal
- Coding bracket 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)
- Tap-off units can only be opened if the fuse-switch-disconnector or the circuit-breaker is open
- Lateral incoming cable connection with additional cabling box possible; entry at the front without cabling box as standard
- Versions available with
  – Switch-disconnector with fuse (on request)
  – Fuse-switch-disconnector (Tab. 5/9)
  – Circuit-breaker (Tab. 5/10, Tab. 5/11, and Tab. 5/13)
  – Empty tap-off units, prepared for the installation of circuit-breakers (Tab. 5/12)
- Sealing option is possible as standard for versions with NH00 or NH1 fuse-switch-disconnectors (for fuse-links NH2 and NH3, on request).

Tap-off units with fuse-switch-disconnector

In the arc-resistant tap-off units with fuse-switch-disconnector (internal arcing test according to IEC/TR 61641), LV HRC fuses are used depending on the rated current (250, 400, and 540 A available). The LV HRC 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.

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 I_e of switching device 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 provided by the customer
1) Aluminum plate with 5 x 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.
If required, observe the country-specific standards: It is not permissible to plug on while energized.

Tab. 5/9: **Type codes for tap-off units of the LD system with fuse-switch-disconnectors "/FSAM"**

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 connection enables the connection of cables with conductor cross-sections up to 2 x 240 mm^2. 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 circuit-breaker 3VA

The tap-off units can be equipped with the circuit-breaker series SENTRON 3VA and mounted while energized.

Note: 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-breaker 3VA2 with 400 A, both basic and premium versions are available.

Basic version (Fig. 5/7):
- 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 leaver operating mechanism
- No cover interlocking
- Cover painted in RAL 7035, structure galvanized
- As additional equipment, cable entry plates can be ordered as single parts for retrofitting.

Premium version (see Fig. 5/7)
- Tap-off units with 3- or 4-pole molded-case circuit-breakers 3VA2 from 100 to 1,000 A
- High switching capacity H (85 kA at 415 V)
- Degree of protection IP54, sprinkler-tested
- Lateral cable entry for multi-core or single-core cables (one undrilled aluminum plate and one plate with two cable grommets each)
- Rotary operating mechanism with I/O adhesive labels

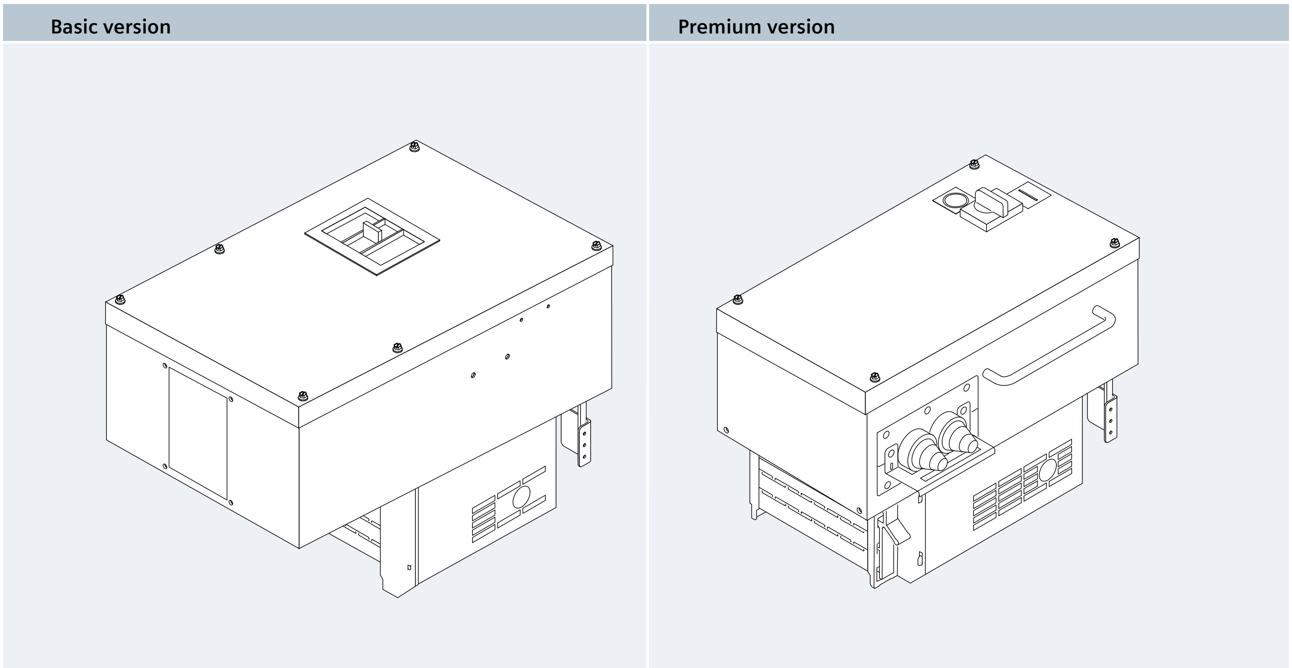


Fig. 5/7: **Example sketches for the basic and premium versions of the circuit-breaker tap-off units for the LD system**

- Remote operation as customer-specific special solution, factory-assembled, (SOND) can be ordered
- Auxiliary switch and accessories as customer-specific special solution, factory-assembled, can be ordered
- Cover interlocking
- Unit completely painted in RAL 7035.

The sizes and available releases of the circuit-breakers are summarized in Tab. 5/10. Regarding the type codes (Tab. 5/11), the specification "-P" must be added for the premium version, particularly in order to distinguish both versions (basic and premium) for the circuit-breaker 3VA2 with rated current 400 A.

Basic version							
Rated current I_n	**Circuit-breaker type**	**Size of tap-off unit**	**Available releases for 3VA**				
			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				×	×

Premium version										
Rated current I_n	**Circuit-breaker type**	**Size of tap-off unit**	**Available releases for 3VA**							
			ETU320	**ETU330**	**ETU340**	**ETU350**	**ETU550**	**ETU560**	**ETU850**	**ETU860**
100 A	3VA2010	1	×	×	×	×	×	×	×	×
160 A	3VA2116		×	×	×	×	×	×	×	×
250 A	3VA2225		×	×		×	×	×	×	×
	3VA2325 (only ETU340)	2			×					
400 A	3VA2340		×	×		×	×	×	×	×
	3VA2440 (only ETU340)				×					
630 A	3VA2463		×	×	×	×	×	×	×	×
800 A	3VA2580	3	×	×	×	×	×			×
1,000 A	3VA2510									

Tab. 5/10: **Possible releases for circuit-breakers 3VA and corresponding sizes of the tap-off units**

Basic version								
LD-K-	**N**	**AK**	**N**	**/3VA**	**N-**	**NNNN-**	**3-**	**Z**
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					
Circuit-breaker version								
3VA1: 80 to 250 A					1			
3VA2: 400 A					2			
Rated current I_n of the circuit-breaker								
80 A						0080		
100 A						0100		
125 A						0125		
160 A						0160		
200 A						0200		
250 A						0250		
400 A (only 3VA2)						0400		
Number of poles of the circuit-breaker								
3-pole							3	
Tripping unit for circuit-breaker								
TM210 (only 80 up to 160 A)								TM210
TM220 (only 80 up to 160 A)								TM220
TM240 (only 80 up to 250 A)								TM240
ETU320 (only 400 A)								ETU320
ETU330 (only 400 A)								ETU330

Premium version									
LD-K-	**N**	**AK**	**N**	**/3VA**	**2-**	**NNNN-**	**N-**	**Z**	**-P**
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						
Circuit-breaker version									
3VA2					2				
Rated current I_n of the circuit-breaker									
100 A						0100			
160 A						0160			
250 A						0250			
400 A						0400			
630 A						0630			
800 A						0800			
1,000 A						1000			
Number of poles of the circuit-breaker									
3-pole							3		
4-pole							4		
Tripping unit for circuit-breaker									
ETU320								ETU320	
ETU330								ETU330	
ETU340								ETU340	
ETU350								ETU350	
ETU550								ETU550	
ETU560								ETU560	
ETU850								ETU850	
ETU860								ETU860	
Version of tap-off unit									
Premium version									-P

Tab. 5/11: **Type codes for tap-off units of the LD system with circuit-breaker 3VA**

Empty tap-off units

The empty tap-off units are based on the premium version of the tap-off units for circuit-breakers (see Fig. 5/7 right) with:

- Degree of protection IP54
- Rated current: 160, 250, and 400 A
- 2 sizes (1 for 160 and 250 A; 2 for 400 A; for dimensional drawings, see Fig. 5/15
- 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
- Lateral cable entry for multi-core or single-core cables (one undrilled aluminum plate and one plate with two cable grommets each)
- Indication of the switch position with I/0 adhesive labels
- Can be mounted while energized.

Note: 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. 5/28). The order numbers of the possible molded-case circuit-breakers are attached to the type codes in Tab. 5/12. They 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 8.

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 NSX					003		
Siemens 3VA2					004		
Suitable for rated current of the 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
Siemens	4-pole	160 A 250 A 400 A	3VA2116-6HL46-0AA0 3VA2225-6HL42-0AA0 3VA2340-6HL42-0AA0
Schneider	3-pole	160 A 250 A 400 A	NSX160-LV430790 NSX250-LV431790 NSX400-LV432695
Schneider	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. 5/12: **Type codes for empty tap-off units of the LD system**

Tap-off units 1,250 A with circuit-breaker 3VL

The tap-off units size 3 are equipped with a circuit-breaker type SENTRON 3VL (type code structure Tab. 5/13) and can be mounted while energized.

Note: Observe the country-specific standards. It may not be permissible to plug on while energized.

They are especially suitable for system and line protection with very high switching capacity L (I_{cu} = 100 kA at 415 V). Further characteristic features are:

- Standard degree of protection IP54
- 3- or 4-pole version
- With adjustable overload releases (500 ... 1,250 A, electronic for 3-pole version) and firmly set short-circuit releases
- 4-pole circuit-breakers are designed without overload or short-circuit release in the N conductor
- Equipped as standard with two auxiliary switches (1 NO + 1 NC) and one alarm switch (1 NO)
- All control connections are wired to terminals
- Black rotary handle for manual operation or version with motor operation available (Fig. 5/8).

Circuit-breaker tap-off units 3VL (1,250 A)									
LD-K-	**N**	**AK**	**N**	**/LS**	**A-**	**AA**	**1250-**	**LS**	**+ ...**
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						
Operation									
Rotary handle					H				
Motor operating mechanism					M				
Number of poles of the circuit-breaker									
3-pole						AE			
4-pole						BE			
Rated current I_e = 1,250 A at 400 V AC							1250		
								LS	
Type suffix									
Undervoltage release (220 ... 250 V AC)									+2H
Shunt release (208 ... 277 V AC)									+8T

Tab. 5/13: **Type codes for circuit-breaker tap-off units 3VL**

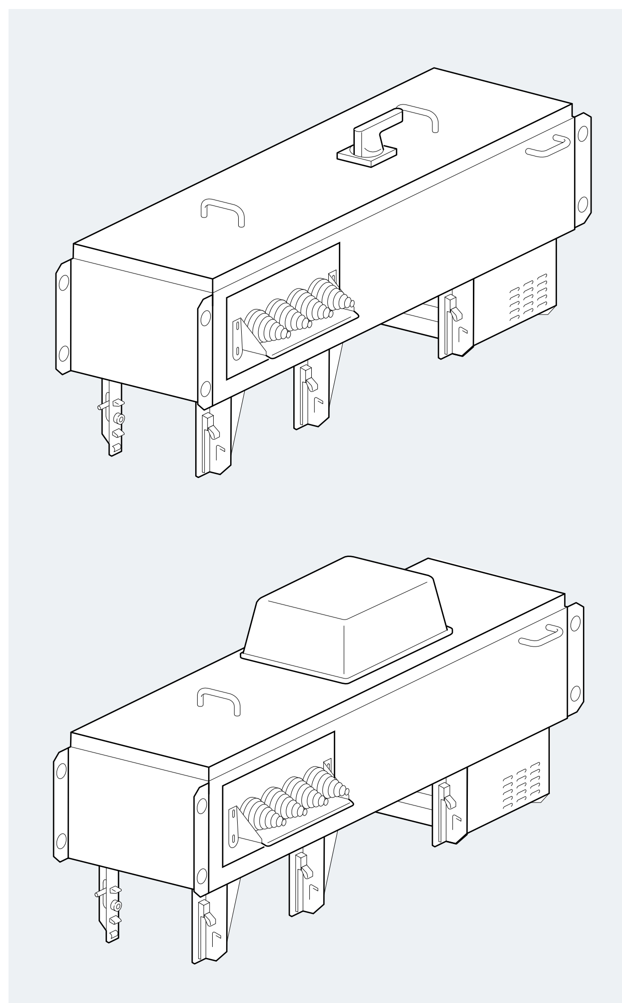


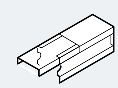
Fig. 5/8: **Circuit-breaker tap-off units 3VL with I_e = 1,250 A; top: with manual operating mechanism; bottom: with motor operating mechanism**

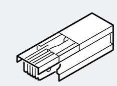
5.3.4 Type Codes for Additional Equipment of the LD System

In order to perform the connection, fixing, and wall and ceiling opening for the busbar trunking systems in the spaces of use, suitable additional equipment components (Tab. 5/14) can be offered, such as:

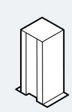
- End flanges:
  At the end of a busbar run, an end flange with hook or with bolt is to be installed depending on the version of the trunking unit
- Suspension brackets:
  For fixing the busbar trunking system in horizontal installation
- Fixing brackets:
  For vertical installation of the busbar trunking 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)	1		6	
4-conductor: LD.441. to LD.841. (*7)	2		4	
5-conductor: LD.461. to LD.861. (*8)	2		6	
4-conductor: LD.442. to LD.842. (*8)	3		4	
5-conductor: LD.462. to LD.862. (*9)	3		6	
Busbar trunking system connection				
Hook				H
Bolt				B

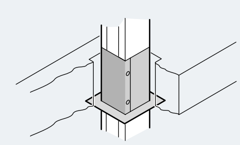




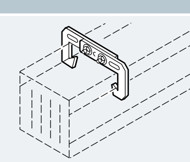
Distribution board blanking flanges	
LD-VE-BF	**N**
LD system	
LD.1... to LD.3...	1
LD.4... to LD.8...	2



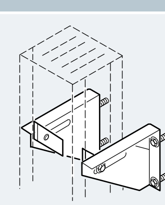
Protective sleeves	
LD-DF	**N**
LD system	
LD.1... to LD.3...	1B
LD.4... to LD.8...	2B



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. 5/14: **Type codes for additional equipment components**

5.4 Technical Specifications

Besides the general technical specifications in Tab. 5/15, 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. 5/16 to Tab. 5/21)
- Copper, 4- or 5-pole: system-dependent data for trunking units LDC.4. or LDC.6. (Tab. 5/22 to Tab. 5/24)
- Recommended conductor cross-sections for the connection pieces for non-Siemens distribution boards (Tab. 5/25)
- Temperature-dependency of the rated currents (Tab. 5/26)
- Weights for busbar runs and feeding units (Tab. 5/27)
- Technical specifications for tap-off units (Tab. 5/28 to Tab. 5/31).

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 • Constant 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 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 classes acc. to IEC 60721 • Climatic environmental conditions • Chemical impact • Biological environmental conditions • Mechanical impact	 1K5 (storage) = 3K7L (operation without exposure to the sun); 2K2 (transport) Salt spray (more contaminants opt.): 1C2 (storage) = 3C2 (operation) = 2C2 (transport) Covered by IP degrees of protection and type of packaging 1B2 (storage) = 3B2 (operation) = 2B2 (transport) Covered by IP degrees of protection and type of packaging 1S2 (storage) = 3S2 (operation) = 2S2 (transport)
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) [4)]

1) Specifications for tap-off units on request
2) According to IEC 61439-1, at a frequency of 60 Hz a derating factor of 0.95 for the rated currents is to be observed for currents > 800 A; 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 the tap-off units with circuit-breaker
4) Basic version of tap-off units with circuit-breaker 3VA: structure tinned, cover painted (RAL 7035)

Tab. 5/15: **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 the conducting paths with 50 Hz and +20 °C busbar temperature	Resistance R_{20}	mΩ/m	0.060	0.045	0.045	0.030	0.030	0.026	0.026
	Reactance X_{20}	mΩ/m	0.046	0.038	0.038	0.024	0.024	0.022	0.021
	Impedance Z_{20}	mΩ/m	0.075	0.059	0.059	0.038	0.038	0.034	0.034
of the conducting paths with 50 Hz and +140 °C busbar temperature	Resistance R_{140}	mΩ/m	0.088	0.067	0.067	0.044	0.044	0.038	0.038
	Reactance X_{140}	mΩ/m	0.046	0.038	0.038	0.024	0.024	0.022	0.021
	Impedance Z_{140}	mΩ/m	0.100	0.077	0.077	0.050	0.050	0.044	0.044
of the conducting paths for 4-pole systems in case of fault	Resistance R_F	mΩ/m	0.108	0.086	0.087	0.074	0.058	0.066	0.052
	Reactance X_F	mΩ/m	0.097	0.082	0.082	0.061	0.052	0.042	0.048
	Impedance 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)	Resistance R_0	mΩ/m	0.246	0.195	0.201	0.213	0.126	0.193	0.117
	Reactance X_0	mΩ/m	0.315	0.264	0.258	0.192	0.177	0.171	0.159
	Impedance 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
Conductor cross-section									
L1, L2, L3	Cross-section A	mm²	530	706	706	1,060	1,060	1,232	1,232
PEN	Cross-section A	mm²	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. 5/16: **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 the conducting paths with 50 Hz and +20 °C busbar temperature	Resistance R_{20}	mΩ/m	0.022	0.022	0.016	0.016	0.013	0.013
	Reactance X_{20}	mΩ/m	0.019	0.019	0.015	0.015	0.013	0.013
	Impedance Z_{20}	mΩ/m	0.030	0.030	0.021	0.022	0.019	0.019
of the conducting paths with 50 Hz and +140 °C busbar temperature	Resistance R_{140}	mΩ/m	0.033	0.033	0.023	0.023	0.019	0.020
	Reactance X_{140}	mΩ/m	0.019	0.019	0.015	0.015	0.013	0.013
	Impedance Z_{140}	mΩ/m	0.038	0.038	0.027	0.028	0.023	0.024
of the conducting paths for 4-pole systems in case of fault	Resistance R_F	mΩ/m	0.059	0.046	0.044	0.034	0.038	0.029
	Reactance X_F	mΩ/m	0.044	0.043	0.033	0.034	0.029	0.031
	Impedance 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)	Resistance R_0	mΩ/m	0.168	0.105	0.123	0.075	0.108	0.063
	Reactance X_0	mΩ/m	0.153	0.141	0.114	0.108	0.099	0.096
	Impedance 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
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. 5/17: **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 the conducting paths with 50 Hz and +20 °C busbar temperature	Resistance R_{20}	mΩ/m	0.060	0.046	0.046	0.030	0.030	0.026	0.026
	Reactance X_{20}	mΩ/m	0.045	0.037	0.037	0.024	0.024	0.022	0.022
	Impedance Z_{20}	mΩ/m	0.075	0.059	0.059	0.038	0.038	0.034	0.034
of the conducting paths with 50 Hz and +140 °C busbar temperature	Resistance R_{140}	mΩ/m	0.089	0.068	0.067	0.044	0.044	0.038	0.038
	Reactance X_{140}	mΩ/m	0.045	0.037	0.037	0.024	0.024	0.022	0.022
	Impedance Z_{140}	mΩ/m	0.100	0.077	0.077	0.050	0.050	0.044	0.044
of the conducting paths for 5-pole systems (PE) in case of fault	Resistance R_F	mΩ/m	0.111	0.089	0.090	0.080	0.080	0.073	0.073
	Reactance X_F	mΩ/m	0.126	0.110	0.110	0.079	0.078	0.073	0.072
	Impedance Z_F	mΩ/m	0.168	0.142	0.142	0.112	0.112	0.103	0.102
of the conducting paths for 5-pole systems (N) in case of fault	Resistance R_F	mΩ/m	0.136	0.105	0.105	0.097	0.067	0.085	0.055
	Reactance X_F	mΩ/m	0.107	0.088	0.088	0.065	0.064	0.058	0.051
	Impedance 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)	Resistance R_0	mΩ/m	0.237	0.195	0.195	0.246	0.246	0.225	0.222
	Reactance X_0	mΩ/m	0.468	0.405	0.405	0.303	0.306	0.273	0.279
	Impedance 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)	Resistance R_0	mΩ/m	0.282	0.219	0.219	0.234	0.144	0.201	0.126
	Reactance X_0	mΩ/m	0.237	0.192	0.192	0.159	0.150	0.141	0.135
	Impedance 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. 5/18: **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
Rated short-time withstand current of 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
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. 5/19: **Technical specifications for trunking units LDA16. to LDA56. (aluminum, 5-pole) – part 2**

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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 the conducting paths with 50 Hz and +20 °C busbar temperature	Resistance R_{20}	mΩ/m	0.023	0.023	0.018	0.018	0.017	0.017
	Reactance X_{20}	mΩ/m	0.019	0.019	0.015	0.015	0.014	0.014
	Impedance Z_{20}	mΩ/m	0.030	0.030	0.023	0.023	0.022	0.022
of the conducting paths with 50 Hz and +140 °C busbar temperature	Resistance R_{140}	mΩ/m	0.034	0.034	0.027	0.027	0.025	0.025
	Reactance X_{140}	mΩ/m	0.020	0.019	0.015	0.015	0.014	0.014
	Impedance Z_{140}	mΩ/m	0.039	0.039	0.030	0.030	0.029	0.029
of the conducting paths for 5-pole systems (PE) in case of fault	Resistance R_F	mΩ/m	0.065	0.065	0.050	0.050	0.045	0.045
	Reactance X_F	mΩ/m	0.067	0.066	0.053	0.052	0.047	0.047
	Impedance Z_F	mΩ/m	0.093	0.093	0.073	0.072	0.065	0.065
of the conducting paths for 5-pole systems (N) in case of fault	Resistance R_F	mΩ/m	0.074	0.052	0.052	0.037	0.044	0.031
	Reactance X_F	mΩ/m	0.052	0.051	0.036	0.039	0.034	0.035
	Impedance 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)	Resistance R_0	mΩ/m	0.201	0.198	0.153	0.150	0.135	0.135
	Reactance X_0	mΩ/m	0.249	0.255	0.195	0.195	0.174	0.174
	Impedance 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)	Resistance R_0	mΩ/m	0.177	0.111	0.126	0.078	0.105	0.069
	Reactance X_0	mΩ/m	0.126	0.123	0.090	0.093	0.078	0.081
	Impedance 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. 5/20: **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
Rated short-time withstand current of 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
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. 5/21: **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 the conducting paths with 50 Hz and +20 °C busbar temperature	Resistance R_{20}	mΩ/m	0.027	0.019	0.013	0.013	0.011	0.011	0.011	0.010
	Reactance X_{20}	mΩ/m	0.037	0.029	0.019	0.019	0.015	0.015	0.013	0.013
	Impedance Z_{20}	mΩ/m	0.046	0.035	0.023	0.023	0.019	0.018	0.017	0.017
of the conducting paths with 50 Hz and +140 °C busbar temperature	Resistance R_{140}	mΩ/m	0.040	0.028	0.020	0.020	0.017	0.016	0.017	0.015
	Reactance X_{140}	mΩ/m	0.037	0.029	0.019	0.019	0.015	0.015	0.013	0.013
	Impedance Z_{140}	mΩ/m	0.055	0.040	0.028	0.028	0.023	0.022	0.021	0.020
of the conducting paths for 4-pole systems in case of fault	Resistance R_F	mΩ/m	0.058	0.044	0.039	0.031	0.028	0.023	0.025	0.020
	Reactance X_F	mΩ/m	0.078	0.061	0.040	0.041	0.031	0.032	0.027	0.028
	Impedance 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 0102)	Resistance R_0	mΩ/m	0.129	0.096	0.105	0.066	0.075	0.048	0.066	0.042
	Reactance X_0	mΩ/m	0.228	0.174	0.132	0.126	0.096	0.096	0.087	0.084
	Impedance 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
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. 5/22: **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	4	4	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 the conducting paths with 50 Hz and +20 °C busbar temperature	Resistance R_{20}	mΩ/m	0.034	0.028	0.020	0.020	0.016	0.016	0.015	0.015
	Reactance X_{20}	mΩ/m	0.037	0.028	0.019	0.019	0.015	0.015	0.014	0.014
	Impedance Z_{20}	mΩ/m	0.050	0.039	0.027	0.027	0.022	0.022	0.021	0.021
of the conducting paths with 50 Hz and +140 °C busbar temperature	Resistance R_{140}	mΩ/m	0.051	0.041	0.029	0.030	0.024	0.024	0.023	0.023
	Reactance X_{140}	mΩ/m	0.037	0.028	0.019	0.019	0.015	0.015	0.014	0.014
	Impedance Z_{140}	mΩ/m	0.063	0.050	0.035	0.035	0.028	0.028	0.026	0.026
of the conducting paths for 5-pole systems (PE) in case of fault	Resistance R_F	mΩ/m	0.064	0.049	0.046	0.046	0.035	0.035	0.031	0.031
	Reactance X_F	mΩ/m	0.104	0.087	0.062	0.062	0.049	0.049	0.045	0.044
	Impedance Z_F	mΩ/m	0.122	0.100	0.077	0.077	0.061	0.060	0.054	0.054
of the conducting paths for 5-pole systems (N) in case of fault	Resistance R_F	mΩ/m	0.068	0.049	0.046	0.033	0.032	0.024	0.028	0.021
	Reactance X_F	mΩ/m	0.082	0.063	0.048	0.048	0.035	0.036	0.031	0.032
	Impedance 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)	Resistance R_0	mΩ/m	0.141	0.105	0.132	0.132	0.099	0.099	0.087	0.087
	Reactance X_0	mΩ/m	0.375	0.303	0.222	0.228	0.171	0.171	0.153	0.156
	Impedance 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)	Resistance R_0	mΩ/m	0.141	0.102	0.111	0.072	0.075	0.051	0.066	0.045
	Reactance X_0	mΩ/m	0.177	0.147	0.105	0.102	0.075	0.078	0.066	0.069
	Impedance 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. 5/23: **Technical specifications for trunking units LDC.6. (copper, 5-pole) – part 1**

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System LDC.6. (copper, 5-pole)			LDC262	LDC362	LDC661	LDC662	LDC761	LDC762	LDC861	LDC862
Number of busbars			**5**	**4**	**4**	**4**	**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
Rated short-time withstand current of 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
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. 5/24: **Technical specifications for trunking units LDC.6. (copper, 5-pole) – part 2**

Connection pieces for non-Siemens distribution boards, Al	Recommended conductor cross-sections in mm^2	Connectable LD systems	Connection pieces for non-Siemens distribution boards, Cu	Recommended conductor cross-sections in mm^2	Connectable LD systems
LDA2.20-FA ...	CU 2 x 60 x 10	LDA1.2. and LDA2.2.	LDC2.20-FA ...	CU 100 x 15	LDC2.2.
LDA3.20-FA ...	CU 100 x 15	LDA3.2.	LDC3.20-FA ...	CU 100 x 15	LDC3.2.
LDA5..0-FA ...	CU 2 x 60 x 10	LDA4... and LDA5...	LDC6..0-FA ...	CU 2 x 100 x 10	LDC6...
LDA7..0-FA ...	CU 2 x 100 x 10	LDA6... and LDA7...	LDC7..0-FA ...	CU 4 x 100 x 12	LDC7...
LDA8..0-FA ...	CU 4 x 100 x 12	LDA8...	LDC8..0-FA ...	CU 4 x 120 x 12	LDC8...

Tab. 5/25: **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. 5/26: **Dependency of the rated current on the ambient temperature for the LD system**

Weight									
Trunking units LDA		**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
Trunking units LDC			**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. 5/27: **Weights for trunking units as well as for connection units and pieces**

Con-
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Intro-
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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_{rmax} of the fuse		A	250	400	630
Maximum permissible operational current $I_{r,\,max}$		A	230	400 [1]	540 [2]
Switching capacity of the integrated 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 cables [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 cables		Undrilled aluminum plate for cable diameters from 21 to 35 mm	Aluminum plate with 5 x M50 cable glands for cable diameters from 21 to 35 mm	
Conductor cross-sections [5]	L1, L2, L3	mm^2	1 x 25 to 1 x 300 / 2 x 240		
	N / PEN / PE	mm^2	1 x 25 to 1 x 300 / 2 x 240		
Weight		kg	45	69	75

1) For vertical mounting position of tap-off units, a derating of 5% is required (derating factor 0.95)
2) For vertical mounting position of 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 lateral cable entry
5) Copper, bolt connection with cable lugs

Tab. 5/28: **Technical specifications for tap-off units with fuse-switch-disconnectors .../FSAM**

Tap-off units with circuit-breaker 3VA – 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		250 mm x 150 mm at the front			
	Max. cable glands		15 x M32			
Connection			Flat screwed connection at the circuit-breaker 3VA, see documentation 3VA			
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		250 mm x 150 mm at the front			
	Max. cable glands		15 x M32			
Connection			Flat screwed connection at the circuit-breaker 3VA, see documentation 3VA			
Weight		kg	30	30	35	

Tab. 5/29: **Technical specifications of the basic versions for circuit-breaker tap-off units .../3VA**

Tap-off units with circuit-breaker 3VA – premium version					
LD-K- . AK . /... -P			**3VA2-0100- ... -P**	**3VA2-0160- ... -P**	**3VA2-0250- ... -P**
Size of tap-off unit (see dimensional drawings)			1	1	1 / 2 [1)]
Maximum permissible operational current I_{nc}		A	100	160	240
Type of molded-case circuit-breaker			3VA2010	3VA2116	3VA2225 / 3VA2325 [1)]
Rated current of molded-case circuit-breaker		A	100	160	250
Cable entries for multi-core or single-core cables	Cable grommet KT		laterally: 2 x KT3		
	Cable diameter		14 mm to 54 mm		
	Undrilled aluminum plate		235 mm x 160 mm		
	Max. cable glands		12 x M40		
Connection lugs L1, L2, L3, N, PEN, PE			1 x M8		
Weight		kg	35	37	37

LD-K- . AK . /... -P			**3VA2-0400- ... -P**	**3VA2-0630- ... -P**	**3VA2-0800- ... -P**	**3VA2-1000- ... -P**
Size of tap-off unit (see dimensional drawings)			2	2	3	3
Maximum permissible operational current I_{nc}		A	400	on request	790	860
Type of molded-case circuit-breaker			3VA2340 / 3VA2440 [1)]	3VA2463	3VA2580	3VA2510
Rated current of molded-case circuit-breaker		A	400	630	800	1,000
Cable entries for multi-core or single-core cables	Cable grommet KT		laterally: 2 x KT4		laterally: 4 x KT4	
	Cable diameter		14 mm to 68 mm		14 mm to 68 mm	
	Undrilled aluminum plate		300 mm x 170 mm		350 mm x 170 mm	
	Max. cable glands		24 x M40		24 x M40	
Connection lugs L1, L2, L3, N, PEN, PE			1 x M8	1 x M10	1 x M12	1 x M12
Weight		kg	58	61	154	154

1) Only 3VA2 with ETU340

Tab. 5/30: **Technical specifications of the premium versions for circuit-breaker tap-off units .../3VA ... -P**

Tap-off units with circuit-breaker 3VL			
LD-K- . AK . /LS . - . . 1250-LS			**3VL 1,250 A [1)]**
Size of tap-off unit (see dimensional drawings)			3
Maximum permissible operational current I_{nc}		A	1,250 [2)]
Type of molded-case circuit-breaker			3VL7712
Rated current of molded-case circuit-breaker		A	1,250
Cable entries for multi-core or single-core cables	Cable grommet KT		laterally: 4 x KT4
	Cable diameter		14 mm to 68 mm
	Undrilled aluminum plate		350 mm x 170 mm
	Max. cable glands		24 x M40
Bolt connection L1, L2, L3, N, PEN, PE			4 x M12 [3)] min. 4 x (4) x 70 mm^2 max. 4 x (4) x 240 mm^2
Weight		kg	150

1) For a frequency of 60 Hz, a derating to 95 % is to be observed for currents greater than 800 A
2) For "bottom-suspended" mounting position of tap-off units, a derating of 10 % is required (derating factor 0.9)
3) For 4 cable lugs for each conductor

Tab. 5/31: **Technical specifications of circuit-breaker tap-off unit .../LS ... 1250-LS with molded-case circuit-breaker 3VL 1,250 A**

5.5 Dimensional Drawings

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. 5/9: Dimensions and views for trunking units
- Fig. 5/10: Views for distribution board and transformer connection units (dimensions in Tab. 5/32)
- Fig. 5/11 and Fig. 5/12: Tag distances for distribution board and transformer connection units (dimensions in Tab. 5/33)
- Fig. 5/13: Views and dimensions for connection tags, basic tags, PE connection tags, and offsets, as well as flange plates and corresponding enclosure cut-outs (see Tab. 5/32)
- Fig. 5/14: Dimensions and views of arc-resistant tap-off units with fuse-switch-disconnector
- Fig. 5/15: Dimensions and views of tap-off units with circuit-breaker 3VA up to 1,000 A and 3VL with 1,250 A, as well as empty tap-off units up to 400 A rated current prepared for installation of molded-case circuit-breakers (Siemens, Schneider)
- Fig. 5/16: Dimensions and views for flanges (LD.EF ...) and protective sleeves (LD-DF ...), as well as fixing elements (LD-B ... and LD-BV)
- Fig. 5/17: Dimensions and views for incoming cable connection units (LD ... -KE .).

Tables:

- Tab. 5/32: Dimensions for lengths L and distances LF (Fig. 5/9), as well as dimensions for flange plates and corresponding enclosure cut-outs (Fig. 5/12 and Fig. 5/13)
- Tab. 5/33: Dimensions for connection tags of the transformer and distribution board connection units AS1 to AS4 (Fig. 5/10 and Fig. 5/11)
- Tab. 5/34: Dimensions for distribution board connection units (-VE for non-Siemens distribution boards; -VEU-... for power distribution boards SIVACON S8; for exchange of the coordinates for other configurations, see Tab. 5/5 and Fig. 5/9) as well as for distribution board connection flanges -VEG.

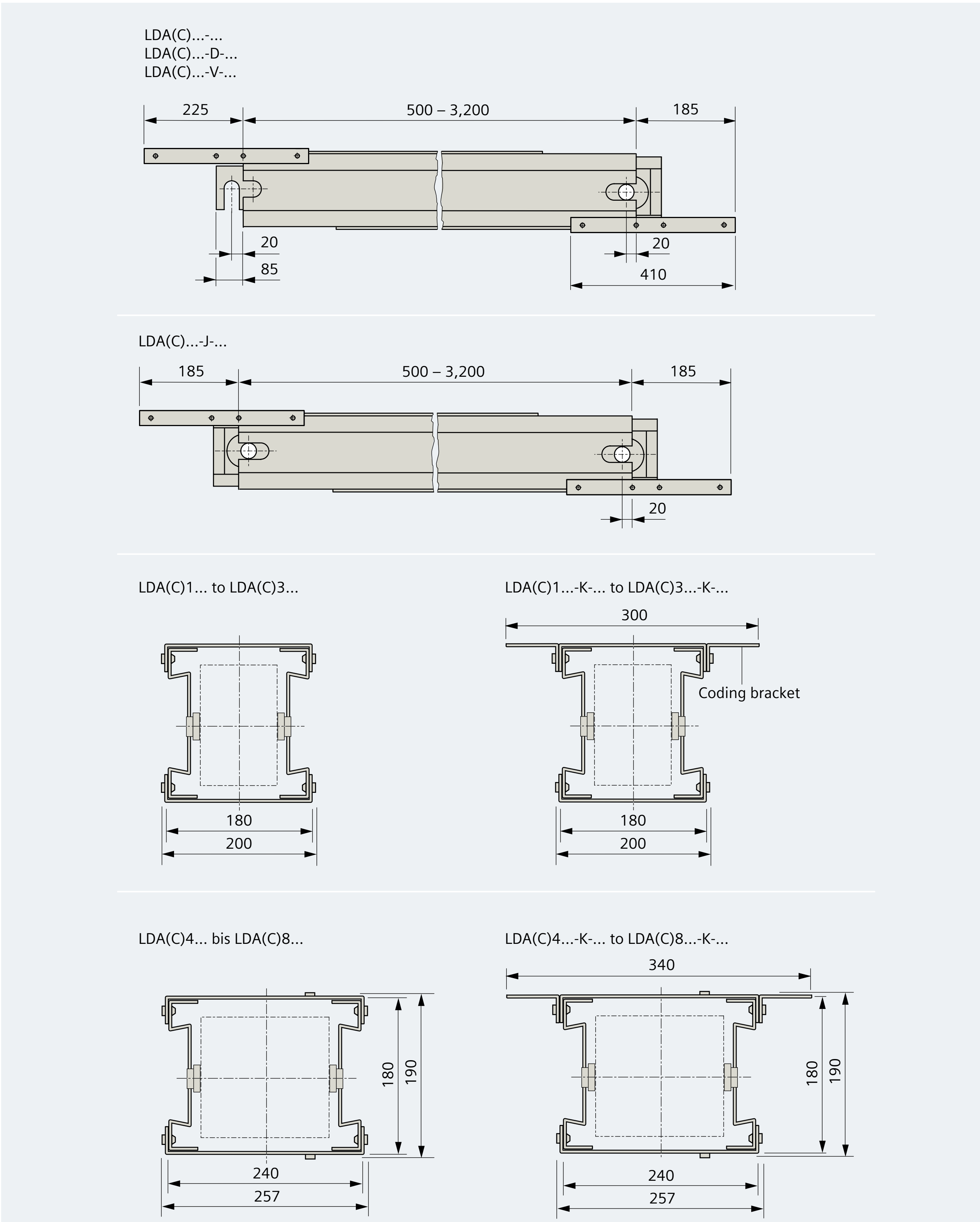
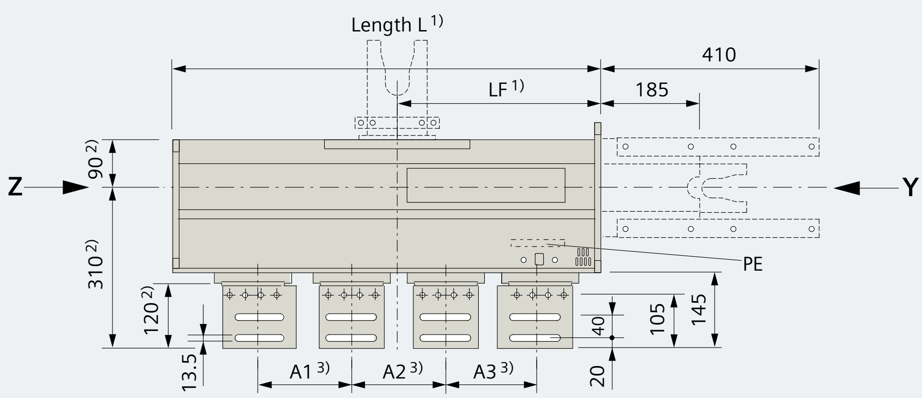
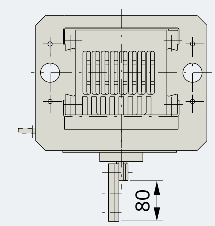


Fig. 5/9: **Dimensional drawings (dimensions in mm) for LD trunking units**

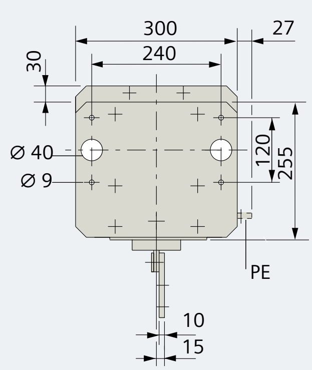
Side view LD.....-AS. (-T)	View Y

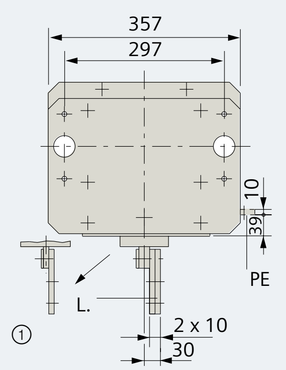




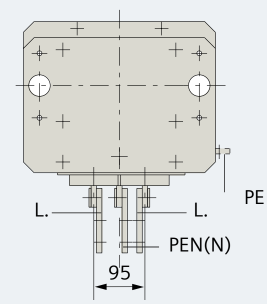
1) For reference dimension length L and distance LF for connection flange, see Tab. 5/32 (for selection keys and views, see Tab. 5/6)
2) Height dimensions apply to all LD connection units
3) Tag distances (for dimensions A1, A2, and A3, see Fig. 5/11 and Fig. 5/12) can be implemented for flexible strip / copper bar widths ≤ 120 mm

View Z LDA3...-AS. +LD-... LDC3...-AS. +LD-...	View Z LDA 6(7)...-AS. +LD-... LDC 6...-AS. +LD-...	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)





① PEN(N) = ½ L for LDA 6(7).1.
and LDC 6.1.



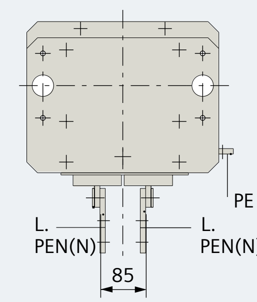
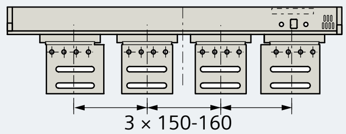


Fig. 5/10: **Dimensional drawings and views (dimensions in mm) for distribution board and transformer connection units LD.....-AS.(-T) (Tab. 5/32) and type suffix +LD... for optional offset and selection of the phase sequence**

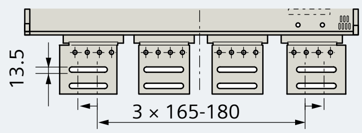
LD.....-AS1 +LD-..

Tag distances in as-delivered condition



Tag type I II II I

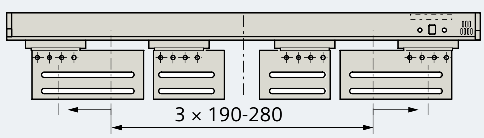
Tag distances can be implemented on site by rotation of the connection tags



Tag type I II II I

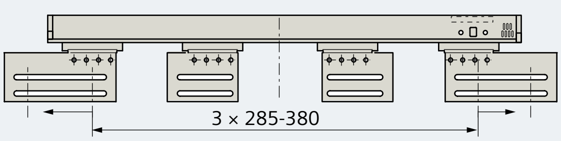
LD.....-AS2 +LD-..

Tag distances in as-delivered condition



Tag type III IV IV III

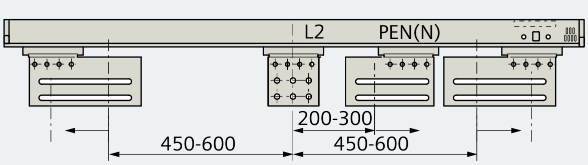
Tag distances can be implemented on site by rotation of the connection tags



Tag type III IV IV III

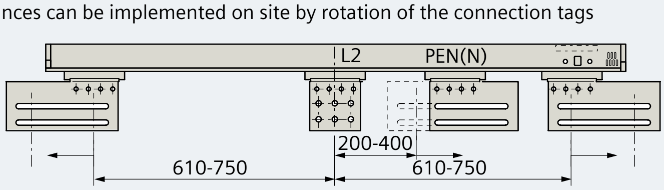
LD.....-AS3 +LD-.E (+LD-.G)

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

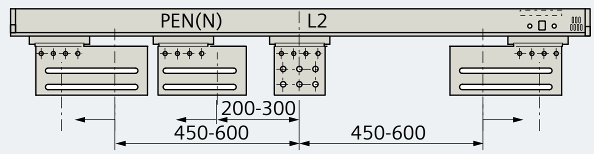


Tag type V VI VII V

Fig. 5/11: **Tag distances (dimensions in mm) for distribution board and transformer connection units AS.(-T) – part 1 (Tab. 5/33)**

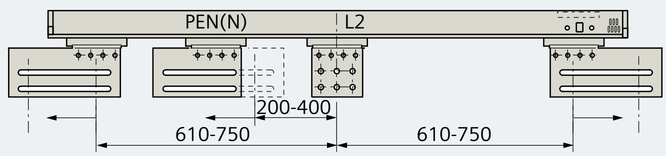
LD.....-AS3 +LD-.F (+LD-.H)

Tag distances in as-delivered condition



Tag type V VII VI V

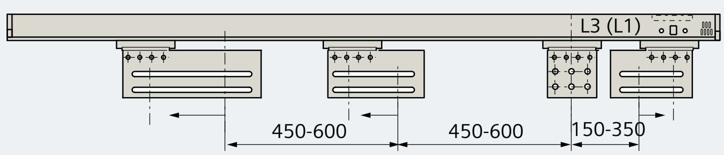
Tag distances can be implemented on site by rotation of the connection tags



Tag type V VII VI V

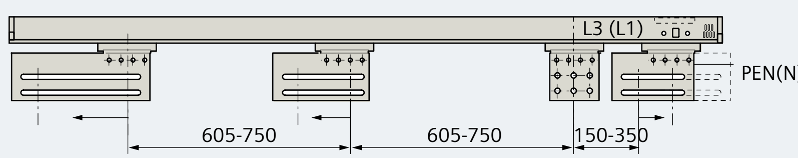
LD.....-AS4 +LD-..A(C)

Tag distances in as-delivered condition



Tag type VII V VI VII

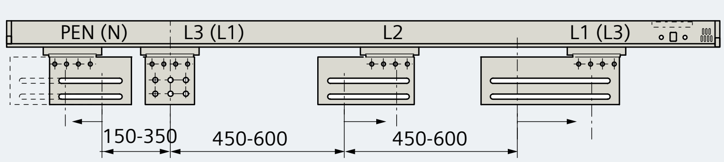
Tag distances can be implemented on site by rotation of the connection tags



Tag type VII V VI VII

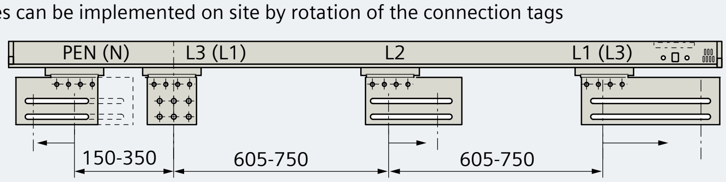
LD.....-AS4 +LD-..B(D)

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

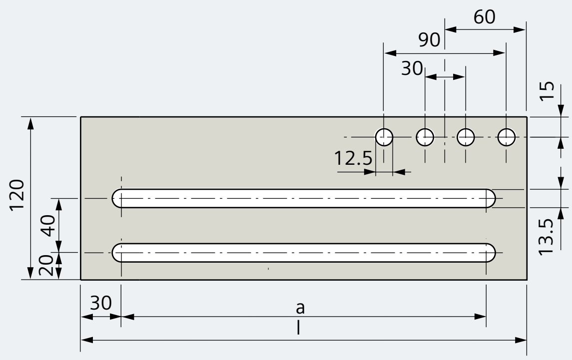


Tag type VII VI V VIII

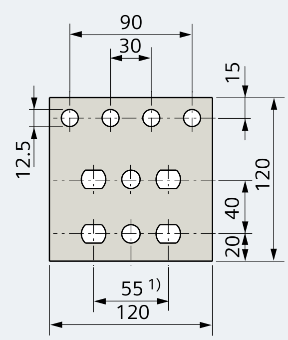
Fig. 5/12: **Tag distances (dimensions in mm) for distribution board and transformer connection units AS.(-T) – part 2 (Tab. 5/33)**

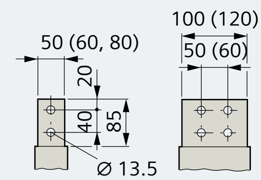
Connection tags AS1 to AS4	Customer connection tags

Type I to VIII (except type VI at AS3 and AS4)



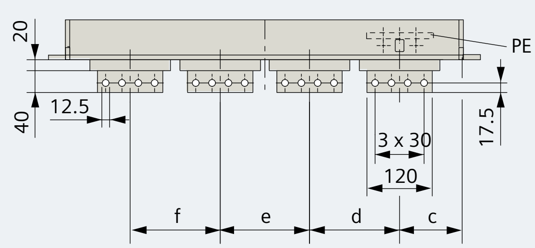
Type VI for AS3 and AS4



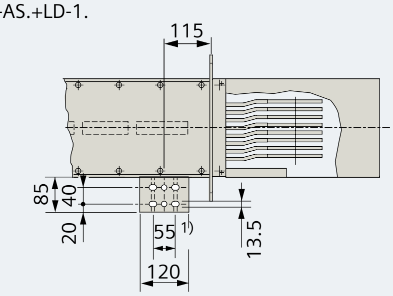


1) Elongated holes with center-to-center distance of 55 mm for implementation of:
50 mm distance for connection of flexible strips with a width of 100 mm,
60 mm distance for connection of flexible strips with a width of 120 mm.

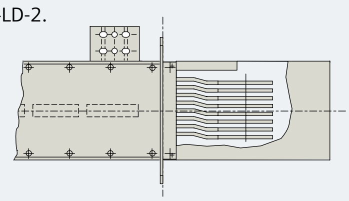
Basic tags of LD connection unit	PE connection tags



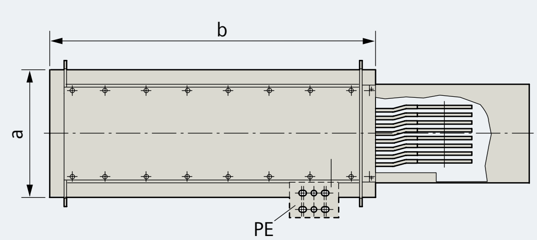
LD...6.-AS.+LD-1.

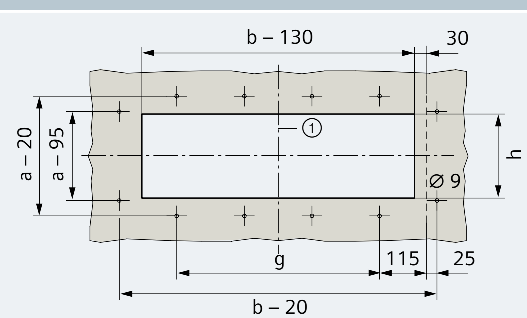


LD...6.-AS.+LD-2.



Aluminum flange plate and enclosure cut-out





① Centerline of LD.....-AS = centerline of cut-out

Fig. 5/13: **Views (dimensions in mm) for connection tags, basic tags, PE connection tags, and offsets, as well as flange plates and corresponding enclosure cut-outs (Tab. 5/32 and Tab. 5/33)**

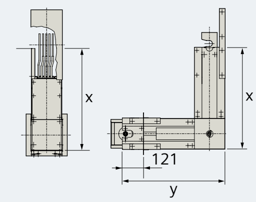
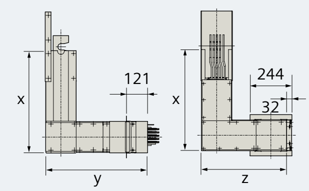
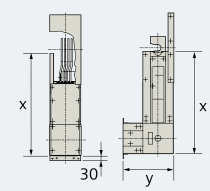
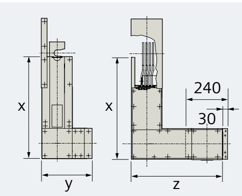
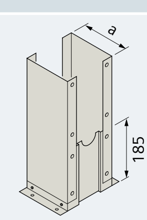
Type	Type suffix [1]	Fig. 5/10		Fig. 5/13							
		L in mm	LF in mm	a in mm	b in mm	c in mm	d in mm	e in mm	f in mm	g in mm	h in mm
LD.3...-AS1 (-T)	+LD-...	725	362.5	255	795	115	165.5	164	165.5	495	110
LDA6(7.8)...-AS1 (-T)	+LD-...			312							110
LDC 6...-AS1 (-T)	+LD-...			312							110
LDC 7(8)...-AS1 (-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

[1] Type suffix +LD-.. for offset (see Fig. 5/13) and phase sequence of the connection tags

Tab. 5/32: **Dimensions in mm for transformer and distribution board connection units LD.....-AS... and corresponding flange plates**

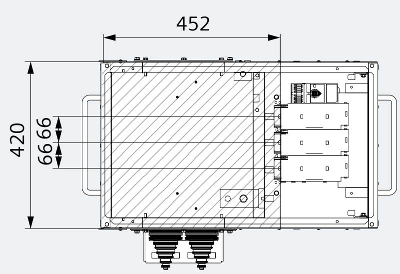
Fig. 5/11 Fig. 5/12	Fig. 5/13		Fig. 5/11 Fig. 5/12			
Tag type	Width a in mm	Length l in mm	AS1	AS2	AS3	AS4
I	82.5	142.5	×			
II	68	128	×			
III	202.5	262.5		×		
IV	110	170		×		
V	210	270			×	
VII	160	220			×	
VIII	360	420				×
V	210	270				×
VII	160	220				×

Tab. 5/33: **Dimensions (in mm) for connection tags AS1 to AS4**

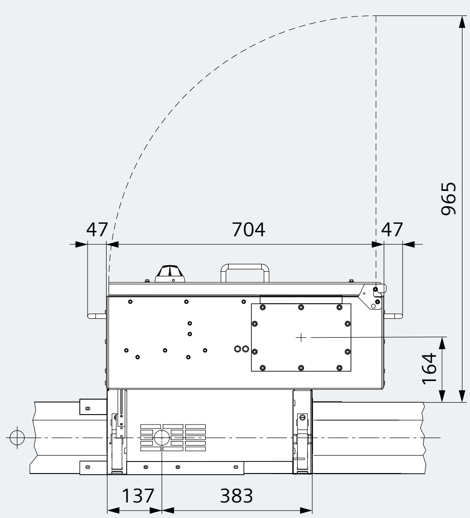
Distribution board connection units for SIVACON S8 -VEU				
Angled connection units (example "LH")	x in mm	y in mm	z in mm	
LDA(C)....-VEU-L.	500	500		
LDA(C)....-VEU-L.-X*	500 to 1,240	500		
LDA(C)....-VEU-L.-Y*	500	500 to 1,240		
LDA(C)....-VEU-L.-X*/Y*	500 to 1,240	500 to 1,240		
Offset connection 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			

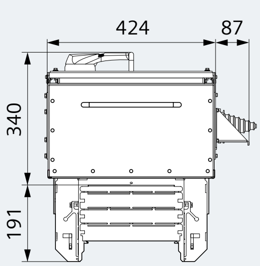
Tab. 5/34: **Dimensions (in mm) for transformer and distribution board connection units (-VEU for power distribution boards SIVACON S8 and -VE for non-Siemens distribution boards and incoming cable connections) as well as for distribution board connection flanges (-VEG)**

Tap-off units with fuse-switch-disconnector …/FSAM250	Tap-off units with fuse-switch-disconnector …/FSAM400 and …/FSAM630

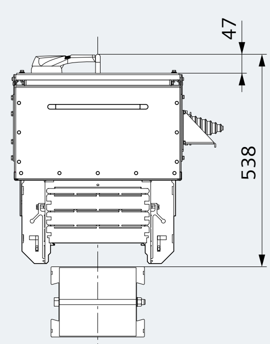


Indoor dimensions

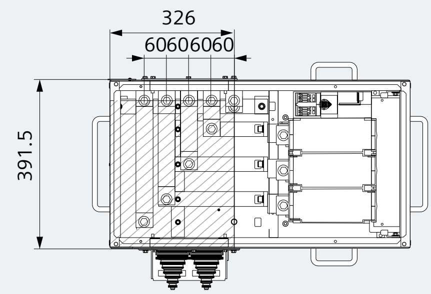




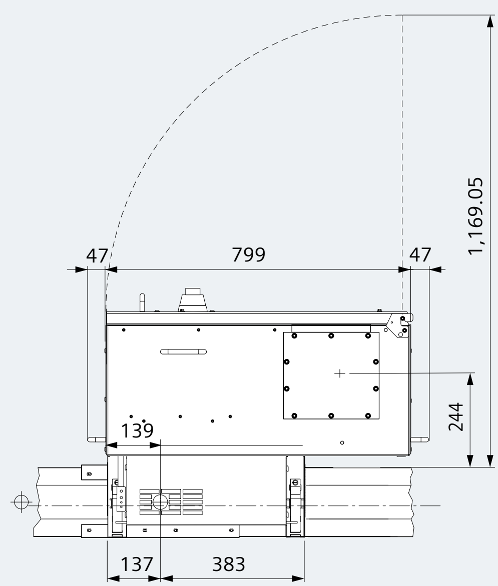
Top-mounted tap-off unit

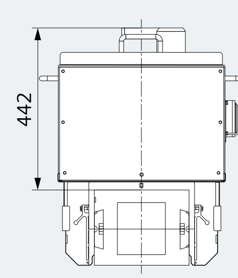


Space requirements for top mounting

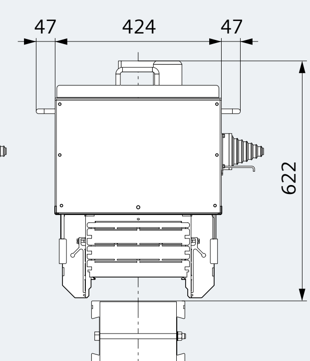


Indoor dimensions





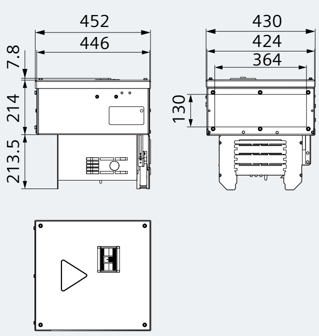
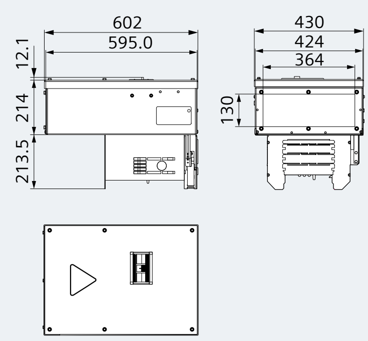
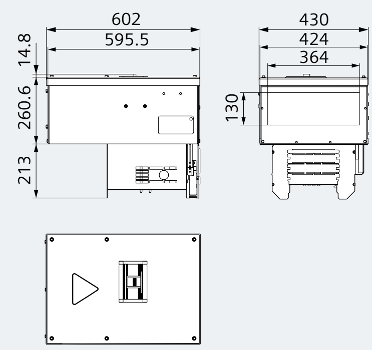
Top-mounted tap-off unit



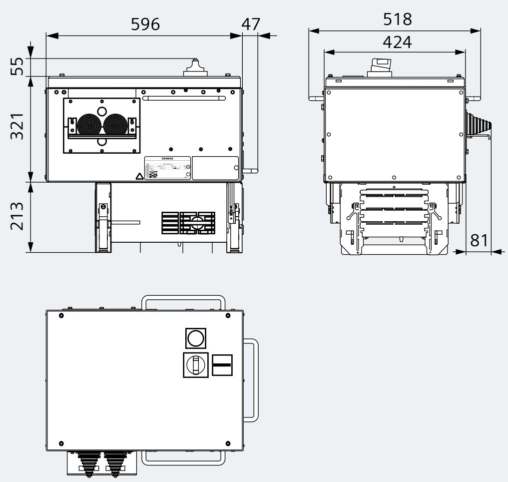
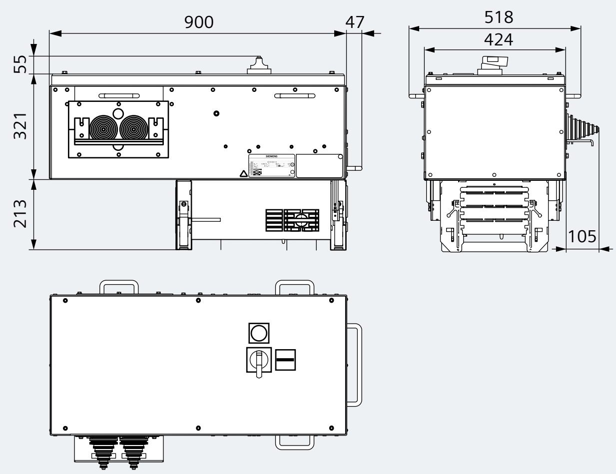
Space requirements for top mounting

Fig. 5/14: **Dimensions (in mm) and views for arc-resistant tap-off units with fuse-switch-disconnector … /FSAM …**

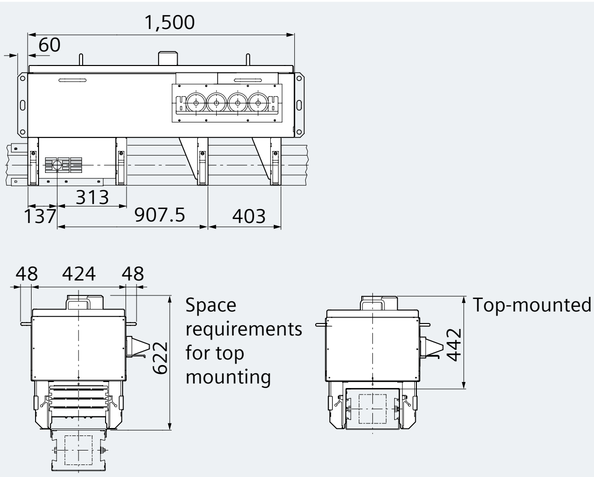
Tap-off units with circuit-breaker 3VA – basic version LD-K-.AK/...

Size 1B (80 to 160 A)	Size 2B (200 and 250 A)	Size 3B (400 A)
		

Tap-off units with circuit-breaker 3VA – 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)
	

Tap-off units with circuit-breaker 3VA (800, 1,000 A) – LD-K-.AK./3VA ... -P and 3VL (1,250 A) LD-K- . AK/LS ... -1250-LS; size 3



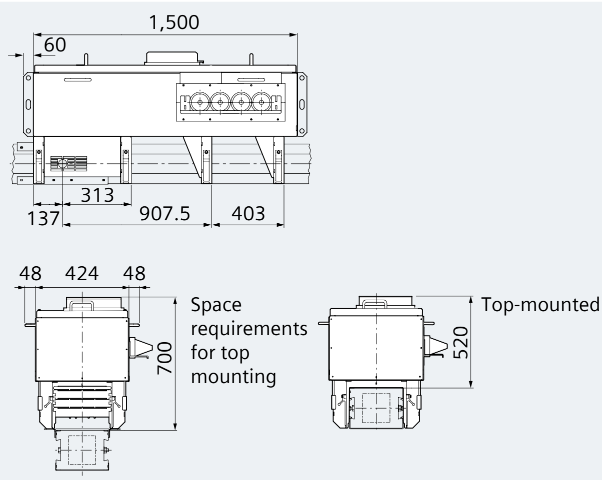
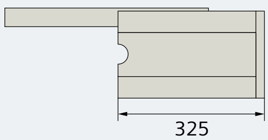
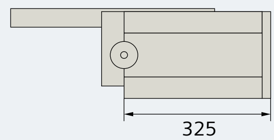


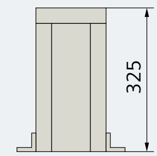
Fig. 5/15: **Dimensions (in mm) and views for tap-off units with circuit-breaker 3VA up to 1,000 A and 3VL with 1,250 A, as well as empty tap-off units up to 400 A prepared for installation of molded-case circuit-breakers (Siemens, Schneider)**

Flanges

LD .-EF .-H .	LD .-EF .-B .	LD .-VE .-BF . .

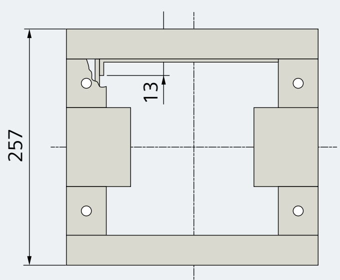


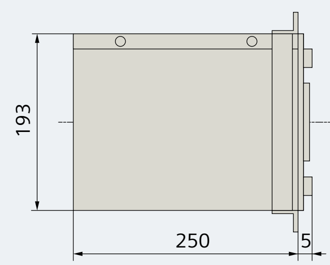


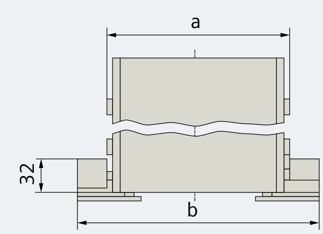


Protective sleeves

LD-DF 1B	a = 213 mm	b = 270 mm
LD-DF 2B	a = 270 mm	b = 327 mm

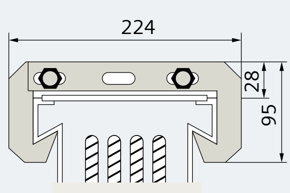


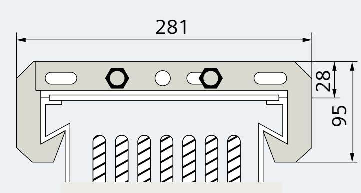




Suspension brackets for horizontal suspension

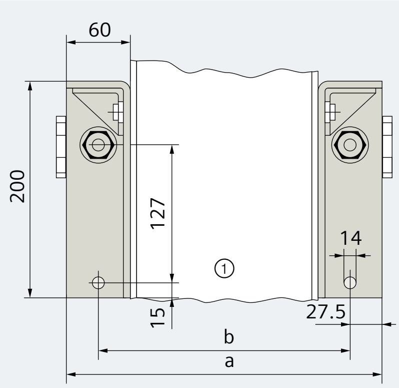
LD-B 1	LD-B 2



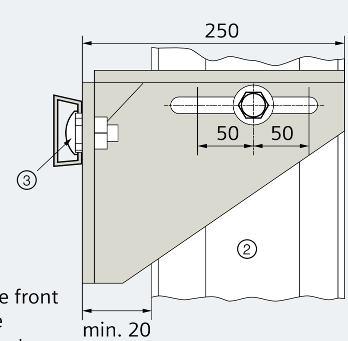


Fixing bracket for vertical fixing

LD-BV



① LD system view from the front
② LD system from the side
③ To be provided by the customer

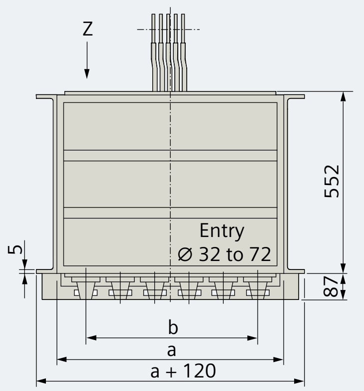


LDA1 ... LDA3	a = 300 mm	b = 245 mm
LDC2 ... LDC3	a = 300 mm	b = 245 mm
LDA4 ... LDA8	a = 357 mm	b = 302 mm
LDC6 ... LDC8	a = 357 mm	b = 302 mm

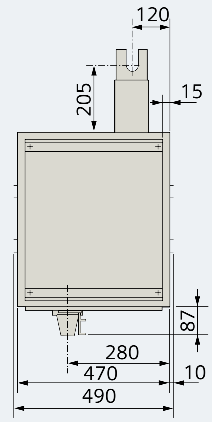
Fig. 5/16: **Dimensions (in mm) and views for additional equipment components of the LD system (for type codes, see Tab. 5/14)**

Incoming cable connection units ... -KE

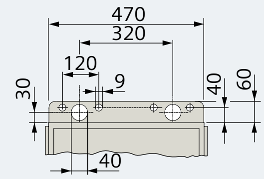
Front view



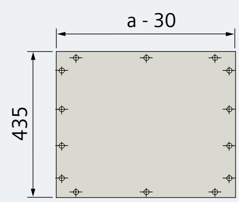
Side view



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. 5/17: **Dimensions (in mm) and views for incoming cable connection units (LD ... -KE .) and the entry plates for single-core cables (+LD-BPAL)**

5.6 Design of the Fire Barrier

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. 5/35 and the corresponding Fig. 5/18.

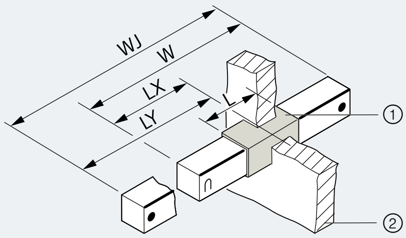
After mounting the busbar run in the fire wall or fire ceiling, the joints must be filled according to the wall or ceiling thickness with stable, non-inflammable material (class A1 or A2-s1, d0 according to EN 13501-1, e.g., with concrete or mortar). The concrete or mortar must conform to the applicable standards for the preservation of 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 values, on request).

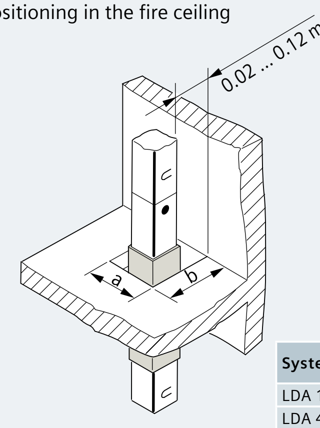
Dimensions for components of the LD system with fire barrier										
		Length of fire barrier	Minimum optional length		Limb length			Fire barrier positioning		
		L in m	W in m	WJ in m	X in m	Y in m	Z in m	LX in m	LY in m	LZ in m
a) Straight trunking unit	LD . 1 ... to LD . 7 ...	0.48	0.92 ... 1.24	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	-
b) 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	-
c) 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	-
d) 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	-
e) 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

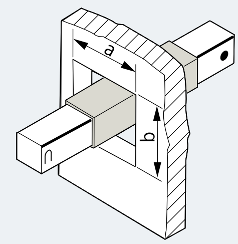
Tab. 5/35: **Dimensions and positioning of the fire barrier for LD system components for partial figures a) to e) in Fig. 5/18 (dimensions in m)**

a) Straight trunking unit



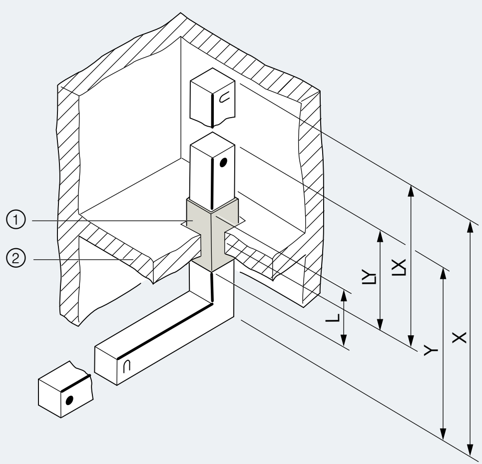
Positioning in the fire ceiling



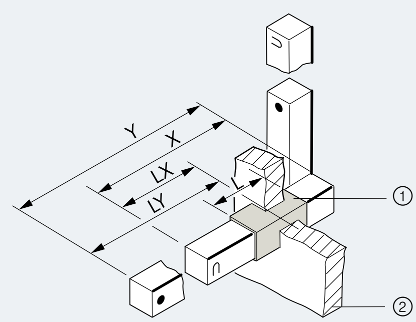


System		a in m	b in m
LDA 1 ... 3	LDC 2 ... 3	0.4	0.4
LDA 4 ... 8	LDC 6 ... 8	0.45	0.4

b) Knee

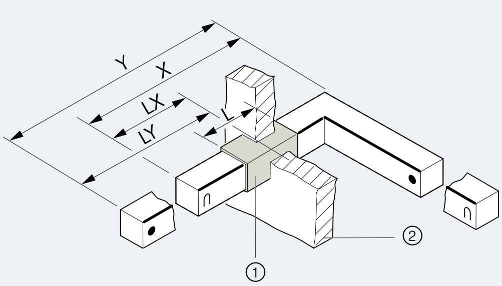


c) Knee, offset



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.

d) Elbow



e) Elbow, offset

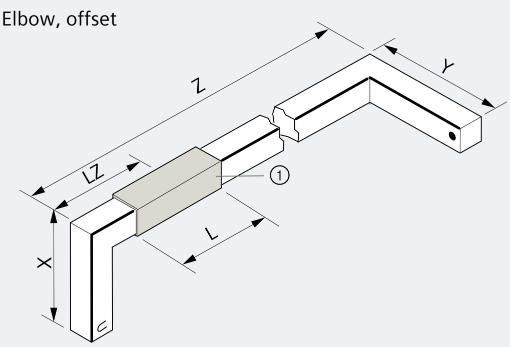


Fig. 5/18: **Graphics to Tab. 5/35 (dimensions and positioning of the fire barrier for LD system components, specifications in m)**

5.7 Dimensions and Derating Factors for Functional Endurance

The busbar trunking system LD 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 8. 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. 5/36.

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
Note: The functional endurance class E 120 has been tested in conformity with the test standard DIN 4102-12. However, E 90 is specified as a maximum in the standard.

Tab. 5/36: **Dimensions and derating factors for the functional endurance of the LD system**

Chapter 6

LI System – 800 to 6,300 A

6 LI System – 800 to 6,300 A

The busbar trunking system LI (Fig. 6/1) 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.

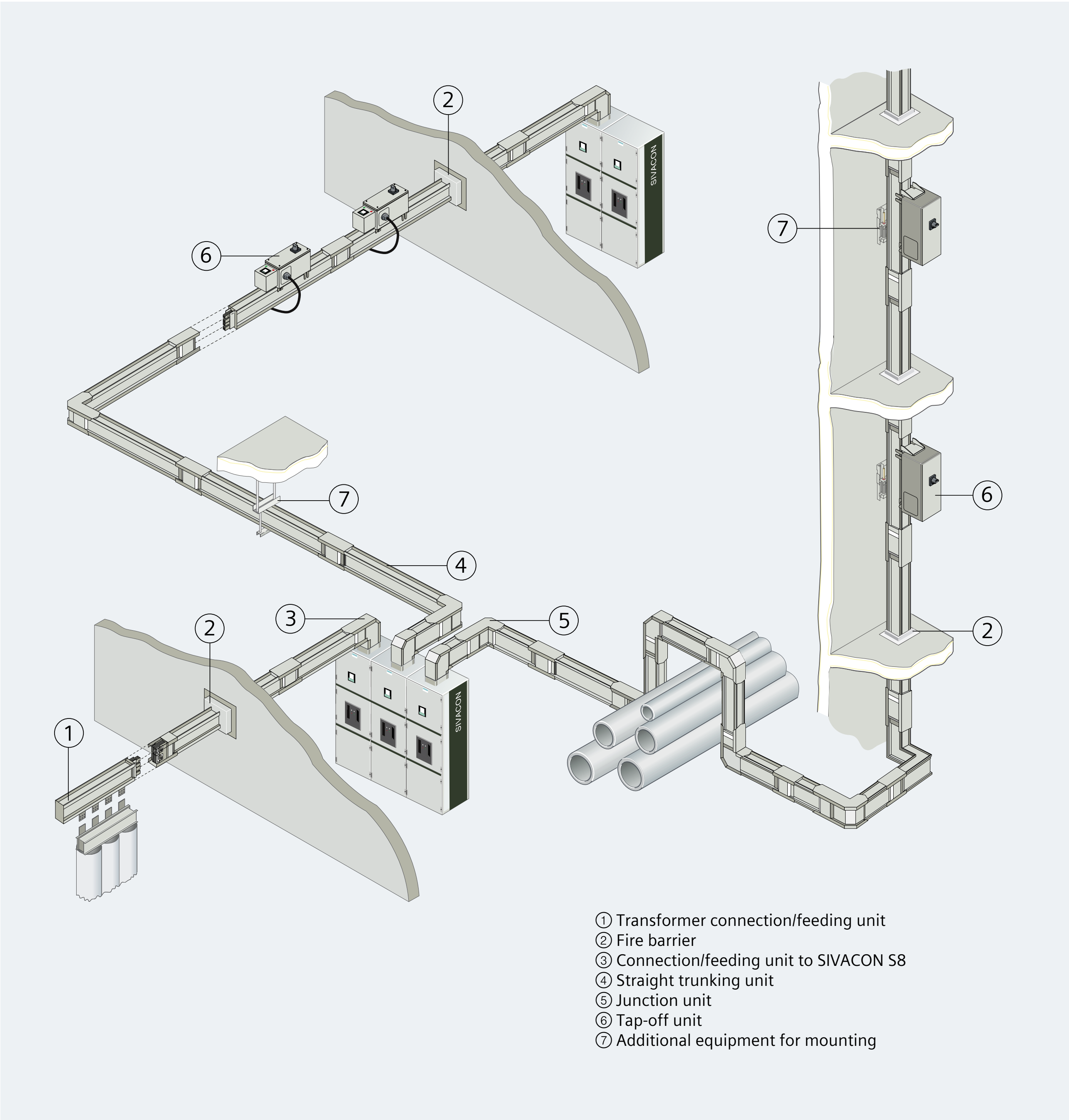


Fig. 6/1: **Overview of busbar trunking system LI**

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)
- 8 different conductor configurations for single and double bodies with 6 or 3 sizes, each for copper and aluminum (see chapter 6.1)
- 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 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 of the European standards
- 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 units with elbow, offset elbow, knee, offset 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 top: 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, Y, and Z).

1 Stipulations for permissible dimensions can be found in the dimensional drawings

Con-tents
Intro-duction
1
2
3
4
5
6
7
8

Infeeds

- Transformer feeding units version "E" with busbar feeder laterally and phase sequence from left or right (PE / PE(H)) as well as busbar feeder upwards (phase sequence left or right)
- Distribution board connection units to power distribution boards SIVACON S8 from top or bottom
- Distribution board connection pieces for non-Siemens distribution boards
- Incoming cable connection units as single-core or multi-core version (phase sequence left or right)
- Distribution board infeed.

Tap-off units

- 7 sizes in degree of protection IP55
- Sheet-steel enclosure with powder coating (color RAL 7035)
- With molded-case circuit-breakers 3VA and 3VL from 50 to 1,250, fuse-switch-disconnectors type 3NP from 160 to 630 A, fuse-bases 3NH from 160 to 630 A (size 00, 1, 2, or 3), and switch-disconnector/fuse combinations FSF from 160 to 630 A
- Empty tap-off units for non-Siemens devices and prepared for the installation of molded-case circuit-breakers SENTRON 3VA and 3VL
- One plug-on/-off facility at the tap-off point
  - guides the plug-on/-off facility 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 unit can only be plugged on or off when the cover is open
- Can be plugged-on/-off while energized, in accordance with EN 50110-1 (VDE 0105-1; national specifications/ standards are to be observed)
- Leading PE contact for safe plugging contact
- Power pick-up through silver-plated lyra contacts of the current pick-up system at the tap-off unit
- Cable entry possible as single-core and multi-core version; cable entry for single core with cable gland available as accessory.

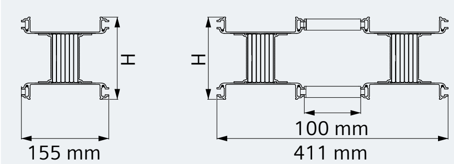
Additional equipment

- End caps for end of busbar run
- Fixing bracket for horizontal or vertical installation
- Ceiling mountings
- Fire barrier factory-assembled or available as a kit for installation on site
- Accessories for transport and installation
- Flexible connectors and screw sets.

6.1 Sizes and Conductor Configurations

Sizes (Tab. 6/1) 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.

Single bodies consist of an enclosure comprising 3 to 6 aluminum or copper busbars each. Accordingly, double bodies contain 6 to 12 bars in two enclosures. The number of busbars is determined by the required conductor configuration.

Cross-section				
	Single body (SB)		**Double body (DB)**	
Width	155 mm		411 mm	
Conductor material	Al	Cu	Al	Cu
Type	LI-A	LI-C	LI-A	LI-C
Overall height H	**Type code**			
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	
213 mm		LI-C . 2500		LI-C . 5000
230 mm	LI-A . 2000		LI-A . 4000	
280 mm		LI-C . 3200		LI-C . 6300
297 mm	LI-A . 2500		LI-A . 5000	

Tab. 6/1: **Sizes (cross-sections) of busbar runs for the LI system**

Busbar design

The busbars of the busbar trunking system LI 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 busbar trunking system LI independent of the mounting position, enabling a flexible busbar run. Usually, current derating is normally not required for edgewise and flat busbar position in horizontal mounting position, as well as on rising main busbars (vertical mounting position, Fig. 6/2). Only for LI-C . 5000 ... (for basic key, see Tab. 6/3) must the reduced rated operational current of 4,890 A be observed (see Tab. 6/17).

Conductor configurations

The busbar trunking system LI is available in eight different conductor configurations (Tab. 6/2). 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).

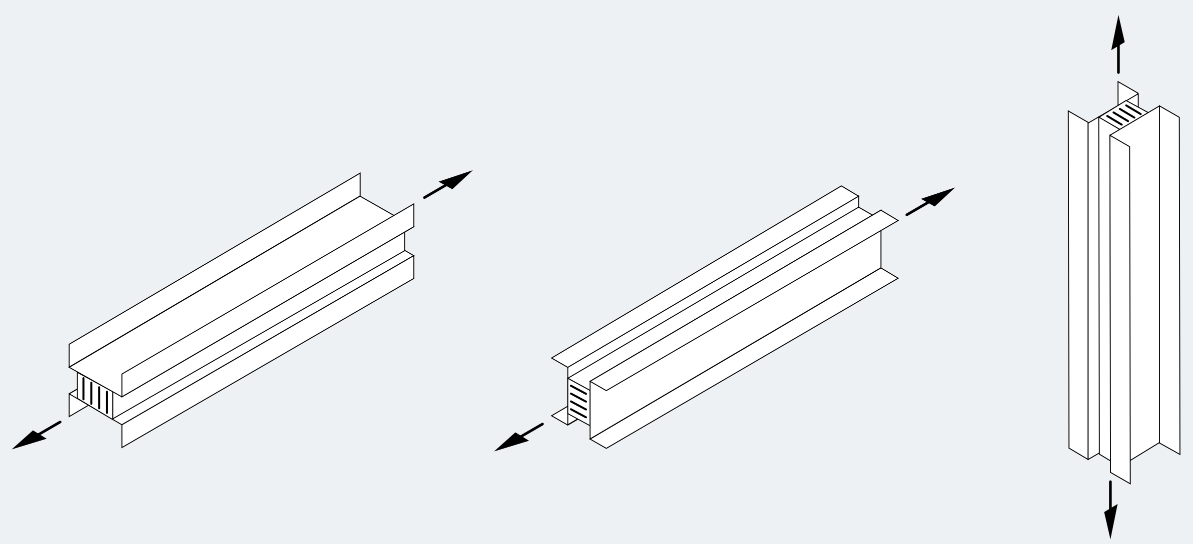
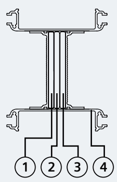
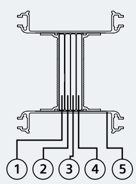
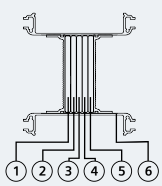
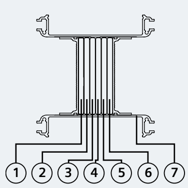


Fig. 6/2: **Mounting positions of the busbar runs**

Body [1]		Conductor configuration ①	②	③	④	⑤	⑥	⑦	Enclosure
	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
	LI-... 6C	N	N	L1	L2	L3	CE [2]	$PE_{encl.}$	Enclosure as PE conductor

[1] For type codes, see chapter 6.2
[2] CE: "Clean Earth" arrangement with separate PE conductor (functional PE), isolated against the enclosure of the busbar trunking system

Tab. 6/2: **Conductor configurations for the busbar runs of the LI system**

Comments:

- 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 busbar trunking system LI.
- Cross-section of PE conductor
  For the magnitude of short-circuit currents, the loop impedance over the PE conductor is important. Due to 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 prevent this.

6.2 Type Codes

For the busbar trunking system LI, the type codes for trunking units, junction units, infeeds, and connections are 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 serve for more precise definition of the selected system component and are attached to the type code.

For tap-off units, additional equipment, fire barrier elements, 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 codes for tap-off units starts with "LI-T-", and the type codes 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 6.3) and in the dimensional drawings (chapter 6.4). For all parts with enclosure, the additional specification H0A:7035 for the standard color RAL 7035 has to be attached to the type code.

6.2.1 Basic Keys and Selection Keys for LI Type Codes

In Tab. 6/3 it has to be observed that a complete type code still requires the selection key (Tab. 6/4) 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							
Insulation 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 50 %)				5G [1)]				
L1 + L2 + L3 + N + PE [3)] (PE conductor 100 %)				5H				
L1 + L2 + L3 + N + (CE) [5)] + PE(H) [2)]				6B				
L1 + L2 + L3 + N + N [4)] + (CE) [5)] + PE(H) [2)]				6C				
Degree of protection								
IP00					00			
IP40					40			
IP55					55			
IP66 [6)]					66			
Selection keys for the desired component (see Tab. 6/4)						. . .		
Busbar ends								
Hook and bolt							HB	
Hook							H	
Bolt							B	
Additional specifications for the desired component (see Tab. 6/4) as well as chapter 6.3 and chapter 6.4								. . .

[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 and indoor installation

Tab. 6/3: **Basic keys for the type codes of the LI system**

Basic key (see Tab. 6/3) LI- . . . . - . . -	Selection key . . . -	(. . . -)	(. . .)	Additional specifications / notes
Straight trunking units				
Straight trunking unit without tap-off points	L-			Length L 500 - 3,000 mm (H0B: 0500 - 3000)
Phase alteration unit	P-			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 6.4; 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-			
Junction units		Elbow	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-			Lengths H0X, H0Y, H0Z
Infeeds / connections		Flange plate	Hook 1)	
Transformer connection units "E", busbar infeed laterally left / right	TCEL- / TCER-		H	Phase sequence H1E, phase distances H1A (see chapter 6.4)
Transformer connection units "E", busbar infeed at the top, transformer connections left / right	TCETL- / TCETR-		H	
Transformer connection units "S" (PEN, PE left / right)	TCSL- / TCSR-		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-			
Connection pieces for non-Siemens distribution boards, double body, PE right / left	FA1- / FA2-			
Connection units for power distribution board SIVACON S8 at the front (installation at the top) / rear (installation at the bottom)	F8PQ . V- / F8PQ . H-			

1) Busbar end only possible with hook (for these connections and infeeds, the selection "B" or "HB" is omitted at the basic key in Tab. 6/3).
Conditions and examples for the additional specifications can be found in chapter 6.4
Note: Transition units between LR system and LI system (specific type code: LRA ...-LIAN ... or LRC ...-LICN ...) must be processed via LR order.
Description of the versions in the dimensional drawings in chapter 6.4 (transition units between LX and LI system are available on request)

Tab. 6/4: **Selection keys for trunking units, junction units, and infeeds of the LI system**

Con-
tents
Intro-
duction
1
2
3
4
5
6
7
8

6.2.2 Type Codes for Tap-Off Units

Depending on the component arrangement in the tap-off units, there are 6 sizes as standard (size 1, 2, 3, 4, 5, and 7) and, on request, size 6 for equipping with 4 circuit-breakers 3VL of 160 A rated current each (Tab. 6/5).

The basic structure for the type codes of the available tap-off units can be found in Tab. 6/6. For this, the installed protection and switching devices (part “Installation device” in Tab. 6/6) still need to be specified in detail.

Moreover, empty tap-off units up to size 5, prepared for the installation of circuit-breakers 3VA or for free arrangement of components, are available (Tab. 6/6). Further information on tap-off units is given in chapter 8.

Fuse-base NH

All 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 codes 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. 6/6 is therefore to be completed with:
-NH .. – 3 – MO-

Fuse-switch-disconnector 3NP11

Switching devices available as standard are:
- 3NP11 33 up to 160 A
- 3NP11 43 up to 250 A
- 3NP11 53 up to 400 A
- 3NP11 63 up to 630 A.

These tap-off units are 3-pole designs, and can be operated manually with the help of a disconnection handle located under the cover (manual operation = MO). 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. 6/6 is therefore to be completed with:
-3NP11 .. – 3 – MO-

Switch-disconnector with fuses FSF

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. 6/6 can therefore be completed with:
-FSF – IEC-
-FSF – BS-

Size	Circuit-breaker 3VL	Circuit-breaker 3VA	Fuse-switch-disconnector 3NP11	Fuse-base NH	Switch-disconnector + fuse FSF
1		50 … 160 A (3VA11 [2)]) 63, 100, 160 A (3VA21 [1)])	-	160 A	-
2		200, 250 A (3VA12 [2)]) 250 A (3VA22)	160 A	250 A	160 A
3		400 A (3VA23)	250 A	400 A	250 A
4		630 A (3VA24)	400 A	630 A	400 A
5		800 A (3VA25)	630 A	-	630 A
6	4 × 160 A (on request)	-	-	-	-
7	1,250 A, 1,600 A (3VL77, 3VL87)	-	-	-	-

[1)] 3VA21 only possible with instrument transformer module.
Note: For size 1 to size 7, instrument transformer modules are available; motor operating mechanisms from size 2
[2)] For 3VA11 and 3VA12, no additional copper lugs, instrument transformers, and motor operating mechanisms are available

Tab. 6/5: **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] / 5C								
L1 + L2 + L3 + N + PE [4] (5H)		3B / 5H								
L1 + L2 + L3 + N + (PE) [2] + PE [1] (6B)		3B / 5H [6] / 6B								
L1 + L2 + L3 + N + N [3]+ (PE) [2] + PE [1] (6C)		3B / 5H [6] / 5C [6] / 6B / 6C								
Degree of protection IP55			55							
Installation device										
Fuse-base NH: 00, 1, 2, 3				NH..						
Fuse-switch-disconnector 3NP11: 33, 43, 53, 63				3NP11..						
3VL: 77, 87				3VL..						
3VA: 11, 12, 21, 22, 23, 24, 25, or empty tap-off unit "prepared" for 3VA				3VA..						
Switch-disconnector with fuses: IEC, BS				FSF-..						
Empty tap-off units for free arrangement of components (I_n = 160 A, 250 A, 400 A, 630 A)				0000						
Number of poles										
3-pole					3					
4-pole					4					
Operation										
Manual operating mechanism (for 3VL, 3VA1, 3VA2, FSF)						RD				
Motor operating mechanism (for 3VL, 3VA2)						MD				
Manual operation (for 3NP11, NH)						MO				
Without (empty tap-off unit for free arrangement of components)						OO				
Plugging guide (dependent on rated current)										
For tap-off units ≤ 630 A: plugging guide integrated							G			
For tap-off units > 630 A: no plugging guide as standard (must be ordered as a separate part)							N			
Cable entry										
Blanking plate (aluminum plate without holes)								B		
Multi-core (sheet-steel plate incl. holes and cable grommets)								M		
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-S systems, the PEN bridge **LI-Z-T-PEN-BAR- .... -S**. for rated current "...." and size "S." = S1, S2, S3, S4, S5, or S7 must be ordered as an accessory
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. 6/6: **Type codes for tap-off units of the LI system (installation devices must be specified separately)**

Con-
tents

Intro-
duction

1

2

3

4

5

6

7

8

Circuit-breaker 3VA

Tap-off units with circuit-breaker 3VA are distinguished by standard types and configurable types.

i) Standard tap-off units with circuit-breaker 3VA

Standard tap-off units with circuit-breaker 3VA do not need a type code, because the indication of the article number of the circuit-breaker (MLFB = order number; German: maschinenlesbare Fabrikatebezeichnung = machine-readable product designation) specifies the complete tap-off unit (Tab. 6/7). As standard, these tap-off units are equipped with:

- Manual rotary operating mechanism
- Conductor configuration 5H
- Aluminum plate without holes for cable entry
- Cable connection directly at the device
- No current transformers.

ii) Specifically configurable tap-off units with 3VA

On the one hand, the specific tap-off units with 3VA can be configured regarding operation, conductor configuration, cable entry, connections, and additional equipment (Tab. 6/6). On the other hand, the greater variability of the circuit-breakers 3VA regarding switching capacity, releases, auxiliary releases, and auxiliary/alarm switches can be used to adapt the tap-off units to the system requirements. The article number structure of the circuit-breakers 3VA for the configurable tap-off units is summarized in Tab. 6/8 (additional special types of tap-off units with 3VA featuring RAL special color, copper lug for an extended customer connection, as well as configurations for power management with SENTRON PAC measuring devices are possible). For a specific configuration, please contact your Siemens partner.

Circuit-breaker 3VL

Tap-off units size 7 can be fitted with circuit-breakers 3VL featuring a rated current of 1,250 A or 1,600 A. These large tap-off units with 3VL must be configured via your Siemens contact partner. In addition to the type codes of Tab. 6/6 for LI-T- ... 3VL ..., the article numbers of the circuit-breakers 3VL are specified. Tab. 6/9 shows the number structure on which the configuration options are based.

The tap-off units size 7 (800 A and 1,250 A) are top-mounted on special trunking units (LI- ... LTB-...), and fastened at the tap-off point with a bolt. The lifter LI-Z-TOB-B is used as mounting aid. The mounting position of the tap-off units is limited to vertical busbar runs, and to top-mounted and bottom-suspended position for horizontal busbar runs. Lateral mounting positions are not possible.

Empty tap-off units

Apart from the equipped tap-off units, three different types of empty tap-off units (type code structure in Tab. 6/10) are available for the rated currents 160 A, 250 A, 400 A, or 630 A, and with conductor configuration 5H as standard:

- Prepared for installation of circuit-breakers 3VA
- Prepared for installation of circuit-breakers 3VL
- 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 8.

Cable entry plates

Besides the flange plate for measuring device boxes, further cable entry plates can be ordered for retrofitting the tap-off units. The type codes matching with the latest tap-off units are listed in Tab. 6/11. For older types of tap-off units, please contact your Siemens partner.

Ancillary equipment units for power metering and communication

The tap-off units can optionally be extended with an electronic measuring or communication device (see Tab. 6/12). The ancillary equipment unit required for this is normally mounted on the PE side on the right of the tap-off unit (size 1 to 5; please inquire the position for size 7). The ancillary equipment unit must not be mounted on an energized tap-off unit (in operation). On site, the positioning can be changed to “left” or “front” by exchanging the cable entry plates (see Tab. 6/11). Furthermore, the ancillary equipment unit can be turned in steps of 90° for better readability of the indications.

3VA1	N	NN-	N	AA	NN-	0AA0
3VA size (corresponds to size of associated tap-off unit in Tab. 6/5)						
3VA size 1	1					
3VA size 2	2					
Rated operational current I_n						
50, 63, 80, 100, 125, and 160 A (only 3VA size 1)		50 ... 16				
200 A, 250 A (only 3VA size 2)		20, 25				
Rated ultimate short-circuit breaking capacity I_{cu}						
36 kA (switching capacity “S” at 415 V)			4			
55 kA (switching capacity “M” at 415 V)			5			
70 kA (switching capacity “H” at 415 V)			6			
Releases						
— / Function / Circuit-breaker / N conductor protection, 4-pole / Short-circuit release						
TM240 / ATAM [1] / 3VA1. (I_n ≤ 250 A, 3-/4-pole) / 0 % / I_i adjustable, instantaneous				EF		
TM240 / ATAM [1] / 3VA1. (I_n ≤ 250 A, 4-pole) / 50 % / I_i adjustable, instantaneous				FF		
TM240 / ATAM [1] / 3VA1. (I_n ≤ 250 A, 4-pole) / 100 % / I_i adjustable, instantaneous				GF		
Number of poles for customer connection						
3-pole, flat screwed connection					32	
4-pole, flat screwed connection					42	
Auxiliary releases and auxiliary/alarm switches						
Without (only available for configurable tap-off units, see Tab. 6/8)						0AA0
3VA2	**N**	**NN-**	**N**	**AA**	**NN-**	**0AA0**
3VA size (corresponds to size of associated tap-off unit in Tab. 6/5)						
3VA size 1	1					
3VA size 2	2					
3VA size 3	3					
3VA size 4	4					
3VA size 5	5					
Rated operational current I_n						
50, 63, 80, 100, 125, and 160 A (only 3VA size 1)		50 ... 16				
200 A (only 3VA size 2)		20				
250 A (only 3VA sizes 2 and 3)		25				
400 A (only 3VA sizes 3 and 4)		40				
630 A (only 3VA sizes 4 and 5)		63				
Rated ultimate short-circuit breaking capacity I_{cu}						
55 kA (switching capacity “M” at 415 V for 3VA1. and I_n ≤ 250 A, as well as for 3VA2.)			5			
85 kA (switching capacity “H” at 415 V for 3VA2.)			6			
Releases						
— / Function / Circuit-breaker / N conductor protection, 4-pole / Short-circuit release						
ETU320 / LI [2] / 3VA2. (I_n ≤ 630 A, 3-/4-pole) / 0, 50, or 100 % / I_i adjustable, instantaneous				HL		
ETU350 / LSI [3] / 3VA2. (I_n ≤ 630 A, 3-/4-pole) / 0, 50, or 100 % / I_i adjustable, delayed				HN		
Number of poles for customer connection						
3-pole, flat screwed connection					32	
4-pole, flat screwed connection					42	
Auxiliary releases and auxiliary/alarm switches						
Without (only available for configurable tap-off units, see Tab. 6/8)						0AA0

[1] ATAM: Adjustable Thermal Adjustable Magnetic Trip Unit
[2] LI: overload protection (L) and instantaneous short-circuit protection (I)
[3] LSI: overload protection (L), short-time delayed short-circuit protection (S), and instantaneous short-circuit protection (I)

Tab. 6/7: **Article number structure of circuit-breakers for standard tap-off units with circuit-breaker 3VA**

3VA	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 … 630 A (please observe Tab. 6/7 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. 6/7)				4 … 6				
110 kA (switching capacity “C” at 415 V for 3VA2.)				7				
Releases								

	Function	Circuit-breaker	N conductor protection, 4-pole	Short-circuit release	AA
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
ETU340	ELISA® LI [5]	3VA2. ($I_n \leq 630$ A, 3- and 4-pole)	0 or 100 %	I_i adjustable, instantaneous	HK
ETU350	LSI [6]	3VA2. ($I_n \leq 630$ A, 3- and 4-pole)	0, 50, or 100 %	I_i adjustable, delayed	HN
ETU850	LSI [6]	3VA2. ($I_n \leq 630$ A, 3- and 4-pole)	from 20 / 40 % to 100 / 160 %	I_i adjustable, delayed	KP
ETU860	LSIG [7]	3VA2. ($I_n \leq 630$ A, 3- and 4-pole)	from 20 / 40 % to 100 / 160 %	I_i adjustable, delayed	KQ

3VA	NN-	0A	A0
Number of poles for customer connection			
3- / 4-pole, flat screwed connection	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 release left STL (12-30 V DC; 24 V AC 50/60 Hz)		0H	
Shunt release left STL (110-127 V AC 50/60 Hz)		0J	
Shunt release left STL (220-250 V DC; 206-277 V AC 50/60 Hz)		0K	
Auxiliary/alarm switches			
Without			A0
2 standard switches (HP: max. 600 V, max. 10 A, 2 conductors possible per contact point)			B0
2 standard switches (HQ: max. 250 V, max. 6 A, 1 conductor per contact point, suitable for electronics)			C0
3 standard switches (HQ)			D0
4 standard switches (HQ)			E0
1 standard switch (HQ) + 1 tripped signaling switch (HQ)			F0
1 standard switch (HP) + 1 tripped signaling switch (HP)			G0
2 standard switches (HQ) + 1 tripped signaling switch (HQ)			H0

[1] ATFM: Adjustable Thermal Fixed Magnetic Trip Unit
[2] ATAM: Adjustable Thermal Adjustable Magnetic Trip Unit
[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] ELISA® is a special current-time characteristic for selective grading of the LI protection: overload protection (L), instantaneous short-circuit protection (I)
[6] LSI: overload protection (L), short-time delayed short-circuit protection (S), and instantaneous short-circuit protection (I)
[7] LSIG: overload protection (L), short-time delayed short-circuit protection (I), and earth-fault protection (G)

Tab. 6/8: **Article number structure of circuit-breakers 3VA for configurable tap-off units (please contact your Siemens partner for configuration of such tap-off units)**

Size 7 of circuit-breaker 3VL with I_n = 1,250 A (flat screwed connection)					3VL7712	-N	AAN	6	-NA	AN
Size 8 of circuit-breaker 3VL with I_n = 1,600 A (connection bars at the front)					**3VL7816**	**-N**	**AAN**	**0**	**-NA**	**AN**
Rated ultimate short-circuit breaking capacity I_{cu}										
55 kA (switching capacity "N" at 415 V)						1				
70 kA (switching capacity "H" at 415 V)						2				
100 kA (switching capacity "L" at 415 V)						3				
Releases										
	Function	Number of poles	N conductor protection, 4-pole	Description of release function						
ETU10	LI	3-pole	-	Overcurrent and short-circuit protection adjustable			SB3			
ETU20	LSI	3-pole	-	Overcurrent adjustable, short-circuit protection with fixed setting, short-circuit delay			SE3			
ETU12	LIG	3-pole	-	Overcurrent and short-circuit protection adjustable, earth-fault function (G) adjustable			SL3			
ETU10	LIN	4-pole	50 / 100 %	Overcurrent and short-circuit protection adjustable			TA4			
ETU20	LSIN	4-pole	50 / 100 %	Overcurrent adjustable, short-circuit protection with fixed setting, short-circuit delay			TF4			
ETU12	LING	4-pole	50 / 100 %	Overcurrent and short-circuit protection adjustable, earth-fault function (G) adjustable			TN4			
Shunt/undervoltage release										
Without									0A	
Undervoltage release 220 ... 250 V AC									2H	
Undervoltage release 208 ... 277 V AC									8T	
Auxiliary releases and auxiliary/alarm switches										
Without										A0
2 auxiliary switches (1 NO / 1 NC) / 1 alarm switch										E1

Tab. 6/9: **Article number structure for configurable circuit-breakers 3VL (1,250 A and 1,600 A), additionally to the type code for a tap-off unit with 3VL**

Empty tap-off units	**Type codes (for explanations, see Tab. 6/6)**								
	Tap-off unit	**Rated current**	**Conductor configu-ration**	**IP**	**Circuit-breaker (0000 = empty)**	**No. of poles**	**Operation / Plugging guide**	**Cable entry / connection**	**Without current trans-formers**
Prepared for 3VL	LI-T-	0000-	5H- 1)	55-	3VL27- / 3VL37- / 3VL47-	3- / 4-	RD-G-	BD-	OO
					3VL57-	3- / 4-	RD-G-	BC-	OO
Prepared for 3VA	LI-T-	0000-	5H- 1)	55-	3VA21- / 3VA22- / 3VA23- / 3VA24-	3- / 4-	RD-G-	BD-	OO
					3VA25-	3- / 4-	RD-G-	BC-	OO
For free arrangement of components	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. 6/10: **Type codes for empty tap-off units for arrangement with 3VL, 3VA, or free components**

Size	**Entry plates for**			
	Multi-core cables	**Single-core cables**	**Al blanking plates**	**Ancillary equipment units**
	- With cable grommets - RAL 7035 and other RAL colors	**- With cable glands - RAL 7035 and other RAL colors**	**- Non-perforated - Non-painted**	**- RAL 7035 and other RAL colors**
1, 2, 3	LI-Z-T-CEP-MCC-S1, -S2, -S3	LI-Z-T-CEP-SCC-S1, -S2, -S3	LI-Z-T-CEP-BP-S1, -S2, -S3	LI-Z-T-CEP-MMB-S1, -S2, -S3
4, 5	LI-Z-T-CEP-MCC1-S4-5	LI-Z-T-CEP-SCC1-S4-5	LI-Z-T-CEP-BP1-S4-5	LI-Z-T-CEP-MMB1-S4-5
7	LI-Z-T-CEP-MCC-S7	LI-Z-T-CEP-SCC-S7	LI-Z-T-CEP-BP-S7	LI-Z-T-CEP-MMB-S7

Tab. 6/11: **Type codes for cable entry plates related to presently available tap-off units**

6.2.3 Type Codes for Additional Equipment of the LI System

Examples for additional equipment:

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 assembly:

	provided by customer	provided by factory
• 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 (312 to 667 mm): LI-Z-BH1 to LI-Z-BH5
- Flexible bracket: LI-Z-BKK2 (2 nos.), LI-Z-BKK8 (8 nos.)
- Bracket for fixed point: 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-BVF-SB (1 no. for single body)
- LI-Z-BVF-DB (2 nos. for double body)

Ancillary equipment units with	Type code	Communication interface	Configuration and order stipulations	Can be ordered separately
PAC2200	LI-Z-MMB-PAC2200-M	M-Bus	Only for tap-off units with current transformers	Yes 1)
PAC 3100	LI-Z-MMB-PAC3100 -RTU	Modbus RTU (RS485)		
PAC 3200	LI-Z-MMB-PAC3200 -PN, -PB, -RTU, -EMBT	Profinet I/O Profibus DPV1 Modbus RTU (RS485) Ethernet with Modbus TCP		
PAC 4200	LI-Z-MMB-PAC4200 -PN, -PB, -RTU, -EMBT			
COM100 module with display for external voltage tapping	LI-Z-MMB-COM100DE -PN, -PB, -RTU, -EMBT	Profinet I/O Profibus DPV1 Modbus RTU (RS485) Ethernet with Modbus TCP	Only for tap-off units with 3VA2., ETU8.. module, and without current transformers	Yes 1)
COM100 module without display for external voltage tapping	LI-Z-MMB-COM100CE -PN, -PB, -RTU, -EMBT			
COM100 module with display with internal voltage tapping	LI-Z-MMB-COM100DS -PN, -PB, -RTU, -EMBT	Profinet I/O Profibus DPV1 Modbus RTU (RS485) Ethernet with Modbus TCP	Only for tap-off units with 3VA2., ETU8.. module, and without current transformers	No
COM100 module without display with internal voltage tapping	LI-Z-MMB-COM100CS -PN, -PB, -RTU, -EMBT			
Empty ancillary equipment units	**Type code**	**Communication interface**	**Configuration and order stipulations**	**Can be ordered separately**
Prepared with cut-out for PAC installation	LI-Z-MMB-PAC0000	-	For all tap-off units	Yes 1)
For free arrangement of components	LI-Z-MMB-XXX0000	-		

1) When ordered separately, suitable cable entry plates must be ordered additionally

Tab. 6/12: **Type codes for ancillary equipment units related to tap-off units for power metering and communication**

6.3 Technical Specifications

Apart from the general technical specifications for the LI system, the conversion factors for the temperature characteristic are listed in Tab. 6/13.

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 I_n • Al busbars • Cu busbars	 800 ... 5,000 A 800 ... 6,300 A
Climatic resistance • Constant 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 / 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)]	-5 °C / +40 °C / +35 °C
Environmental classes acc. to IEC 60721 derived from climatic resistance tests • Climatic environmental conditions • Chemical impact • Biological environmental conditions • Mechanical impact	 1K5 (storage) = 3K7L (operation without exposure to the sun); 2K2 (transport) Salt spray (more contaminants opt.): 1C2 (storage) = 3C2 (operation) = 2C2 (transport) Covered by IP degrees of protection and type of packaging 1B2 (storage) = 3B2 (operation) = 2B2 (transport) Covered by IP degrees of protection and type of packaging 1S2 (storage) = 3S2 (operation) = 2S2 (transport)
Degree of protection acc. to IEC 60529	IP55 (IP66 for power transmission and indoor installation)
Degree of protection against external mechanical impacts	IK08 according 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. 6/13: **General system data and temperature characteristic of the LI system**

6.3.1 Technical Specifications for LI Trunking Units

The tables are structured regarding the conductor material, the fault current calculation methods, and the fire loads:

- Tab. 6/14 Technical specifications for trunking units LI-A
- Tab. 6/15 Impedances LI-A for fault currents according to the impedance method
- Tab. 6/16 Impedances LI-A for fault currents according to the symmetrical components method
- Tab. 6/17 Technical specifications for trunking units LI-C
- Tab. 6/18 Impedances LI-C for fault currents according to the impedance method
- Tab. 6/19 Impedances LI-C for fault currents according to the symmetrical components method
- Tab. 6/20 Fire loads for trunking units of the LI system
- Tab. 6/21 Weights for trunking units of 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	Resistance 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	Resistance R_1	mΩ/m	0.125	0.088	0.074	0.052	0.038	0.027	0.026	0.018	0.013
	Reactance X_1	mΩ/m	0.021	0.016	0.014	0.010	0.008	0.006	0.005	0.004	0.003
	Impedance 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	Resistance 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
[1] Calculated values											

Tab. 6/14: **Technical specifications for trunking units LI-A**

LI-A				0800	1000	1250	1600	2000	2500	3200	4000	5000
Impedance per unit length of the fault loops phase with PE and phase with PEN												
3ph-PE(H) 3ph-N-PE(H) 3ph-200% N-PE(H) 3ph-N-PE(H)-CE 3ph-200% N-PE(H)-CE	Resistance	$R_{b20\text{-}ph\text{-}PE}$	mΩ/m	0.136	0.106	0.095	0.076	0.061	0.052	0.040	0.033	0.025
	Reactance	$X_{b20\text{-}ph\text{-}PE}$	mΩ/m	0.053	0.044	0.039	0.031	0.024	0.018	0.016	0.012	0.007
	Impedance	$Z_{b20\text{-}ph\text{-}PE}$	mΩ/m	0.146	0.115	0.102	0.082	0.066	0.055	0.042	0.035	0.026
3ph-N-100% PE(B) 3ph-PEN	Resistance	$R_{b20\text{-}ph\text{-}PE\,/\,PEN}$	mΩ/m	0.127	0.096	0.083	0.062	0.047	0.035	0.032	0.024	0.018
	Reactance	$X_{b20\text{-}ph\text{-}PE\,/\,PEN}$	mΩ/m	0.045	0.035	0.030	0.023	0.016	0.012	0.012	0.009	0.006
	Impedance	$Z_{b20\text{-}ph\text{-}PE\,/\,PEN}$	mΩ/m	0.134	0.102	0.088	0.066	0.050	0.037	0.034	0.026	0.019
Impedance per unit length of the fault loops phase with N and phase with phase												
3ph-N-PE(H) 3ph-N-100% PE(B) 3ph-N-PE(H)-CE	Resistance	$R_{b20\text{-}ph\text{-}N(ph)}$	mΩ/m	0.190	0.134	0.113	0.081	0.058	0.042	0.040	0.029	0.021
	Reactance	$X_{b20\text{-}ph\text{-}N(ph)}$	mΩ/m	0.052	0.043	0.033	0.025	0.019	0.013	0.014	0.009	0.008
	Impedance	$Z_{b20\text{-}ph\text{-}N(ph)}$	mΩ/m	0.197	0.141	0.117	0.084	0.061	0.044	0.042	0.030	0.022
3ph-200% N-PE(H) 3ph-200% N-PE(H)-CE	Resistance	$R_{b20\text{-}ph\text{-}N}$	mΩ/m	1)	1)	1)	1)	1)	1)	1)	1)	1)
	Reactance	$X_{b20\text{-}ph\text{-}N}$	mΩ/m	1)	1)	1)	1)	1)	1)	1)	1)	1)
	Impedance	$Z_{b20\text{-}ph\text{-}N}$	mΩ/m	1)	1)	1)	1)	1)	1)	1)	1)	1)
	Resistance	$R_{b20\text{-}ph\text{-}ph}$	mΩ/m	0.183	0.128	0.108	0.076	0.054	0.040	0.037	0.028	0.020
	Reactance	$X_{b20\text{-}ph\text{-}ph}$	mΩ/m	0.036	0.030	0.023	0.017	0.015	0.009	0.010	0.006	0.005
	Impedance	$Z_{b20\text{-}ph\text{-}ph}$	mΩ/m	0.186	0.131	0.110	0.078	0.056	0.041	0.038	0.028	0.020

1) On request
PE(H): enclosure as PE; PE(B): PE as a separate busbar

Tab. 6/15: **Impedances LI-A for calculation of fault currents according to the impedance method with ambient temperature 20 °C and frequency 50 Hz**

LI-A				0800	1000	1250	1600	2000	2500	3200	4000	5000
Zero impedance of the phases with PE and phase with PEN												
3ph-PE(H) 3ph-N-PE(H) 3ph-200% N-PE(H) 3ph-N-PE(H)-CE 3ph-200% N-PE(H)-CE	Resistance	$R_{b20\text{-}ph\text{-}PE}$	mΩ/m	0.229	0.192	0.179	0.154	0.129	0.116	0.080	0.073	0.055
	Reactance	$X_{b20\text{-}ph\text{-}PE}$	mΩ/m	0.126	0.108	0.096	0.078	0.060	0.045	0.039	0.030	0.033
	Impedance	$Z_{b20\text{-}ph\text{-}PE}$	mΩ/m	0.262	0.220	0.203	0.173	0.142	0.124	0.089	0.079	0.064
3ph-N-100% PE(B) 3ph-PEN	Resistance	$R_{b20\text{-}ph\text{-}PE\,/\,PEN}$	mΩ/m	0.202	0.163	0.143	0.112	0.088	0.067	0.058	0.046	0.035
	Reactance	$X_{b20\text{-}ph\text{-}PE\,/\,PEN}$	mΩ/m	0.102	0.078	0.069	0.051	0.039	0.030	0.039	0.018	0.015
	Impedance	$Z_{b20\text{-}ph\text{-}PE\,/\,PEN}$	mΩ/m	0.226	0.181	0.158	0.123	0.096	0.074	0.070	0.049	0.038
Zero impedance of the fault loops phase with N												
3ph-N-PE(H) 3ph-N-100% PE(B) 3ph-N-PE(H)-CE	Resistance	$R_{b20\text{-}ph\text{-}N(ph)}$	mΩ/m	0.387	0.273	0.231	0.165	0.120	0.087	0.081	0.060	0.042
	Reactance	$X_{b20\text{-}ph\text{-}N(ph)}$	mΩ/m	0.117	0.096	0.075	0.054	0.048	0.030	0.030	0.018	0.018
	Impedance	$Z_{b20\text{-}ph\text{-}N(ph)}$	mΩ/m	0.404	0.289	0.243	0.174	0.129	0.092	0.086	0.063	0.046
3ph-200% N-PE(H) 3ph-200% N-PE(H)-CE	Resistance	$R_{b20\text{-}ph\text{-}N}$	mΩ/m	1)	1)	1)	1)	1)	1)	1)	1)	1)
	Reactance	$X_{b20\text{-}ph\text{-}N}$	mΩ/m	1)	1)	1)	1)	1)	1)	1)	1)	1)
	Impedance	$Z_{b20\text{-}ph\text{-}N}$	mΩ/m	1)	1)	1)	1)	1)	1)	1)	1)	1)

1) On request
PE(H): enclosure as PE; PE(B): PE as a separate busbar

Tab. 6/16: **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	Resistance 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	Resistance R_1	mΩ/m	0.074	0.065	0.044	0.034	0.025	0.017	0.017	0.012	0.009
	Reactance X_1	mΩ/m	0.021	0.019	0.012	0.010	0.008	0.006	0.005	0.004	0.003
	Impedance 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	Resistance 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

[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. 6/17: **Technical specifications for trunking units LI-C**

LI-C				1000	1250	1600	2000	2500	3200	4000	5000	6300
Impedance per unit length of the fault loops phase with PE and phase with PEN												
3ph-PE(H) 3ph-N-PE(H) 3ph-200% N-PE(H) 3ph-N-PE(H)-CE 3ph-200% N-PE(H)-CE	Resistance	$R_{b20-ph-PE}$	mΩ/m	0.101	0.093	0.073	0.063	0.054	0.045	0.032	0.028	0.023
	Reactance	$X_{b20-ph-PE}$	mΩ/m	0.050	0.047	0.038	0.030	0.024	0.017	0.016	0.012	0.009
	Impedance	$Z_{b20-ph-PE}$	mΩ/m	0.112	0.104	0.082	0.070	0.059	0.049	0.036	0.030	0.025
3ph-N-100% PE(B) 3ph-PEN	Resistance	$R_{b20-ph-PE / PEN}$	mΩ/m	0.086	0.079	0.056	0.045	0.035	0.025	0.023	0.018	0.014
	Reactance	$X_{b20-ph-PE / PEN}$	mΩ/m	0.041	0.037	0.028	0.022	0.017	0.012	0.011	0.008	0.006
	Impedance	$Z_{b20-ph-PE / PEN}$	mΩ/m	0.096	0.087	0.062	0.050	0.039	0.028	0.025	0.020	0.015
Impedance per unit length of the fault loops phase with N and phase with phase												
3ph-N-PE(H) 3ph-N-100% PE(B) 3ph-N-PE(H)-CE	Resistance	$R_{b20-ph-N(ph)}$	mΩ/m	0.116	0.103	0.069	0.053	0.040	0.028	0.027	0.021	0.014
	Reactance	$X_{b20-ph-N(ph)}$	mΩ/m	0.047	0.047	0.030	0.024	0.021	0.014	0.014	0.011	0.008
	Impedance	$Z_{b20-ph-N(ph)}$	mΩ/m	0.126	0.114	0.076	0.058	0.045	0.031	0.030	0.023	0.016
3ph-200% N-PE(H) 3ph-200% N-PE(H)-CE	Resistance	$R_{b20-ph-N}$	mΩ/m	1)	1)	1)	1)	1)	1)	1)	1)	1)
	Reactance	$X_{b20-ph-N}$	mΩ/m	1)	1)	1)	1)	1)	1)	1)	1)	1)
	Impedance	$Z_{b20-ph-N}$	mΩ/m	1)	1)	1)	1)	1)	1)	1)	1)	1)
	Resistance	$R_{b20-ph-ph}$	mΩ/m	0.106	0.094	0.063	0.048	0.036	0.025	0.024	0.018	0.013
	Reactance	$X_{b20-ph-ph}$	mΩ/m	0.040	0.036	0.026	0.019	0.016	0.010	0.009	0.008	0.006
	Impedance	$Z_{b20-ph-ph}$	mΩ/m	0.113	0.100	0.068	0.052	0.039	0.027	0.026	0.019	0.014

1) On request
PE(H): enclosure as PE; PE(B): PE as a separate busbar

Tab. 6/18: **Impedances LI-C for calculation of fault currents according to the impedance method with ambient temperature 20 °C and frequency 50 Hz**

LI-C				1000	1250	1600	2000	2500	3200	4000	5000	6300
Zero impedance of the phases with PE and phase with PEN												
3ph-PE(H) 3ph-N-PE(H) 3ph-200% N-PE(H) 3ph-N-PE(H)-CE 3ph-200% N-PE(H)-CE	Resistance	$R_{b20-ph-PE}$	mΩ/m	0.196	0.185	0.156	0.140	0.127	0.111	0.072	0.066	0.056
	Reactance	$X_{b20-ph-PE}$	mΩ/m	0.123	0.120	0.093	0.078	0.063	0.045	0.042	0.033	0.024
	Impedance	$Z_{b20-ph-PE}$	mΩ/m	0.231	0.221	0.181	0.160	0.142	0.120	0.083	0.073	0.061
3ph-N-100% PE(B) 3ph-PEN	Resistance	$R_{b20-ph-N(ph)}$	mΩ/m	0.154	0.144	0.106	0.088	0.069	0.051	0.045	0.036	0.029
	Reactance	$X_{b20-ph-N(ph)}$	mΩ/m	0.090	0.084	0.060	0.048	0.036	0.027	0.024	0.021	0.012
	Impedance	$Z_{b20-ph-N(ph)}$	mΩ/m	0.179	0.167	0.122	0.100	0.078	0.058	0.051	0.042	0.031
Zero impedance of the fault loops phase with N												
3ph-N-PE(H) 3ph-N-100% PE(B) 3ph-N-PE(H)-CE	Resistance	$R_{b20-ph-N(ph)}$	mΩ/m	0.240	0.213	0.144	0.111	0.084	0.060	0.054	0.042	0.030
	Reactance	$X_{b20-ph-N(ph)}$	mΩ/m	0.108	0.105	0.066	0.051	0.045	0.033	0.030	0.024	0.015
	Impedance	$Z_{b20-ph-N(ph)}$	mΩ/m	0.263	0.237	0.158	0.122	0.095	0.068	0.062	0.048	0.034
3ph-200% N-PE(H) 3ph-200% N-PE(H)-CE	Resistance	$R_{b20-ph-N}$	mΩ/m	1)	1)	1)	1)	1)	1)	1)	1)	1)
	Reactance	$X_{b20-ph-N}$	mΩ/m	1)	1)	1)	1)	1)	1)	1)	1)	1)
	Impedance	$Z_{b20-ph-N}$	mΩ/m	1)	1)	1)	1)	1)	1)	1)	1)	1)

1) On request
PE(H): enclosure as PE; PE(B): PE as a separate busbar

Tab. 6/19: **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. 6/3)**	**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
3ph-200% N-PE(H)-CE	6	6C	kWh/m	2.87	3.42	3.93	4.67	6.14	7.77	9.35	12.28	15.54
LI-C				**1000**	**1250**	**1600**	**2000**	**2500**	**3200**	**4000**	**5000**	**6300**
Trunking units, conductor configuration	**Number of busbars**	**Key for configuration (Tab. 6/3)**	**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
3ph-200% N-PE(H)-CE	6	6C	kWh/m	2.87	3.16	3.84	4.45	5.59	7.43	9.29	11.19	14.87
Fire load per tap-off point			kWh	0.98								
PE(H): enclosure as PE; PE(B): PE as a separate busbar												

Tab. 6/20: **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. 6/3)**	**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
3ph-200% N-PE(H)-CE	6	6C	kg/m	14.1	16.9	18.7	23.3	29.5	38.1	46.7	59.0	76.0
LI-C				**1000**	**1250**	**1600**	**2000**	**2500**	**3200**	**4000**	**5000**	**6300**
Trunking units, conductor configuration	**Number of busbars**	**Key for configuration (Tab. 6/3)**	**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
3ph-200% N-PE(H)-CE	6	6C	kg/m	26.5	30.4	39.9	53.1	68.7	95.5	105.4	136.6	190.2
PE(H): enclosure as PE; PE(B): PE as a separate busbar												

Tab. 6/21: **Weights for trunking units of the LI system**

6.3.2 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 = 400 V
- Degree of protection IP55
- Ambient temperature:
  min. = -5 °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. 6/22 to Tab. 6/26. 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.

Tap-off units LI-T with circuit-breaker 3VA			3VA11	3VA21	3VA12	3VA22
Rated currents						
Rated current I_n		A	50, 63, 80, 100, 125, 160	63, 100, 160	200, 250	160, 250
Maximum permissible operational current I_{nc}		A	50, 63, 80, 100, 125, 141	63, 100, 157	200, 248	160, 245
Rated conditional short-circuit current I_{cc}	Switching capacity N	kA	25	-	-	-
	Switching capacity S	kA	36	-	-	-
	Switching capacity M	kA	55	55	55	55
	Switching capacity H	kA	70	85	70	85
	Switching capacity C	kA	-	110	-	110
Cable entry [1]						
Cable grommets for multi-core cables [2]			KT4	KT4	KT4	KT4
Single-core cables through undrilled Al plate [3]			7 × M32	7 × M32	7 × M40	7 × M40
Connections						
Bolt connection with copper lug L1, L2, L3, N (4-pole) or bolt connection N (3-pole) / PE, PEN			M8	M8	M8	M10
		mm^2	1 × 50 ... 150	1 × 50 ... 150	1 × 50 ... 150	1 × 50 ... 150
		mm^2	2 × 50 ... 120	2 × 50 ... 120	2 × 50 ... 120	2 × 95 ... 120
Direct connection L1, L2, L3, N (4-pole)			M6	M8	M8	M8
		mm^2	[4]	[4]	[4]	[4]
Weight		kg	20	20	30	30
Size of tap-off unit			Size 1 [5]	Size 1 [6]	Size 2 [5]	Size 2

Tap-off units LI-T with circuit-breaker 3VA			3VA23	3VA24	3VA25
Rated currents					
Rated current I_n		A	250, 400	400, 630	630
Maximum permissible operational current I_{nc}		A	250, 385	400, 475	630
Rated conditional short-circuit current I_{cc}	Switching capacity M	kA	55	55	55
	Switching capacity H	kA	85	85	85
	Switching capacity C	kA	110	110	110
Cable entry [1]					
Cable grommets for multi-core cables [2]			KT4	2 × KT4	2 × KT4
Single-core cables through undrilled Al plate [3]			7 × M50	14 × M50	14 × M50
Connections					
Bolt connection with copper lug L1, L2, L3, N (4-pole) or bolt connection N (3-pole) / PE, PEN			M10	M10	M10
		mm^2	1 × 95 ... 240	1 × 95 ... 240	1 × 95 ... 240
		mm^2	2 × 95 ... 120	2 × 95 ... 120	2 × 95 ... 120
Direct connection L1, L2, L3, N (4-pole)			M10	M10	M10
		mm^2	[4]	[4]	[4]
Weight		kg	50	60	80
Size of tap-off unit			Size 3	Size 4	Size 5

[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] Cable grommets KT4 for cable diameters from 14 to 68 mm
[3] Al plate, undrilled for cable glands; cable glands with strain relief are required (not included in the scope of supply)
[4] See technical documentation for circuit-breaker 3VA
[5] No motor operating mechanism possible
[6] Wit instrument transformer module and motor operating mechanism: size 2 of the tap-off unit

Tab. 6/22: **Technical specifications for LI tap-off units with circuit-breaker 3VA**

Tap-off units LI-T with circuit-breaker 3VL			3VL7	3VL8
Rated currents				
Rated current I_n		A	800	1,250
Maximum permissible operational current I_{nc}		A	800	1,130
Rated conditional short-circuit current I_{cc}	Switching capacity N	kA	55	55
	Switching capacity H	kA	70	70
	Switching capacity L	kA	100	100
Connectable cross-sections (copper)				
Bolt connection with copper lug / Bolt connection			M12	M12
L1, L2, L3, N (4-pole) / N (3-pole), PE, PEN		mm²	1 x 95 ... 300	1 x 95 ... 300
		mm²	4 x 95 ... 300	4 x 95 ... 300
Cable grommets for multi-core cables [1]			4 x KT4	4 x KT4
Single-core cables through undrilled Al plate [2]			2 x 14 x M50	2 x 14 x M50
Weight		kg	150	170
Size of tap-off unit			Size 7	Size 7

[1] Cable grommets KT4 for cable diameters from 14 to 68 mm
[2] Al plate, undrilled for cable glands; cable glands with strain relief are required (not included in the scope of supply)

Tab. 6/23: **Technical specifications for LI tap-off units with circuit-breaker 3VL**

Tap-off units LI-T with switch-disconnector 3NP11		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		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		Size 2	Size 3	Size 4	Size 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. 6/24: **Technical specifications for LI tap-off units with switch-disconnector and fuse-bases 3NP11**

Tap-off units with fuse-switch-disconnector	Unit	FSF160	FSF250	FSF400	FSF630
Fuse-link NH / BS (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 [1] / 130	215 / 195	320 / 300	485 [2] / 505
Switching capacity of fuse-switch-disconnector [3]		AC-22B	AC-22B	AC-22B	AC-22B
Rated conditional short-circuit current I_{cc} for protection by fuses [4]: NH / BS	kA	100 / 80	100 / 80	100 / 80	100 / 80
Connectable cross-sections					
Connection to bolt with copper lug		M8	M8	M10	M10
L1, L2, L3	mm^2	1 × 50 ... 150	1 × 50 ... 150	1 × 95 ... 240	1 × 95 ... 240
	mm^2	2 × 50 ... 120	2 × 50 ... 120	2 × 95 ... 120	2 × 95 ... 120
Direct connection		M8	M10	M10	M12
L1, L2, L3	mm^2	max. 95	max. 240	max. 240	max. 300
Connection to bolt		M8	M 8	M10	M10
N, PE, PEN	mm^2	1 × 50 ... 150	1 × 50 ... 150	1 × 95 ... 240	1 × 95 ... 240
	mm^2	2 × 50 ... 120	2 × 50 ... 120	2 × 95 ... 120	2 × 95 ... 120
Cable grommets for multi-core cables [5]		KT4	KT4	2 × KT4	2 × KT4
Single-core cables through undrilled Al plate [6]		7 × M40	7 × M50	14 × M50	14 × M50
Weight	kg	29	40	54	78
Size of the tap-off unit		Size 2	Size 3	Size 4	Size 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} = 125 A
[2] 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
[3] Utilization category for installed fuse-switch-disconnector according to IEC 60947-3
[4] Fuses according to IEC 60269-1 and -2
[5] Cable grommets KT4 for cable diameters from 14 to 68 mm
[6] Al plate, undrilled for cable glands; cable glands with strain relief are required (not included in the scope of supply)

Tab. 6/25: **Technical specifications for LI tap-off units with fuse-switch-disconnector FSF**

Tap-off units LI-T with fuse-bases	Unit	NH00	NH1	NH2	NH3
Fuse-link NH		**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	mm^2	1 × 50 ... 150	1 × 50 ... 150	1 × 95 ... 240	1 × 95 ... 240
	mm^2	2 × 50 ... 120	2 × 50 ... 120	2 × 95 ... 120	2 × 95 ... 120
Direct connection		M8	M10	M10	M12
L1, L2, L3	mm^2	max. 95	max. 240	max. 240	max. 300
Connection to bolt		M8	M 8	M10	M10
N, PE, PEN	mm^2	1 × 50 ... 150	1 × 50 ... 150	1 × 95 ... 240	1 × 95 ... 240
	mm^2	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		Size 1	Size 2	Size 3	Size 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. 6/26: **Technical specifications for LI tap-off units with fuse-bases NH**

6.3.3 Technical Specifications for Infeeds and Connections of the LI System

Transformer connection units "E"

For the transformer connections "E" (units "TCEL", "TCER", "TCETL", and "TCETR" in Tab. 6/4), the conductor configurations 3B, 4B, and 5B are available as standard with the phase sequences (additional specification to the type code: H1E) of Tab. 6/27 and the phase distances (additional specification to the type code: H1A) of Tab. 6/28. Other conductor configurations can be inquired if needed.

The distances between the phases can be selected within the specified minimum and maximum values. For the versions "TCETL" and "TCETR", there is only the distance Fix2 (Fix1 = Fix2).

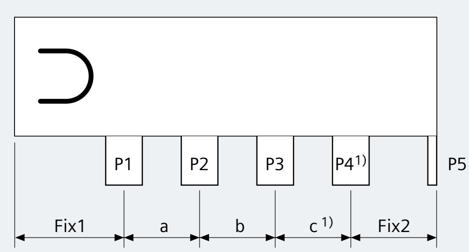
An additional enclosure for the transformer connection unit is available as an accessory on request. Being equipped with an adapter frame, the transformer connection unit can be flanged onto a distribution board enclosure / transformer enclosure.

Note: No elbows or knees with a fixed limb can be connected to the versions "TCETL" and "TCETR".

	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, the data before the slash refer to 4-conductor configurations; those after the slash refer to 5-conductor configurations
- The phase sequences "I" and "K" refer to 3-conductor configurations

Tab. 6/27: **Phase sequences for transformer connection units "TCEL", "TCER", "TCETL", and "TCETR"**



System	Fix1: TCE .	Fix2: TCE . TCET . 2)	a, b, c: 4B, 5B a, b: 3B minimum	a, b, c: 4B, 5B (a, b: 3B) maximum
LIA0800, LIC1000	266 mm	120 mm	135 mm	800 (1,200) mm
LIA1000	278 mm	132 mm	160 mm	800 (1,200) mm
LIA1250, LIC1600	286 mm	140 mm	175 mm	800 (1,200) mm
LIA1600, LIA3200	306 mm	160 mm	215 mm	800 (1,200) mm
LIA2000, LIA4000	333 mm	187 mm	270 mm	800 (1,200) mm
LIA2500, LIA5000	368 mm	222 mm	340 mm	800 (1,200) mm
LIC1250	271 mm	125 mm	145 mm	800 (1,200) mm
LIC2000, LIC4000	301 mm	155 mm	205 mm	800 (1,200) mm
LIC2500, LIC5000	323 mm	177 mm	250 mm	800 (1,200) mm
LIC3200, LIC6300	361 mm	215 mm	325 mm	800 (1,200) mm

Maximum possible total length: 3,000 mm:
1) Conductor configuration 3B: phase 4 and distance c omitted
2) "TCETR", "TCETL": 2 × Fix2 must be taken, as Fix1 = Fix2
"TCER", "TCEL": Fix1 and Fix2 are different

Tab. 6/28: **Phase sequences of the transformer connection units "TCEL", "TCER", "TCETL", and "TCETR" for conductor configurations 3B, 4B, and 5B**

Transformer connection units "S"

The phase distance of the connection tags at the transformer connection units "S" ("TCSL": PEN, PE left; "TCSR": PEN, PE right) is generally 160 mm. Other dimensions can be inquired as a customer-specific design.

The conductor configurations 3B, 4B, 5B, and 5H are available as standard (5C, 6B, and 6C on request; 5G in preparation). In addition, a suitable connection flange (enclosure) must be ordered, which ensures the degree of protection of the connection point. 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. In height direction, the bellows can be compressed or stretched approx. ± 20 mm as a maximum.

Incoming cable connection units "E" and "S"

The incoming cable connection units type "E" (... CFE ...) 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 connection). The incoming cable connection units type "S" (... 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 connection as standard. In addition, a suitable connection flange (enclosure) must be ordered, which ensures the degree of protection of the connection point. The cross-sections for the cable connection are given in Tab. 6/29.

Connection to connection pieces for non-Siemens distribution boards

To connect the connection pieces for non-Siemens distribution boards FA, the conductor cross-sections given in Tab. 6/30 must be provided.

Cable connection: number of cables × cross-section size		
System	**LI ... -CFE ...**	**LI ... -CFS ...**
LI-A . 0800	3 × 300 mm ^{2}	2 × 300 mm ^{2}
LI-A . 1000, LI-C . 1000	4 × 300 mm ^{2}	4 × 300 mm ^{2}
LI-A . 1250, LI-C . 1250	5 × 300 mm ^{2}	4 × 300 mm ^{2}
LI-A . 1600, LI-C . 1600	6 × 300 mm ^{2}	4 × 300 mm ^{2}
LI-A . 2000, LI-C . 2000	8 × 300 mm ^{2}	6 × 300 mm ^{2}
LI-A . 2500, LI-C . 2500	10 × 300 mm ^{2}	8 × 300 mm ^{2}
LI-C . 3200	11 × 300 mm ^{2}	8 × 300 mm ^{2}
LI-A . 3200		8 × 300 mm ^{2}
LI-C . 4000		10 × 300 mm ^{2}
LI-A . 4000		12 × 300 mm ^{2}
LI-C . 5000		14 × 300 mm ^{2}
LI-A . 5000		16 × 300 mm ^{2}
LI-C . 6300		16 × 300 mm ^{2}

Tab. 6/29: **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. 6/30: **Conductor cross-sections for bare copper busbars for connecting the connection pieces for non-Siemens distribution boards according to DIN 43671**

6.4 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 to the respective article number and automatically generated in the configuration tool "BusbarPlan" when the component lists are created.

For configuration, symbolic representations of the system components (Fig. 6/3) 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 thicker 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
- Limb designations:
  Z-limb With hook
  Y-limb With bolt
  Z-limb Limb between X- and Y-limb
- Angle W Junction unit with flexible angle (one fixed limb FX or FY): 85° ≤ W ≤ 175°.

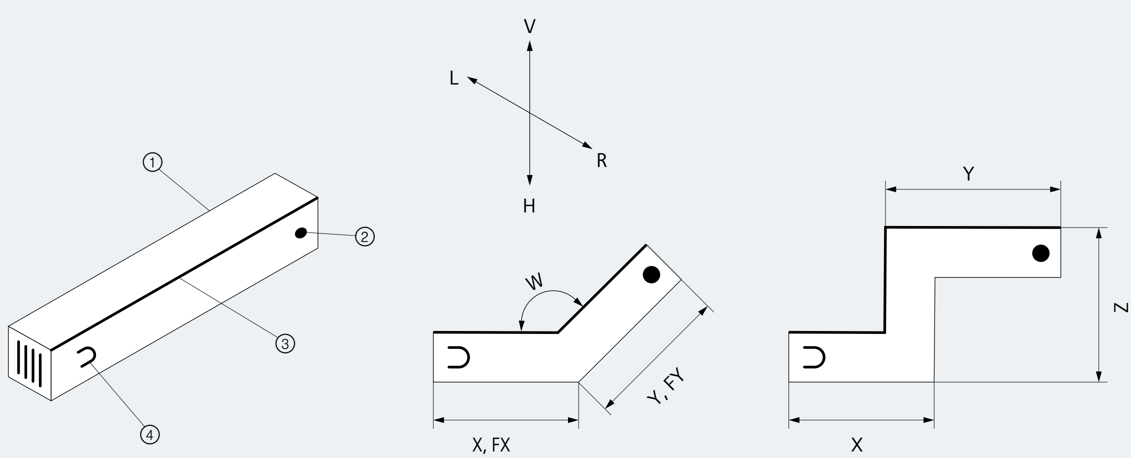
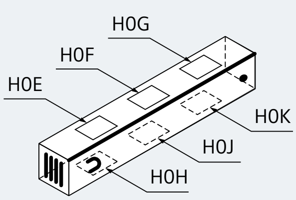


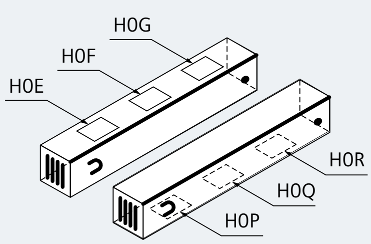
Fig. 6/3: **Symbolic representation of LI trunking units without tap-off points for configuration**

Con-
tents
Intro-
duction
1
2
3
4
5
6
7
8

6.4.1 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. 6/4): length H0C (4-digit specification 1150 ... 3000 in mm; e.g., "H0C:3000" for 3,000 mm)
  Position of the tap-off points (Fig. 6/4):
  H0E, H0F, H0G at the top for single body, and left-top for double body
  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. 6/4) or at the bottom (selection key "LTB01" in Tab. 6/4) 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.





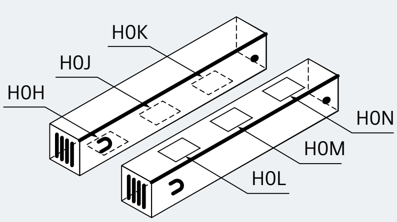


Fig. 6/4: **Symbolic representation of LI trunking units with tap-off points for configuration**

The connections for single and double body are shown in Fig. 6/5. Depending on the different heights of the systems, there are one, two, or three bolt connections between the trunking units (Fig. 6/6). The following illustrations always show only one version, with a different number of bolts for connection according to the busbar height.

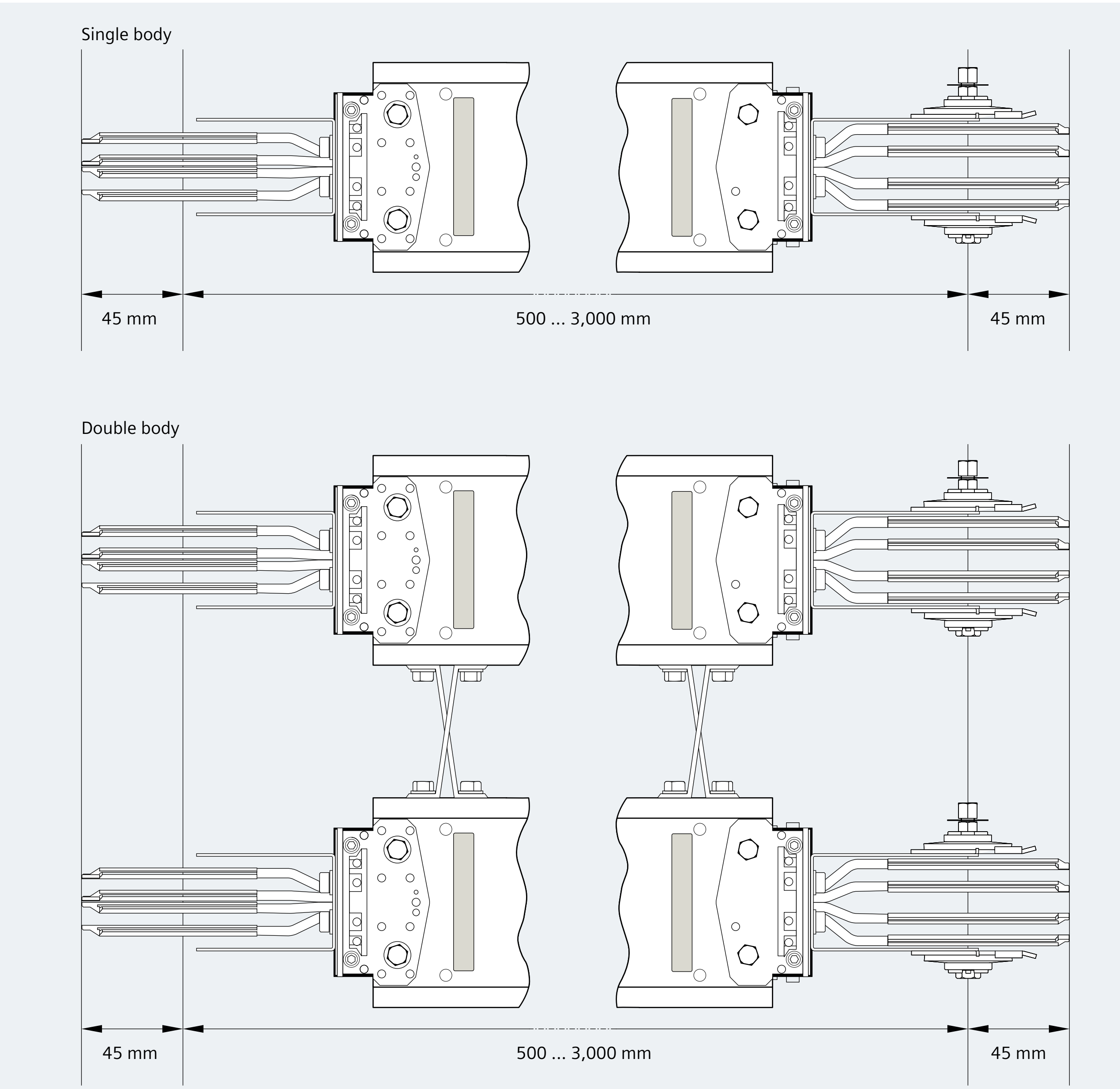
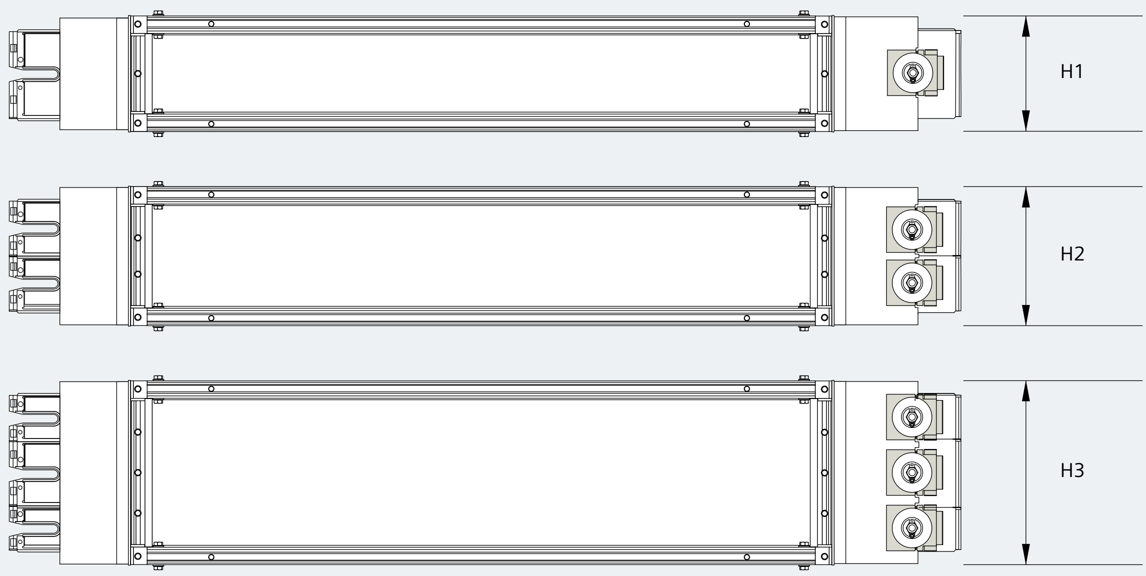


Fig. 6/5: **Top view for the ends of the trunking units**



Overall height	Height	Type code			
		Single body		Double body	
H1	111 mm	LI-A . 0800	LI-C . 1000		
	117 mm		LI-C . 1250		
	132	LI-A . 1000			
	146	LI-A . 1250	LI-C . 1600		
	174		LI-C . 2000		LI-C . 4000
	182	LI-A . 1600		LI-A . 3200	
H2	213		LI-C . 2500		LI-C . 5000
	230	LI-A . 2000		LI-A . 4000	
H3	280		LI-C . 3200		LI-C . 6300
	297	LI-A . 2500		LI-A . 5000	

Fig. 6/6: **Side view for the different overall heights**

6.4.2 Junction Units

Additional specifications for the junction units elbow, offset elbow, knee, offset knee, Z-units and T-unit (symbolic representations in Fig. 6/7) are:

Color H0A: 7035

Length X, Y, and Z: Minimum and maximum values for H0X, H0Y, and H0Z of the different junction units are listed in Tab. 6/31.

Angle H0W: For simple knees and elbows with a fixed limb (FX, FY), angles between 85° and 175° are possible in steps of 5°; 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. 6/7) is predefined for each type (the overall height H is given according to Tab. 6/1).

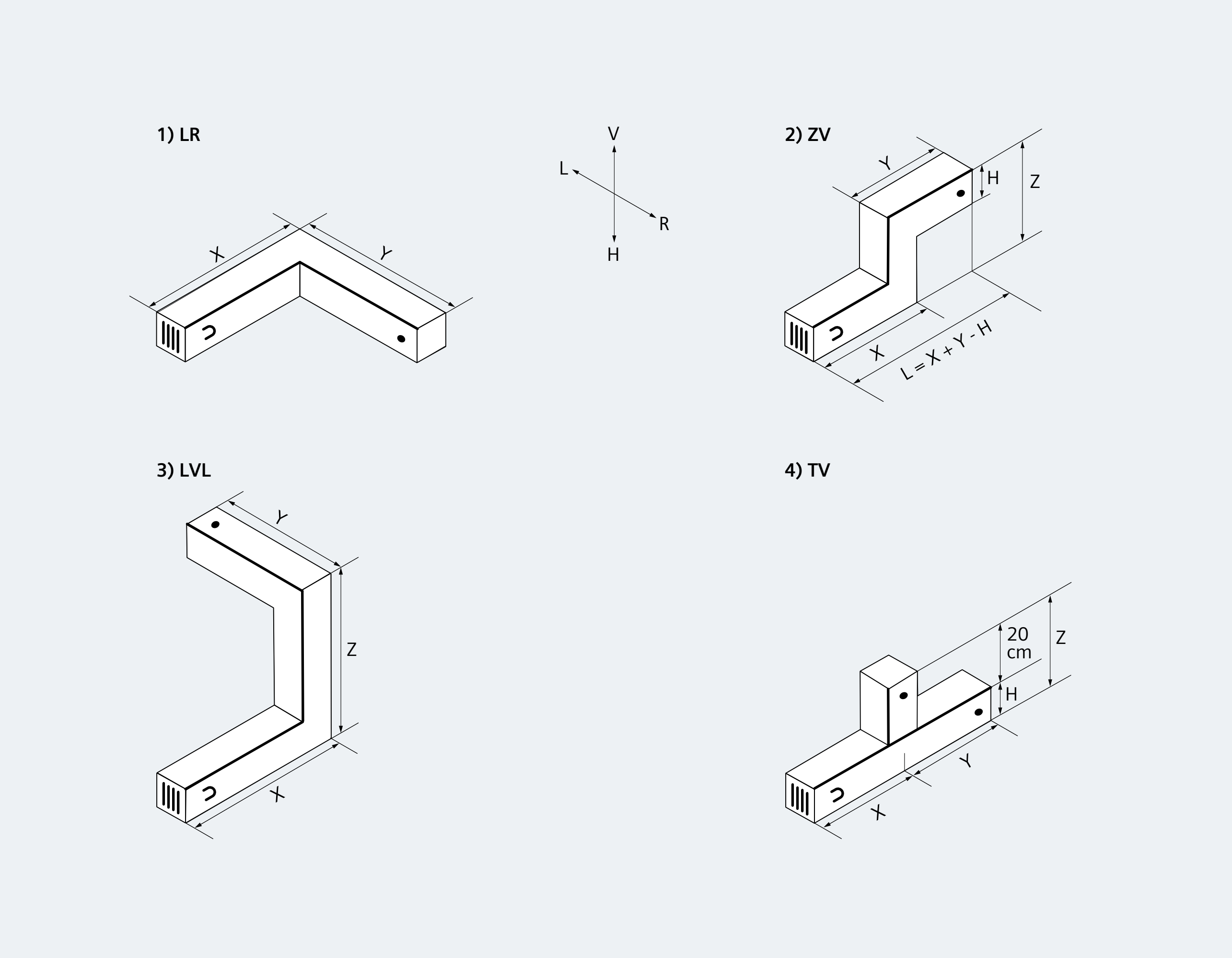


Fig. 6/7: **Schematic representation for junction units and length specifications (Tab. 6/31)**
1) Elbow or knee (here elbow right LR)
2) Z-unit (here Z-unit front ZV)
3) Elbow offset or knee offset (here knee front-left LVL)
4) T-unit (here T-unit front TV)

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	Lengths in mm								
Elbow	LL, LR [1)]	X, Y	340 - 1,900	340 - 1,900	340 - 1,900	340 - 1,900	340 - 1,900	340 - 1,900	600 - 1,900	600 - 1,900	600 - 1,900
	LL(-N90)-FX(FY), LR(-N90)-FX(FY)	X, Y / FY, FX	480 - 1,900 / 270	480 - 1,900 / 270	480 - 1,900 / 270	480 - 1,900 / 270	480 - 1,900 / 270	480 - 1,900 / 270	740 - 1,900 / 525	740 - 1,900 / 525	740 - 1,900 / 525
Knee	LV, LH [2)]	X, Y	330 - 1,900	350 - 1,900	370 - 1,900	400 - 1,900	450 - 1,900	520 - 1,900	400 - 1,900	450 - 1,900	520 - 1,900
	LV(-N90)-FX(FY), LH(-N90)-FX(FY)	X, Y / FY, FX	420 - 1,900 / 300	430 - 1,900 / 320	450 - 1,900 / 320	480 - 1,900 / 370	530 - 1,900 / 420	600 - 1,900 / 470	480 - 1,900 / 370	530 - 1,900 / 420	600 - 1,900 / 470
Elbow, offset	LLV, LLH, LRV, LRH [3)]	X_{min}	330	350	370	400	450	520	400	450	520
		Y_{min}	340	340	340	340	340	340	600	600	600
		Z_{min}	320	340	350	390	440	500	640	690	760
Knee, offset	LVL, LHL, LVR, LHR [3)]	X_{min}	340	340	340	340	340	340	600	600	600
		Y_{min}	330	350	370	400	450	520	400	450	520
		Z_{min}	320	340	350	390	440	500	640	690	760
Z-unit	ZH, ZV [4)]	X, Y	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	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, Y	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	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, TH [5)]	X, Y	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 = 2,800 mm maximum
[2)] X + Y = 3,000 mm maximum
[3)] X + Y + Z = 3,000 mm maximum
[4)] X + Y + Z = 2,800 mm maximum
[5)] Additional specification H0Z: Z = overall height H + 200 mm (for overall height H, see Tab. 6/1); X + Y = 3,000 mm maximum

Tab. 6/31: **Length specifications for junction units of the LI system**

6.4.3 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 sum of the operational currents of all tap-off units on the left side should be approximately equal to the sum on the right side. The load should be uniformly distributed to both sub-runs of the double body.

An EP unit (Fig. 6/8) establishes equipotential bonding between the left-hand and the right-hand sub-run. 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- ...".
- Available conductor configurations: 3B, 4B, 5B, 5C, 5H, 6B, 6C.

Note: Distribution board flanges FA- and F8PQ.- as well as incoming cable connection units 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. 6/9) 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. A fixed point must be provided at the following system components:

- Transformer connection units TCE and TCET
- Incoming cable connection units CFE and CFS
- Connection pieces for non-Siemens distribution boards FA
- Straight trunking units and junction units depending on the length and layout of the busbar run.

Within a defined length, the expansion compensation can compensate for both compressive 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.

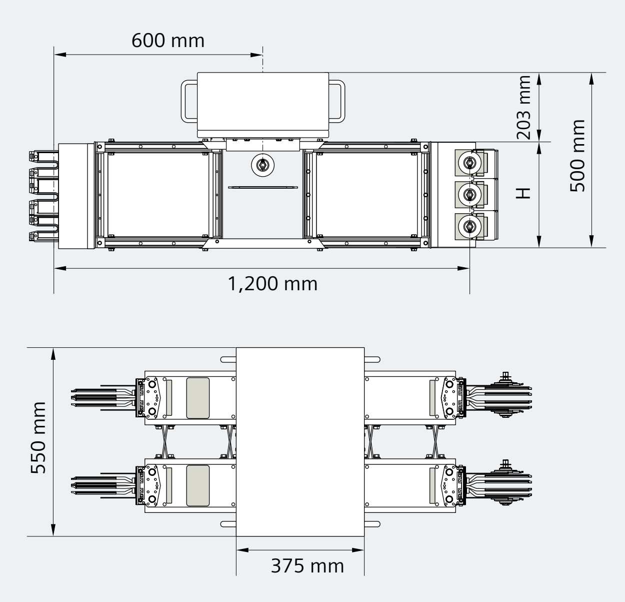
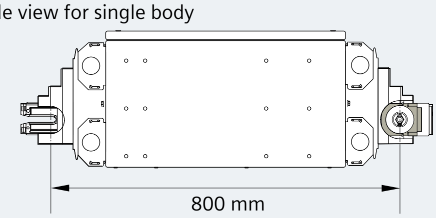
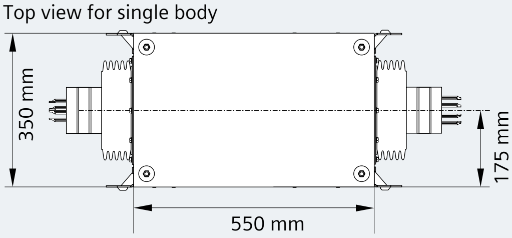


Fig. 6/8: **Equipotential bonding unit for LI double bodies (height H corresponds to the values from Tab. 6/1; dimensions in mm)**

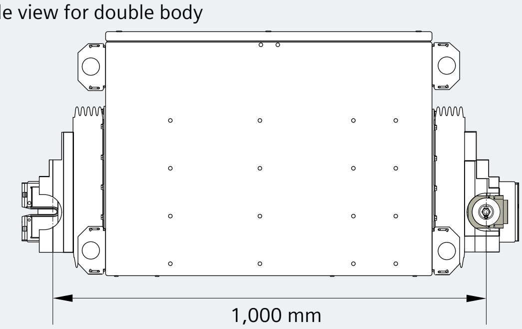
Side view for single body



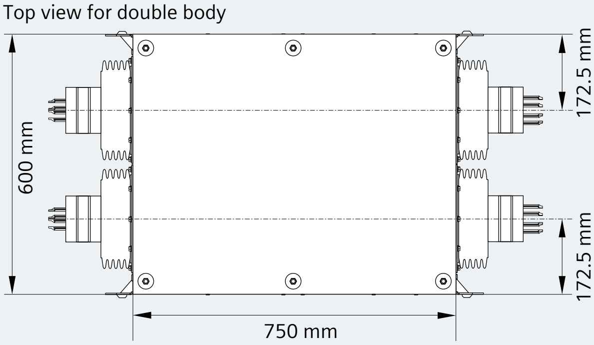
Top view for single body

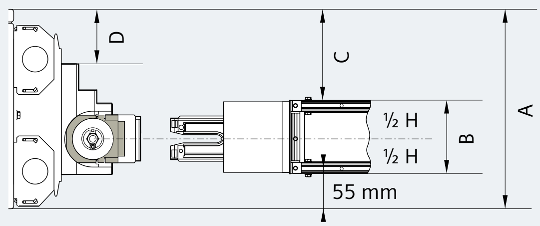


Side view for double body



Top view for double body





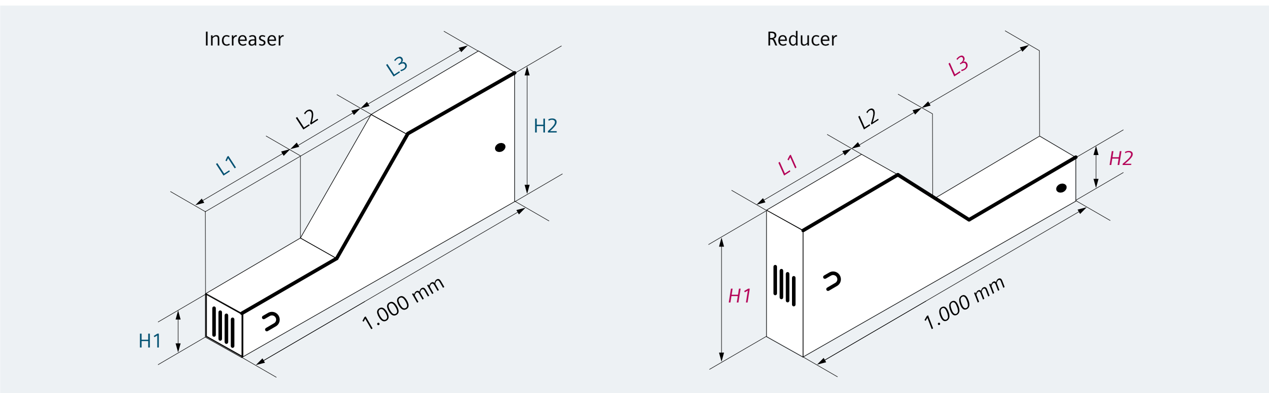
Single bodies				
System	A	B	C	D
LI-A . 0800	314 mm	110 mm	149 mm	87 mm
LI-A . 1000		121 mm	127 mm	
LI-A . 1250		128 mm	113 mm	
LI-A . 1600		146 mm	77 mm	
LI-A . 2000	429 mm	170 mm	144 mm	98 mm
LI-A . 2500		203 mm	78 mm	
LI-C . 1000	314 mm	110 mm	149 mm	87 mm
LI-C . 1250		114 mm	142 mm	
LI-C . 1600		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. 6/9: **Dimensions for equipotential bonding units of the LI system (dimensions in mm)** *iii) Transition units LI-LI*

To adjust the busbar trunking system LI 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 guaranteed 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. 6/32). Available conductor configurations: 3B, 4B, 5B, 5C, 5H, 6B, 6C.



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. 6/32: **Dimensions for transition units LI-LI (dimensions in mm)** *iv) Transition units LR-LI*

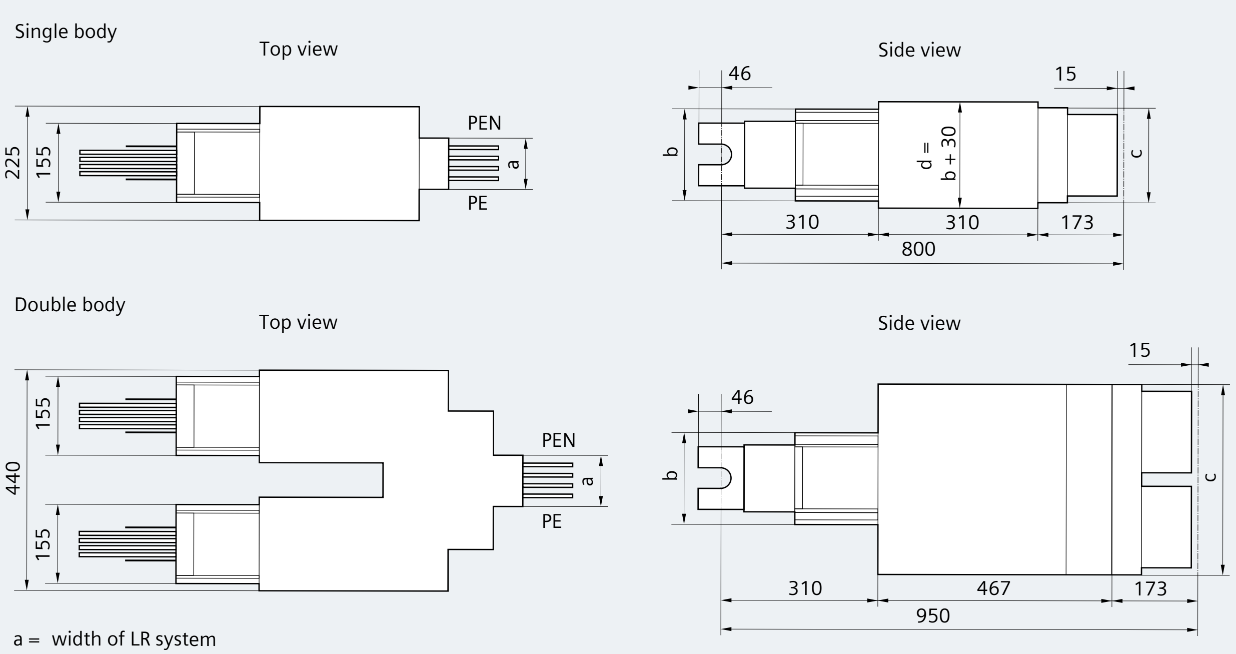
To connect the busbar trunking system LR with the LI system electrically and mechanically, a transition unit LR-LI must be used. This connection is design verified according to IEC 61439-1 and -6. Conductor configurations available for the LI system are 4B, 5B, and 5H. The LR system must be selected accordingly with 4 or 5 conductors (Tab. 6/33).

As standard, the transition unit has a hook connection on the LI side (Fig. 6/10). 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. 6/33: **Type codes for LR-LI transition units**



a = width of LR system
b = height of LI system
c = height of LR system

Fig. 6/10: **Dimensions for LR-LI transition units (dimensions in mm)**

6.4.4 Infeeds, Connections

For easy connection of the busbar trunking system LI 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 to non-Siemens distribution boards*
iv) *Distribution board connection units for SIVACON S8*

i) *Transformer connection units and connection flanges*

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", are available. Moreover, there is a universal connection unit "TCS" available with a fixed phase distance (160 mm), which can also be used for the connection of distribution boards.

Regarding the position of the auxiliary line for configuration, a difference is made between left "L" and right "R" for the respective types (Fig. 6/11). At the connection unit "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 phase sequences available as standard in TCE and TCET units are listed in Tab. 6/27 for 3-, 4-, and 5-conductor configurations.

As standard, the transformer connection units TCE, TCET, and TCS are available only with hook connection. The conductor configurations 3B, 4B, and 5B are available as standard; for TCS, additionally the configuration 5H. Further conductor configurations can be inquired if needed. All types of trunking units can be connected to TCE and TCS. The scope of supply includes one set of fixing screws, nuts, and conical spring washers per tag as standard.

The connection tags are firmly positioned according to the order stipulations, and cannot be modified on site anymore. Dimensions are given in Tab. 6/28. The T-limb of the connection unit TCET has a fixed length that cannot be selected. No fixed limb of an elbow or a knee from the busbar trunking system LI can be connected to it.

For the connection unit TCS, a suitable connection flange (for enclosure, see chapter 6.4.6) must be ordered, which ensures the degree of protection of the connection point. The flange type depends on the type of the trunking unit that is 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 a double body, the connection tags can be positioned either under the left-hand or the right-hand sub-run (Fig. 6/12). The tags are factory-assembled according to the stipulations. However, the tags can be modified on site.

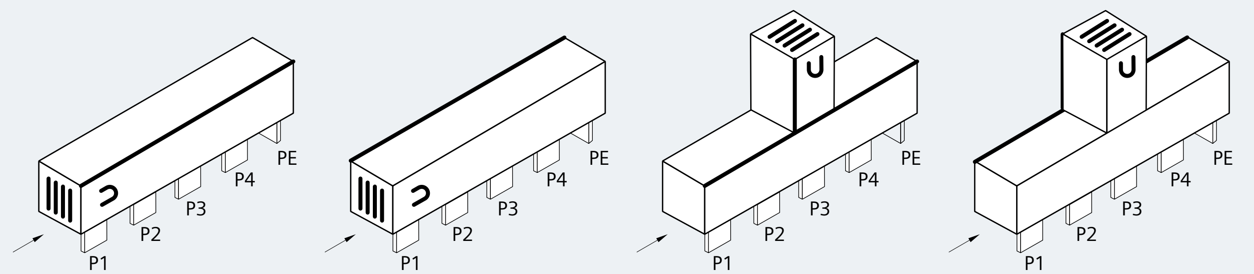


Fig. 6/11: **PE conductor arrangement for LI transformer connection units TCE and TCET**

Connection units of the type TCS are used as cost-efficient infeeds for transformer and distribution board connection. The fixed phase distance of 160 mm is particularly suited for the connection of oil-immersed transformers. Dimensions for the different types are given in Tab. 6/34.

In addition, a suitable connection flange (enclosure) must be ordered, which ensures the degree of protection of the connection point (see chapter 6.4.6).

Optionally, a bellows can be ordered (e.g., type LI-Z-TCS-H01), for example, for connecting the connection units TCS to an encapsulated transformer. The additional height of the bellows is 90 mm. The lateral movement is approx. ± 10 mm as a maximum. In height direction, the bellows can be compressed or stretched approx. ± 20 mm as a maximum.

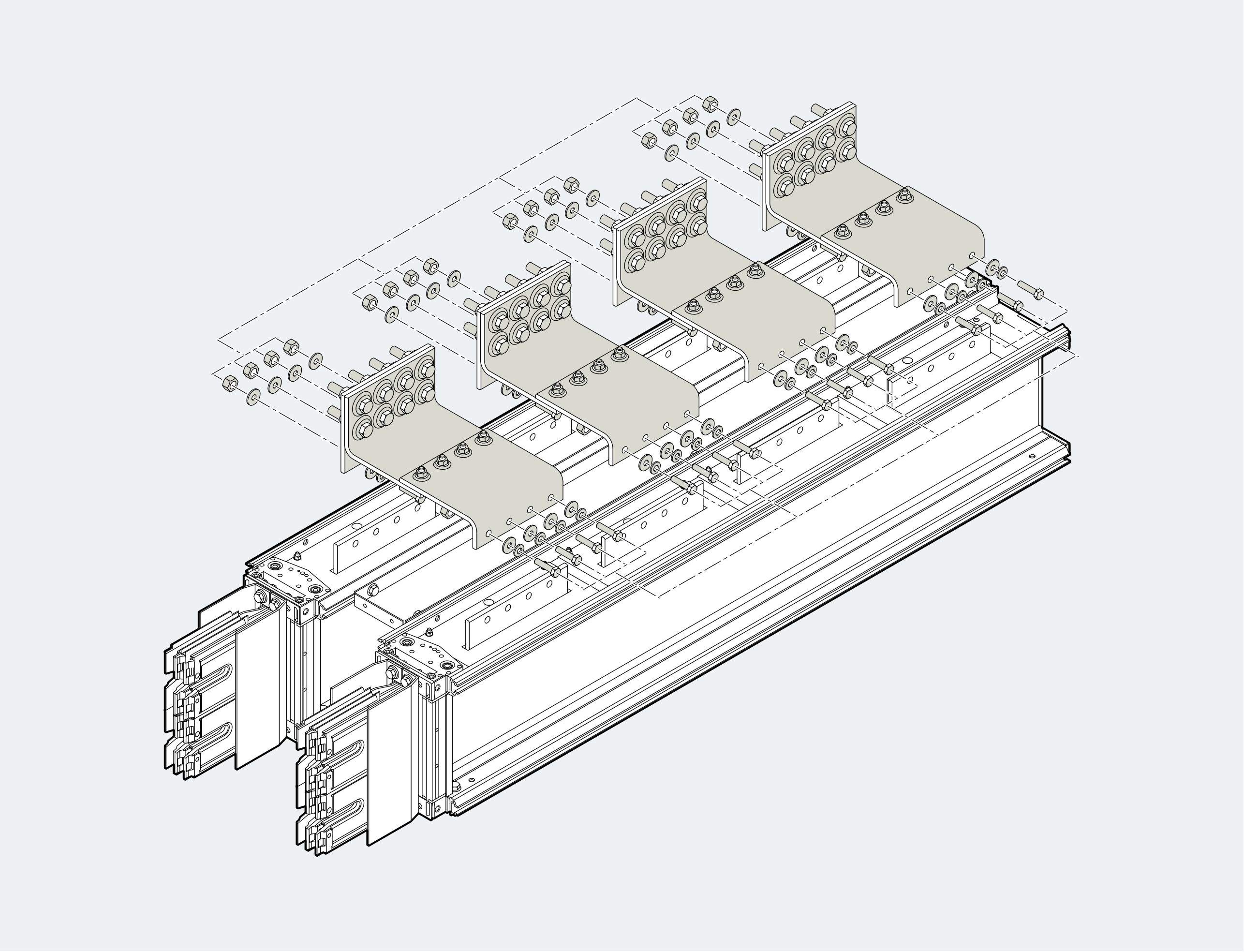
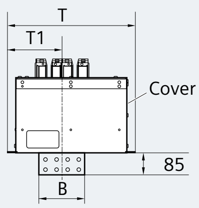


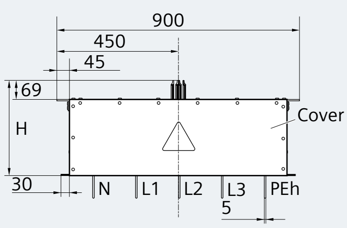
Fig. 6/12: **Connection tags for transformer connection TCE / TCET on an LI double body**

Connection units TCS for single bodies

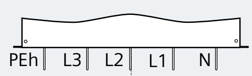
Side view



LI ... TCSR-H



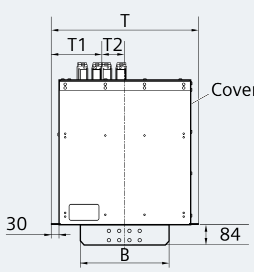
LI ... TCSL-H



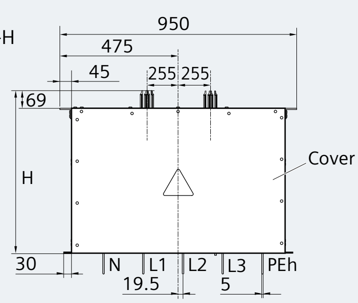
System (TCSR / TCSL)	T	T1	T2	B	H
LI-A . 0800 .. -00-TCS . -H	350 mm	140 mm		51 mm	431 mm
LI-A . 1000 .. -00-TCS . -H	350 mm	151 mm		72 mm	431 mm
LI-A . 1250 .. -00-TCS . -H	350 mm	158 mm		86 mm	431 mm
LI-A . 1600 .. -00-TCS . -H	350 mm	176 mm		122 mm	431 mm
LI-A . 2000 .. -00-TCS . -H	470 mm	200 mm		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

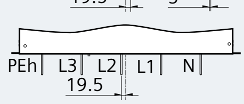
Side view



LI ... TCSR-H



LI ... TCSL-H



System (TCSR / TCSL)	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. 6/34: **Dimensions (dimensions in mm) for connection units TCS of the LI system**

Con-tents
Intro-duction
1
2
3
4
5
6
7
8

ii) Incoming cable connection units

The incoming cable connection units CFE and CFS are used for feeding into the busbar trunking system LI when only cable connection is possible. CFE and CFS units are equipped with a hook connection 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 connection). CFE units are only available for LI single bodies (Tab. 6/35).

CFS units, however, can be used for both LI single and LI double bodies. They feature connection tags, which enable the connection (bolt connection) of several conductors per phase. The CFS units have the degree of protection IP40 as standard.

For further information on incoming cable connection units CFS, such as dimensions and connections, please contact your Siemens partner.

iii) Connection pieces for non-Siemens distribution boards

The busbar head type FA (Fig. 6/13) is used to connect an LI busbar run to a non-Siemens distribution board. Normally, the FA is installed by the original equipment manufacturer under his 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, a suitable distribution board flange must be ordered (see chapter 6.4.6), which 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 usually 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 verification of the short-circuit withstand strength of the distribution board busbars can only be provided 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 connection must be dimensioned to 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.

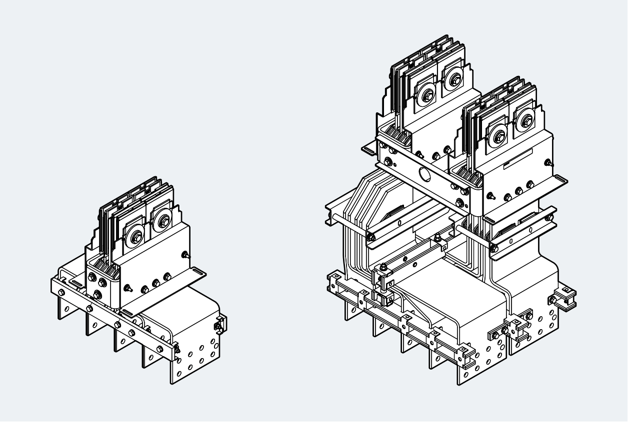
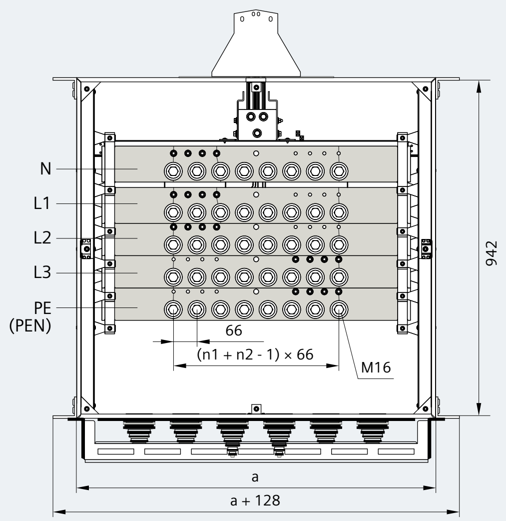


Fig. 6/13: **Connection pieces for non-Siemens distribution boards for single body (left) and double body (right)**

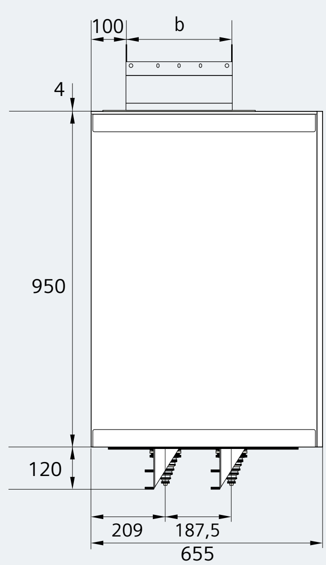
Incoming cable connection units CFE for single bodies

Front view:

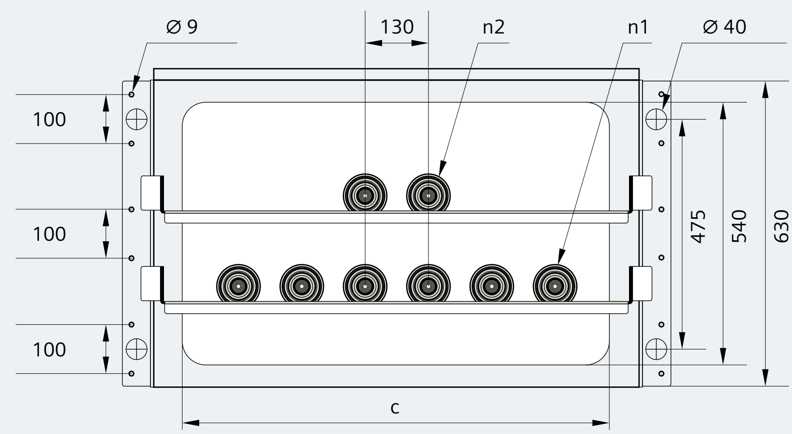


System	a in mm	b in mm	c in mm	n1	n2	Screw
LI-AM0800- .. -CFE ...	670	110.5	540	3	0	3 × M16
LI-AM1000- .. -CFE ...	670	131.8	540	3	1	4 × M16
LI-AM1250- .. -CFE ...	670	146.1	540	3	2	5 × M16
LI-AM1600- .. -CFE ...	670	181.8	540	3	3	6 × M16
LI-AM2000- .. -CFE ...	1,000	229.8	880	6	2	8 × M16
LI-AM2500- .. -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. 6/35: **Dimensions (in mm) for incoming cable connection units 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 power distribution board SIVACON S8 and enables the connection of the LI busbar run (Fig. 6/14). 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 circuit-breaker 3WL, 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 busbar trunking system LI to a busbar head with a rated current of 1,600 A) can be obtained from your Siemens contact partner.

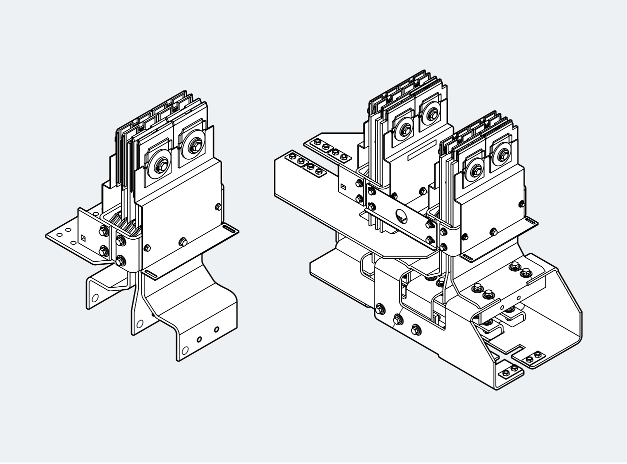


Fig. 6/14: **Busbar heads F8PQ for connection to the power distribution board SIVACON S8**

6.4.5 Overview of Connection Options

Tab. 6/36 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, Z-unit)	No	Yes
Variable limb of a junction unit (knee, elbow, Z-unit)	Yes	Yes
T-unit	No	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	Yes 1)	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. 6/36: **Connection options for components of the busbar trunking system LI**

6.4.6 Connection Flange (Enclosure)

The flange type (Fig. 6/15) depends on the connection type and the type of the trunking unit that is 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 body 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.

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, FA, F8PQ).

Order number LI-Z- ① N ② NA- ③-④-⑤-N with

① Conductor material: Al = A, Cu = C

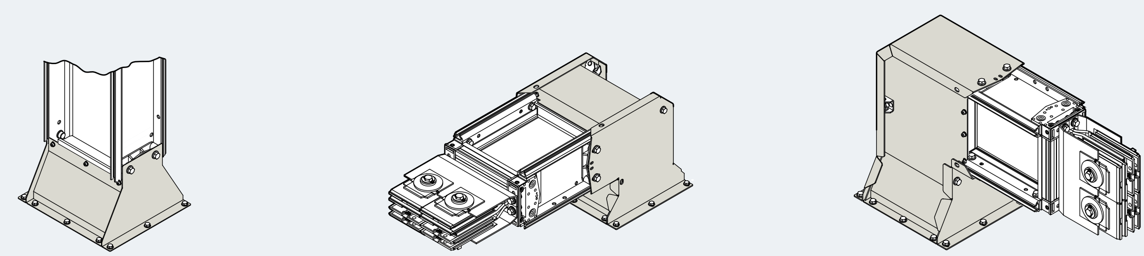
② Rated current: 800 A = 0800, 1,000 A = 1000, ...

③ Degree of protection: IP40 = 40, IP55 = 55

④ Connection type: CFE / CFS / TCS / FA / F8PQV = FA; F8PQH = 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. 6/15: **Connection flange elements HS, HE, and HK of the LI system**

6.4.7 Tap-off Units

The tap-off units can be plugged on/off while energized, depending on the type of installation device (Fig. 6/16). This means that it is not necessary to de-energize the busbar trunking system LI for mounting or removing the tap-off unit. In this context, the country-specific standards must be observed. The leading PE contact is provided for safe plugging on/off.

The cable entry is available for:

- Multi-core cables: sheet-steel flange plate with cable grommet and strain relief at the front side (as in Fig. 6/16); one sheet-steel blanking plate each at the side, and one pressure relief plate at the side for versions with circuit-breaker 3VL
- Single-core cables: aluminum flange plate without cable glands at the front side; on the side, one sheet-steel blanking plate and a pressure relief plate each; a cable gland is available as an additional equipment.

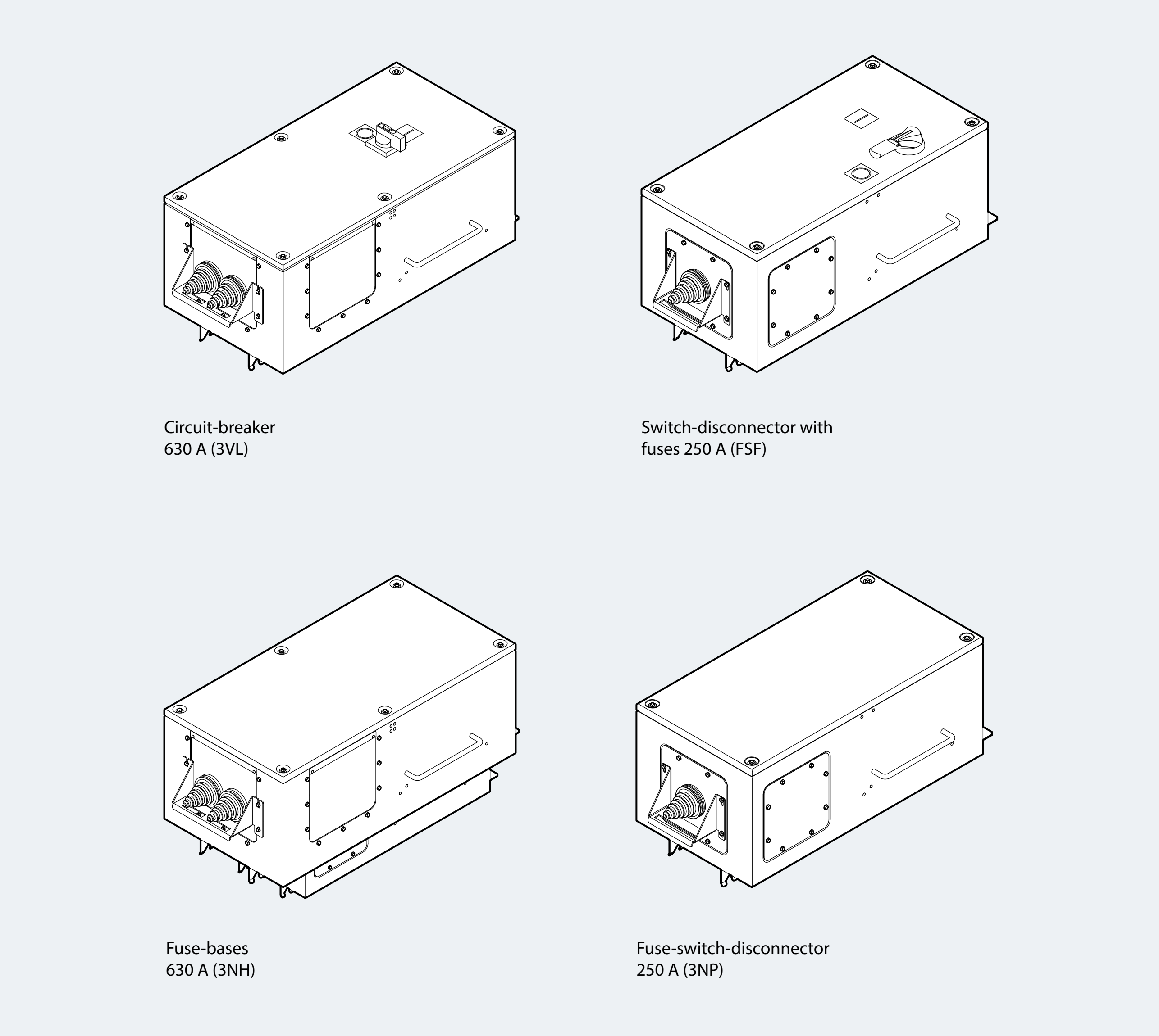


Fig. 6/16: **Examples for LI tap-off units for a rated current up to 250 A or up to 630 A**

Con-tents
Intro-duction
1
2
3
4
5
6
7
8

For the different installed components (3NP, 3NH, FSF, 3VA, or 3VL) up to 630 A, the basic units differ by the dimensions and the number of grommets, depending on the rated current. The dimensions are given in Fig. 6/17 and Tab. 6/37. For installed circuit-breakers 3VL with 1,250 A and 1,600 A), the tap-off units are top-mounted on special trunking units (LI- ... LTB-..., available from 1,600 A), and fastened at the tap-off point with a bolt.

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 lateral cable entry, 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 equipment, 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 or right-hand trunking unit can be exchanged on site in order to exchange the position of the tap-off point as well.

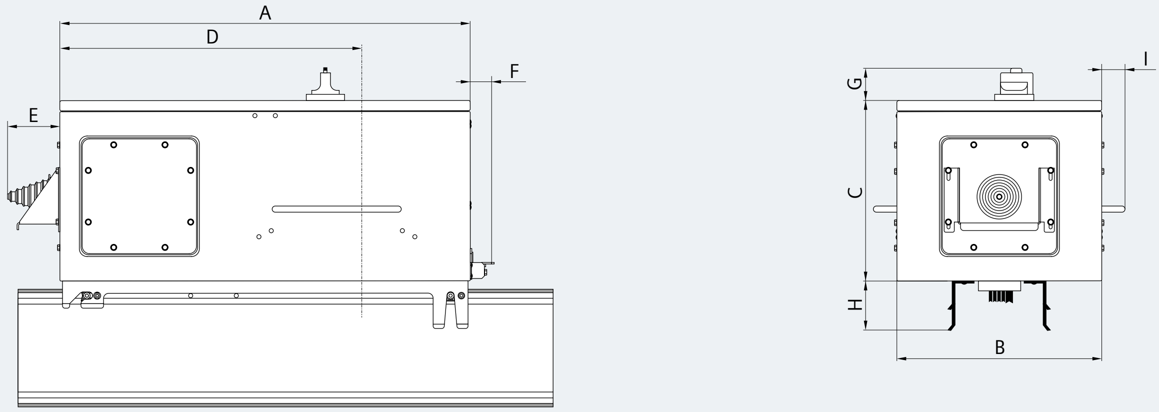
Fig. 6/18 and Tab. 6/38 illustrate the positioning of tap-off units for the sizes 1 to 5 and 7. The smallest configuring dimension for the upper tap-off point is 670 mm (for the lower tap-off point: 490 mm). During configuration, the first tap-off point for tap-off units size 3, 4, or 5 must be selected 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. 6/19).

Attention: Flange covers can only be replaced if the busbar is de-energized!

To configure tap-off points for tap-off units size 7 (trunking units from 1,600 A), please observe Fig. 6/20.

Sizes 1 to 5



Size 7

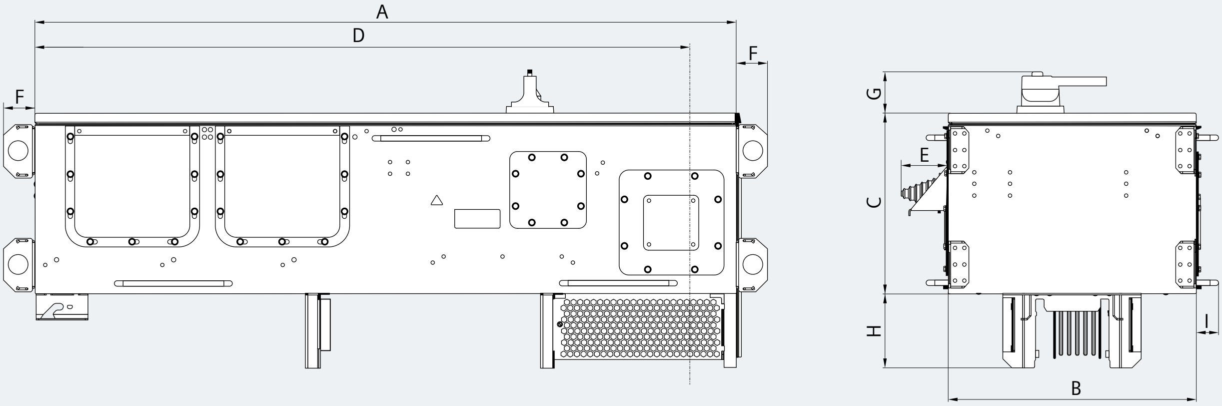


Fig. 6/17: **Views and dimensions for LI tap-off units (for dimensions from A to I, see Tab. 6/37)**

Dimension	Size					
	1	2	3	4	5	7
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	530 mm
C	250 mm	280 mm	352 mm	352 mm	382 mm	382 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	85 mm
F	50 mm	50 mm	50 mm	50 mm	50 mm	64 mm
G	55 mm [3]	55 mm [3]	55 mm [3]	55 mm [3]	75 mm [3]	87 mm
H	95 mm	95 mm	95 mm	95 mm	95 mm	159 mm
I	0 [1]	47 mm [2]	47 mm	47 mm	47 mm	47 mm

[1] No handles
[2] I = 0 for tap-off units size 2 with circuit-breaker 3VA (no handles)
[3] For tap-off unit with 3VA; 57 mm for tap-off unit with 3VL

Tab. 6/37: **Dimensions for LI tap-off units (for views with dimensions, see Fig. 6/17)**

Con-
tents

Intro-
duction

1

2

3

4

5

6

7

8

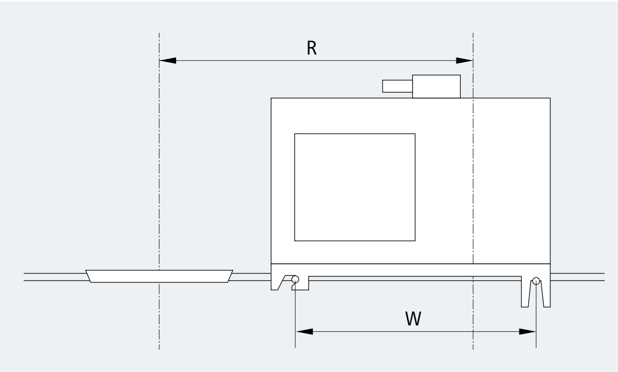


Fig. 6/18: **Positioning of tap-off points for tap-off units size 1 to 5 (for dimensions R and W, see Tab. 6/38)**

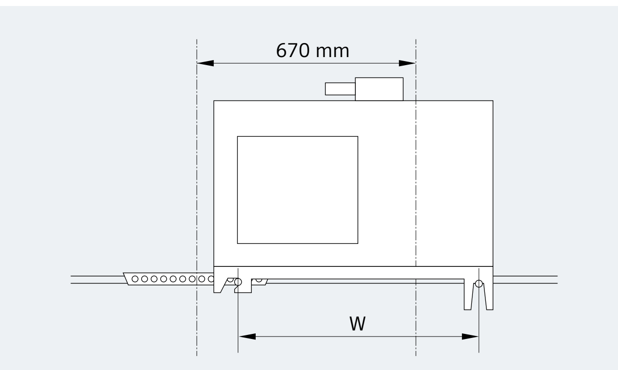


Fig. 6/19: **Tap-off points (dimensions in mm) for special case with flange cover type LI-Z-T-SJC-TOB for tap-off units size 3, 4, or 5 with distance W from Tab. 6/36 (here: size 3 schematically)**

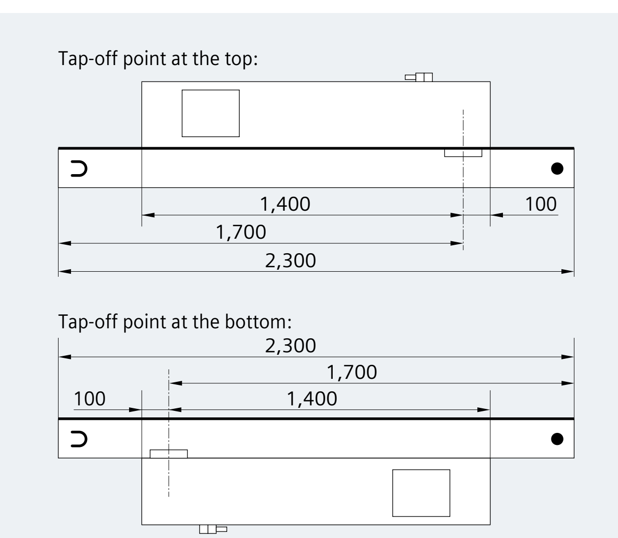


Fig. 6/20: **Positioning of tap-off points (dimensions in mm) for tap-off units size 7**

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. 6/38: **Dimensions in mm for positioning the tap-off points (sizes 1 to 5)**

All tap-off units can optionally be equipped with current transformers and a connectable box with an electronic measuring device SENTRON PAC (Fig. 6/21; type LI-Z-MMB-PACxxxx-yyy, whereby xxxx identifies the SENTRON PAC type integrated in the box, and yyy the communication interface, see Tab. 6/11. Cable connection is done directly at the switching device itself as standard. Optionally, connection lugs (flat bars) can be ordered.

To connect a measuring device box, the tap-off unit must be equipped with current transformers and a power supply unit for the measuring device SENTRON PAC, e.g., via a circuit-breaker 3RV. Additionally, a new flange plate must be ordered for the tap-off unit (type LI-Z-T-CEP-MMB-S1, S2, S3, or LI-Z-T-CEP-MMB1-S4-5 depending on the size 1 to 5 of the tap-off unit).

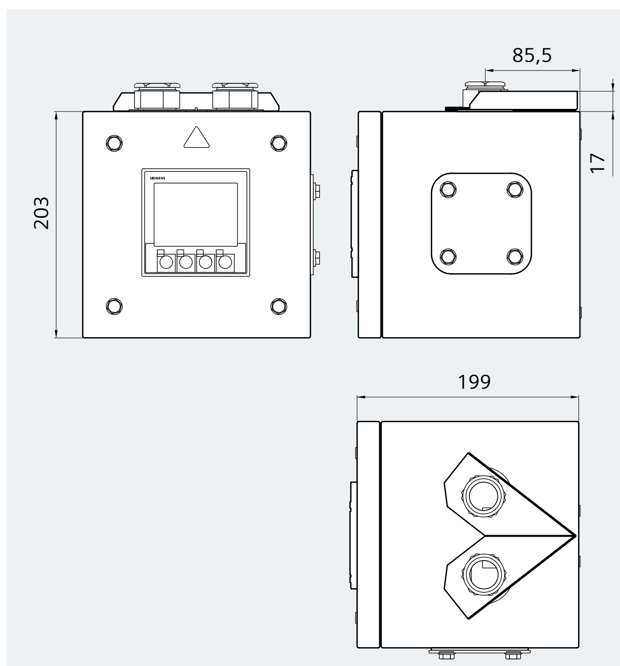


Fig. 6/21: **Views and dimensions of the measuring device box (dimensions in mm) for LI tap-off units**

6.4.8 Additional Equipment

For the examples given in chapter 6.2.3, specifications regarding the dimensions and the use of accessories are given in the following illustrations:

- Fig. 6/22: End caps LI- ... -E-H and ... -E-B
- Fig. 6/23: Vertical fixings: spring bracket LI-Z-BV-.. and fixed point bracket LI-Z-BVFP-..
- Fig. 6/24: U-profiles LI-Z-BH. and fixing elements LI-Z-BKK. or LI-Z-BKFK2 for horizontal fixing
- Fig. 6/25: Fixing elements for ceiling cut-outs: LI-Z-BVD-.. as counterpart for the spring bracket and fixed point 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

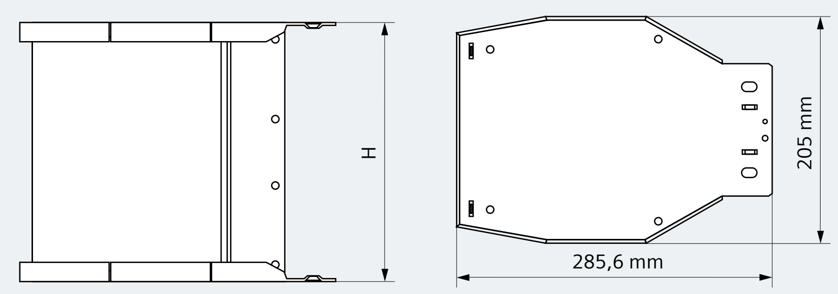


Fig. 6/22: **Dimensions (in mm) and views for end caps of the LI system**

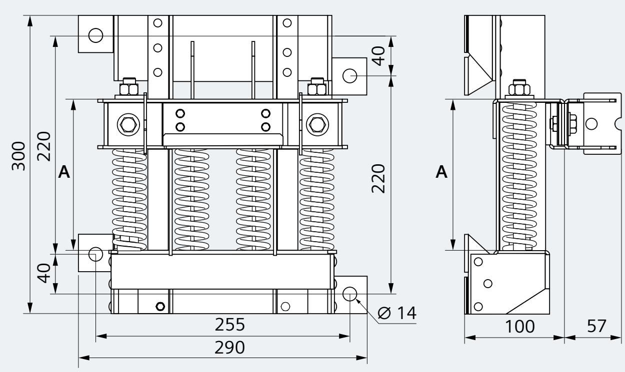
The spring brackets LI-Z-BV .. for vertical fixing provide the regular distribution of the weight onto the supporting building parts, allowing for expansion of the busbar run at the same time. The spring brackets are selected according to the weight of the busbar run (depending on the rated current and the conductor configuration; Fig. 6/23 and Tab. 6/39) 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. 6/39).

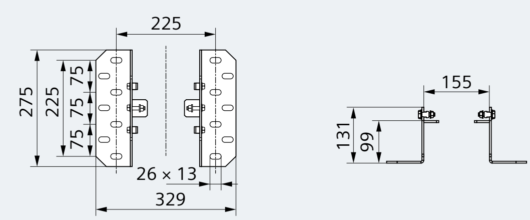
Spring bracket type	Color of the spring	Number of springs	A	Load
LI-Z-BV-01	yellow	3	106 mm	30 to 79 kg
LI-Z-BV-02	red	3	101 mm	80 to 119 kg
LI-Z-BV-03	red	4	99 mm	120 to 159 kg
LI-Z-BV-04	blue	4	108 mm	160 to 199 kg
LI-Z-BV-05	green	4	118 mm	200 to 239 kg
LI-Z-BV-06	gray	4	127 mm	240 to 279 kg
LI-Z-BV-07	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

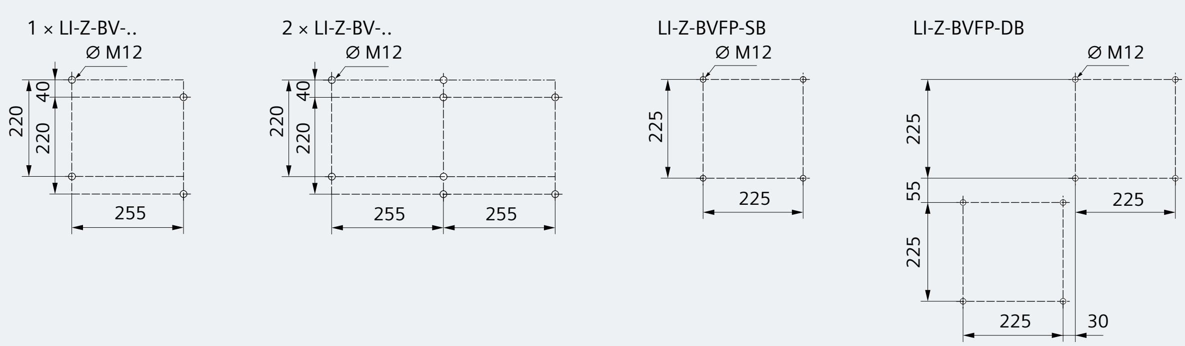
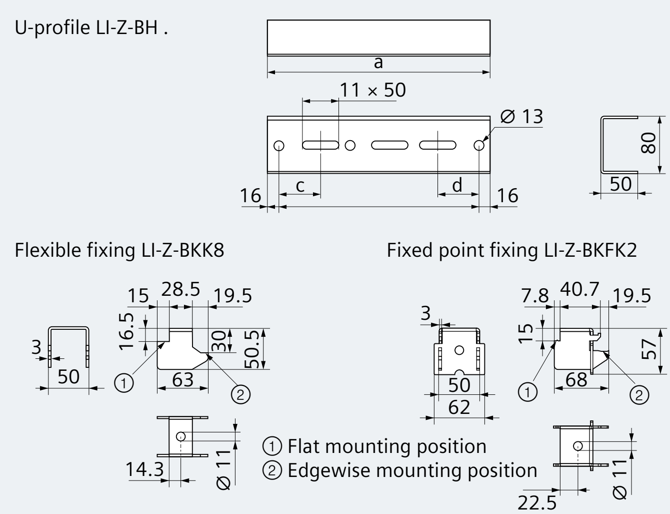


Fig. 6/23: **Dimensions (in mm) and views for spring brackets and fixed point brackets for vertical fixing of the LI system**

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 x LI-Z-BV-02	2 x LI-Z-BV-02	2 x LI-Z-BV-03	2 x LI-Z-BV-03	2 x LI-Z-BV-03	2 x LI-Z-BV-03	2 x LI-Z-BV-03	2 x LI-Z-BV-04
LI-A . 4000 ..-...	2 x LI-Z-BV-03	2 x LI-Z-BV-03	2 x LI-Z-BV-03	2 x LI-Z-BV-04	2 x LI-Z-BV-03	2 x LI-Z-BV-04	2 x LI-Z-BV-04	2 x LI-Z-BV-05
LI-A . 5000 ..-...	2 x LI-Z-BV-03	2 x LI-Z-BV-03	2 x LI-Z-BV-04	2 x LI-Z-BV-05	2 x LI-Z-BV-04	2 x LI-Z-BV-05	2 x LI-Z-BV-06	2 x 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 x LI-Z-BV-04	2 x LI-Z-BV-04	2 x LI-Z-BV-05	2 x LI-Z-BV-06	2 x LI-Z-BV-04	2 x LI-Z-BV-05	2 x LI-Z-BV-06	2 x LI-Z-BV-07
LI-C . 5000 ..-...	2 x LI-Z-BV-05	2 x LI-Z-BV-06	2 x LI-Z-BV-07	2 x LI-Z-BV-07	2 x LI-Z-BV-06	2 x LI-Z-BV-07	2 x LI-Z-BV-08	on request
LI-C . 6300 ..-...	2 x LI-Z-BV-06	2 x LI-Z-BV-08	on request	on request	2 x 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 x LI-Z-BV-01	2 x LI-Z-BV-02	2 x LI-Z-BV-02	2 x LI-Z-BV-02	2 x LI-Z-BV-02	2 x LI-Z-BV-02	2 x LI-Z-BV-02	2 x LI-Z-BV-03
LI-A . 4000 ..-...	2 x LI-Z-BV-02	2 x LI-Z-BV-02	2 x LI-Z-BV-03	2 x LI-Z-BV-03	2 x LI-Z-BV-02	2 x LI-Z-BV-03	2 x LI-Z-BV-03	2 x LI-Z-BV-04
LI-A . 5000 ..-...	2 x LI-Z-BV-02	2 x LI-Z-BV-03	2 x LI-Z-BV-03	2 x LI-Z-BV-04	2 x LI-Z-BV-03	2 x LI-Z-BV-04	2 x LI-Z-BV-04	2 x 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 x LI-Z-BV-03	2 x LI-Z-BV-04	2 x LI-Z-BV-05	2 x LI-Z-BV-05	2 x LI-Z-BV-04	2 x LI-Z-BV-05	2 x LI-Z-BV-06	2 x LI-Z-BV-06
LI-C . 5000 ..-...	2 x LI-Z-BV-04	2 x LI-Z-BV-05	2 x LI-Z-BV-06	2 x LI-Z-BV-07	2 x LI-Z-BV-05	2 x LI-Z-BV-06	2 x LI-Z-BV-07	2 x LI-Z-BV-08
LI-C . 6300 ..-...	2 x LI-Z-BV-05	2 x LI-Z-BV-07	2 x LI-Z-BV-08	on request	2 x LI-Z-BV-06	2 x LI-Z-BV-08	on request	-

Tab. 6/39: **Supporting distances for mounting spring brackets in case of vertical installation (other supporting distances on request)**

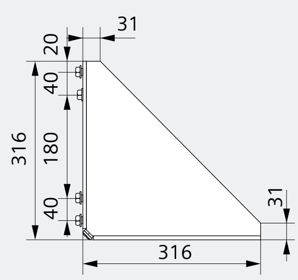
Dimensions				
Type	a	b	c	d
LI-Z-BH1	312 mm	280 mm	59 mm	57 mm
LI-Z-BH2	382 mm	350 mm	56 mm	56 mm
LI-Z-BH3	482 mm	450 mm	59 mm	56 mm
LI-Z-BH4	567 mm	535 mm	56 mm	59 mm
LI-Z-BH5	667 mm	635 mm	59 mm	59 mm

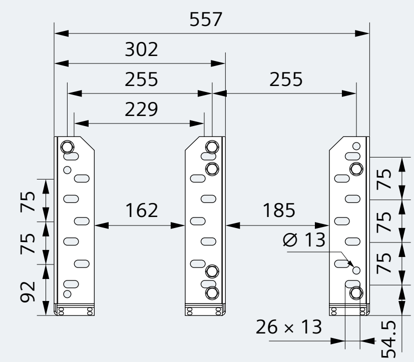


Assignment: busbar type – fixing type					
Trunking unit type	Flat mounting position	Edgewise mounting position	Trunking unit type	Flat mounting position	Edgewise mounting position
LI-A.0800...	LI-Z-BH1	LI-Z-BH1	LI-C.1000...	LI-Z-BH1	LI-Z-BH1
LI-A.1000...	LI-Z-BH1	LI-Z-BH1	LI-C.1250...	LI-Z-BH1	LI-Z-BH1
LI-A.1250...	LI-Z-BH1	LI-Z-BH1	LI-C.1600...	LI-Z-BH1	LI-Z-BH1
LI-A.1600...	LI-Z-BH2	LI-Z-BH1	LI-C.2000...	LI-Z-BH2	LI-Z-BH1
LI-A.2000...	LI-Z-BH2	LI-Z-BH1	LI-C.2500...	LI-Z-BH2	LI-Z-BH1
LI-A.2500...	LI-Z-BH3	LI-Z-BH1	LI-C.3200...	LI-Z-BH3	LI-Z-BH1
LI-A.3200...	LI-Z-BH2	LI-Z-BH4	LI-C.4000...	LI-Z-BH2	LI-Z-BH4
LI-A.4000...	LI-Z-BH2	LI-Z-BH4	LI-C.5000...	LI-Z-BH2	LI-Z-BH4
LI-A.5000...	LI-Z-BH3	LI-Z-BH4	LI-C.6300...	LI-Z-BH3	LI-Z-BH4
Universal use	LI-Z-BH5	LI-Z-BH5	Universal use	LI-Z-BH5	LI-Z-BH5

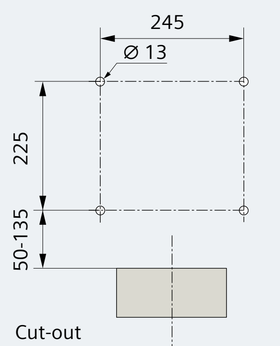
Fig. 6/24: **Dimensions (in mm) and views for horizontal fixings of the LI system**

Fixing LI-Z-BVD-..

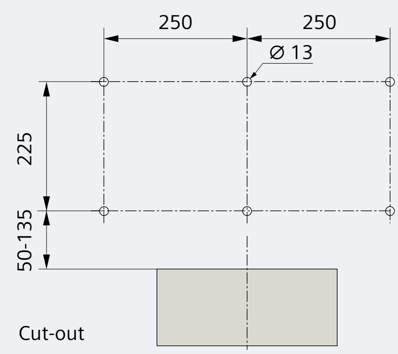




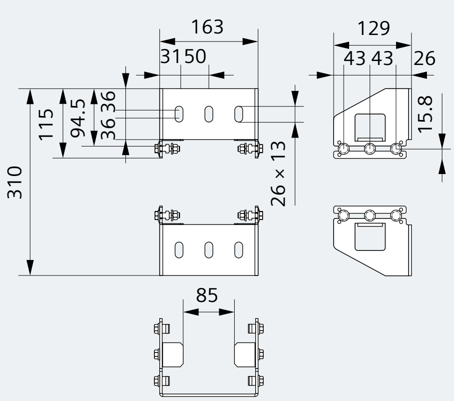
Drilling template LI-Z-BVD-SB



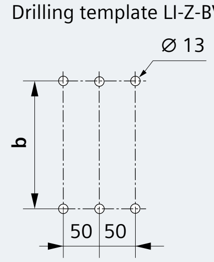
Drilling template LI-Z-BVD-DB



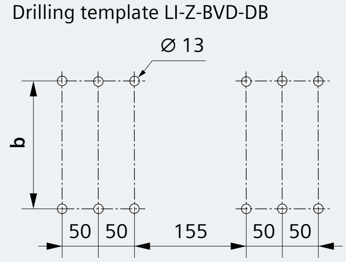
Fixing LI-Z-BVF-..



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

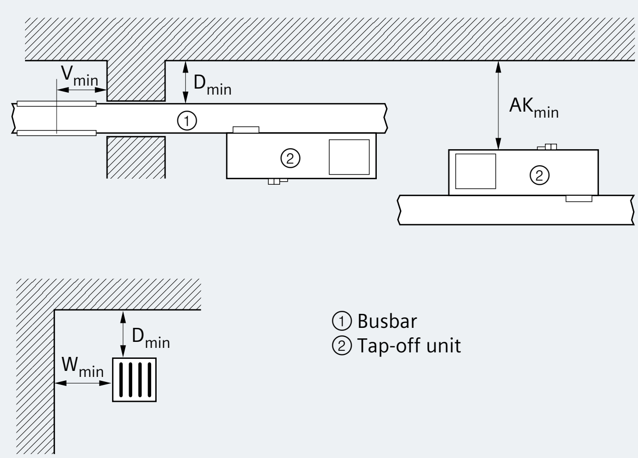
Fig. 6/25: **Dimensions (in mm) and views for fixing elements at ceiling cut-outs (LI-Z.BVDF-.. in connection with spring bracket LI-Z-BV .. and LI-Z-BVF-..)**

6.4.9 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. 6/40. In this context, please observe the following:

- When an expansion compensation or an equipotential bonding is used (see chapter 6.4.3), 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. 6/40) 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. 6/40) 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	Height AK [2]



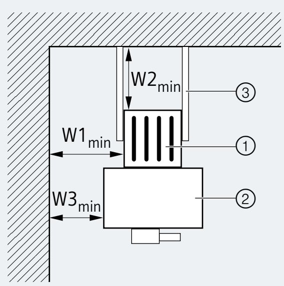
[1] Attention: When an expansion compensation or an equipotential bonding is used, the minimum distance D_{min}, W_{min} must be increased accordingly by 100 mm as a minimum.
[2] It must be possible to open the top cover of a tap-off unit. Therefore, the distance from a top-mounted tap-off unit to the ceiling must be at least the height of the cover. Furthermore, the minimum distance AK_{min} of a tap-off unit from the ceiling must at least be its own height including the handle and the top-mounting height, as it must be possible to mount/remove the tap-off units.

Tab. 6/40: **Wall and ceiling distances for horizontal LI runs with edgewise busbar position**

For the wall and ceiling distances of vertical busbar runs (Tab. 6/41), 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 wall unevennesses or wall inclinations. The fixing material is selected according to the corresponding load. The fixing brackets can be attached directly to the wall if there are no wall unevennesses or wall inclinations.

Abbreviation	Description	Distance
$W1_{min}$	Wall – trunking unit (flat side)	100 mm
$W2_{min}$	Wall – trunking unit (edgewise side)	100 mm
$W3_{min}$	Wall – tap-off side	50 mm



① Vertical LI busbar run
② Tap-off unit
③ Vertical fixing bracket

Tab. 6/41: **Wall distance for vertical LI runs**

6.5 Design of the Fire Barrier

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 DIBt is available (a European Technical Assessment (ETA) document, is in preparation).

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 ≥ 400 kg/m^3
- The solid ceiling must be made of concrete, ferroconcrete, or autoclaved aerated concrete with a density of ≥ 550 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. The distance between the posts and the barrier must be 100 mm or more. The space between the cladding of the wall and the post or the barrier must be firmly filled at least 100 mm deep with mineral wool of the fire behavior class A1 or A2 according to EN 13501-1.

Only one LI busbar trunking unit each must be led through the openings. The wall or the ceiling must be classified with the intended fire resistance duration according to EN 13501-2 (EI 90 or EI 120).

The fire barrier is possible for straight trunking units or junction units. The dimensions of the fire barrier block are given in Fig. 6/26, and the positioning on the trunking unit is given in Fig. 6/27. 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 are given in Tab. 6/42.

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
- One double body or two single bodies at a distance of 100 mm may be led through a wall or ceiling opening as a maximum (enclosure-enclosure)
- 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 should not be less than 100 mm. In case of installations not related to the system, e.g., cable routes and pipes, the minimum distance between the wall or ceiling openings must not be less than 200 mm (combined barriers are not permissible).

System type	Fire resistance class			
	EI 90		EI 120	
	Thickness a	Length L	Thickness a	Length L
LI-A...-MOS	25 mm	700 mm	50 mm (2 × 25 mm)	750 mm
LI-C...-MOS	50 mm (2 × 25 mm)	800 mm	50 mm (2 × 25 mm)	950 mm

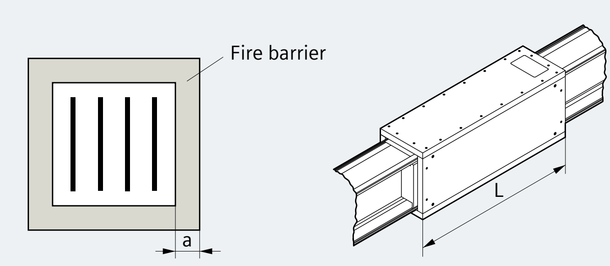
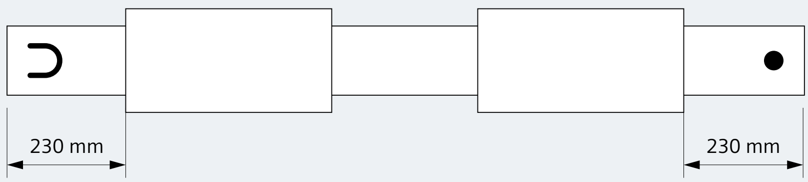


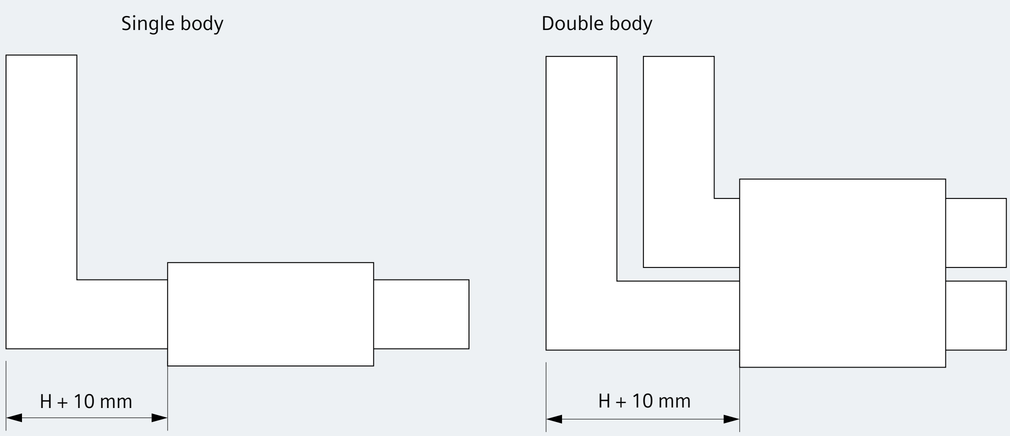
Fig. 6/26: **Dimensions and views for fire barriers LI-...-EI90-MOS and LI-...-EI120-MOS to be assembled by the customer**

Straight length: minimum distance up to the edge of the fire barrier block

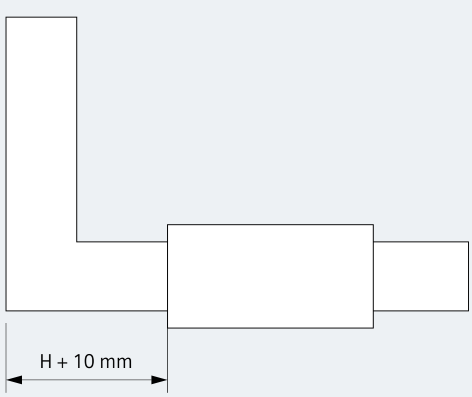


Note: The minimum distance up to the edge of the fire barrier block is 370 mm if the craning tool for suspension and transport of the trunking unit has to be attached to load slings.

Elbow: minimum distance from the outside edge of the elbow up to the edge of the fire barrier block [1)]



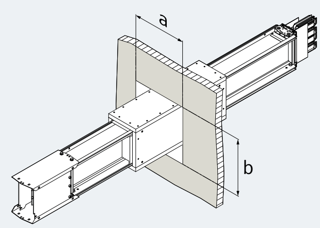
Knee (single and double body): minimum distance from the outside edge of the knee up to the edge of the fire barrier block [1)]



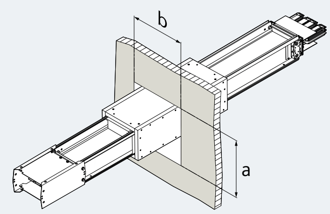
[1)] The minimum distance of the fire barrier block from the hook or bolt end is the same as for the “straight length”

Fig. 6/27: **Positioning of the fire barrier blocks on the LI trunking units (H = enclosure height or width)**

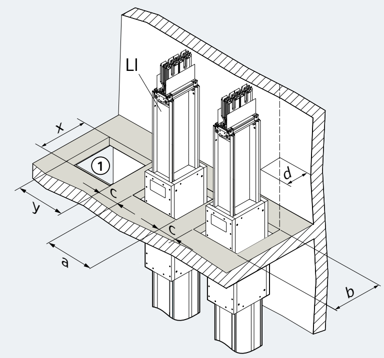
Wall cut-out,
edgewise trunking unit



Wall cut-out,
flat trunking unit



Ceiling cut-out



Remark: The dimensions of the neighboring cut-outs apply to walls as well

① Cut-out for external components or equipment (e.g., cable or pipe barriers)

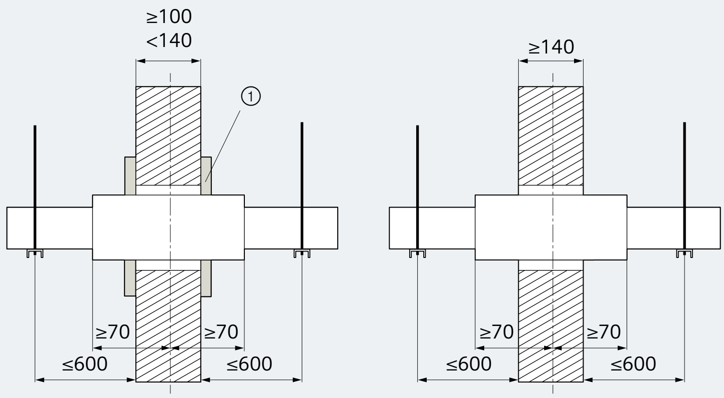
System LI-A	LI- ... -EI90			LI- ... -EI120			System LI-C	LI- ... -EI90 / -EI120		
	a in mm	b in mm	d in mm	a in mm	b in mm	d in mm		a in mm	b in mm	d in mm
LI-A-0800 ...	300	260		350	310		LI-C-1000 ...	350	310	
LI-A-1000 ...	300	280		350	330		LI-C-1250 ...	350	320	
LI-A-1250 ...	300	300		350	350		LI-C-1600 ...	350	350	
LI-A-1600 ...	300	330		350	380		LI-C-2000 ...	350	370	
LI-A-2000 ...	300	380	≥ 50	350	430	≥ 70	LI-C-2500 ...	350	410	≥ 70
LI-A-2500 ...	300	450		350	500		LI-C-3200 ...	350	480	
LI-A-3200 ...	560	330		610	380		LI-C-4000 ...	610	370	
LI-A-4000 ...	560	380		610	430		LI-C-5000 ...	610	410	
LI-A-5000 ...	560	450		610	500		LI-C-6300 ...	610	480	

	Distance c in mm	
Opening X × Y	LI -> ... ①	LI -> LI
> 200 mm × 200 mm	≥ 200	≥ 100
≤ 200 mm × 200 mm	≥ 100	≥ 100

Tab. 6/42: **Dimensions and distances (dimensions in mm) for wall cut-outs and ceiling cut-outs with LI fire barrier**

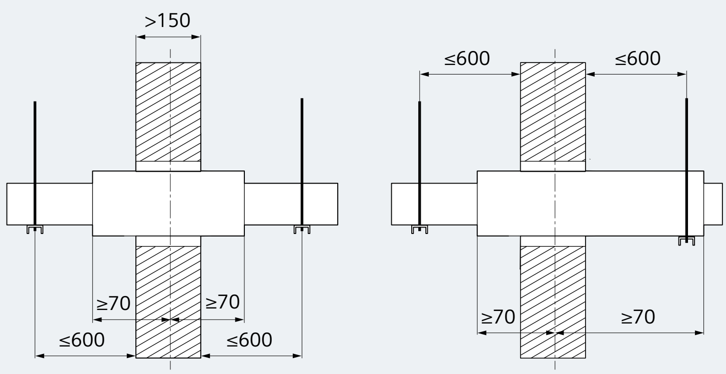
- The system-specific fixing elements must be used. No fire barrier may be configured on a fixed limb
- The busbar trunking unit must be fixed in such a way that it stays operable in case of fire, preventing any additional mechanical stress on the barrier, and preserving the barrier throughout the classification period (Fig. 6/28 and Fig. 6/29)
- After installation, all remaining gaps between the fire barrier block and the wall or ceiling opening must be completely filled with non-flammable material, e.g., concrete or mortar, according to the thickness of the wall or ceiling, or optionally with non-flammable mineral wool. Finally, the gap must be filled on both sides with mineral mortar, at least 5 mm deep
- The concrete or mortar must conform to the applicable standards for the preservation of the fire resistance class of the wall or ceiling (e.g., EN 206 and EN 998-2)
- The fire barrier block should feature a minimum distance of 50 mm to the ceiling or the wall surface
- In case of deviations, consultation with the responsible Siemens product management is required.

Fire barrier in solid fire wall LI- ... - EI90

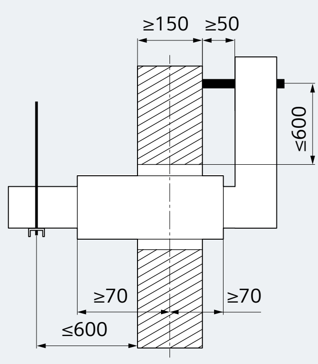


Notes:
The reinforcement ① for the fire wall must be made of fore barrier plates (PROMATECT®-H) with a thickness of 20 mm and a width of 100 mm as a minimum, and be provided on both sides of the surface of the building element.
For installation in solid walls with a wall thickness > 140 mm, the reinforcement on both sides can be omitted.
For off-center installation regarding the solid wall, the outside edge of the fire barrier block must be at a distance of at least 70 mm from the wall center.
Tolerance for fixing distances: ± 50 mm

Fire barrier in solid fire wall LI- ... - EI90 / -EI120



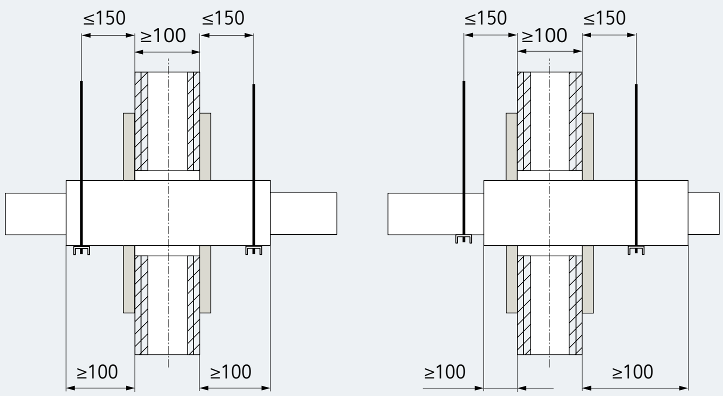
Notes:
For off-center installation regarding the solid wall, the outside edge of the fire barrier block must be at a distance of at least 70 mm from the wall center.
Tolerance for fixing distances: ± 50 mm



Note:
Representation of a junction unit with fire barrier in combination with a wall beam for horizontal installation or a system-specific fixing bracket for vertical installation

Fig. 6/28: **Positioning of the fire barrier blocks in solid fire walls (dimensions in mm)**

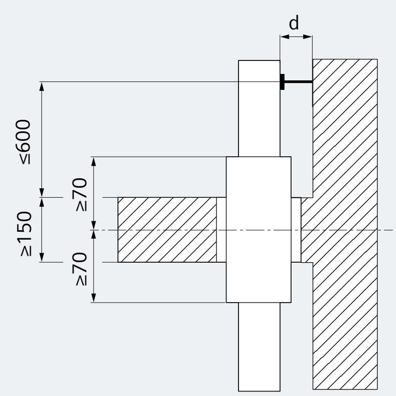
Fire barrier in lightweight partition wall LI- ... - EI90



Notes:
The opening reveal has to be closed all around with U-profiles made of sheet steel. Then, the opening reveal must be cladded all around with 20 mm thick cement- or plaster-bound structural panels with fire behavior class A1 or A2 according to EN 13501-1.
After positioning the busbar trunking system, the gaps between the opening reveal and the fire barrier block must be completely and solidly filled with non-flammable mineral wool with fire behavior class A1 according to EN 13501-1.
Then, reinforcements made of 20-mm thick structural panels "PROMATECT®-H" (approval no.: ETA-06/0206) must be provided on both sides of the wall.
Finally, the remaining gaps must be completely filled with fire barrier sealant "PROMASEAL®-Mastic" (approval no.: AbP P-NDS04-373).

For off-center installation regarding the lightweight partition wall, the outside edge of the fire barrier block must be at a distance of at least 100 mm from the wall surface.
Tolerance for fixing distances: ± 50 mm

Fire barrier in solid fire wall LI- ... -EI90 / -EI120



Notes:
Tolerance for fixing distances: ± 50 mm
Dimensions for distance d: see Tab. 6/42

Fig. 6/29: **Positioning of the fire barrier blocks in lightweight partition walls or fire ceilings (dimensions in mm)**

6.6 Dimensions and Derating Factors for Functional Endurance

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 8. 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. 6/43.

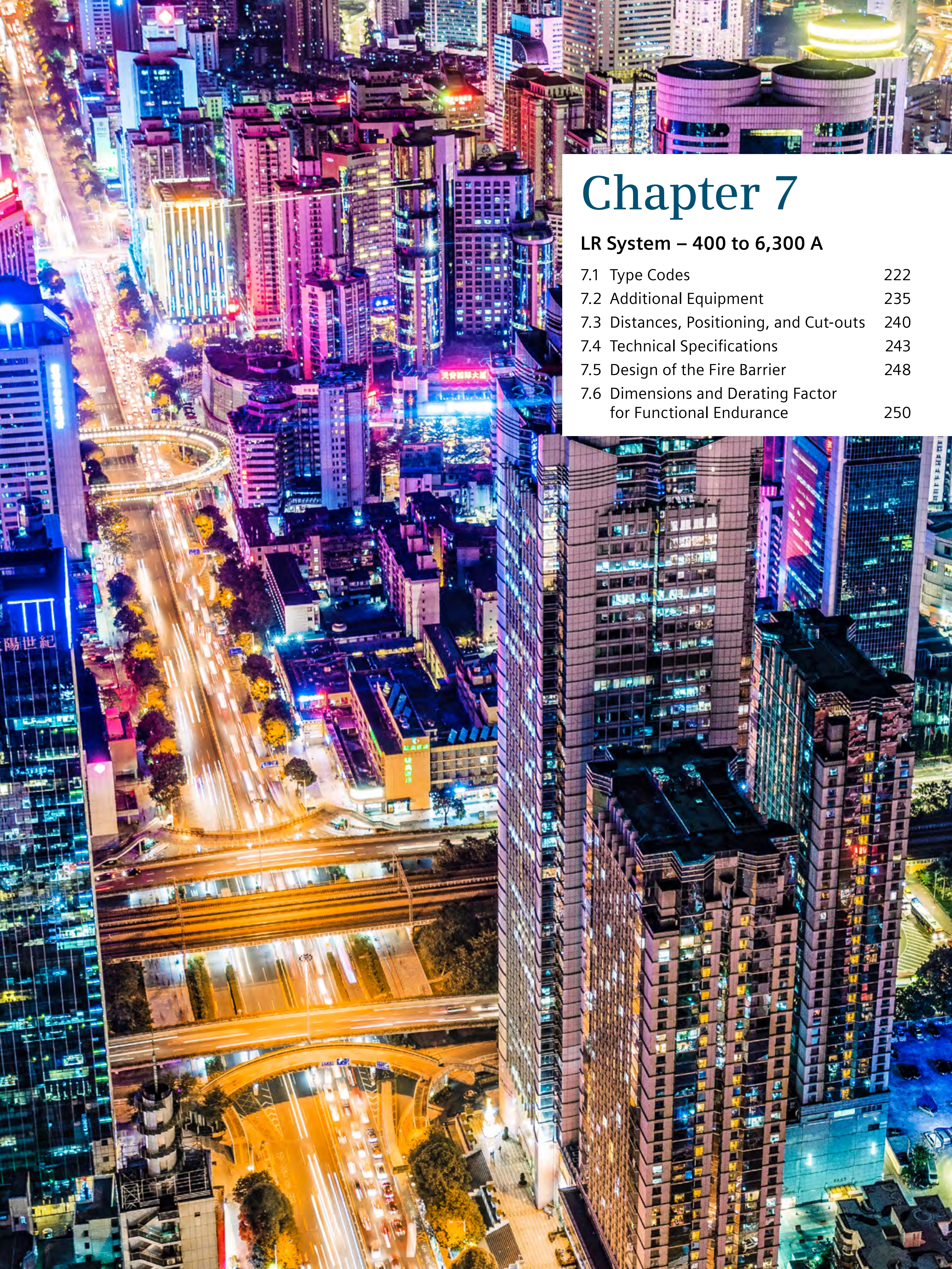
The general building inspectorate certificate (German: abP = allgemeines bauaufsichtliches Prüfzeugnis) with the approval number P-SAC-02/III-694 describes the design for

- 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		External dimensions horizontal, flat		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
	0800				240 mm	250 mm		0.70	0.62
	1000				260 mm	270 mm		0.69	0.61
	1250			300 mm	280 mm	290 mm	290 mm	0.63	0.56
	1600				310 mm	320 mm		0.65	0.57
LI-A .	2000				360 mm	370 mm		0.65	0.58
	2500				430 mm	440 mm		0.67	0.59
	3200				310 mm			0.52	0.51
	4000			550 mm	360 mm	not covered by abP	not covered by abP	0.52	0.51
	5000				430 mm			0.53	0.52
	1000	45 mm	LS		240 mm			0.62	0.57
	1250				260 mm			0.76	0.66
	1600			300 mm	280 mm	not covered by abP	not covered by abP	0.70	0.61
	2000				310 mm			0.68	0.59
LI-C .	2500				360 mm			0.66	0.58
	3200				430 mm			0.68	0.60
	4000				310 mm			0.54	0.51
	5000			550 mm	360 mm	not covered by abP	not covered by abP	0.54	0.51
	6300				430 mm			0.56	0.54

Tab. 6/43: **Dimensions and derating factors for the functional endurance (functional endurance classes E 15 … E 90) of the LI system**



Chapter 7

LR System – 400 to 6,300 A

7 LR System – 400 to 6,300 A

The busbar trunking system LR (Fig. 7/1) 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 mounting 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

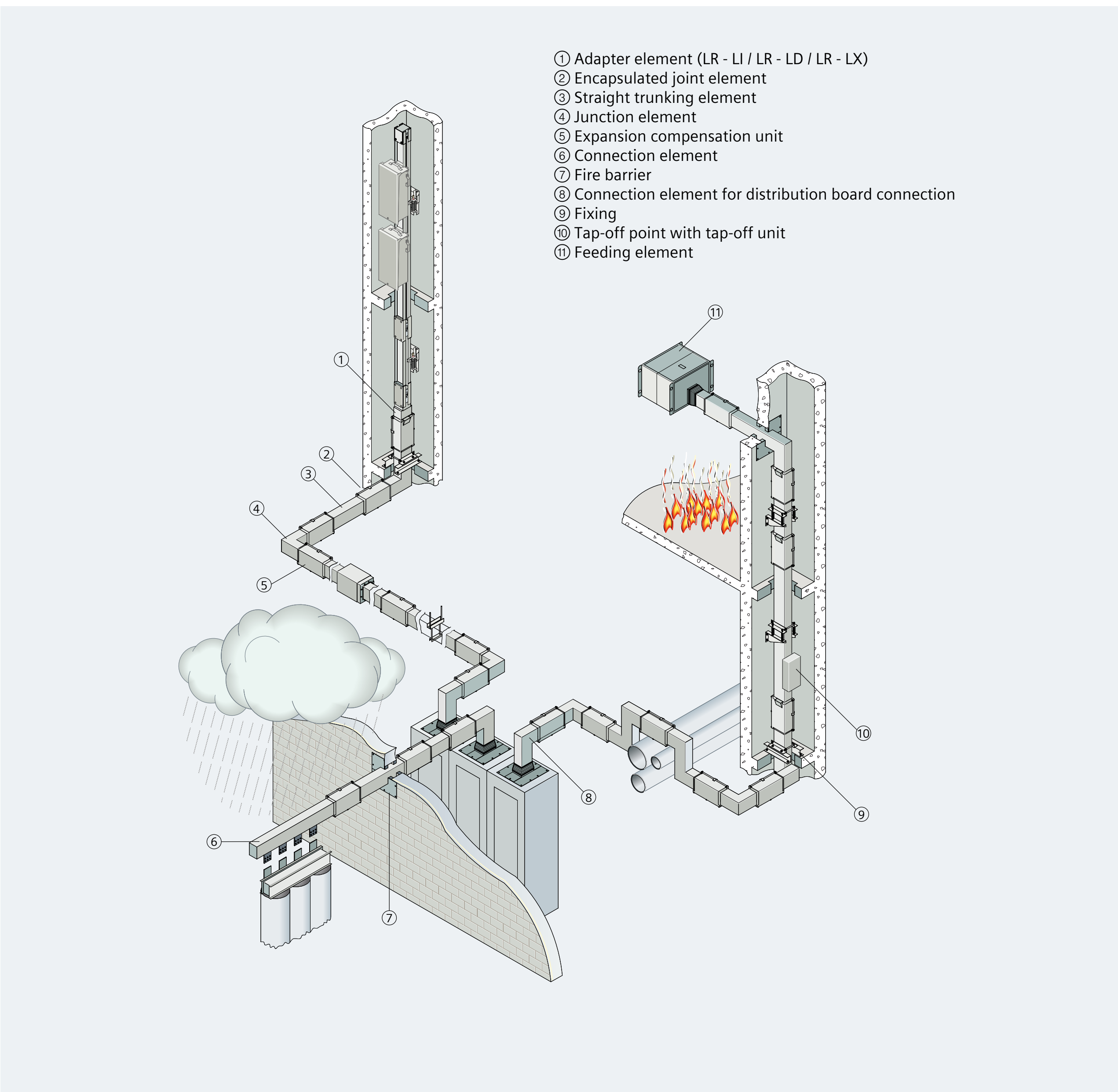


Fig. 7/1: **Overview of busbar trunking system LR** be optimally adjusted to the construction conditions with elbow elements, connectors, and T-elements for change of direction. Places of use are both the industrial sector and infrastructure projects such as railway stations, airports, or data centers.

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 busbars in edgewise and flat positions 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 (constant) and IEC 60068-2-30 (cyclic); suitable for tropical climate and seawater atmosphere
- Halogen-free in accordance with 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
- Suitability for sprinklers.

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, 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.

7.1 Type Codes

The type codes for the different sizes (Tab. 7/1) 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. 7/3). 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 busbar trunking systems SIVACON 8PS (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 (-XR) 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. 7/1: **Type codes 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. 7/2: **Type suffix 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 if 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. 7/1) is amended with a type suffix (Tab. 7/2):
- 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.

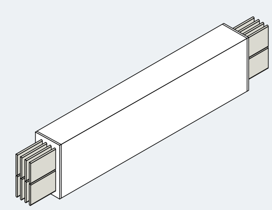
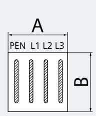
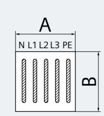
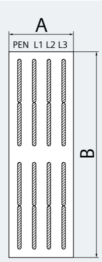
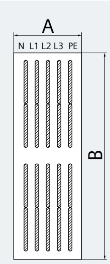
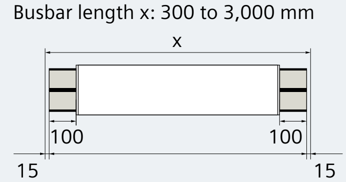
With the fire barrier kits, the trunking elements reach the fire resistance classes EI 90 or EI 120 beyond the standard fire resistance class EI 60. They are used for wall or ceiling cut-outs and consist of the following parts:
- "PROMATECT®-200" plates
- Sealing material "PROMASEAL®" for sealing the 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.

Ordering 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		LR . 0151-6		90		
LR . 0241-6	90	90		LR . 0251-6	90	90		
LR . 0341-6		90		LR . 0351-6		90		
LR . 0441-8		110		LR . 0451-8		110		
LR . 0541-0		130		LR . 0551-0		130		
LR..0641-2		150		LR . 0651-2		150		
LR..0741-8	100	190		LR . 0751-8	120	190		
LR . 0841-0		230		LR . 0851-0		230		
LR . 0941-2		270		LR . 0951-2		270		Busbar length x: 300 to 3,000 mm
LR . 2741-8		380		LR . 2751-8		380		
LR . 2841-0	100	460		LR . 2851-0	120	460		
LR . 2941-2		540		LR . 2951-2		540		

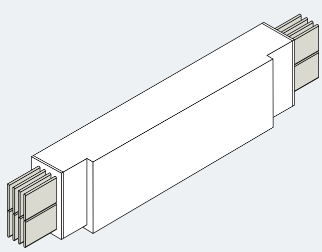
Tab. 7/3: **Sizes and dimensional drawings (dimensions in mm) for straight trunking elements (observe 15 mm space for joint blocks on each side). Order example: straight length 1.7 m, conductor material Cu, 4-conductor configuration, rated current 2,000 A: LRC0741-8-2,0 (X = 1.7 m)**

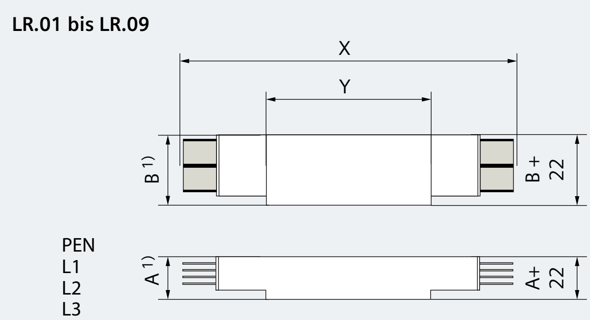
Phase alteration elements

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. 7/2. 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. 7/2, 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 ... –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

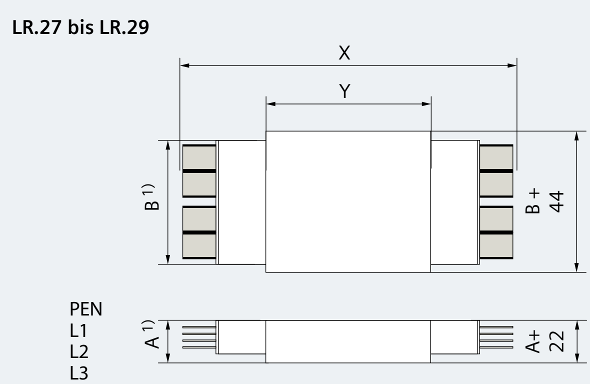


Fig. 7/2: **Views and dimensions (in mm) of the phase alteration elements LR ... -P and neutral conductor alteration elements LR ... -PN (illustrations for 4-conductor configuration)**
1) For specifications on width A and height B, see Tab. 7/3

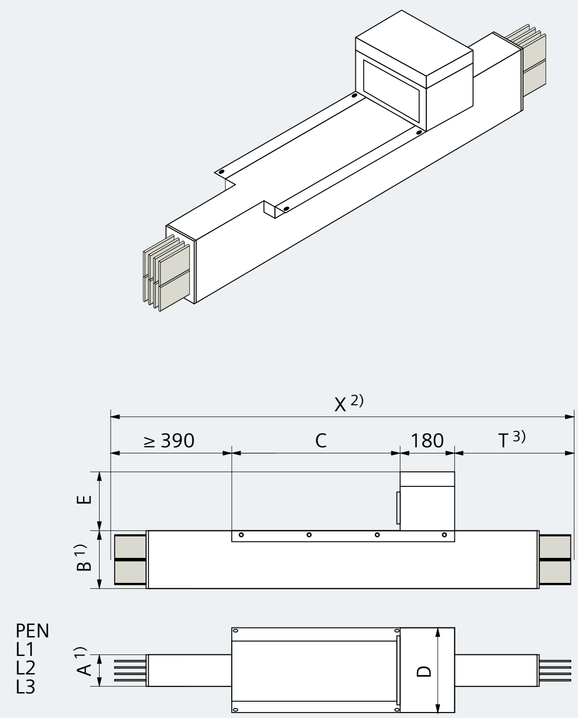
Tap-off points

Views and dimensions for trunking elements with tap-off point (type suffix LR-AD) are given in Fig. 7/3. With the tap-off unit available on request (up to 630 A), project-specific switching devices, such as circuit-breakers, are installed and connected to the tap-off point both electrically and mechanically. 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. 7/3 must be submitted as an additional specification. Further properties and technical specifications must be clarified specifically to the project.

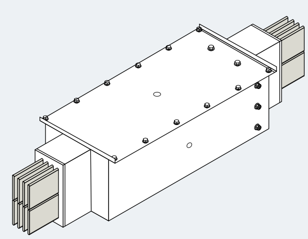
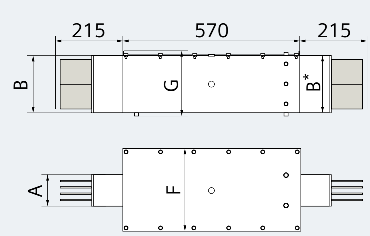
Adapter, expansion compensation, junction elements, connections

For adapter elements, expansion compensation units, junction elements (including T-elements), connection elements, and incoming cable connection elements, the characteristic structures of the respective type codes are listed in Tab. 7/4 up to Tab. 7/9 together with views, dimensions, versions, and examples. For junction elements and connection elements, the length specifications X, Y, and 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. 7/3
2) The length X of the trunking element is 1,680 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

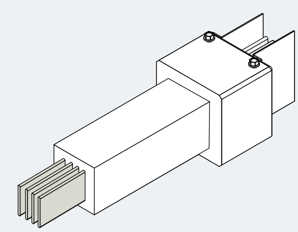
Fig. 7/3: **Views and dimensions (in mm) of the trunking elements with tap-off point**

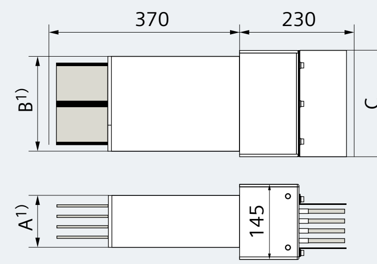
Type code	Width F in mm	Height G 1) in mm	Expansion compensation unit	Dimensional drawing
LR . 0141-.-D up to LR . 0941-.-D	270	B + 30		
LR . 2741-.-D up to LR . 2941-.-D	250	B + 45		
LR . 0151-.-D up to LR . 0951-.-D	320	B + 30		
LR . 2751-.-D up to LR . 2951-.-D	300	B + 45		

1) For specifications on width A and height B, see Tab. 7/3

Tab. 7/4: **Type codes 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. 7/3. 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		

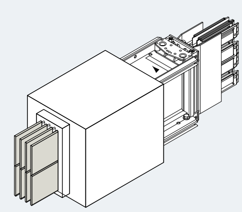


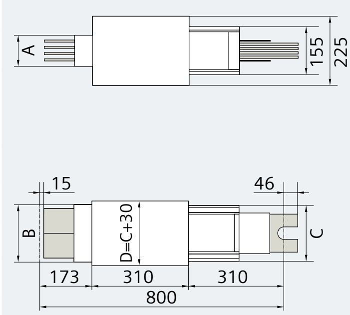


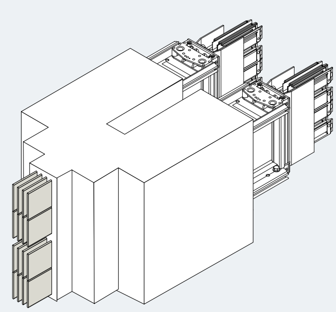
1) For specifications on width A and height B, see Tab. 7/3

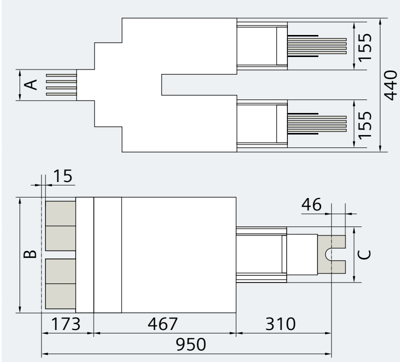
Tab. 7/5: **Type codes and dimensions for adapter elements from the LR system to the LX system (dimensions in mm)**
In the type code, "A" must be inserted for Al or "C" for Cu, as well as the number of conductors (4, 5) accordingly for LR and LX.
Example: type code for adapter element LR-LX with Al, 1,600 A, 4-conductor configuration = LRA0741-8-LXA0541

Type code		Height C in mm	Adapter element	Dimensional drawing
LRA03 . 1	-LIAN0800 . .	111		
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		A = width of LR system 1) B = height of LR system 1) C = height of LI system
LRA27 . 1	-LIAN3200 . .	182		
LRA28 . 1	-LIAN4000 . .	230		
LRA29 . 1	-LIAN4600 . .	297		
LRC27 . 1	-LICN4000 . .	174		
LRC28 . 1	-LICN5000 . .	213		
LRC29 . 1	-LICN6150 . .	280		A = width of LR system 1) B = height of LR system 1) C = height of LI system





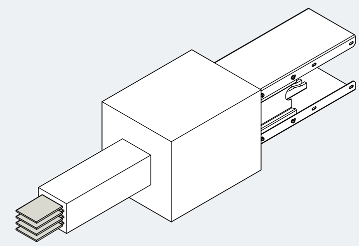


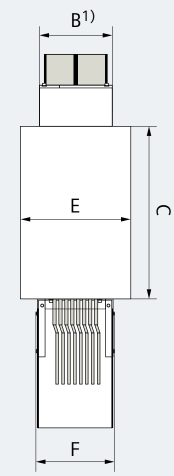


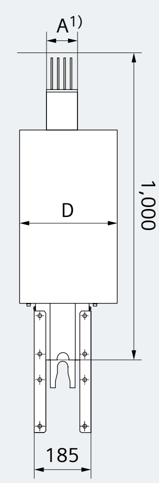
1) For specifications on width "A" and height "B" of the LR system, see Tab. 7/3

Tab. 7/6: **Type codes 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	





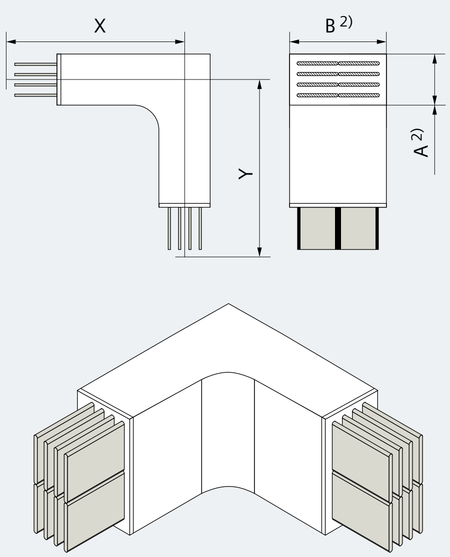


1) For specifications on width A and height B of the LR system, see Tab. 7/3

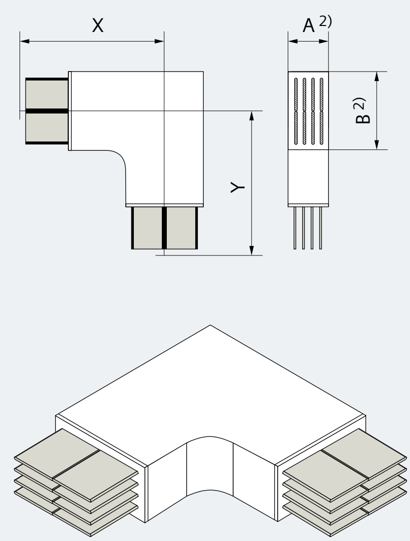
Tab. 7/7: **Type codes and dimensions (in mm) for adapter elements from the LR system to the LD system. Example: type code for adapter element LR-LD with Al, 1,600 A, 5-conductor configuration, LD with 100 % N busbar = LRA0751-8-LDA3620**

Type code		(X + Y) in mm		X in mm		Y in mm	
		min	max	min	max	min	max
LR . 01 . 1 up 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 up 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 up 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)

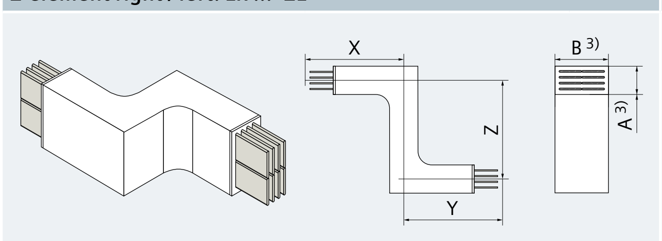


[1] Specifications for the respective conductor height (-0, -2, -6, -8) must be inserted in the type code in front of the addition for the junction element
[2] For width A and height B, see Tab. 7/3

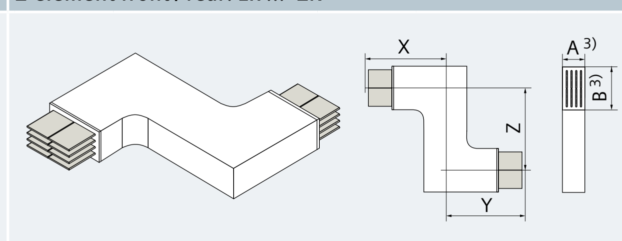
Tab. 7/8: **Type codes and dimensions (in mm) for edgewise angles (elbow ... -E) and flat angles (knee ...-K) of the LR system.**
In the type code, Al or Cu (A, C) and the number of conductors (4 or 5) must be inserted.
Example: type code for elbow element with Cu, 2,000 A, 5-conductor configuration, 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 up to LR . 29 . 1 [1]	-ZE	610	1,400	300	700	300	700	10	700
LR . 01 . 1 up to LR . 09 . 1 [1]	-ZK	710	1,400	350	700	350	700	10	700
LR . 27 . 1 up to LR . 29 . 1 [1]	-ZK	1,010	2,000	500	700	500	700	10	1,000
LR . 01 . 1-6 up 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 up to LR . 09 . 1 [1]	-TV	1,050		350		350		350	
LR . 27 . 1 up to LR . 29 . 1 [1]	-TV	1,500		500		500		500	
LR . 01 . 1 up to LR . 09 . 1 [1]	-TV-2,0	1,060	2,000	350	1,150	350	1,150	350	500
LR . 27 . 1 up to LR . 29 . 1 [1]	-TV-2,0	1,510	2,000	500	1,000	500	1,000	500	700

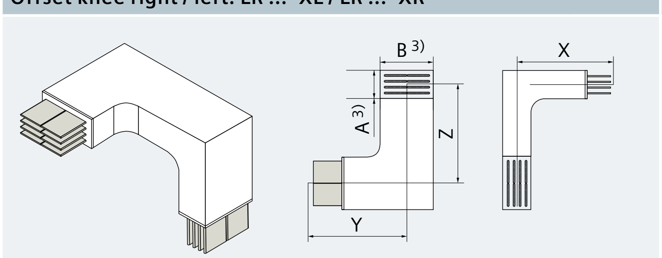
Z-element right / left: LR ... -ZE



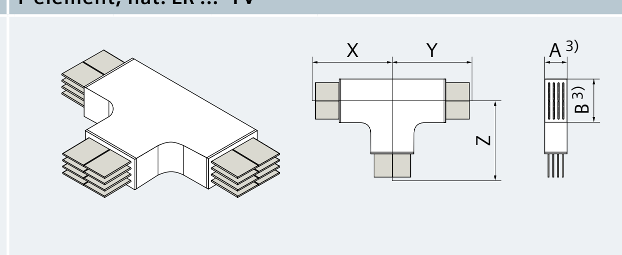
Z-element front / rear: LR ... -ZK



Offset knee right / left: LR ... -XL / LR ... -XR



T-element, flat: LR ... -TV



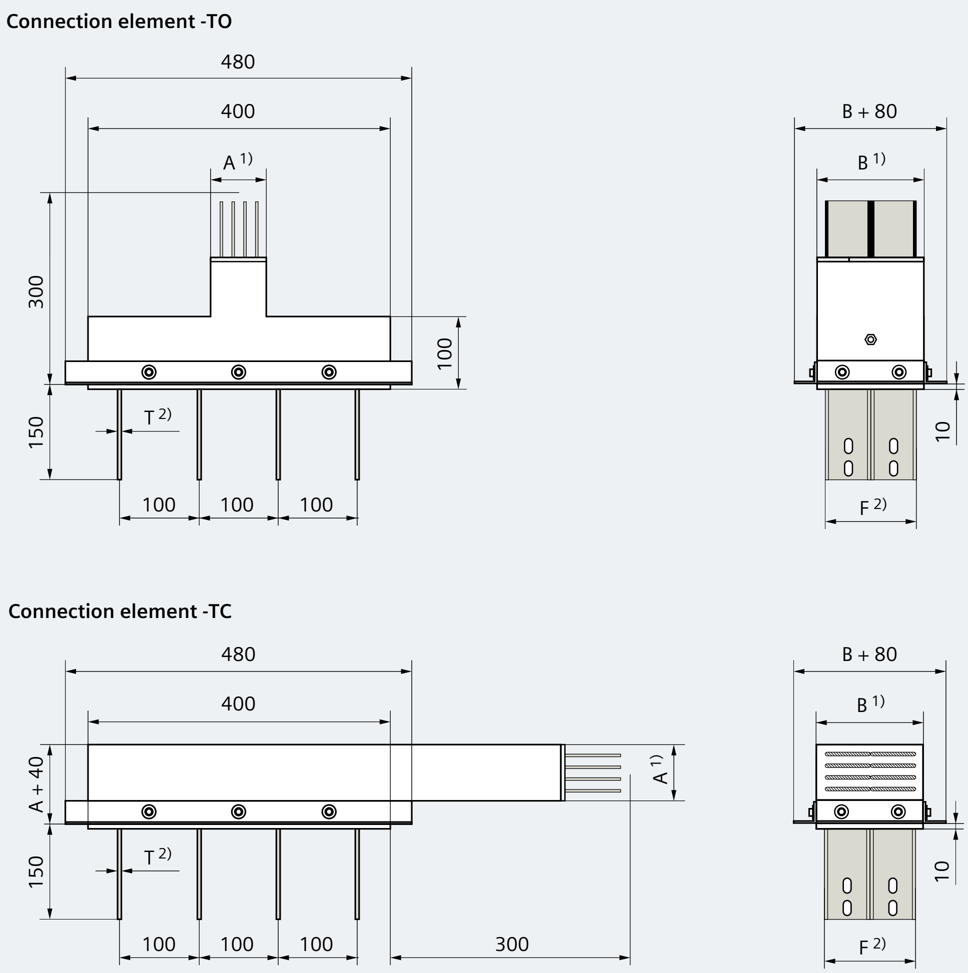
1) Specifications for the respective conductor height (-0, -2, -6, -8) must be inserted in the type code in front of the addition for the junction element
2) Specifications for 4-conductor configuration / 5-conductor configuration
3) For width A and height B, see Tab. 7/3

Tab. 7/9: **Type codes 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. 7/4 and Fig. 7/5, only the connection elements with 4 conductors are shown.

The dimensions of the connection elements LR....-..-TO and LR....-.6.-TC in Fig. 7/4 are firmly correlated with the values "A" and "B" (see Tab. 7/3). The dimensions and hole patterns of the tags can be found in Tab. 7/11.

Further connection elements LR....-..-T.-F with dimensions that can be selected within certain limits are shown in Fig. 7/5. The design-specific values are given in Tab. 7/10.

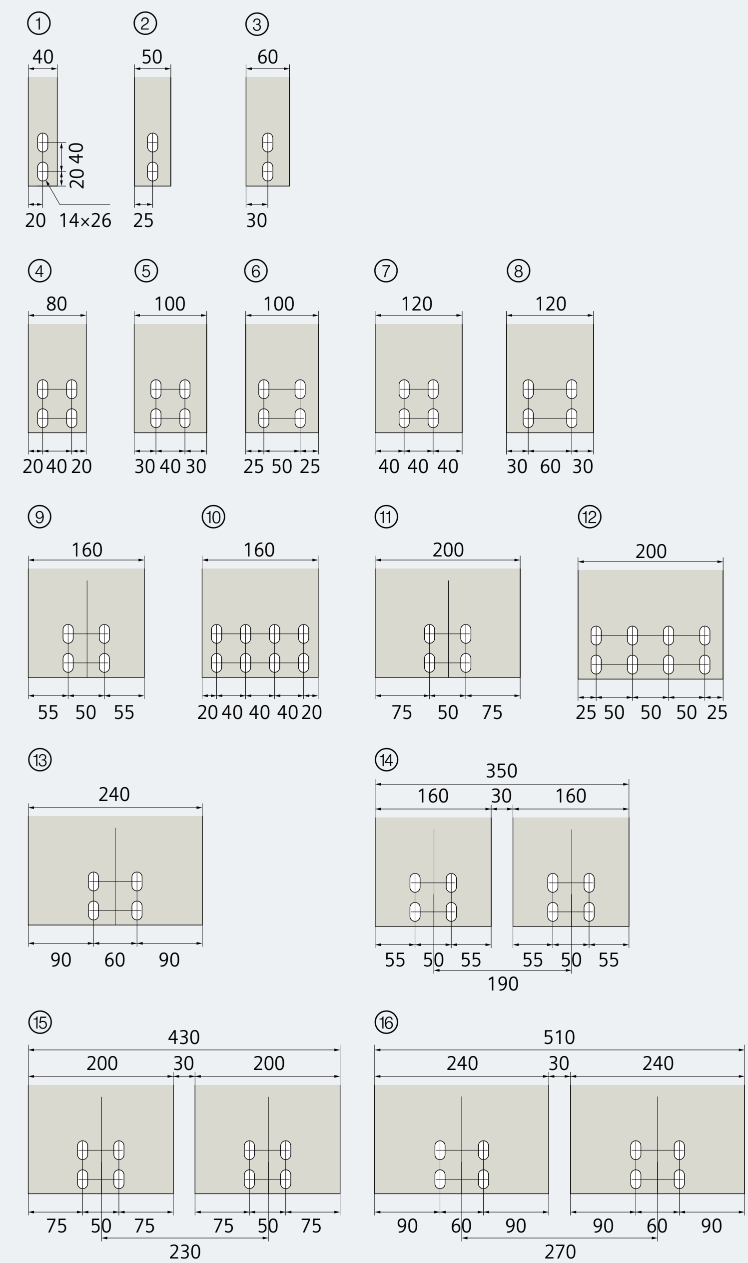


1) For specifications on width A and height B, see Tab. 7/3
2) For specifications on dimensions F and T of the connection tags, see Tab. 7/10

Fig. 7/4: **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)**

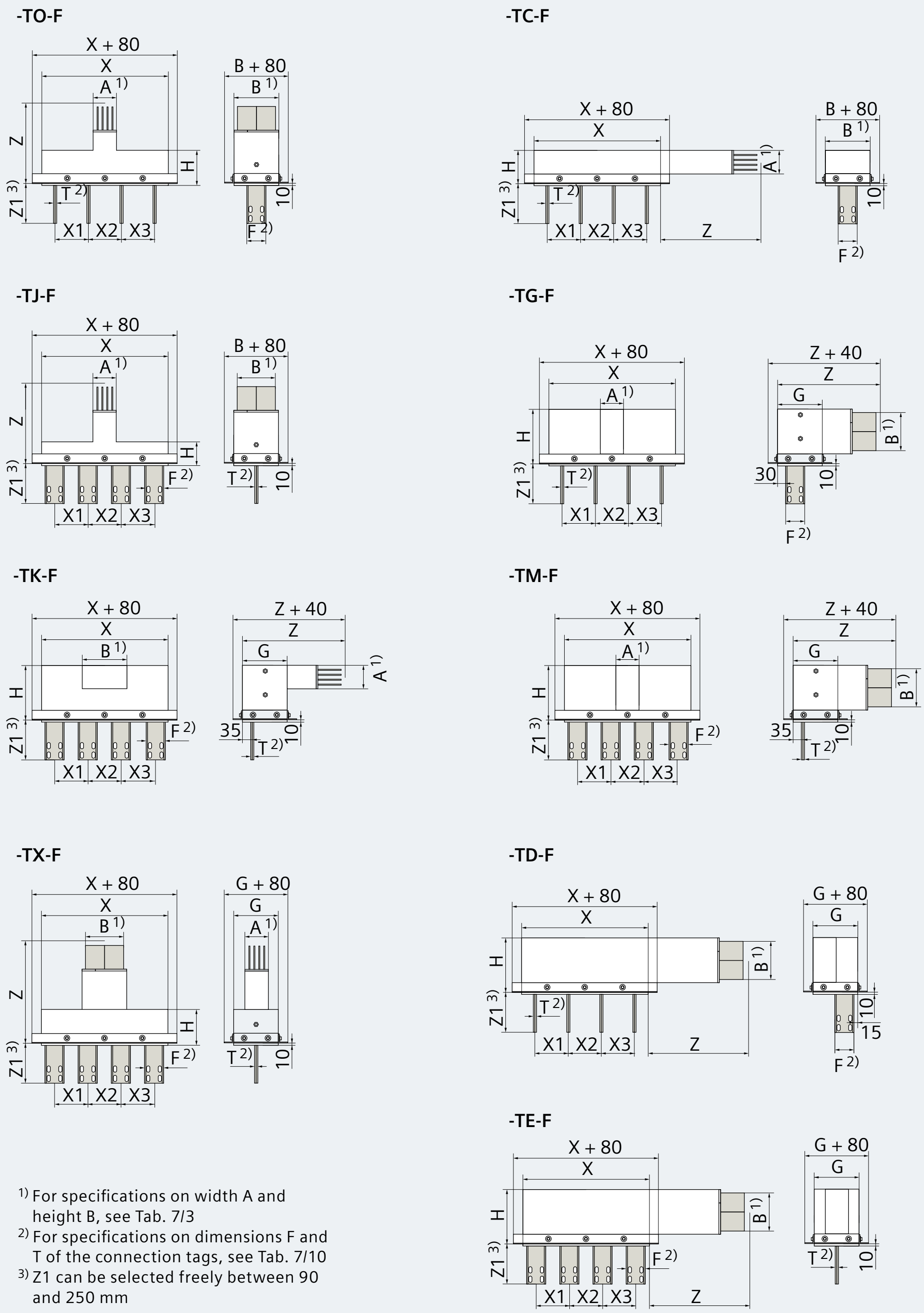
Type code LR ... [1]	Width F × thickness T in mm for tags of connection elements ...-TO / ...-TC	...-T.-F [2]
.01.1-6	60 × 3 (3)	40 × 10 (1)
.02.1-6	60 × 4 (3)	50 × 10 (2)
.03.1-6	60 × 6 (3)	60 × 10 (3)
.04.1-8	80 × 6 (4)	50 × 20 (2) 60 × 10 (3) 80 × 10 (4)
.05.1-0	100 × 6 (5)	50 × 20 (2) 60 × 20 (3) 80 × 10 (4) 100 × 10 (6)
.06.1-2	120 × 6.3 (Al) (7) 120 × 6.2 (Cu) (7)	60 × 20 (3) 80 × 10 (4) 100 × 10 (6)
.07.1-8	160 × 6 (9)	60 × 20 (3) 80 × 20 (4) 100 × 10 (6) 120 × 10 (8)
.08.1-0	200 × 6 (11)	80 × 20 (4) 100 × 20 (6) 120 × 20 (8)
.09.1-2	240 × 6.3 (Al) (13) 240 × 6.2 (Cu) (13)	100 × 30 (6) 120 × 20 (8) 160 × 10 (10)
.27.1-8	2*160 × 6 (14)	100 × 40 (6) 120 × 30 (8) 160 × 20 (10) 200 × 20 (12)
.28.1-0	2*200 × 6 (15)	100 × 50 (6) 120 × 40 (8) 160 × 30 (10) 200 × 20 (12)
.29.1-8	2*240 × 6.3 (Al) (16) 2*240 × 6.2 (Cu) (16)	120 × 50 (8) 160 × 40 (10) 200 × 30 (12)

Hole patterns for connection tags
Dimensions in mm



[1] In 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. 7/10: **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. 7/3
2) For specifications on dimensions F and T of the connection tags, see Tab. 7/10
3) Z1 can be selected freely between 90 and 250 mm

Fig. 7/5: **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. 7/11**

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 up 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 up to .29.1	-TD-F	Offset r / l [2]						A+F+15	B+40
.01.1 up to .29.1	-TO-F					300		-	4 L [4]: 120 5 L [4]: 140
.01.1 up to .29.1	-TG-F					F+245		F+85	B+40
.0141 up 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 up to .2951		5 conductors [5]		F+100+X1+X2+X3+X4				3*T+225	
.0141 up to .2941	-TJ-F	4 conductors		F+100+X1+X2+X3		300		-	T+85
.0151 up to .2951		5 conductors		F+100+X1+X2+X3+X4				-	T+125
.0141 up to .2941	-TM-F	4 conductors		F+100+X1+X2+X3		T+255		T+95	B+40
.0151 up to .2951		5 conductors		F+100+X1+X2+X3+X4		T+295		T+135	
.0141 up to .0941	-TK-F	4 conductors [5]		F+100+X1+X2+X3		B+T+290	700	B+T+130	2*T+205
.2741 up to .2941						B/2+T+290		B/2+T+130	
.0151 up to .0951		5 conductors [5]		F+100+X1+X2+X3+X4		B+T+290		B+T+130	3*T+245
.2751 up to .2951						B/2+T+290		B/2+T+130	
.0141 up to .0941	-TX-F	4 conductors [5]		F+100+X1+X2+X3		B+260		2*T+210	B+100
.2741 up to .2941						B/2+260			B/2+100
.0151 up to .0951		5 conductors [5]		F+100+X1+X2+X3+X4		B+260		3*T+250	B+100
.2751 up 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 together with the dimensions for X1, X2, X3, X4 (if applicable), Z, Z1, F, and T
[3] For specifications on width A and height B for the different sizes, see Tab. 7/3; for specifications on dimensions F and T for connection tags, see Tab. 7/10
[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. 7/11: **Type codes and dimensions (in mm) for the different sizes of the connection elements LR... -T... from Fig. 7/5. 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 A,
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

Con-
tents
Intro-
duction
1
2
3
4
5
6
7
8

Incoming cable connection elements LR.... -. -KE

With the incoming cable connection elements (LR....-.-KE) (Fig. 7/6), single-core or multi-core cables can be connected. Cross-sections up to 300 mm^2 (bolt connection) 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.

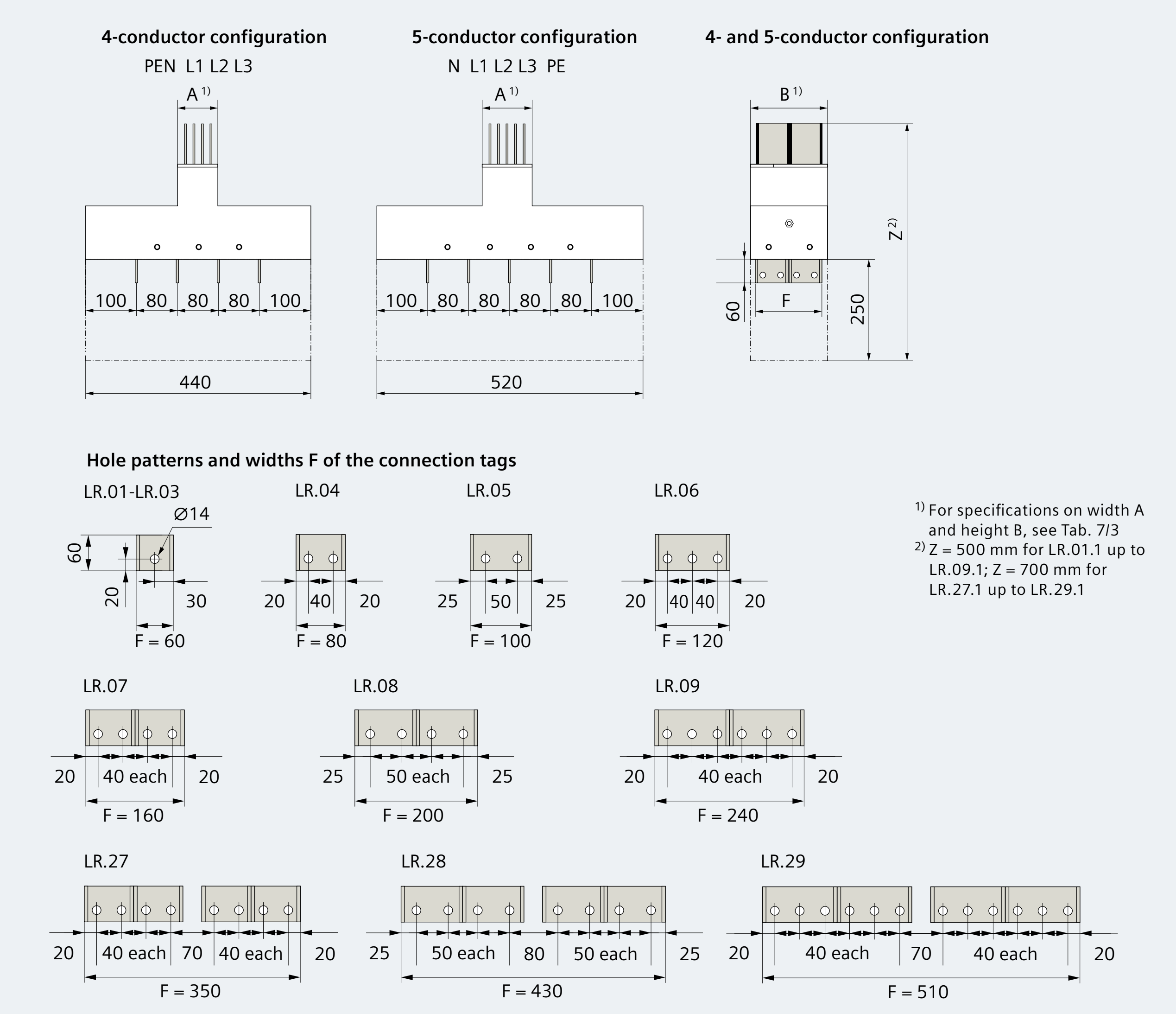


Fig. 7/6: **Dimensional drawings (dimensions in [mm) for the incoming cable connection elements LR....-.–KE and associated connection tags with hole patterns.**
Order example: incoming cable connection element KE, Cu, 5-conductor configuration, 4,000 A: LRC2751-8-KE

7.2 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

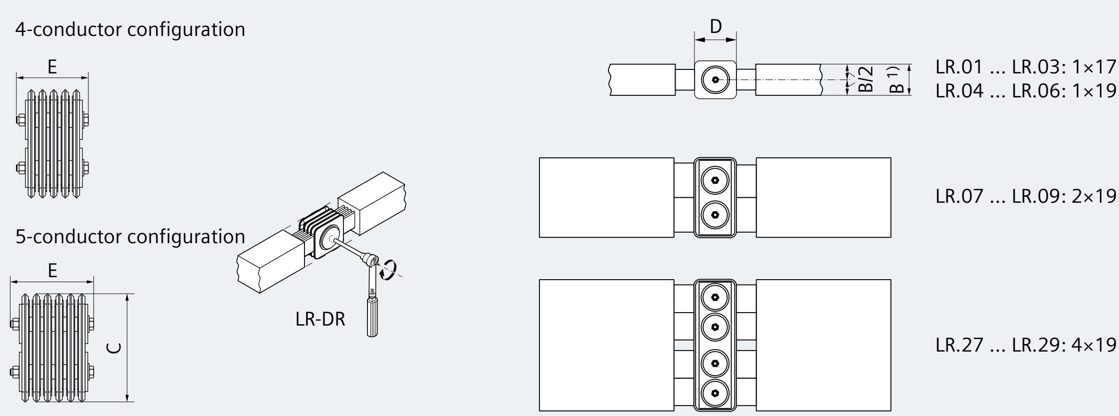
The joint block is used for the electrical and mechanical connection of trunking elements (Tab. 7/12). The trunking elements LR are generally delivered without connecting elements (joint blocks, or also called monoblocks). Thus, the joint blocks must always be considered, planned, and ordered separately 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. 7/3

Tab. 7/12: **Joint blocks for the different sizes; torque wrench LR-DR as mounting accessories (dimensions in mm)**

Casting shells

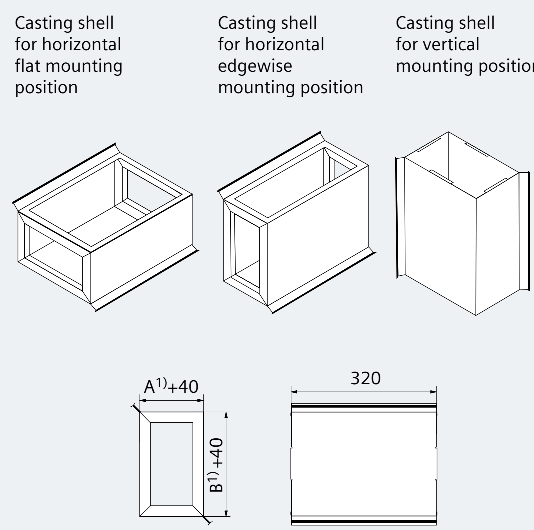
The connection point with the joint block muss be encapsulated with epoxy resin. As accessories for this, there are casting shells (vertical, horizontal with edgewise or flat busbar position), casting compound (resin and curing agent), release agent (for pre-treatment of the casting shell), and various tools (e.g., for mixing, filling, grinding). According to Tab. 7/13, 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. 7/13).

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. 7/14). 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. 7/13).

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. 7/14: **Casting shells delivered according to the number of connection points**

LR	- N	F	A	N/N	Views and dimensions (in mm)
LRA/LRC system (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. 7/3
[2] For LR . 01 .1 up 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. 7/13: **Type codes, views, and dimensional drawings for casting shells (in mm)**

Fixing

Fixing brackets are available for horizontal (edgewise or flat busbar position) and vertical installation (Fig. 7/7). 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 must be considered for 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. 7/8 shows the dimensions for the fixing elements. The sizes C, D, E, and F in Fig. 7/8, which depend on the busbar type, are summarized in Tab. 7/15. Distances and cut-outs that are already to be considered during the planning are summarized in Fig. 7/9.

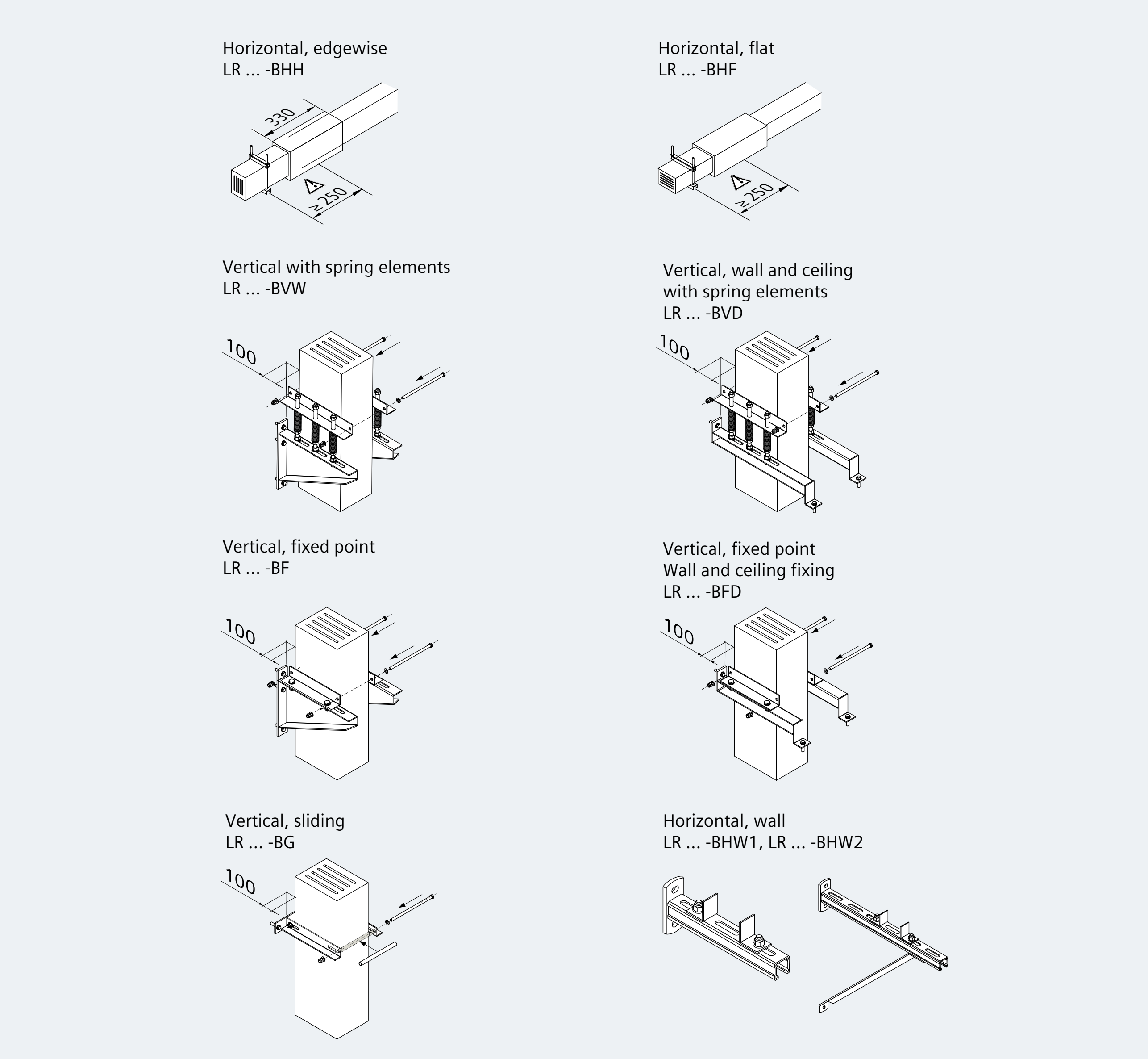


Fig. 7/7: **Fixing elements for LR system (dimensions in mm)**

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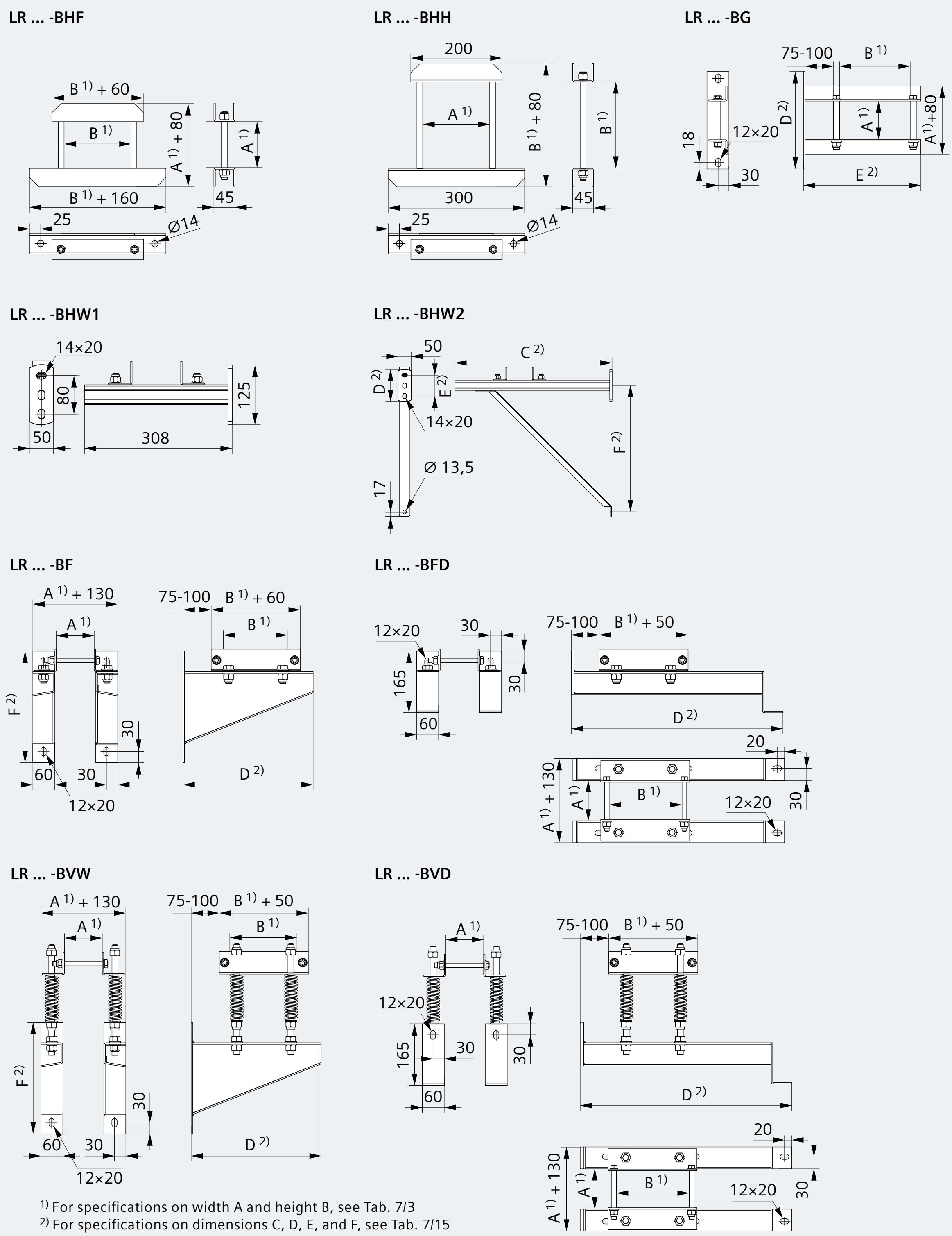

1) For specifications on width A and height B, see Tab. 7/3
2) For specifications on dimensions C, D, E, and F, see Tab. 7/15

Fig. 7/8: **Fixing elements for LR system (dimensions in mm)**

Fixing type	LR system	C	D	E	F
BHW1	LR . 01.1 up to LR . 07.1	308 mm	125 mm	80 mm	
BHW2	LR . 08.1 up to LR . 09.1	458 mm	125 mm	80 mm	291 mm
	LR . 27.1 up to LR . 29.1	758 mm	165 mm	120 mm	510 mm
BG	LR . 01.1 up to LR . 03.1		265 mm	224 mm	
	LR . 0441 up to LR . 064.1		265 mm	280 mm	
	LR . 0451 up to LR . 065.1		285 mm	280 mm	
	LR . 0741		265 mm	320 mm	
	LR . 0751		285 mm	320 mm	
	LR . 0841 up to LR . 094.1		265 mm	404 mm	
	LR . 0851 up 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 up to LR . 06.1		220 mm		220 mm
	LR . 07.1 up 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 up to LR . 06.1		450 mm		
	LR . 07.1 up to LR . 09.1		570 mm		
	LR . 27.1		680 mm		
	LR . 28.1 up to LR . 29.1		840 mm		

Tab. 7/15: **Dimensions (in mm) for LR fixing elements to Fig. 7/8**

7.3 Distances, Positioning, and Cut-outs

As the fixing elements and fixing points and the busbar runs 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 dimensional of straight trunking elements. Fig. 7/9 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. 7/9 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. 7/9).

Fig. 7/10 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 busbar run is encapsulated at the manufacturing plant specifically to the project or order.

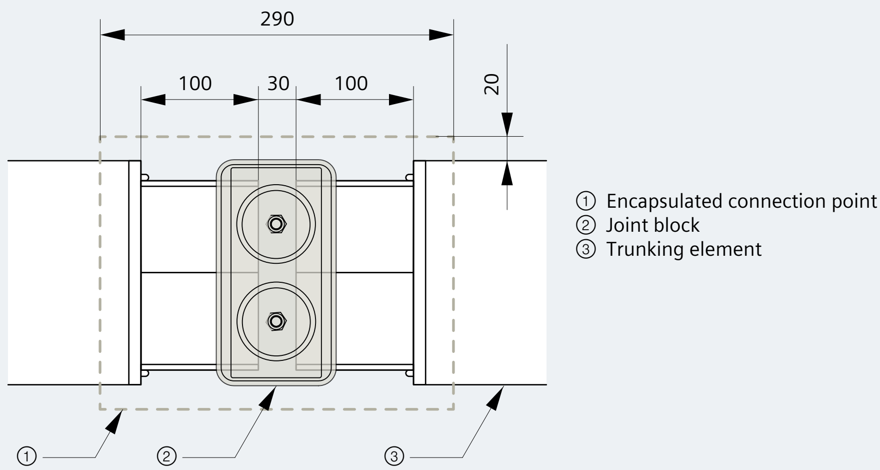

Fig. 7/9: **Dimensions for an encapsulated connection point (dimensions in mm)**

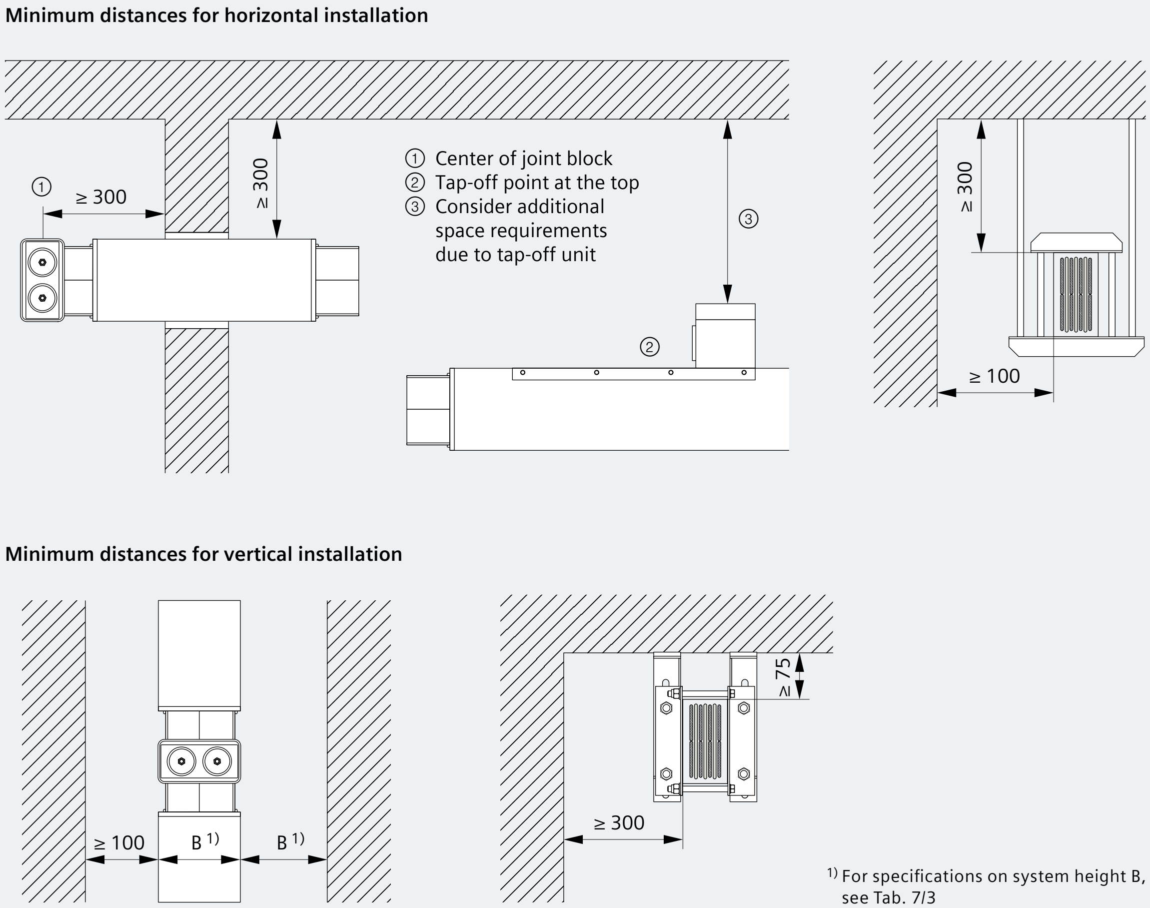

Fig. 7/10: **Distances from the trunking elements to the building elements (dimensions in mm)**

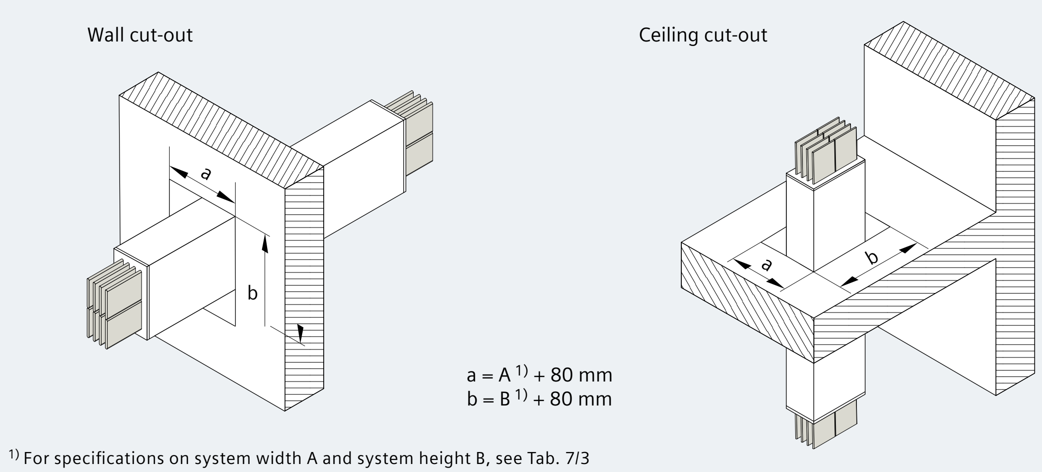

Fig. 7/11: **Dimensions (in mm) for wall cut-outs and ceiling cut-outs**

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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
- Busbar run 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 busbar run (Tab. 7/16). Within a defined length, the expansion compensation can compensate for both compressive and tensile forces.

Fixed points are special fixing brackets that solidly fix the trunking element by means of the 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.

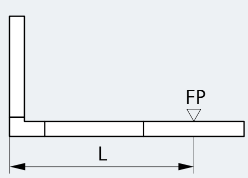
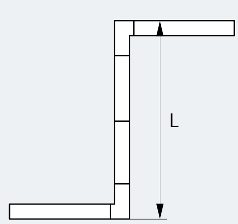
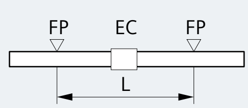
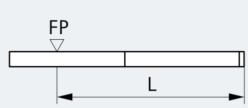
Attachment of a fixed point is necessary on the following system components:

- 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. 7/16).

Note: At an ambient temperature of less than -5° C, the number of expansion compensations 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 (distance 1.5 m). Then, sliding brackets and spring brackets are configured alternatively from bottom to top (distance 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			
	Busbar run:	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 one 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. 7/16: **Run lengths for using an expansion compensation (for an ambient temperature from -5 °C to +60 °C)**

7.4 Technical Specifications

Apart from the general technical specifications in Tab. 7/17, the derating factors regarding the temperature dependency and the site altitude above sea level (Tab. 7/17) must be observed. The system-dependent data is distinguished by conductor material, number of conductors, and rated current:

- Tab. 7/18: LRA0 . . 1 (4- and 5-conductor configuration, Al)
- Tab. 7/19: 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 (for horizontal flat mounting position, maximum 4,600 A) 630 ... 6,300 A (for horizontal flat mounting position, maximum 6,150 A)
Climatic resistance	• Constant temperature / humidity, according to IEC 60068-2-78 • Cyclic temperature / humidity, according 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. 7/17: **General system data, temperature characteristic, and impact of the site altitude above sea level**

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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	Resistance R_{20}	mΩ/m	0.149	0.118	0.078	0.060	0.048	0.040
	Reactance X_{20}	mΩ/m	0.050	0.041	0.026	0.053	0.050	0.041
	Impedance 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	Resistance R_{warm}	mΩ/m	0.176	0.141	0.095	0.073	0.058	0.050
	Reactance X_{warm}	mΩ/m	0.050	0.041	0.026	0.053	0.050	0.041
	Impedance 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	Resistance R_F	mΩ/m	0.296	0.235	0.156	0.123	0.096	0.078
	Reactance X_F	mΩ/m	0.174	0.158	0.154	0.146	0.116	0.096
	Impedance 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)	Resistance R_0	mΩ/m	0.468	0.378	0.254	0.197	0.157	0.131
	Reactance X_0	mΩ/m	0.606	0.503	0.422	0.349	0.280	0.235
	Impedance 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)		mm^2	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	Resistance R_{20}	mΩ/m	0.149	0.118	0.078	0.060	0.048	0.040
	Reactance X_{20}	mΩ/m	0.050	0.041	0.026	0.053	0.050	0.041
	Impedance 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	Resistance R_{warm}	mΩ/m	0.176	0.141	0.095	0.073	0.058	0.050
	Reactance X_{warm}	mΩ/m	0.050	0.041	0.026	0.053	0.050	0.041
	Impedance 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)	Resistance R_F	mΩ/m	0.296	0.235	0.156	0.123	0.096	0.078
	Reactance X_F	mΩ/m	0.174	0.158	0.154	0.146	0.116	0.096
	Impedance 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):	Resistance R_0	mΩ/m	0.468	0.378	0.254	0.197	0.157	0.131
	Reactance X_0	mΩ/m	0.606	0.503	0.422	0.349	0.280	0.235
	Impedance 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)		mm^2	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. 7/18: **Technical specifications for trunking elements LRA**

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	Resistance R_{20}	mΩ/m	0.030	0.023	0.020	0.015	0.012	0.010
	Reactance X_{20}	mΩ/m	0.046	0.030	0.029	0.024	0.025	0.022
	Impedance 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	Resistance R_{warm}	mΩ/m	0.035	0.029	0.025	0.019	0.015	0.013
	Reactance X_{warm}	mΩ/m	0.046	0.030	0.029	0.024	0.025	0.022
	Impedance 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	Resistance R_F	mΩ/m	0.060	0.048	0.040	0.029	0.021	0.018
	Reactance X_F	mΩ/m	0.090	0.115	0.117	0.092	0.083	0.067
	Impedance 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)	Resistance R_0	mΩ/m	0.096	0.079	0.067	0.050	0.040	0.033
	Reactance X_0	mΩ/m	0.218	0.209	0.201	0.194	0.191	0.165
	Impedance 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)		mm^2	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	Resistance R_{20}	mΩ/m	0.030	0.023	0.020	0.015	0.012	0.010
	Reactance X_{20}	mΩ/m	0.046	0.030	0.029	0.024	0.025	0.022
	Impedance 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	Resistance R_{warm}	mΩ/m	0.035	0.029	0.025	0.019	0.015	0.013
	Reactance X_{warm}	mΩ/m	0.046	0.030	0.029	0.024	0.025	0.022
	Impedance 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)	Resistance R_F	mΩ/m	0.060	0.048	0.040	0.029	0.021	0.018
	Reactance X_F	mΩ/m	0.090	0.115	0.117	0.092	0.083	0.067
	Impedance 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):	Resistance R_0	mΩ/m	0.096	0.079	0.067	0.050	0.040	0.033
	Reactance X_0	mΩ/m	0.218	0.209	0.201	0.194	0.191	0.165
	Impedance 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)		mm^2	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

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	Resistance R_{20}	mΩ/m	0.096	0.074	0.049	0.039	0.031	0.025
	Reactance X_{20}	mΩ/m	0.103	0.085	0.069	0.051	0.046	0.038
	Impedance 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	Resistance R_{warm}	mΩ/m	0.118	0.091	0.060	0.048	0.039	0.031
	Reactance X_{warm}	mΩ/m	0.103	0.085	0.069	0.051	0.046	0.038
	Impedance 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	Resistance R_F	mΩ/m	0.164	0.124	0.095	0.076	0.058	0.048
	Reactance X_F	mΩ/m	0.227	0.188	0.158	0.135	0.114	0.097
	Impedance 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)	Resistance R_0	mΩ/m	0.269	0.215	0.170	0.141	0.113	0.094
	Reactance X_0	mΩ/m	0.262	0.223	0.191	0.162	0.137	0.118
	Impedance 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)		mm^2	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	Resistance R_{20}	mΩ/m	0.096	0.074	0.049	0.039	0.031	0.025
	Reactance X_{20}	mΩ/m	0.103	0.085	0.069	0.051	0.046	0.038
	Impedance 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	Resistance R_{warm}	mΩ/m	0.118	0.091	0.060	0.048	0.039	0.031
	Reactance X_{warm}	mΩ/m	0.103	0.085	0.069	0.051	0.046	0.038
	Impedance 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)	Resistance R_F	mΩ/m	0.164	0.124	0.095	0.076	0.058	0.048
	Reactance X_F	mΩ/m	0.227	0.188	0.158	0.135	0.114	0.097
	Impedance 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):	Resistance R_0	mΩ/m	0.269	0.215	0.170	0.141	0.113	0.094
	Reactance X_0	mΩ/m	0.262	0.223	0.191	0.162	0.137	0.118
	Impedance 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)		mm^2	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. 7/19: **Technical specifications for trunking elements LRC**

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	Resistance R_{20}	mΩ/m	0.019	0.016	0.014	0.010	0.008	0.006
	Reactance X_{20}	mΩ/m	0.034	0.031	0.029	0.014	0.012	0.011
	Impedance 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	Resistance R_{warm}	mΩ/m	0.024	0.019	0.018	0.013	0.010	0.008
	Reactance X_{warm}	mΩ/m	0.034	0.031	0.029	0.014	0.012	0.011
	Impedance 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	Resistance R_F	mΩ/m	0.038	0.030	0.023	0.017	0.014	0.010
	Reactance X_F	mΩ/m	0.083	0.070	0.059	0.052	0.044	0.038
	Impedance 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)	Resistance R_0	mΩ/m	0.077	0.062	0.052	0.045	0.037	0.030
	Reactance X_0	mΩ/m	0.099	0.083	0.071	0.065	0.056	0.047
	Impedance 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)		mm^2	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	Resistance R_{20}	mΩ/m	0.019	0.016	0.014	0.010	0.008	0.006
	Reactance X_{20}	mΩ/m	0.034	0.031	0.029	0.014	0.012	0.011
	Impedance 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	Resistance R_{warm}	mΩ/m	0.024	0.019	0.018	0.013	0.010	0.008
	Reactance X_{warm}	mΩ/m	0.034	0.031	0.029	0.014	0.012	0.011
	Impedance 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)	Resistance R_F	mΩ/m	0.038	0.030	0.023	0.017	0.014	0.010
	Reactance X_F	mΩ/m	0.083	0.070	0.059	0.052	0.044	0.038
	Impedance 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):	Resistance R_0	mΩ/m	0.077	0.062	0.052	0.045	0.037	0.030
	Reactance X_0	mΩ/m	0.099	0.083	0.071	0.065	0.056	0.047
	Impedance 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)		mm^2	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

7.5 Design of the Fire Barrier

All trunking elements of the busbar trunking system LR can be equipped with a fire barrier. Thus, they fulfil the stipulations 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 ISO 834-1 or IEC 61439-6), 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 ≥ 500 kg/m³
- The solid ceiling must be made of concrete, ferroconcrete, or autoclaved aerated concrete with a density ≥ 500 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 behavior 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 the ceiling must be classified with the intended fire resistance duration according to EN 13501-2 (EI 60 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. 7/12 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. 7/13.

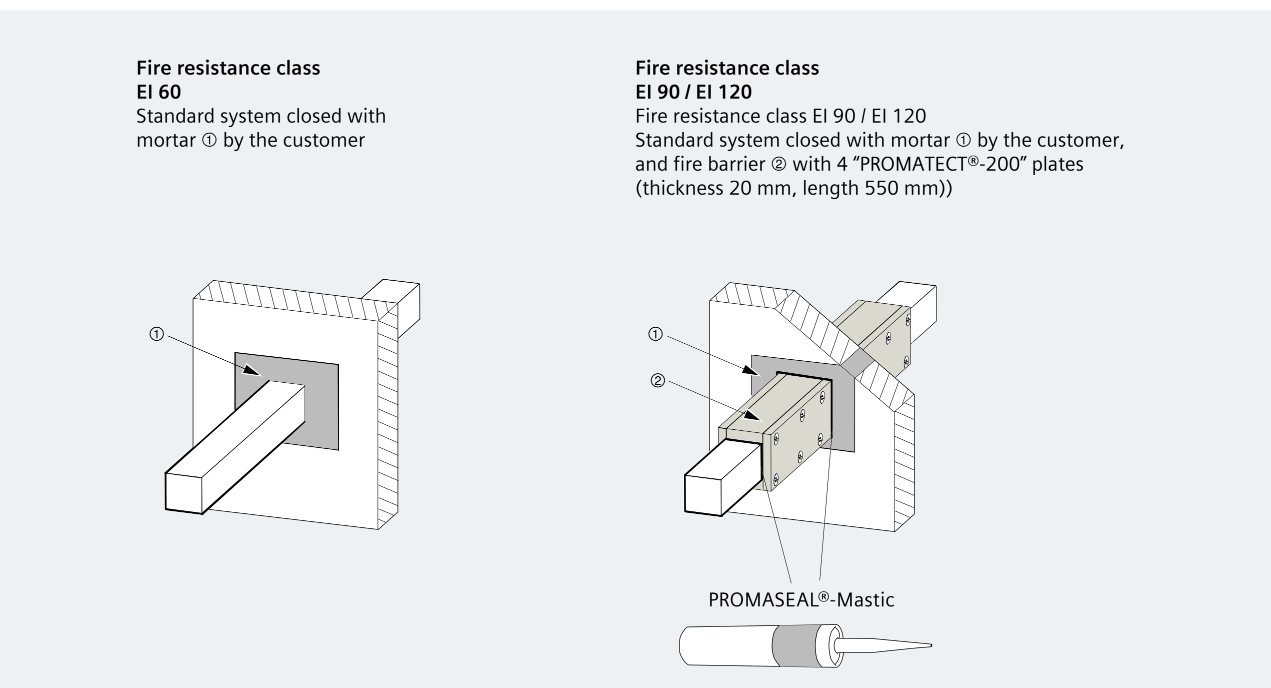

Fig. 7/12: **Constructional measures for the fire resistance classes EI 60 or EI 90 / EI 120**

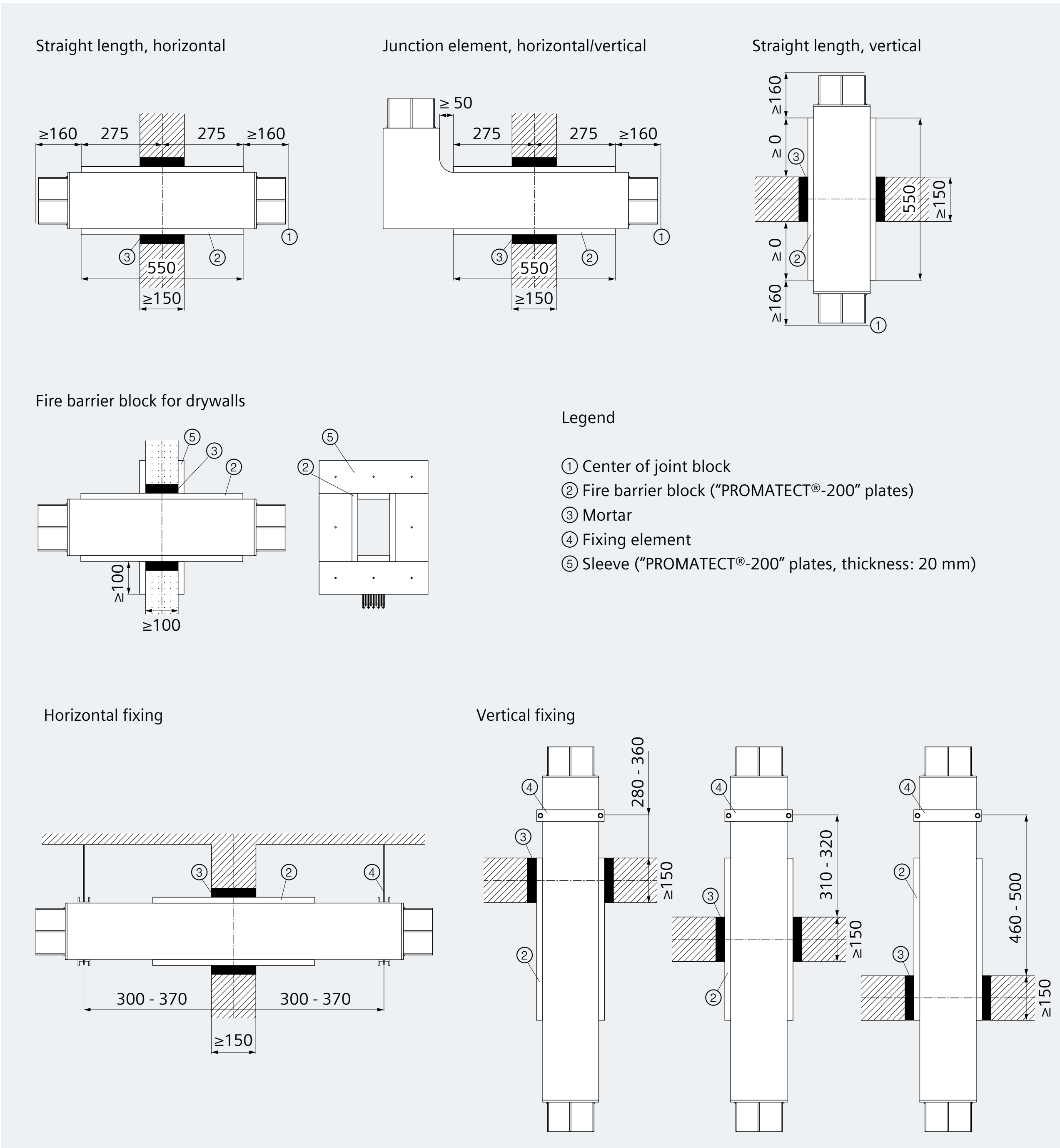

Fig. 7/13: **Dimensions (in mm) and positioning of fire barrier blocks and fixings**

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7.6 Dimensions and Derating Factor for Functional Endurance

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 with a density of ≥ 500 kg/m^3
- Ceilings (minimum thickness 150 mm) made of concrete, ferroconcrete, or autoclaved aerated concrete with a density of ≥ 500 kg/m^3.

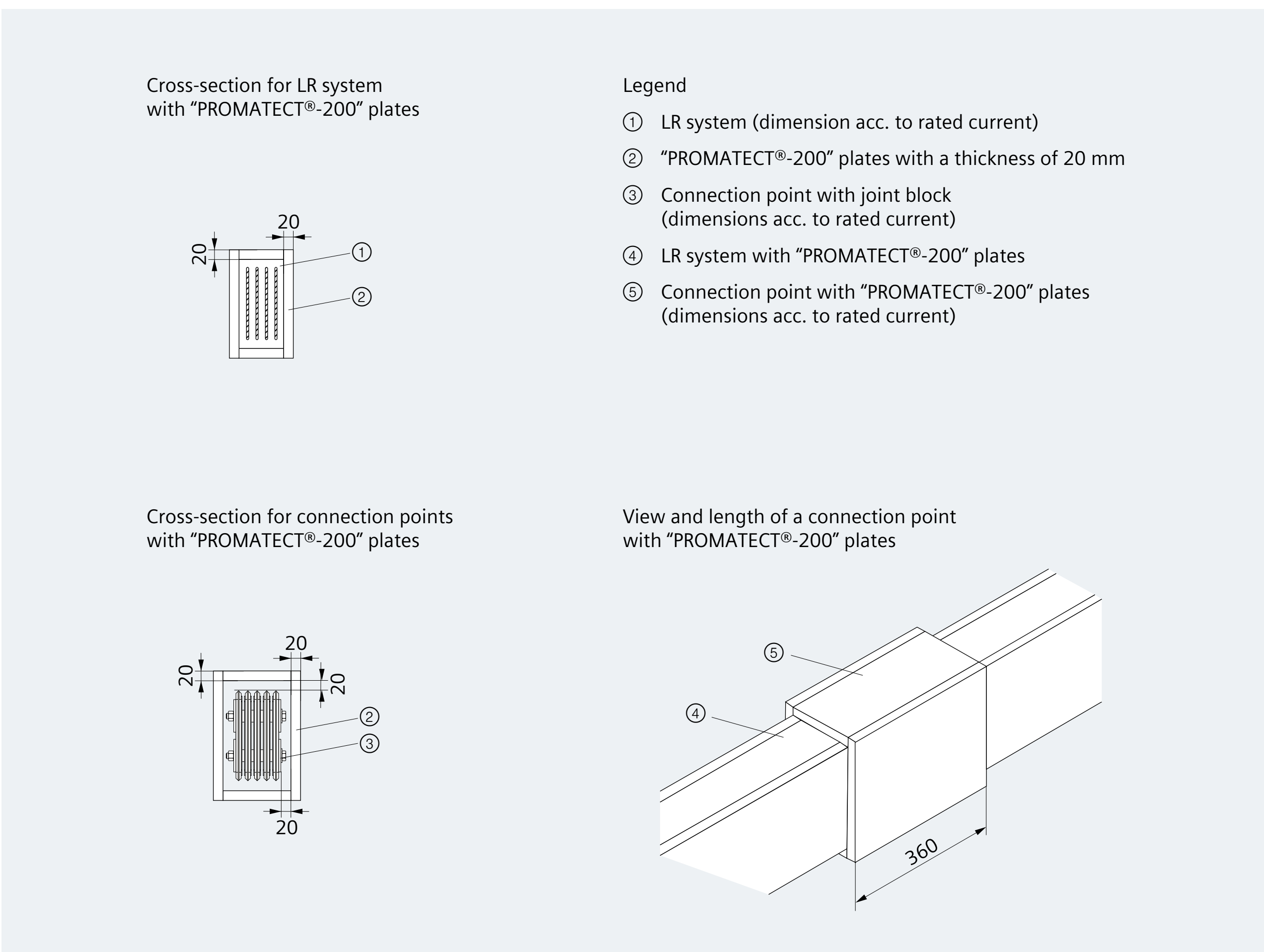

Fig. 7/14: **Dimensions (in mm) and views for the functional endurance measures of the LI system**

Chapter 8

Annexes

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8 Annexes

8.1 Functional Endurance

For the functional endurance it may be necessary to secure the route with an additional protective enclosure towards the room. Due to the worse ventilation / heat dissipation caused by the fire barrier, the associated derating factors for the maximum permissible currents may have to be considered during the planning.

8.1.1 Applicable Regulations

Special requirements are placed on electrical equipment used in electrical service locations, special rooms, and special installations such as medical locations or public facilities and working places In conformity with the IEC 60364-5-56 standard and the specific series of standards IEC 60364-7- ..., the electrical equipment must be provided with special safety measures, particularly regarding the “fire protection applications/equipment”.

Moreover, the legal regulations of the countries have to be observed so that the safety equipment remains operable for a specific time in case of a fire. In particular, this applies to the following equipment:

- Fire detection systems
- Systems for alerting and providing instructions to visitors and employees
- Emergency lighting
- Passenger lifts with evacuation circuits that assure functional performance in the incoming power supply area for at least 30 minutes under full fire conditions
- Water pressure boosting systems for the supply of extinguishing water
- Ventilation systems of safety stairs, lift shafts, and engine rooms of fire brigade lifts, where functioning must be guaranteed for at least 90 minutes.

To be able to offer the required functional endurance for busbar trunking systems, tests were successfully carried out for the busbar trunking systems BD2, LD, LI, and LR at the Civil Engineering Materials Testing Institutes in Braunschweig and Leipzig, Germany, in some cases in cooperation with the Promat company. During fire testing, various systems with a cladding made of PROMATECT® plates with different thicknesses were subjected to an external fire load in compliance with the standard temperature curve (STC) from DIN 4102-2 in order to evaluate the functional endurance according to DIN 4102-12 (Fig. 8/1).

Formula: $T - T_0 = 345 \cdot \lg (8 \cdot t + 1)$

with

T = Fire room temperature in Kelvin

T_0 = Temperature of the test specimens at the beginning of the test in Kelvin

t = Time in minutes

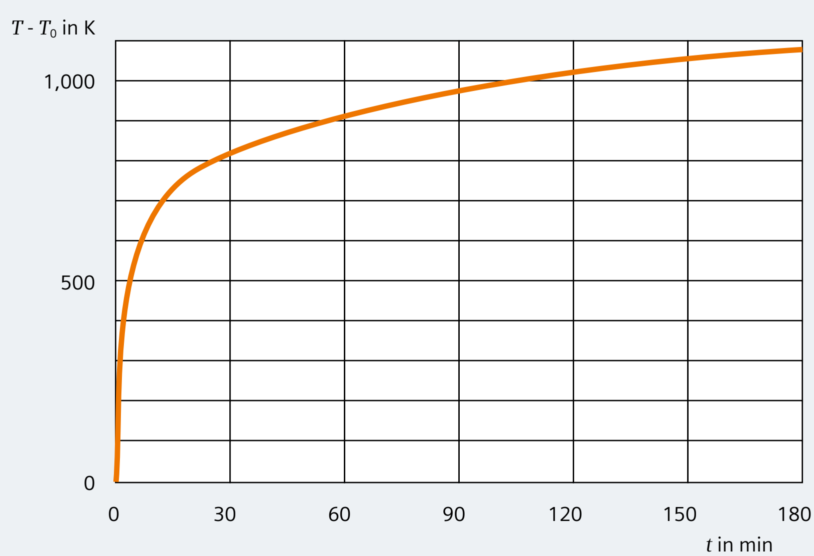


Fig. 8/1: **Standard temperature curve (STC) according to DIN 4102-2 to assess the functional endurance**

8.1.2 Versions

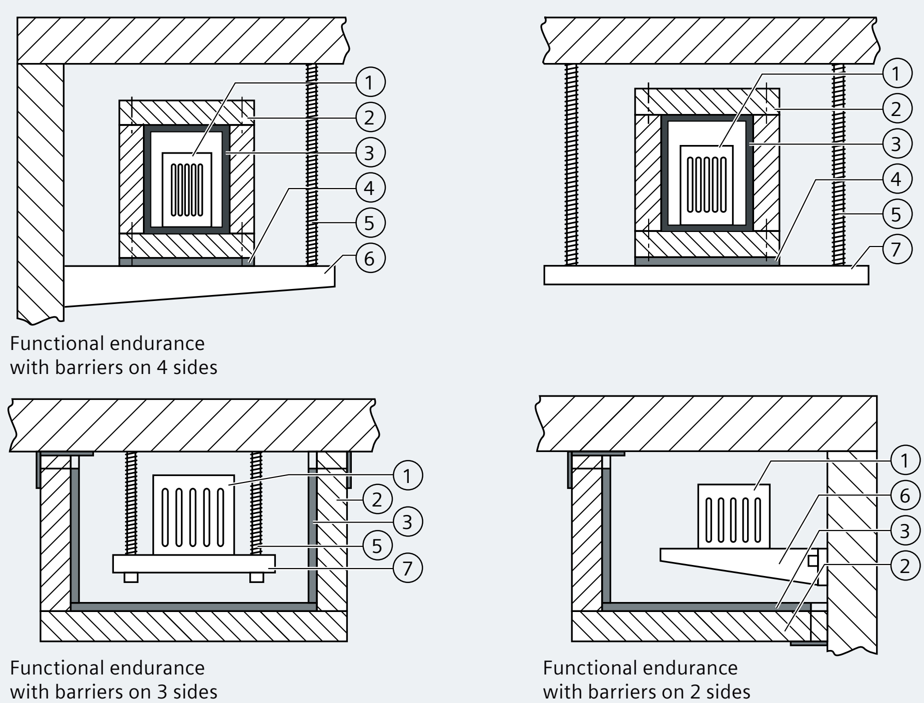
To comply with the functional endurance, special components are available for the functional endurance duct as well as for the carrier construction for the duct and the busbar trunking systems BD2, LD, LR, and LI. Depending on the ambient conditions, different versions of the duct (barriers on 4 or 3 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 or complied with:

The maximum permissible distances between the fixing points, as well as a maximum permissible tensile stress of 6 N/mm² must be accomplished.

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 versions are sketched in Fig. 8/2. 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 Busbar trunking system
② Cladding of functional endurance duct
③ Cladding at transverse joints (joint edges)
④ Load distribution plate
⑤ Threaded rod (M12 / M16)
⑥ Beam in compliance with the statics
⑦ Carrier profile in compliance with the statics

Fig. 8/2: **Versions for functional endurance of busbar trunking systems**

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8.2 Fire Barrier

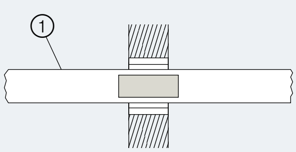
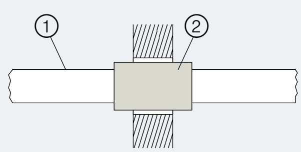
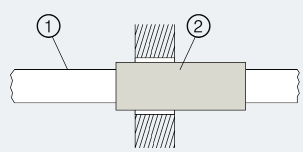
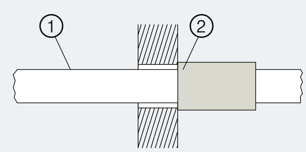
National regulations (in Germany, the Model Building Regulation and the building regulations of individual federal states) or insurance associations normally require that buildings are constructed in such a way as to "prevent the development and spread of fire and fumes and make possible the rescue of persons and animals as well as fire fighting". This means that neither fire nor smoke gas may be transferred from one floor or fire zone to another one.

The busbar trunking systems BD01, BD2, LD, LI, and LR can be equipped with fire barriers. Fire barriers are described in the equipment standard for busbar trunking systems IEC 61439-6, 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. 8/3 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 barrier.

Depending on their version and type, the fire barriers conform to the fire resistance classes S 60, S 90, and S 120 in accordance with the German DIN 4102-9 (EI 60, EI 90, and EI 120 following EN 13501-2, partly in preparation). The fire barrier at the busbar trunking system is installed at the factory (BD2, LD), can be installed on site (BD01, LI, LR), or can be omitted (e.g., in the case of the LR system, whereby the fire barrier is installed on site after closing the ceiling/wall with filler. Normally, there is no external fire barrier in the wall/ceiling for the LR system).

Without external fire barrier, in the center of the wall/ceiling	**With external fire barrier, in the center of the wall/ceiling**	**With external fire barrier, asymmetrically in wall/ceiling**	**With external fire barrier, mounted to wall/ceiling**
			
Example: - BD2A with internal fire barrier S 90, S 120 for wall thickness M ≥ 35 cm	Examples: - BD01: S 90 - BD2: S 120 (for wall thickness < 35 cm) - LD: S 120 - LI: EI 90, EI 120 - LR: S 90 [1)], S 120 [1)]	Example: LI: EI 90, EI 120	Example: BD01: S 90 Fire barrier mounted on both sides

① Busbar trunking system
② External fire barrier

1) 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. 8/3: **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. 8/1 (the minimum distance 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.

Note: The fire barrier versions described in here have passed tests in accordance with DIN 4102-9 or EN 1366-3. In Germany, fire barriers must have a general approval from the local building inspectorate or a European technical approval. These approvals are issued, among others, by the DIBt (= Deutsches Institut für Bautechnik, German Institute for Structural Engineering) in Berlin. Any deviations from the approval must be clarified with the product manager at Siemens, in order to apply for a possibly necessary consent at the competent building authority of the federal state in the individual case.

To install fire barriers in lightweight partition walls for the systems BD01 (see chapter 3), BD2, LD, and LI, fire barrier tests were carried out and passed. Further details to versions and approvals can be obtained from the product manager at Siemens.

Note: After installation, you must fill the space between the busbar trunking system or the fire barrier block and the wall or ceiling cut-out with non-flammable material, e.g., concrete or mortar, according to the thickness of the wall or ceiling. The concrete or mortar must conform to the applicable standards for the preservation of the fire resistance class of the wall or ceiling (e.g., EN 206 and EN 998-2).

Note for minimum distance: To install the SIVACON 8PS busbar trunking systems with fire barrier, a minimum distance of 5 cm between the system or the system fire barrier and the building element must generally be observed. This ensures enough space for mounting the busbar run and the fixing brackets, as well as for mortaring into the building element.

	Fire resistance class		
System	**S 60 / EI 60**	**S 90 / EI 90**	**S 120 / EI 120**
BD01	1	1	-
BD2	2	2	3
LD	3	3	3
LI	4	4	4
LR	5	4	4

Legend:

1: Fire barrier kit for S 90 and S 60 to be mounted on site in solid/lightweight partition wall or solid ceiling

2: Fire barrier for S 90 and S 60, mounted on the system at the factory, for installation in solid wall/ceiling

3: Fire barrier (internal and external part) for S 120, mounted on the system at the factory, for installation in solid wall/ceiling

4: Fire barrier kit for EI 90 and EI 120 to be mounted on site in solid wall/ceiling

5: EI 60 as standard, without system-specific fire barrier

Tab. 8/1: **Fire barrier versions and classification of the fire resistance classes of the busbar trunking systems**

8.3 Voltage Drop Diagrams

As described in chapter 2, the voltage drop on longer busbar trunking systems can be calculated in the first planning phases.

For the different busbar trunking system, voltage drops can be read in Fig. 8/4 and Fig. 8/5. They are related to one meter length and entered as a function of cos φ.

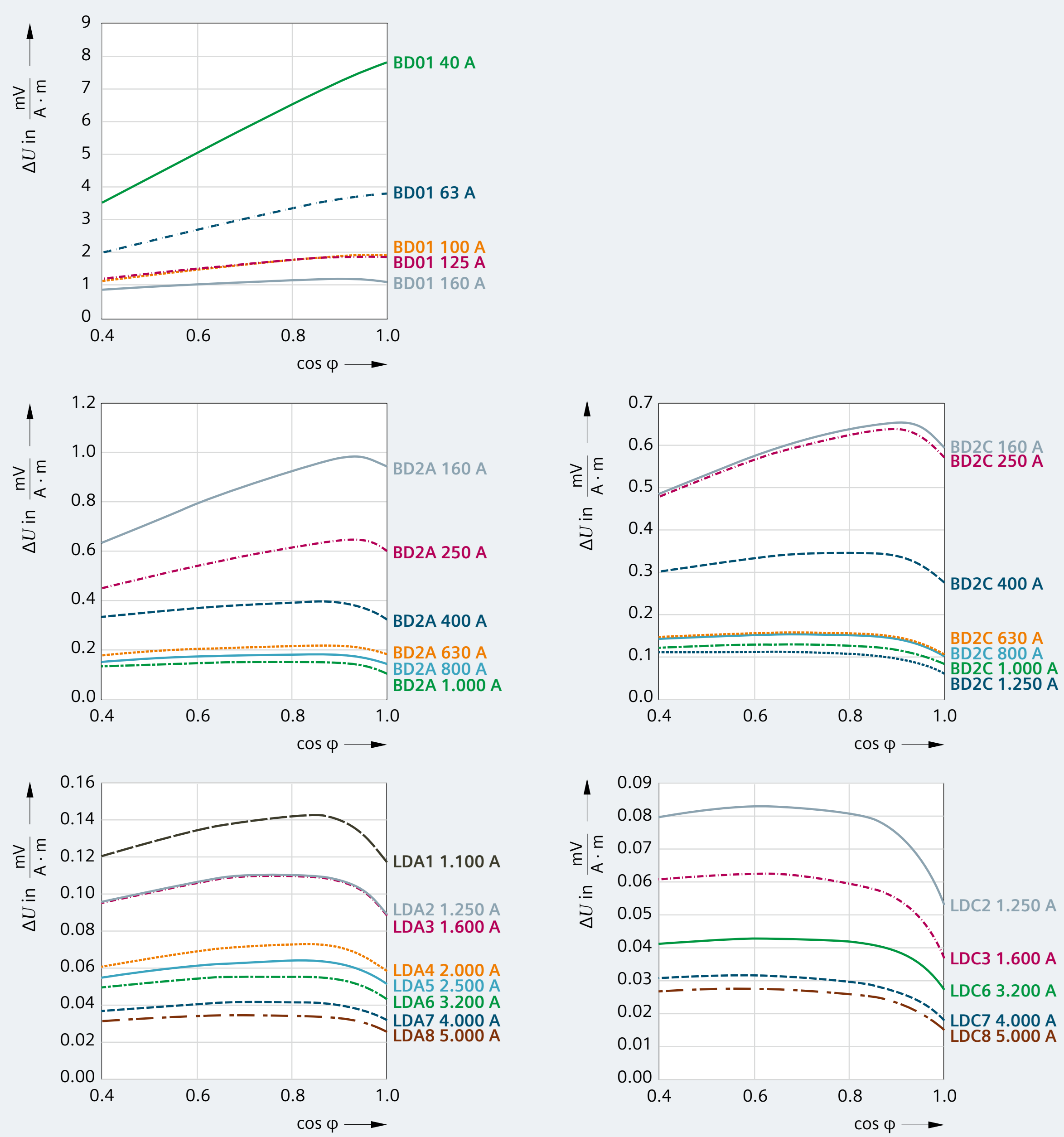


Fig. 8/4: **Voltage drop diagrams for the busbar trunking systems BD01, BD2, and LD**

In addition, the following applies:
Load distribution factor k = 1 (if the conditions of the infeeds and tap-offs are different, the voltage drop values must be multiplied by the accordingly changed factor).

Resistances at final temperature rise (55 °C) of the busbars according to the calculations in SIMARIS design.

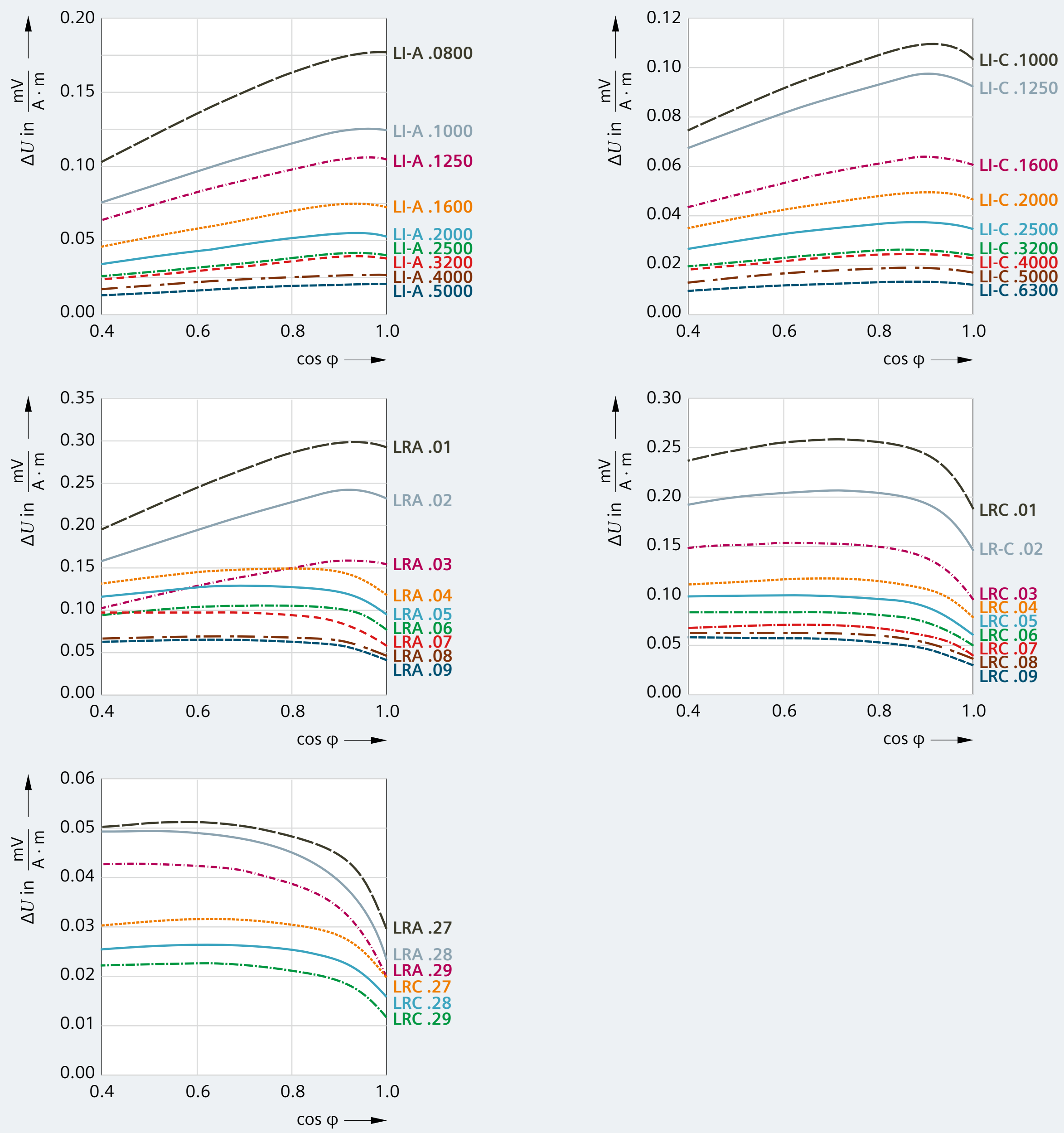


Fig. 8/5: **Voltage drop diagrams for the busbar trunking systems LI and LR**

8.4 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. 8/6 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. That is why the evaluation of a magnetic field calculation with the finite element method provides similarly exact results. The observance of the result ranges from Fig. 8/7 to Fig. 8/14 is sufficient for the first planning phases. The magnetic field strengths are all referred to 1 A for better comparability, and must be multiplied by the rated operational current for evaluation.

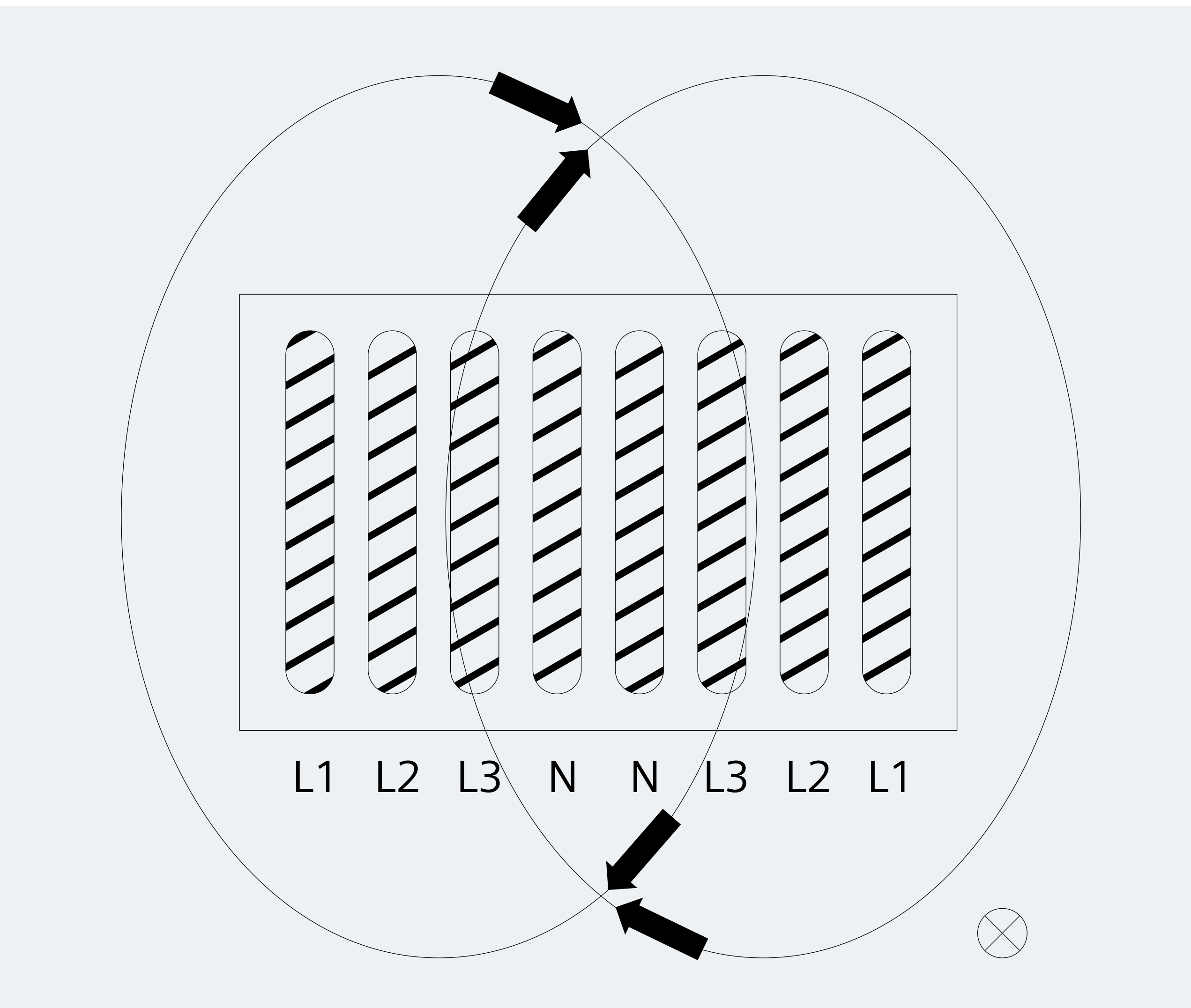


Fig. 8/6: **Overlapping of the magnetic field lines for LD systems with 2 busbars per phase**

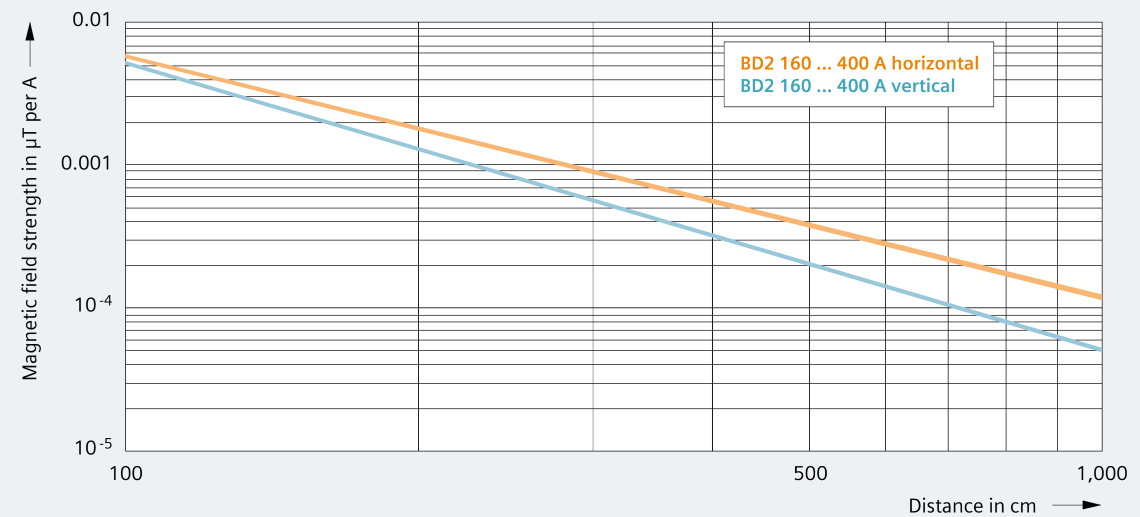


Fig. 8/7: **Magnetic field strength ranges for busbar trunking systems BD2 160 ... 400 A in horizontal and vertical direction (Fig. 2/4)**

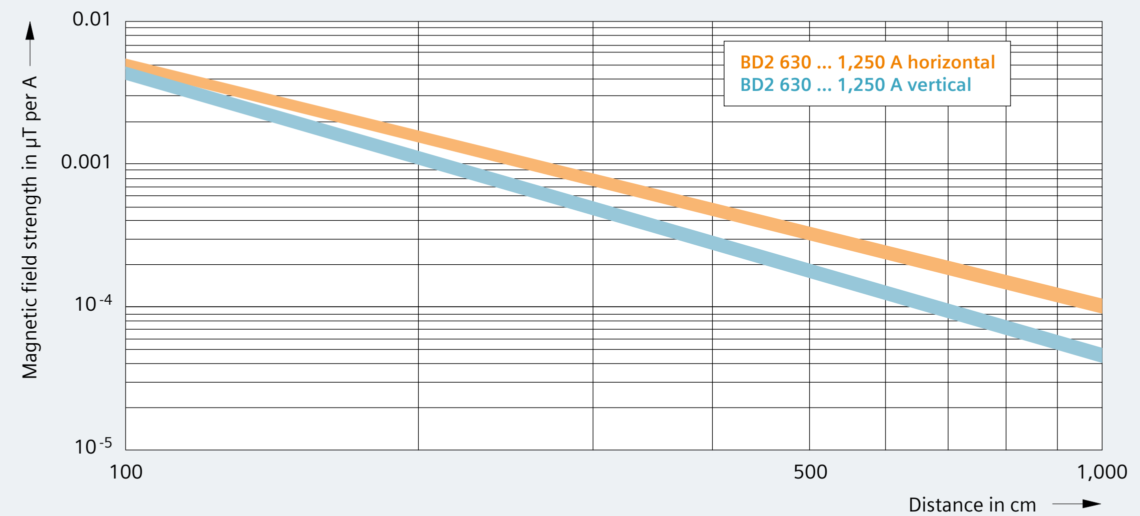


Fig. 8/8: **Magnetic field strength ranges for busbar trunking systems BD2 630 ... 1,250 A in horizontal and vertical direction (Fig. 2/4)**

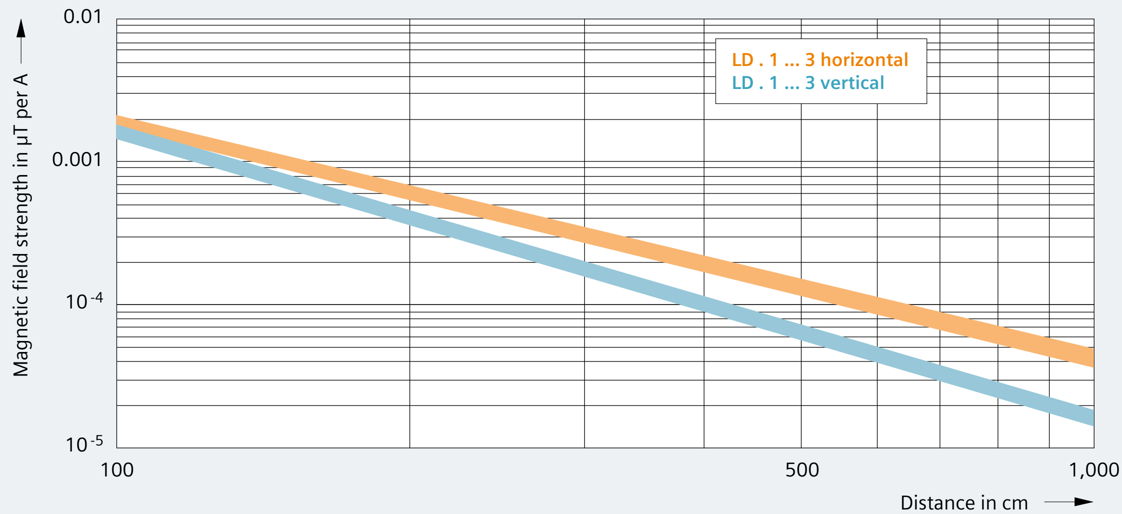


Fig. 8/9: **Magnetic field strength ranges for single bodies LD . 1 ... to LD . 3 in horizontal and vertical direction (Fig. 2/4)**

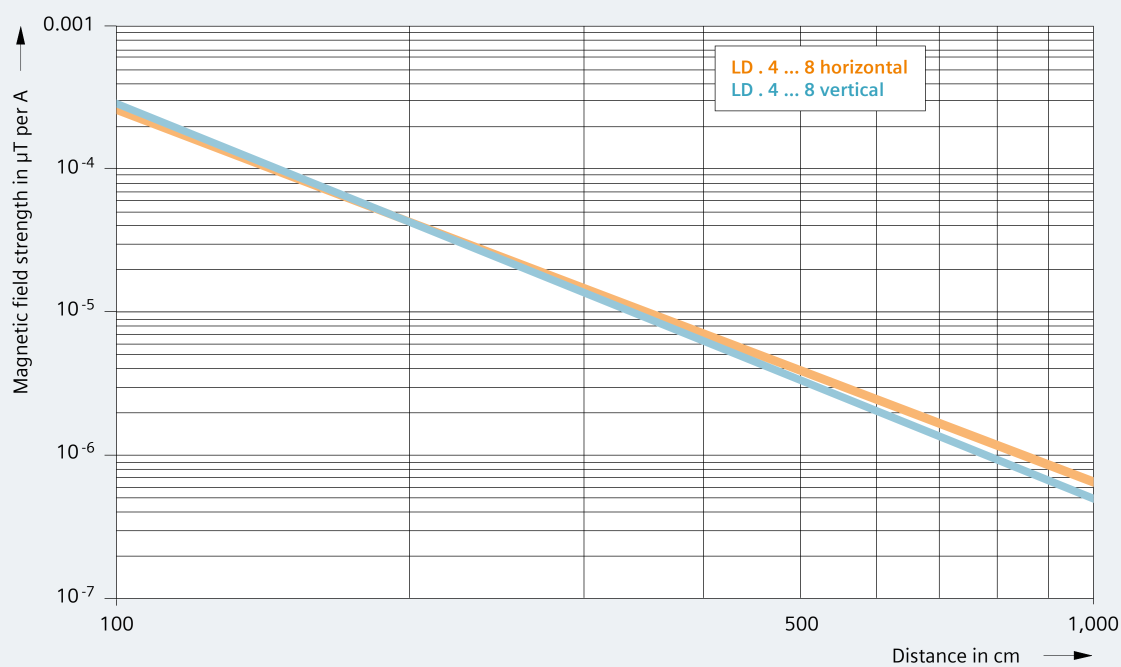


Fig. 8/10: **Magnetic field strength ranges for double bodies LD . 4 ... to LD . 8 in horizontal and vertical direction (Fig. 2/4)**

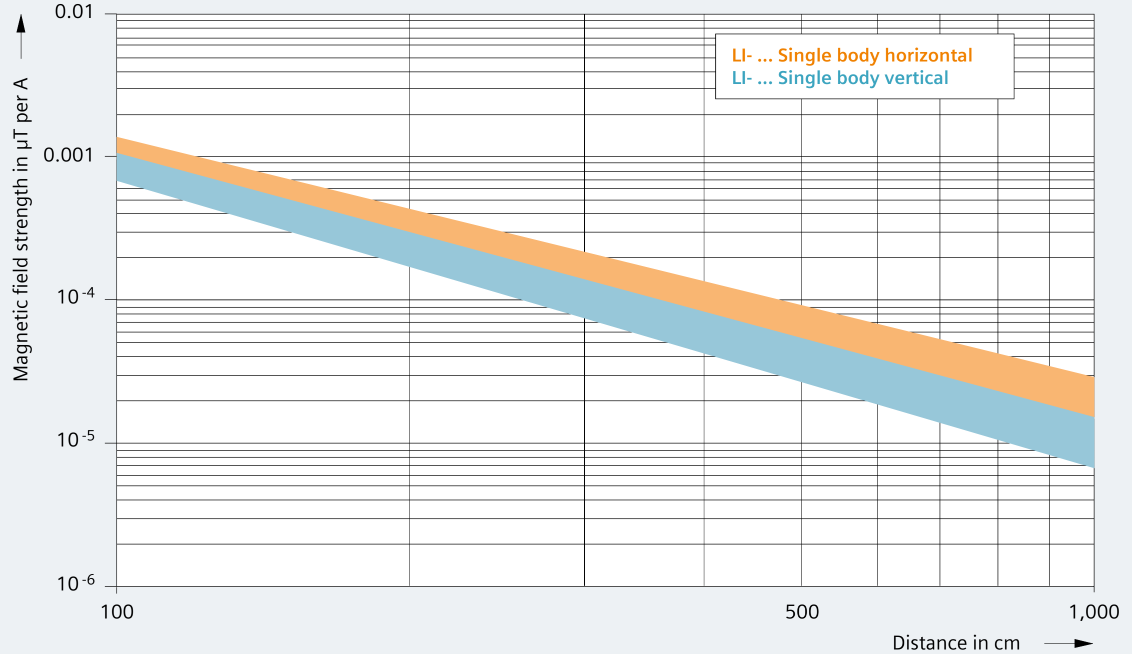


Fig. 8/11: **Magnetic field strength ranges for single bodies LI in horizontal and vertical direction (Fig. 2/4)**

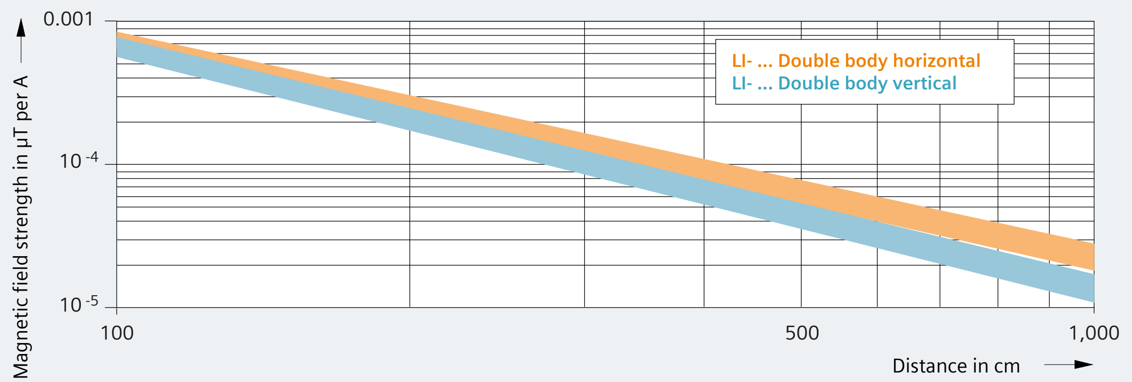


Fig. 8/12: **Magnetic field strength ranges for double bodies LI in horizontal and vertical direction (Fig. 2/4)**

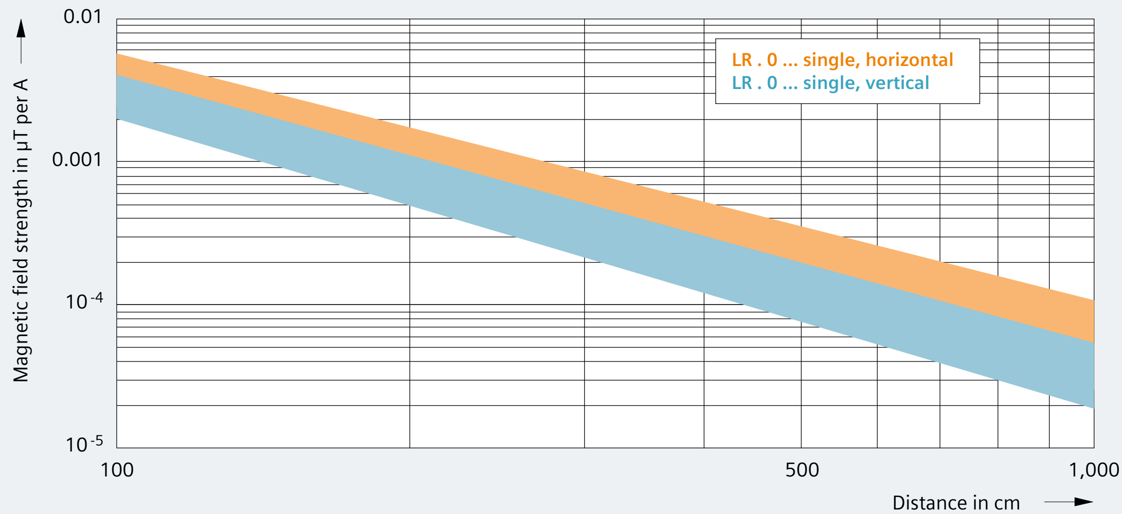


Fig. 8/13: **Magnetic field strength ranges for single bodies LR . 0 ... in horizontal and vertical direction (Fig. 2/4)**

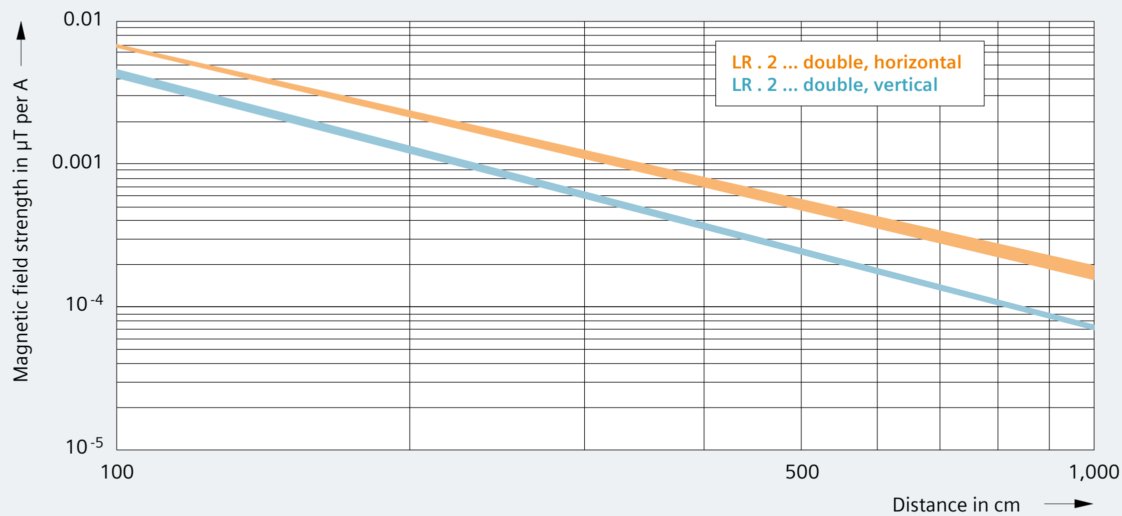


Fig. 8/14: **Magnetic field strength ranges for double bodies LR . 2 ... in horizontal and vertical direction (Fig. 2/4)**

8.5 Route Planning

The busbar trunking system can be routed horizontally or vertically. Symbols can be used for easy configuration of the routes. The configuration symbols identify the mounting position of the system component, the conductor arrangement, the open busbar end, the side with the terminal, the position of the flange cover, and the operating side for the terminal.

At the open busbar end, the side with the PE is identified by means of a thick black line – the side with the terminal with a dot to the line according to Fig. 8/15. For junction units, the viewing direction is selected from the open busbar end. In the case of infeeds, the position of the cabling box to the trunking unit is not type-deciding, as the busbar flange can be turned to the necessary phase position on site.

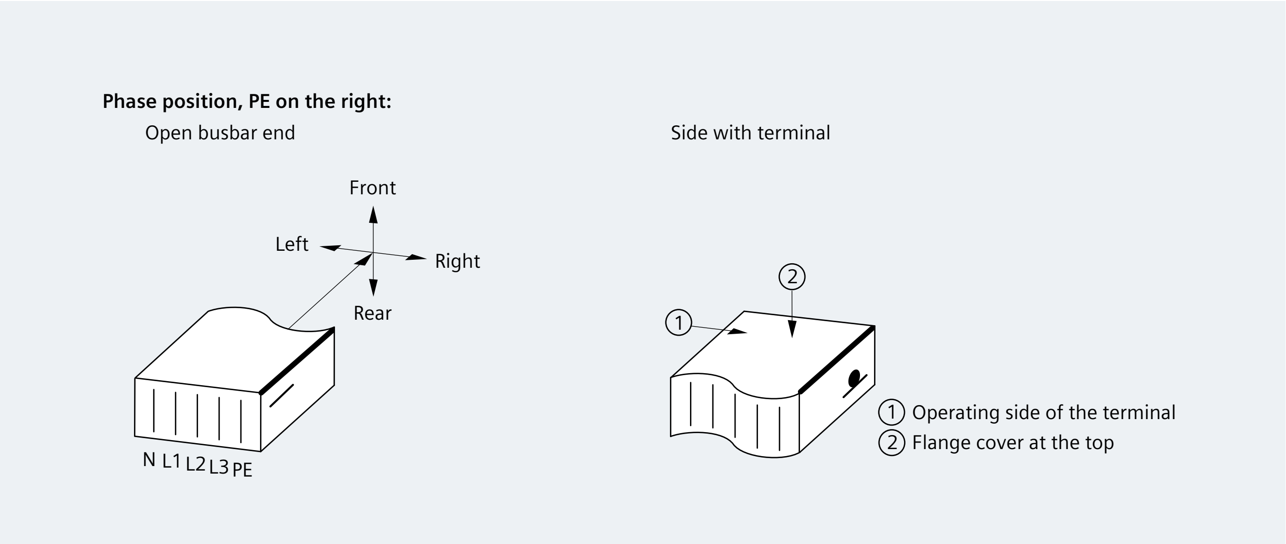


Fig. 8/15: **Identification of the phase position for configuration**

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Intro-
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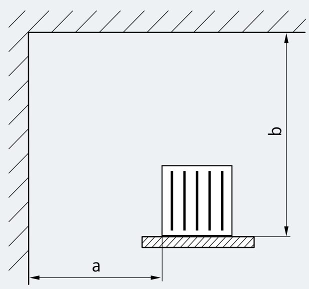
8.5.1 Horizontal Installation

As the mounting position can be selected freely, there are two types of horizontal busbar runs:

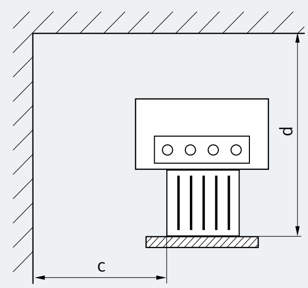
- Horizontal, edgewise
- Horizontal, flat.

To ensure easy installation of the trunking units and tap-off units, minimum distances to the building elements (Tab. 8/2) 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	68
LI-A . 1000		10	23 (26)	38	123	BD2A(630 ... 1000)	BD2C(630 ... 1250)	10	21 (26)	30	62
	LI-C . 1250	10	22 (26)	38	122	LDA1 ... 3	LDC2 ... 3	10	36	35	100
LI-A . 1250	LI-C . 1600	10	25 (26)	38	125	LDA4 ... 8	LDC6 ... 8	10	36	38	100
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						
	LI-C . 6300	10	38 (51)	38	138						

[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 clearances depend on the dimensions of the tap-off units. The dimensions for trunking units with horizontal flat mounting position and suspended 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. 8/2: **Space requirements for busbar trunking systems in horizontal installation**

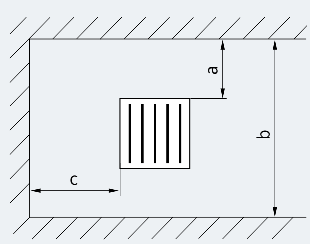
8.5.2 Vertical Installation

When vertical busbar runs are planned, the floor height from ceiling center to ceiling center is the decisive dimension for selecting the busbar lengths.

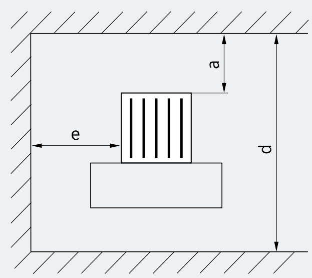
Same as for horizontal installation, minimum distances to the building elements (Tab. 8/3) have to be observed when the route for vertical installation is planned. Again, a difference must be made between:
- Busbar trunking system without tap-off units
- Busbar trunking system with tap-off units.

8.5.3 Fixing Brackets

System-specific fixing brackets must be used for fixing the trunking units (Tab. 8/4 to Tab. 8/6).



without tap-off unit



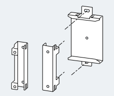
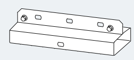
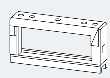
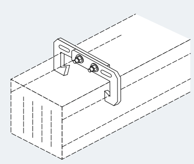
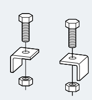
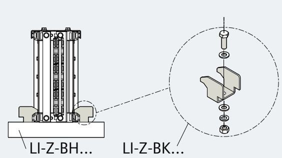
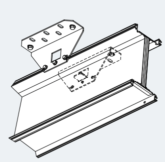
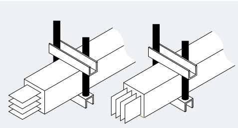
with tap-off unit

System		Clearances [1] a [2, 3] in cm	b [2] in cm	c in cm	d [4] in cm	e in cm
LI-A . 0800	LI-C . 1000	10 (6)	21	15	131	38
LI-A . 1000		10 (6)	23	15	133	38
	LI-C . 1250	10 (6)	22	15	132	38
LI-A . 1250	LI-C . 1600	10 (6)	25	15	135	38
LI-A . 1600		10 (6)	28	15	138	38
	LI-C . 2000	10 (6)	27	15	137	38
LI-A . 2000		10 (6)	33	15	143	38
	LI-C . 2500	10 (6)	31	15	141	38
LI-A . 2500		10 (6)	40	15	150	38
	LI-C . 3200	10 (6)	38	15	148	38
LI-A . 3200		10 (6)	28	15	138	38
	LI-C . 4000	10 (6)	27	15	137	38
LI-A . 4000		10 (6)	33	15	143	38
	LI-C . 5000	10 (6)	31	15	141	38
LI-A . 5000		10 (6)	40	15	150	38
	LI-C . 6300	10 (6)	38	15	148	38

System		Clearances [1] a [2, 3] in cm	b [2] in cm	c in cm	d [4] in cm	e in cm
BD2A (160 ... 400)	BD2C (160 ... 400)	5 (3)	19	10	116	30
BD2A (630...1000)	BD2C (630...1250)	5 (3)	31	10	120	30
LDA1 ... 3	LDC2 ... 3	10 (2)	46	10	146	35
LDA4 ... 8	LDC6 ... 8	10 (2)	46	10	146	38
LRA01 ... 03	LRC01 ... 03	10	69	10	– [5]	– [5]
LRA04 ...	LRC04 ...	10	72	10	– [5]	– [5]
LRA05 ...	LRC05 ...	10	75	10	– [5]	– [5]
LRA01 ... 03	LRC01 ... 03	10	79	10	– [5]	– [5]
LRA04 ...	LRC04 ...	10	82	10	– [5]	– [5]
LRA05 ...	LRC05 ...	10	84	10	– [5]	– [5]
LRA06 ...	LRC06 ...	10	98	10	– [5]	– [5]
LRA07 ...	LRC07 ...	10	104	10	– [5]	– [5]
LRA08 ...	LRC08 ...	10	108	10	– [5]	– [5]

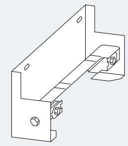
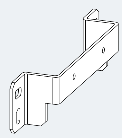
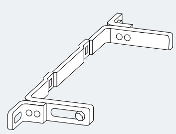
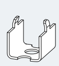
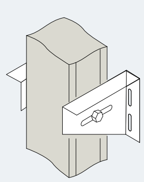
[1] The enclosure dimensions of incoming cable connection units are not taken into account
[2] Clearances apply as minimum dimensions taking into account the recommended cut-out dimensions for the fire barrier in the ceiling and flush termination between the cut-out and the wall
[3] The reduced dimensions in brackets apply to trunking units without fire barriers and refer to the requirements of the vertical fixing brackets. If local conditions vary, fillers will be required, which must be provided by the customer
[4] 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
[5] The clearances depend on the dimensions of the tap-off units. The dimensions are available on request

Tab. 8/3: **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)	• For carrying the weight of the busbar run • For fixing to suspended supports • LD-B1 for LD . 1 up tp LD . 3 • LD-B2 for LD . 4 up to LD . 8	Distance x • For LDA1 up tp LDA3: x ≤ 6 m • For LDA4 up tp 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
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: x ≤ 2 m For edgewise mounting position: 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

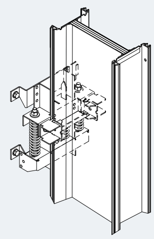
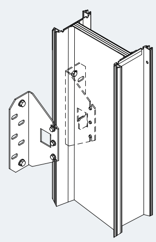
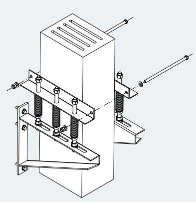
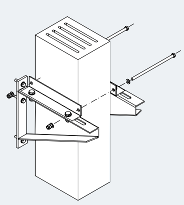
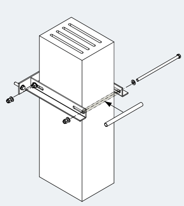
[1)] Fixed point brackets are not required due to the system design
[2)] The dimensions are recommendations for planning. Max. permissible fixing distances are given in the technical specification tables

Tab. 8/4: **Fixing brackets for horizontal fixing of the busbar trunking systems**

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 up 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. 8/5: **Fixing brackets for vertical fixing of the BD2 and LD systems**

System	Type of bracket	Function	Fixing distance x [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. 8/6: **Fixing brackets for vertical fixing of the LI and LR systems**

8.5.4 Carrier Construction

The variety of local structural conditions is reflected in the large number of different carrier constructions. Fig. 8/16 shows common versions for ceilings, walls, or floors.

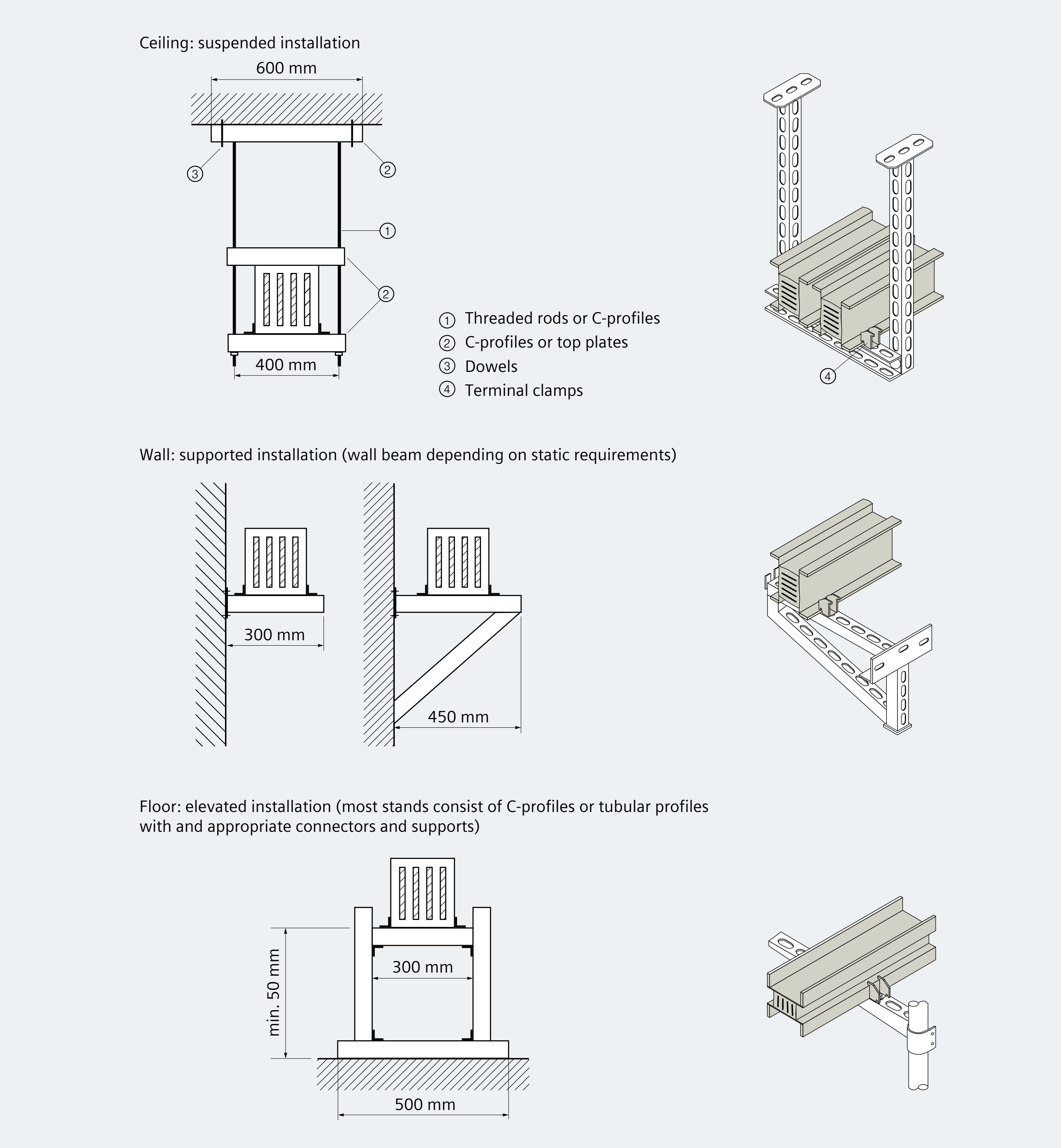


Fig. 8/16: **Schematic representation of exemplary carrier constructions for suspended, supported, and elevated installation**

8.6 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 commits himself to keep Siemens AG indemnified from any third-party claims resulting 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 serous injury or death. For safety reasons, the stipulations in the equipping instructions must be observed.

8.7 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		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 60068-2-61		Umweltprüfungen; Teil 2: Prüfverfahren; Prüfung Z/ABDM: Reihenfolge von klimatischen Prüfungen	Environmental testing; part 2: test methods; test Z/ABDM: climatic sequence
IEC 60068-2-78	VDE 0468-2-78	Umgebungseinflüsse – Teil 2-78: Prüfverfahren – Prüfung Cab:	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		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		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

International	National	German title	English title
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 Supplement 1	VDE 06060-600-1 Supplement 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 61439-2	VDE 06060-600-2	Niederspannungs-Schaltgerätekombinationen – Teil 2: Energie-Schaltgerätekombinationen	Low-voltage switchgear and controlgear assemblies – Part 2: Power switchgear and controlgear 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
IEC TR 61641	VDE 0660-600-2 Supplement 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

International	National	German title	English title
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

8.8 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
ECG	Electrocardiogram
EEG	Electroencephalogram
EIB	European Installation Bus and protocol for building automation
EMC	Electromagnetic Compatibility
EN	European Standard
ETU	Electronic Trip Unit

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)

L

LVMD	Low-Voltage Main Distribution

M

MCB	Miniature Circuit-Breaker
MLFB	Maschinenlesbare Fabrikatebezeichnung (German for machine-readable product designation: 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
mw	modular width

N

NH	Niederspannung-Hochleistung (German for low-voltage high-rupturing-capacity, LV HRC) (for identification of fuse-links)

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
RCD	Residual Current-operated protective Device
RH	Relative Humidity

S

SchuKo	Plug and socket system with protective contacts for domestic use
SCPD	Short-Circuit Protection Device
STC	Standard Temperature Curve

T

TCP	Transmission Control Protocol
TM	Thermal-Magnetic release

V

VDE	Verband der Elektrotechnik, Elektronik und Informationstechnik (Association for Electrical, Electronic and Information Technologies)

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