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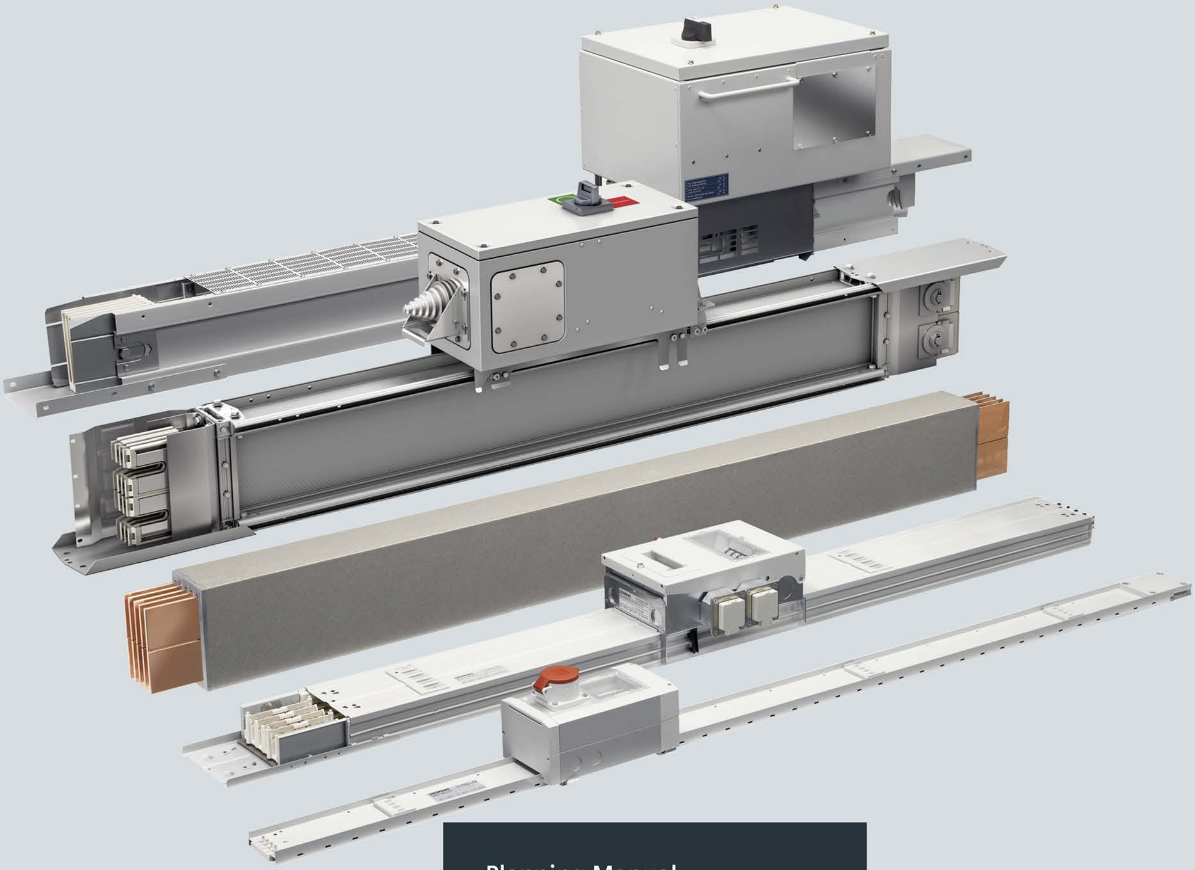

Planning Manual

Busbar Trunking Systems SIVACON 8PS

Totally Integrated Power - SIVACON

Edition 11/2016

siemens.com/busbar

SIEMENS

Energy Management Medium Voltage & Systems

Busbar trunking system SIVACON 8PS - Planning with SIVACON 8PS

Planning Manual

11/2016

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Legal information

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This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

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indicates that death or severe personal injury **may** result if proper precautions are not taken.

⚠CAUTION
indicates that minor personal injury can result if proper precautions are not taken.

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indicates that property damage can result if proper precautions are not taken.

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Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

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We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

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System overview

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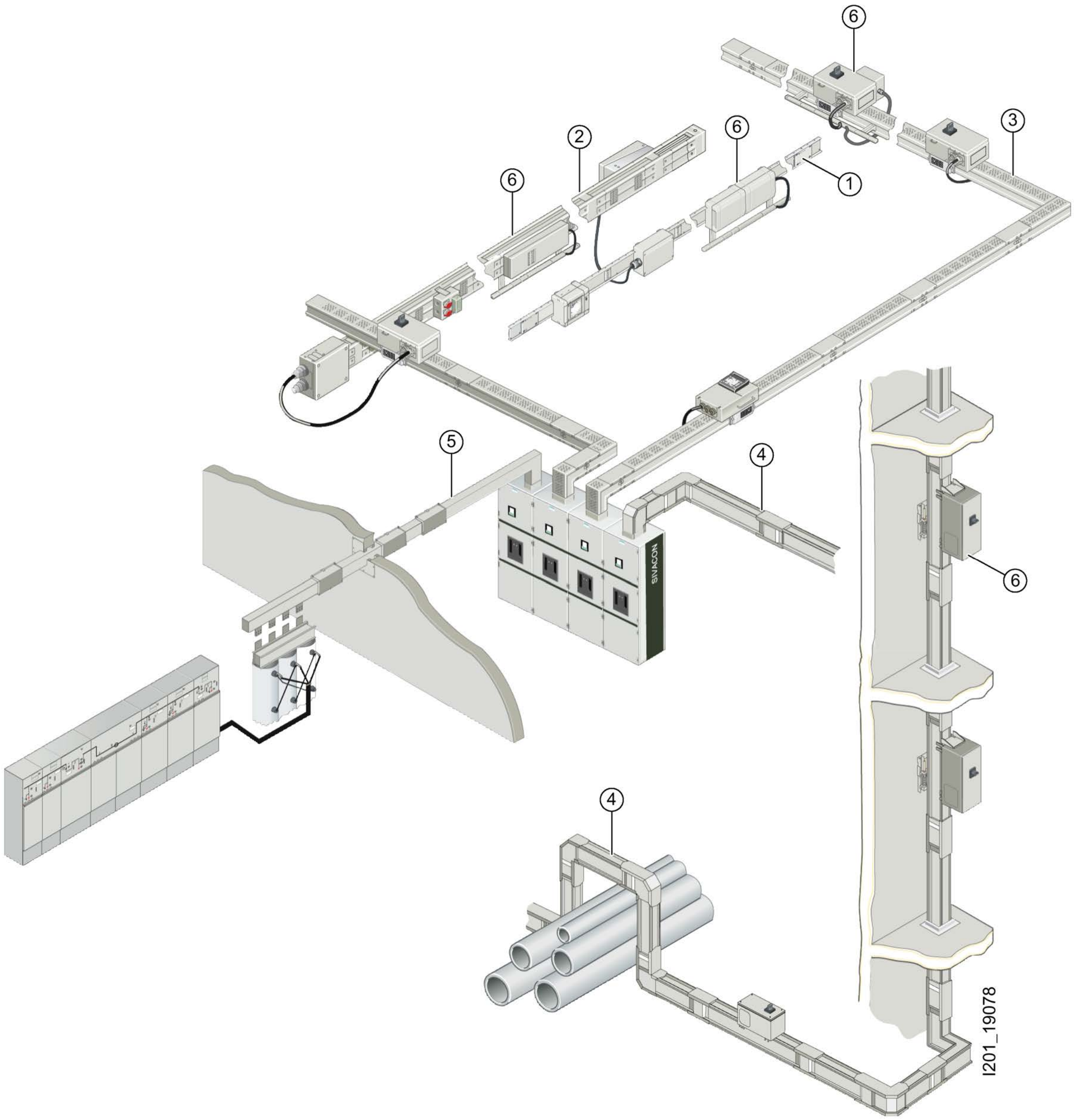
1.1 Overview of Siemens busbar trunking systems



①	BD01 system	④	LI system
②	BD2 system	⑤	LR system
③	LD system	⑥	Communication-enabled busbar trunking system for connection to the following busbar trunking systems: KNX (EIB / Instabus), AS-Interface, PROFIBUS, PROFINET, Modbus

Figure 1-1 Busbar trunking systems, overview

Siemens supplies the following busbar trunking systems:

Up to 160 A

BD01 system

- Flexible power supply
- Variable junction units
- Quick and easy to plan
- Time-saving installation
- Reliable mechanical and electrical connection technology
- High stability and low weight
- Positive opening and closing of the tap-off point
- Versatile tap-off units
- Small number of basic modules
- Storage-friendly system
- High degree of protection (IP54) for side-mounted and downwards tap-off points under extreme ambient conditions, IP55 with additional equipment.

You can find more information in the chapter "BD01 system (Page 15)" and in Catalogue LV 70.

Networked busbar trunking systems

- Networked functional expansions for combination with established tap-off units
- Applications:
  - Wide-area lighting control
  - Remote control and signalling in industrial environments
  - Consumption data acquisition for central power tap-offs
- KNX, AS-i, PROFIBUS, PROFINET and Modbus bus systems
- Quick and easy to plan
- Flexibility in terms of expansion and changes
- Modular system
- Can be retrofitted to existing installations
- Can be used with BD01, BD2, LD, and LI systems

You can find more information in the chapter "Networked busbar trunking systems for industrial and building applications (Page 18)" and in Catalogue LV 70.

Up to 1250 A

BD2 system

- Quick and easy to plan
- Time-saving and efficient installation
- Reliable and safe operation
- Flexible modular system with simple solutions for every application
- Power distribution system can be planned at an early stage without an exact knowledge of load locations
- Early readiness for operation thanks to quick and easy installation
- High degree of protection IP54 or IP55 for use in harsh industrial environments
- Innovative design: Omission of compensation elements to compensate for expansion

You can find more information in the chapter "Planning with BD2 (Page 35)" and in Catalogue LV 70.

Up to 5000 A

LD system

The busbar trunking system for optimum power distribution in industry:

- Reliable and safe operation
- Quick and easy installation
- Space-saving compact design up to 5000 A in one enclosure
- Load feeders up to 1250 A
- IP34 degree of protection with air cooling (IP54 with sealed enclosure)
- Type-tested connection to distribution boards and transformers

For more information: "Planning with LD (Page 105)"

Up to 6300 A

LI system

The busbar trunking system for power transmission and distribution in buildings

- Reliable and safe operation
- Quick and easy installation
- Sandwich design up to 6300 A
- Load feeders up to 1250 A
- High degree of protection IP55 for use in harsh industrial environments
- Type-tested connection to distribution boards and transformers

For more information: "Planning with LI (Page 159)"

LR system

The busbar trunking system for power transmission under extreme ambient conditions (IP68)

- Reliable and safe operation
- Quick and easy installation
- Cast resin system up to 6300 A
- Safe connection to distribution boards and transformers
- High degree of protection IP68 for outdoor applications

For more information: "Planning with LR (Page 235)"

SIMARIS design dimensioning software

SIMARIS design makes dimensioning electrical power distribution systems easy, fast and safe.

SIMARIS sketch - 3-D busbar run diagrams for efficient planning

You can create busbar run diagrams for the busbar trunking systems BD01, BD2, LD, as well as for the new high-current system LI, intuitively and quickly with SIMARIS sketch.

You can find more information at: SIMARIS (http://www.siemens.com/simaris)

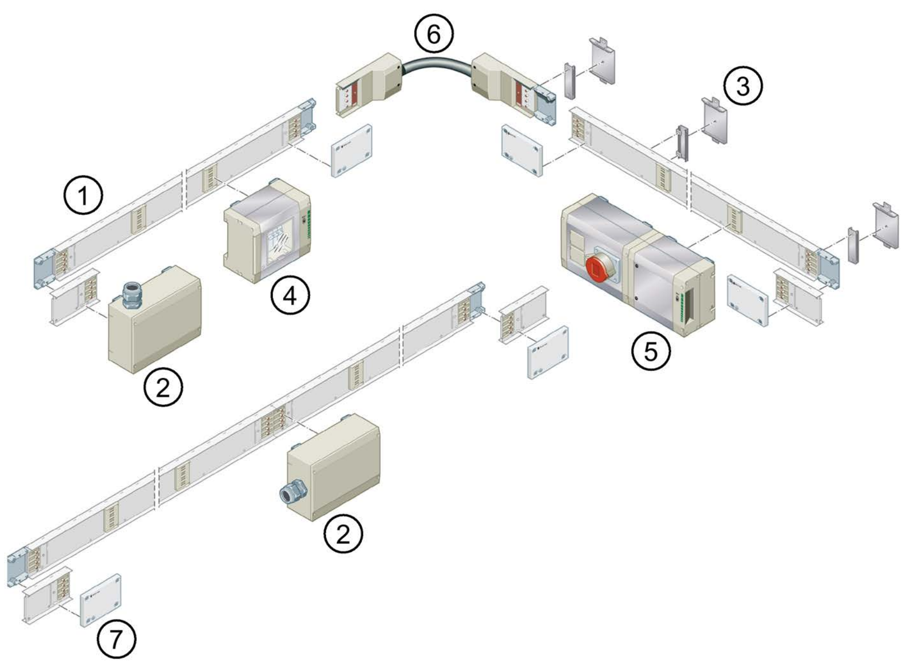
1.2 BD01 system

System overview

The BD01 busbar trunking system is designed for applications from 40 A to 160 A.

In the BD01 system, a single size supports 5 rated currents. In other words, all other components can be used across the power range for all 5 rated currents.

		BD01...
Rated current		40 A, 63 A, 100 A, 125 A, 160 A
Rated operating voltage	AC	400 V
Degree of protection		IP54, IP55
Spacing of tap-off points		Every 0.5 m on one side every 1 m on one side
Rated load feeder current		Up to 63 A



① Trunking unit
② Feeder unit
③ Fixing bracket
④ Tap-off unit
⑤ Ancillary equipment unit
⑥ Junction unit
⑦ End cap

Figure 1-2 System overview of BD01 system

Connection method

The assembly of the trunking units – even with the end caps and feeder units – is fast and inherently safe. The trunking units or end caps are simply inserted into the lower housing of the joint block. Once the upper part of the joint block or end cap is fitted, a secure connection is established by simply tightening the 4 screws.

Figure 1-3 Establishing a safe connection

Tap-off units

Tap-off units are available in four different sizes to connect the loads and also with various components fitted, e.g. such as plugs, fuses, miniature circuit breakers or combinations of the aforementioned.

Figure 1-4 Tap-off unit BD01 system

Ancillary equipment units offer additional space for decentral function expansions. Thus, automation and control components can be installed directly on the busbar.

Fixing and mounting

The BD01 busbar is installed edgewise, with the tap-off points on the side using fixing brackets on the wall, ceiling or non-fixed installation. The mounting is implemented on the connection points using a universal fixing bracket. The system can also be fitted flat with the tap-off points pointing downwards. This reduces the required fixing interval by half.

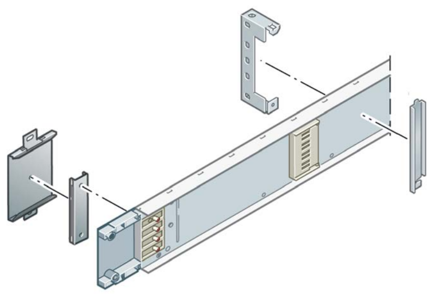


Figure 1-5 Fixing the BD01 system

Fire protection

If the busbar trunking system is routed through a fire wall or ceiling, it must have fire protection. Compliant with site requirements, Siemens offers fire protection class S90.

(EI90 available soon)

Ex-works equipment:

- External fire protection in the form of a kit for on-site mounting

Mineral mortar or fire protection mastic to seal the joints between busbar trunking system and component must be provided by the customer.

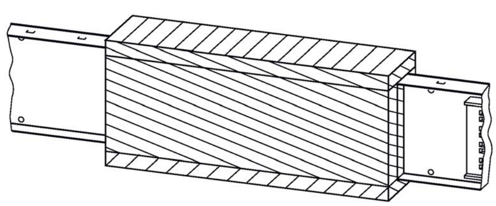


Figure 1-6 Fire protection BD01-S90

The approval documentation for Germany can be ordered separately:

- Approval kit BD01-S90-ZUL-D
  (approval certificate, wall signage and declaration of compliance)

1.3 Networked busbar trunking systems for industrial and building applications

The advantages of busbar trunking systems

The busbar trunking system has its advantages in the transport, distribution as well as switching and protection of electrical energy.

Integration of automation and building systems engineering into the Siemens busbar trunking systems results in further advantages and also increases the flexibility of the busbar trunking system.

The combination of standard tap-off units with standard ancillary equipment units guarantees enhancement in efficiency with the design, installation and operation.

The advantages of the system solution for planning

- Modular system
- Tested standard components
- Freedom in the selection of the bus system
- Use of most popular bus systems

The advantages of the system solution during commissioning

- Easy and quick mounting
- Step-by-step commissioning possible
- Flexibility in terms of changes and expansions

The advantages of the system solution in operation

- Transparency of circuit states
- Central recording of power costs
- Increase in system availability thanks to immediate detection of error location and type
- Preventive maintenance through recording of operating hours and operating cycles

Planning principles

2

2.1 Structure of the planning manual

It is not by any means easy to plan a power distribution concept involving the dimensioning of systems and devices. End user requirements have to be matched with the technical capabilities of the manufacturer. This planning manual will provide assistance as you plan and design the following busbar trunking systems from 160 A to 6300 A:

- BD2
- LD
- LI
- LR

Description of the individual systems

Each system has a dedicated chapter describing its technical characteristics and areas of application. Illustrations of the individual busbar trunking system elements also appear. All significant information relevant to the planning process is given particular emphasis and explained in detail.

Further information

You will find advice to help you to develop a ready-to-use planning solution under "Further information". These include specific dimensioning principles and detailed information about topics such as fireproof barriers and functional endurance.

Siemens can offer a range of services and engineering tools to assist you in drafting your specification. For an overview and explanation of functions and features, please see Tools and services (Page 307).

2.2 Busbar trunking system planning

2.2.1 Principles of busbar trunking system planning

Decision-making criteria affecting the creation of the power supply concept

When drafting a planning concept for a power supply, in addition to the applicable standards and regulations, you also need to clarify and address issues of cost and technology. Accordingly, when dimensioning and selecting electrical equipment such as distribution boards and transformers, rather than focussing on them individually, you need to aim to optimise their performance as part of a combined system.

All components have to be dimensioned sufficiently for loads both in rated operation and in the event of a malfunction. Furthermore, you must take the following important issues into consideration when drafting a power supply concept:

- Building type, use and design (e.g. high rise, low rise or number of storeys)
- Determination of load centres, identification of possible supply routes and locations for transformers and main distribution boards
- Calculation of the building's effective installed loads according to specific area loads as appropriate for the building's use
- Planning authority regulations and requirements
- Requirements set out by the utility company

Requirements to be met by power supply concepts

Planning will never produce just a single option for a solution. Rather, you will need to assess a number of possible options on the basis of issues relating to technology and cost. The following requirements are major factors:

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

The solution: Siemens busbar trunking systems

In most applications, these requirements can easily be solved by using suitable busbar trunking systems.

It is for this reason that busbar trunking systems are increasingly being preferred to cable trunking by engineering consultants charged with designing systems for power transmission and distribution. Siemens offers busbar trunking systems from 40 to 6300 A:

- The BD01 busbar trunking system from 40 to 160 A for supplying power to shopfloors with tap-offs up to 63 A
- The BD2 system from 160 to 1250 A for supplying power to medium-sized consumers in building and industrial applications
- The ventilated LD system for supplying power to consumers with medium power requirements in industrial applications
- The LI sandwich system for power distribution to consumers with high power requirements in building applications
- The LR cast resin system for power transmission under extreme ambient conditions (IP68)

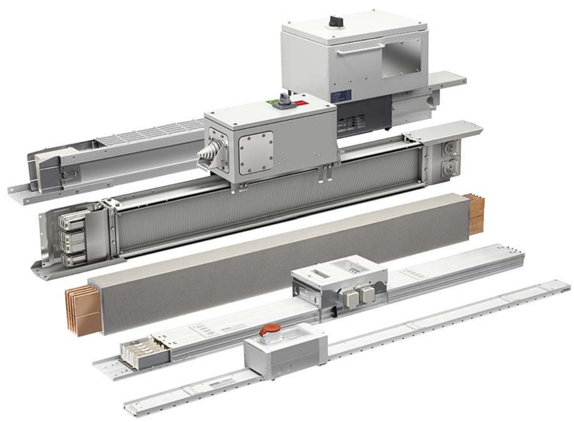


Figure 2-1 Siemens busbar trunking systems

2.2.2 Different types of busbar trunking systems and their functional scope

Requirements of the power supply

Specific requirements of power supplies and their individual components are typical of modern production facilities and in building technology today. This is particularly true of automated facilities.

The ability to retrofit new equipment or modify existing resources without interrupting active production is not only important for the continuous provision of the electrical power supply. It is also a vital requirement for production facilities operating on a multiple shift basis.

Increased safety and complex systems require a power distribution system which is able to respond to all requirements associated with costs and technology.

The BD01, BD2, LD, LI and LR busbar trunking systems are type-tested low-voltage switchgear assemblies in accordance with IEC / EN 61439-1 and -6.

The BD01, BD2 and LD systems consist of busbars, internal bar fixings, an external enclosure, fixing and connection accessories. The LI sandwich system and the LR cast resin system consist of busbars, fixing and connection accessories and an insulating foil, along with an aluminium enclosure (LI) or an enclosure made from epoxy resin (LR).

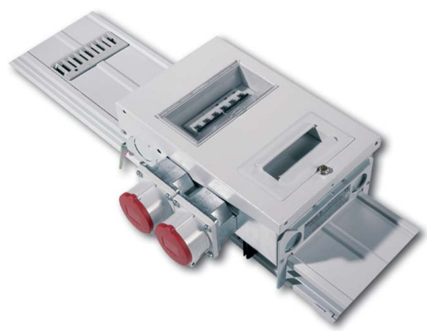


Figure 2-2 BD2 trunking unit with tap-off unit

Power transmission

Components of the busbar trunking system transmit power between transformers and low voltage power distribution systems and from the main distribution board to the service distribution board. Trunking units without tap-off points are used for the power transmission. In addition to the standard lengths, customers can select any lengths to meet their particular building requirements.

Power distribution

The main application of busbar trunking systems is power distribution. Current can't be taken from just a single point which is permanently installed such as a cable installation. Current tap-off units can be moved to any position within the entire system. To tap power at any given point simply requires positioning a tap-off unit at that location on the busbar.

The result is a flexible distribution system for decentralised power supply to a particular line or area. Tap-off points can be mounted on one or both sides of straight trunking units.

Depending on the requirements of the particular application, busbar trunking units with tap-off units for a rated current of 1250 A from a single tap-off point are available for tapping off power and connecting loads. The tap-off units can be equipped with fuses, fuse-switches, miniature circuit breakers or circuit breakers as desired.

To be able to change the tap-off units without disconnecting the busbar trunking run, the following **requirements** apply:

- The PE contact on the tap-off unit leads during installation and lags during removal.
- The parts which are live during installation, removal or connection have complete protection against direct contact (degree of protection IP2x).
- Installation requires phasing to be correct.
- The tap-off unit must be isolated during installation and removal.

Figure 2-3 Tap-off units for flexible current consumption

2.2.3 A comparison of busbar trunking systems and cable trunking

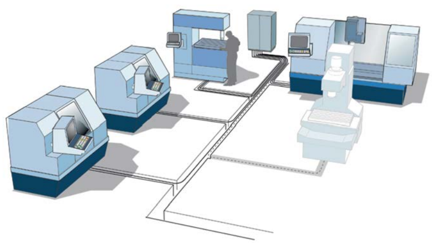
Comparison of features

Feature	Busbar trunking unit	Cable trunking
Type-tested system	x	—
Mechanical safety	High	Low
Fire load	Low	High
Thermal characteristics	Ambient temperature compliant with IEC / EN 61439-1 and -6 max. +40°C and +35°C average over 24 hours	Cable loads are related to +30 °C in accordance with DIN 57298-4, Chap. 5.3.3.1 / DIN VDE 0298-4/2.88.
Network topology	Transparent (line topology with load feeders connected in series via tap-off units)	Significant cable cluster at feeding point due to point-to-point power supply to loads from central power distribution system
Protective devices for loads	In the tap-off unit: facilitating direct and immediately traceable assignment to load locally.	Centrally in the distribution board: this means that assignment to the load cannot be verified directly. You have to rely on the cable and load being labelled correctly.
Space requirements	Low	High, since correspondingly large distribution boards are needed. Laying criteria (clustering, laying method, current carrying capacity, etc.) have to be taken into account
Retrofitting in the event of changes to load feeders	Highly flexible thanks to tap-off points in the trunking units and large number of different tap-off units	Time-consuming and expensive. Additional cables need to be laid from the distribution board to the load.
Planning and configuration	Quick and easy using computer-assisted planning tools	Configuration is time-consuming and complex (distribution board and cable dimensioning, cable diagrams, etc.)
Dimensioning (current, voltage drop, neutralisation conditions)	Complex	Very complex
Troubleshooting expenditure	Low	High
Fireproof barrier	Type-tested, factory-built	Dependent upon installation quality on site
Functional endurance	Functional endurance tested to DIN 4102-12	Dependent upon installation quality on site
Electromagnetic interference	Low	Relatively high for standard cables
Installation	Few installation accessories and tools, short installation times	Extensive installation accessories and numerous tools, long installation times
Weight	Weighs up to 1/3 of comparable cable weight	Up to 3 times the weight of the busbar trunking system
Halogen-free, PVC-free [1)]	All tap-off units are halogen-free and PVC-free.	Standard cables are not halogen-free and PVC-free.

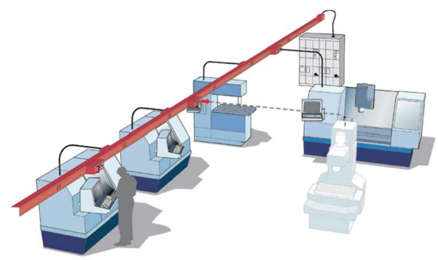
1) Details must be obtained from manufacturer

Planning made easier

Easy to plan, quick to install and flexible to use: Siemens busbar trunking systems are an efficient means of supplying power to any building. Power distribution can be planned precisely on the basis of total connected load and the type and number of loads. Planning tools such as SIMARIS design provide assistance. The line topology with load feeders arranged at regular intervals ensures transparency. All applications can be implemented quickly and compactly with standardised sizes.



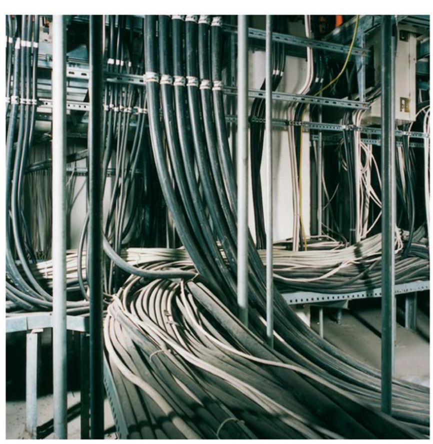
In a cable trunking system, new loads have to be connected via an additional sub-distribution board; this costs both time and money.



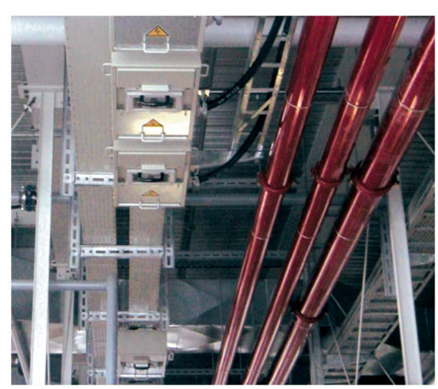
On busbar trunking systems, tap-off units in the vicinity of loads ensure local transparency.

Increased safety due to high short-circuit rating and minimum fire load.

Advanced safety – both in respect of short-circuit rating and where fire load is concerned. BD2A 250 busbar trunking systems, for example, have a fire load of just 1.32 kWh/m, whereas comparable cable trunking systems (NYY 4 x 95 / 50 mm^2) are rated at 5.19 kWh/m. The busbars are also halogen-free. Siemens busbar trunking systems feature high short-circuit rating. Furthermore, troubleshooting is made easier thanks to local load short-circuit protection.



High fire load with cables



Low fire load with busbars

2.2.4 Planning guidelines

Documentation aids

The planning manual "Planning with SIVACON 8PS" contains general principles and product-specific details for planning and dimensioning power distribution using SIVACON 8PS busbars.

For the complete planning of all main components from medium voltage, through transformers, to the power outlet for utility and industrial buildings, use of the application manual of TIP is recommended.

Advance planning

Infeed powers	Rated currents and short-circuit currents of standard transformers (Page 28)
Connected loads	Technical data of the systems (Page 29)
Demand factor	Planning example (Page 278)
Permissible voltage drop	Determining the voltage drop (Page 267)
Required protective measures	Degrees of protection for busbar trunking systems (Page 272)
Distribution systems (network structures)	Distribution systems (Page 275)
Selection of the power supply concept:	
Centralised with cable and subdistribution boards	A comparison of busbar trunking systems and cable trunking (Page 24)
Decentralised with busbar trunking systems	A comparison of busbar trunking systems and cable trunking (Page 24)

Draft planning

System sizing

Short-circuit rating	Technical data of the systems (Page 29)
Rated operating currents	Technical data of the systems (Page 29)
Calculation of voltage drop	Determining the voltage drop (Page 267)
Overload protection and short-circuit protection	Overload protection and short-circuit protection (Page 271)
Degree of protection depending on room type to DIN VDE 0100	Degrees of protection for busbar trunking systems (Page 272)

Consideration of busbar layout

	BD2	LD	LI	LR
Trunking units	Straight trunking units (Page 41)	Straight trunking units (Page 112)	Straight trunking units (Page 170)	Straight trunking units (Page 242)
Junction units	Junction units (Page 42)	Junction units (Page 115)	Junction units (Page 173)	Junction units (Page 243)
Tap-off units	Tap-off units (Page 50)	Tap-off units (Page 122)	Tap-off units (Page 188)	—
Fireproof barriers	Fireproof barrier (Page 285)			
Additional equipment	Additional equipment (Page 60)	Additional equipment (Page 127)	Additional equipment (Page 195)	Additional equipment (Page 250)

Installation

General installation instructions	Installation instructions for trunking units, incoming supplies, tap-off units and accessories Additionally for BD2: installation manual for the BD2 system (order no. A5E02126895) LD: installation manual for the LD system (order no. A5E02321020) LI: Installation manual LI system (Available soon) LR: installation manual for the LR system (order no. A5E00949791)

Creation of a specification

Specification texts BD2	Preliminary remark for specifications (Page 36)
Specification texts LD	Preliminary technical descriptions for specifications (Page 106)
Tender specification texts LI	Preliminary technical descriptions for specifications (Page 160)
Specification texts LR	Preliminary remark for specifications (Page 236)

You will also find the latest tender specification text modules for SIVACON 8PS online:

Tender specification texts (http://www.siemens.de/ausschreibungstexte)

2.3 Rated currents and short-circuit currents of standard transformers

Rated voltage U_{rT}	400 / 230 V, 50 Hz			525 V, 50 Hz			690 / 400 V, 50 Hz		
Rated short-circuit voltage value U_{kr}		4 %[1]	6 %[2]		4 %[1]	6 %[2]		4 %[1]	6 %[2]
Rated power	Rated current I_r	Initial symmetrical short-circuit current I''_k [3]		Rated current I_r	Initial symmetrical short-circuit current I''_k [3]		Rated current I_r	Initial symmetrical short-circuit current I''_k [3]	
[kVA]	[A]	[A]	[A]	[A]	[A]	[A]	[A]	[A]	[A]
50	72	1933	1306	55	1473	995	42	1116	754
100	144	3871	2612	110	2950	1990	84	2235	1508
160	230	6209	4192	176	4731	3194	133	3585	2420
200	288	7749	5239	220	5904	3992	167	4474	3025
250	360	9716	6552	275	7402	4992	209	5609	3783
315	455	12247	8259	346	9331	6292	262	7071	4768
400	578	15506	10492	440	11814	7994	335	8953	6058
500	722	19438	12020	550	14810	9158	418	11223	6939
630	910	24503	16193	693	18669	12338	525	14147	9349
800	1154	--	20992	880	--	15994	670	--	12120
1000	1444	--	26224	1100	--	19980	836	--	15140
1250	1805	--	32791	1375	--	24984	1046	--	18932
1600	2310	--	39818	1760	--	30338	1330	--	22989
2000	2887	--	52511	2200	--	40008	1674	--	30317
2500	3608	--	65547	2749	--	49941	2090	--	37844
3150	4550	--	82656	3470	--	62976	2640	--	47722

1) U_{kr} = 4 %, standardised to DIN EN 60909-0 / DIN VDE 0102 Part 0 for S_{rT} = 50 ... 630 kVA

2) U_{kr} = 6 %, standardised to DIN EN 60909-0 / DIN VDE 0102 Part 0 for S_{rT} = 100 ... 1600 kVA

3) I''_k Unaffected transformer initial symmetrical short-circuit current in the case of connection to a mains supply with unlimited short-circuit power taking into account the voltage factor and the correction factor for transformer impedance in accordance with DIN EN 60909 / DIN VDE 0102 Part 0 (July 2002)

Approximation formula

Transformer rated current	Transformer short-circuit AC current	
I_N [A] = k x S_{NT} [kVA]	$I''_k = I_N / u_k \times 100$ [A]	400 V: k = 1.45 690 V: k = 0.84

2.4 System selection criteria

2.4.1 Technical data of the systems

Selection of BD01, BD2, LI, LD and LR

		BD01	BD2	LI	LD	LR
Rated operating voltage U_e AC	V	400	690	1000	1000	1000
Standard degree of protection		IP54, IP55	IP52, IP54, IP55	IP55	IP34, IP54 [1)]	IP68
Rated current I_{nA}	A	40 … 160	160 … 1250	800 … 5000, 6300[2)]	1100 … 5000	400 … 6300
Rated short-time withstand current I_{CW} (1 s)	kA	0.58 … 2.5	5.5 ... 34	35 … 150	55 … 116	12 … 100
Conditional short-circuit rating I_{cf} / I_{cc} for TU up to < 630 A	kA	[3)]	[3)]	120 / 100	120 / 100	[2)]
Conditional short-circuit rating I_{cc} for TU 800 A and above	kA	—	—	100	100	[2)]
Conductor configurations						
L1, N, PE=enclosure		—	—	—	—	—
L1, L2, N, PE=enclosure		—	—	—	—	—
L1, L2, L3, N, PE=enclosure		x	—	x	—	—
L1, L2, L3, PE=enclosure		—	—	x	—	—
L1, L2, L3, PEN		—	—	x	x	x
L1, L2, L3, N, PE=busbar		—	x	x	x	x
L1, L2, L3, 2N, PE=enclosure		—	—	x	—	—
L1, L2, L3, 2N, PE=busbar		—	—	x	—	—
L1, L2, L3, N, (PE) [4)], PE=enclosure		—	—	x	—	—
L1, L2, L3, 2N, (PE) [4)], PE=enclosure		—	—	x	—	—

		BD01	BD2	LI	LD	LR
Dimensions width x height						
for 40 A (Al, Cu)	mm x mm	90 x 25	—	—	—	—
for 160 A (Al, Cu)	mm x mm	90 x 25	167 x 68	—	—	—
for 400 A (Al)	mm x mm	—	167 x 68	—	—	90 x 90
for 1000 A (Al)	mm x mm	—	167 x 126	155 x 132	180 x 180	120 x 120
for 2000 A (Al)	mm x mm	—	—	155 x 230	240 x 180	120 x 220
for 4000 A (Al)	mm x mm	—	—	410 x 230	240 x 180	120 x 440
for 1000 A (Cu)	mm x mm	—	—	155 x 111	180 x 180	90 x 90
for 2000 A (Cu)	mm x mm	—	—	155 x 174	240 x 180	120 x 192
for 3200 A (Cu)	mm x mm	—	—	155 x 280	240 x 180	120 x 240
for 5000 A (Cu)	mm x mm	—	—	410 x 213	240 x 180	120 x 440
for 6300 A (Cu)	mm x mm	—	—	410 x 280	—	120 x 480
Fire load						
Trunking unit incl. tap-off points	kWh/m	0.76	1.32 … 2	—	—	—
Trunking unit without tap-off point	kWh/m	—	—	2.13 … 15.54	4.16 … 8.83	13.01 … 86.96
per tap-off point	kWh	—	—	0.89	7.8 … 10.8	2)
Voltage drop						
for 40 A (Al, Cu)	mV / m/ A	3.192 5)	—	—	—	—
for 160 A (Al, Cu)	mV / m/ A	0.553 5)	0.519 5)	—	—	—
for 400 A (Al)	mV / m/ A	—	0.544 5)	—	—	0.312 6)
for 1000 A (Al) 6)	mV / m/ A	—	0.15 5)	0.080 5)	0.116 6)	0.156 6)
for 2000 A (Al) 6)	mV / m/ A	—	—	0.033 5)	0.079 6)	0.068 6)
for 4000 A (Al) 6)	mV / m/ A	—	—	0.057 5)	0.043 6)	0.043 6)
for 1000 A (Cu) 6)	mV / m/ A	—	—	0.080 5)	—	0.148 6)
for 2000 A (Cu) 6)	mV / m/ A	—	—	0.065 5)	0.08 6)	0.064 6)
for 3200 A (Cu) 6)	mV / m/ A	—	—	0.048 5)	0.048 6)7)	0.049 6)
for 5000 A (Cu) 6)	mV / m/ A	—	—	0.108 5)	0.03 6)	0.025 6)
Magnetic fields 8)						
for 40 A (Al, Cu)	µT	0.4	—	—	—	—
for 160 A (Al, Cu)	µT	0.6	2.8	—	—	—
for 400 A (Al)	µT	—	11.1	—	—	2)
for 1000 A (Al)	µT	—	14.6	5.38	11.0	2)
for 2000 A (Al)	µT	—	—	13.32	12.0	2)
for 4000 A (Al)	µT	—	—	9.12	13.0	2)
for 1000 A (Cu)	µT	—	—	—	2)	2)
for 2000 A (Cu)	µT	—	—	2)	9.7	2)
for 5000 A (Cu)	µT	—	—	2)	14.4	2)

		BD01	BD2	LI	LD	LR
Max. fixing distances						
Al systems	m	1.5 … 3.1	2.5 … 4.0	2.0 … 3.0	5.0 … 6.0	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
Tap-offs can be plugged into tap-off points at 3 m intervals						
Up to 16 A	Units	6	11	—	—	0[9]
Up to 63 A	Units	6	10	6	3	0[9]
Up to 125 A	Units	—	10	6	3	0[9]
160 A … 250 A	Units	—	6	6	3	0[9]
315 A … 630 A	Units	—	4[10]	4	3	0[9]
800 A … 1250 A	Units	—	—	1	2	0[9]

1) With IP54, derating of up to 36 % needs to be applied

2) On request

3) Usually equivalent to the protective devices installed (< I_{cw}), see the corresponding technical data

4) (PE) = Clean earth

5) Voltage drop data for 50 Hz 3-phase, cos phi = 0.9, symmetrical load, distributed load decrease and single-side infeed

6) Voltage drop data for 50 Hz 3-phase, cos phi = 0.9, symmetrical load, concentrated load decrease and single-side infeed

7) With LDC6 (I_{nA} = 3400 A)

8) Magnetic field values measured with symmetrical load 0.5 m away from the busbar trunking system

9) Tap-off units can only be connected between two busbar trunkings with a bolt-on joint block (fixed tap-off unit)

10) Can only be used as of BD2-630

2.4.2 Areas of application for high-current systems

Selection of high-current systems

In principle, SIVACON 8PS offers three high-current systems. We recommend the following selection dependent upon area of application and ambient conditions:

<table>
<tr><th rowspan="2">Location of use</th><th rowspan="2" colspan="2">Areas of application</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
• Insurance companies
• Internet providers
• Computer centres
• Broadcasting stations
• Shopping centres
• Furniture stores
• Trade fairs
• Airports
• Hospitals
• Clinics
• Office buildings</td><td>For power distribution in multi-storey buildings with a mainly vertical layout</td><td>X</td><td>—</td><td>—</td></tr>
<tr><td>To avoid neutral conductor overload due to electronic loads subject to harmonics</td><td>X</td><td>—</td><td>—</td></tr>
<tr><td>To prevent interference potentials in the busbar enclosure impairing the operating capability of loads</td><td>X</td><td>—</td><td>—</td></tr>
<tr><td>For a high density of load tap-off points in the smallest of spaces</td><td>X</td><td>X</td><td>—</td></tr>
<tr><td>To protect loads against negative influences of magnetic field emissions
1. Systems up to and including 1600 A
2. Systems from 2000 A</td><td>
X</td><td>

X</td><td>—</td></tr>
<tr><td>For power distribution with a mainly horizontal layout and IP34 degree of protection</td><td>—</td><td>X</td><td>—</td></tr>
<tr><td rowspan="6">Industrial buildings</td><td rowspan="6">• Industrial buildings
• Production environments</td><td>When arc-fault-resistant load feeders are required.</td><td>—</td><td>X</td><td>—</td></tr>
<tr><td>When degree of protection IP34 is sufficient.</td><td>—</td><td>X</td><td>—</td></tr>
<tr><td>When the degree of protection IP55 is required.</td><td>X</td><td>—</td><td>—</td></tr>
<tr><td>When degree of protection IP6x is required.</td><td>—</td><td>—</td><td>X</td></tr>
<tr><td>For power transmission under extreme production conditions</td><td>—</td><td>—</td><td>X</td></tr>
<tr><td>For power transmission outside closed buildings</td><td>—</td><td>—</td><td>X</td></tr>
</table>

2.4.3 Selection on the basis of rated transformer data

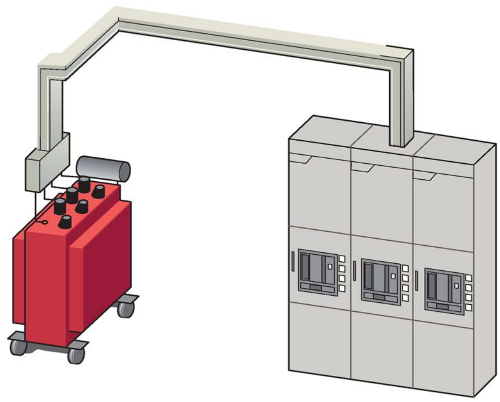


Figure 2-4 Connection of a transformer to a Siemens power distribution board

The table can be used to select the appropriate busbar trunking system on the basis of the transformer's rated current. The short-circuit rating of the LD, LI and LR busbar trunking systems is usually higher than the values for the transformer's sustained and peak short-circuit currents. However, this only applies if just a single transformer is used for the low-voltage supply. Higher short-circuit values are possible on ring or meshed networks or if transformers are connected in parallel in a low-voltage switchgear assembly. Such scenarios must therefore be given special consideration. Please refer to the technical data for the busbar trunking systems in question for specific data about short-circuit ratings.

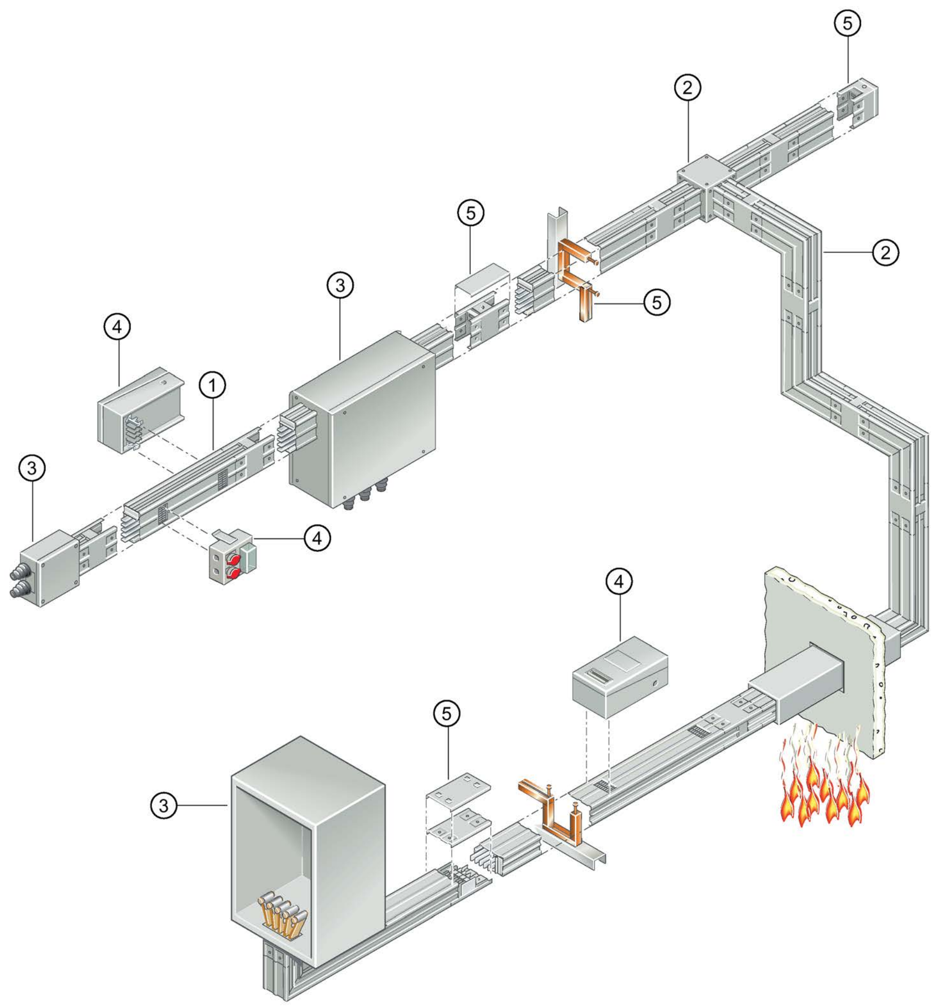
Rated power	Rated current I	Initial symmetrical short-circuit current I''_k (U_k=6 %)	Peak short-circuit current I_{pk} (u_k=6 %)	LD size	Rated current I_{nA} IP34	LI size	Rated current I_{nA} IP54 / IP55	LR size	Rated current I_{nA} IP68
[kVA]	[A]	[kArms]	[kA]		[A]		[A]		[A]
630	910	16.19	38.58	LDA1	1100	LI-..1000	1000	LRA04 / LRC03	1000
800	1155	19.25	49.00	LDA2	1250	LI-..1250	1250	LRA06 / LRC04	1400 / 1350
1000	1444	24.06	61.24	LDA3	1600	LI-..1600	1600	LRA07 / LRC05	1700
1250	1805	30.07	76.57	LDA4	2000	LI-..2000	2000	LRA08 / LRC07	2000
1600	2310	38.50	98.00	LDA5	2500	LI-..2500	2500	LRA09 / LRC08	2500
2000	2887	48.11	122.50	LDA6	3000	LI-..3200	3200	LRA27 / LRC09	3200
2500	3609	60.11	153.10	LDA7	3700	LI-..4000	4000	LRA28 / LRC27	4000
3150	4546	75.78	192.90	LDC8	5000	LI-..5000	5000	LRA29 / LRC28	5000

You can find other values in the following chapters:

- For the BD2 system: "Technical specifications (Page 62)"
- For the LD system: "Technical specifications (Page 128)"
- For the LI system: "Technical specifications (Page 197)"
- For the LR system: "Technical specifications (Page 252)"

3 Planning with BD2

3.1 System description



① Straight trunking units
② Junction units
③ Feeder units
④ Tap-off units
⑤ Additional equipment

Figure 3-1 Overview of BD2 busbar trunking system

The BD2 busbar trunking system is suitable for universal use. Designed for applications involving flexible power supplies and power distribution for consumers in industrial and commercial environments, it can also be used to transmit power from one supply point to another. In addition, the BD2 busbar trunking system can be used as a rising main busbar in high rise buildings.

3.2 System components

3.2.1 Preliminary remark for specifications

The BD2 busbar trunking systems are to be offered as type-tested low-voltage switchgear assemblies in accordance with IEC / EN 61439-1 and -6.

The brand offered represents a complete system consisting of system modules, including elements for connection to the distribution boards such as brackets, straight trunking units, e.g. Z connectors, T connectors, and flexible junction units.

Trunking units with tap-off openings can be equipped with coded tap-off units. Tap-off units are protected against incorrect mounting. Depending on the type, the isolation of the tap-off units during removal is assured by a compulsory sequence of operations or by cautionary instructions.

If necessary, it is possible to equip the busbar trunking system with an asbestos-free fire barrier which conforms in the case of BD2C to the fire resistance class S120 and in the case of BD2A to S90 or S120 (EI90 and EI120 available soon). The trunking unit's steel enclosure is made of moulded steel profiles to permit large fixing distances between suspension points. The enclosure is painted in a light grey colour (RAL 7035).

The external dimensions may not exceed 68 x 167 mm up to 400 A or 126 x 167 mm up to 1250 A. The connection of the individual systemmodules is implemented with state-of-the-art quick connection terminals with integral compensation for expansion. The system is protected against phase inversion. A mechanical, electrical and maintenance-free connection between two busbar trunking system elements can be established quickly and safely using conventional tools.

The conductors are made of aluminium or copper. The aluminium and copper conductors must be nickel-plated and tinned along their entire length. The fire load should not exceed the value stated in the technical specifications. Expansion compensation must be integrated into eachtrunking unit. Busbar trunking units should be able to be mounted both horizontally and vertically. Junction units may not be used to connect cables.. Flexible junction unit are permissible as system modules of the busbar trunking system.

The following declarations of conformity must be included with the offer:

- EN ISO 9001 QA certification
- Certificates verifying
  - That the fire barrier has been tested and approved
  - That functional endurance has been tested and approved

The general preliminary remarks are followed by a detailed description of the system as appropriate for technical requirements:

Technical data for BD2 busbar trunking systems

	BD2-...
Rated current	_________[1]
Degree of protection	IP52 / IP54 / IP55[2]
Mounting position	Horizontal / vertical [2]
Rated insulation voltage	690 V AC / 800 V DC
Rated operating voltage	690 V AC
Rated frequency	50 … 60 Hz
Rated peak withstand current I_{pk}	_________[1]
Rated short-time withstand current I_{cw} (1 s)	_________[1]
Conductor material	Al / Cu[2]
No. of conductors (active)	5
Fire load	_________[1]
Enclosure dimensions:	
160 … 400 A	68 x 167 mm
630 … 1250 A	126 x 167 mm

1) Enter the data of the selected system variable. You can find more detailed information in the "Technical specifications".

2) Please delete as appropriate.

Note

The innovative design and construction of the BD2 busbar trunking system means that additional compensation units to compensate busbar expansion are not required. Prevailing length expansion caused by current heat is compensated in the quick connection terminal.

Furthermore, regardless of mounting position and degree of protection, the BD2 busbar trunking system can always be loaded at 100 % of rated current. This only has to be reduced in the case of pure power transmission in the edgewise mounting position (to 0.9 x I_e).

3.2.2 Type code

Trunking units

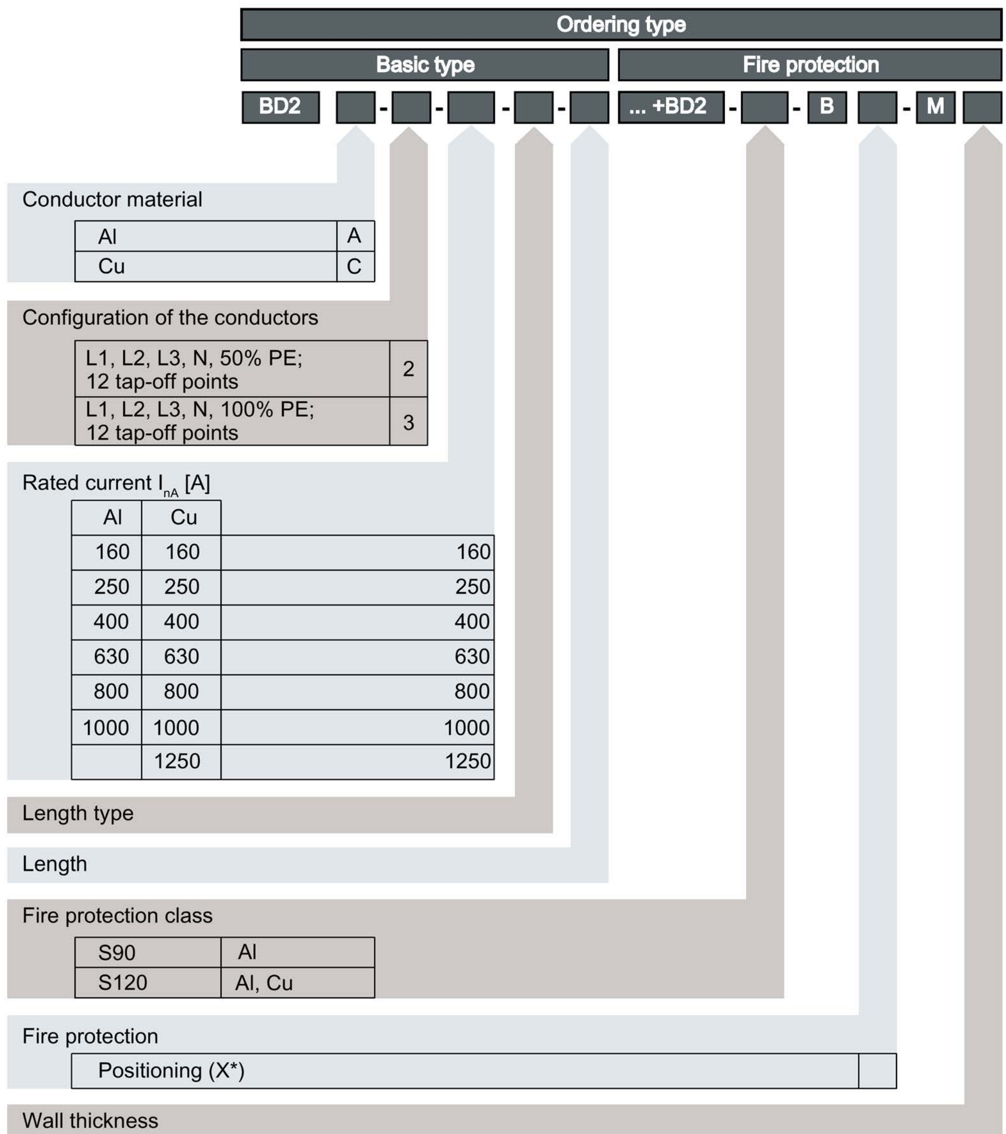
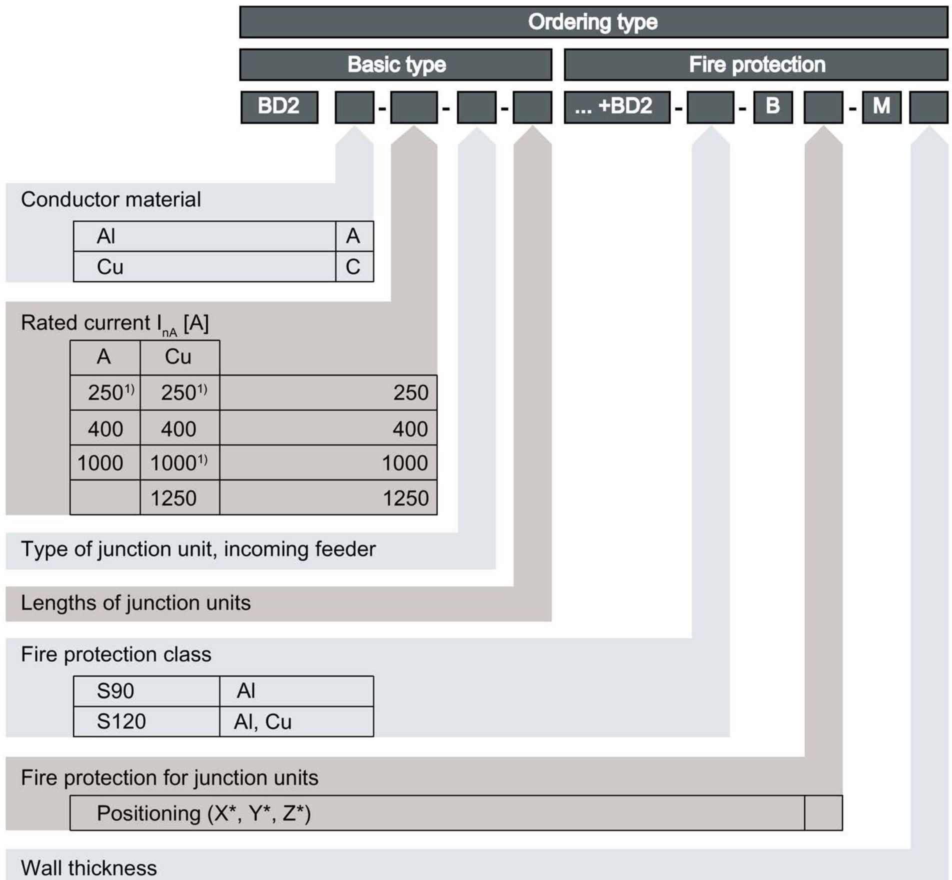


Figure 3-2 Type codes for BD2A/BD2C trunking units

Feeder units, junction units



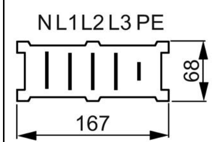
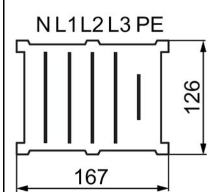
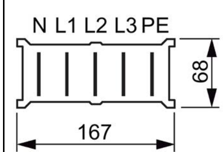
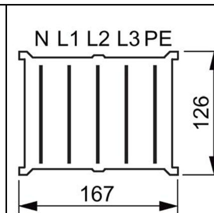
1) Feeder units only

Selection example for trunking units

A rated current of 1000 A is calculated for a project. Aluminium conductors shall be used. A 5-pole system has to be used. The cross section of the neutral conductor needs to be equal to the cross section of the phase conductor.

This results in type **BD2A-3-1000-**

Trunking unit sizes (cross sections)

	Size 1	**Size 2**
Conductor configuration 2	 160 … 400 A	 630 … 1250 A
	BD2A-2, BD2C-2 trunking units	
Conductor configuration 3	 160 … 400 A	 630 … 1250 A
	BD2A-3, BD2C-3 trunking units, junction units, BD2A-..., BD2C-... incoming supplies	

Additional equipment is available for both sizes and conductor configurations.

Tap-off units with moulded-plastic enclosures up to 25 A and tap-off units with sheet steel enclosures can be used as tap-offs for size 1 up to 250 A and size 2 up to 530 A.

3.2.3 Straight trunking units

Straight trunking units are used to transmit electrical power and to supply loads.

Straight trunking units without tap-off points for horizontal and vertical installation

400 to 1250 A

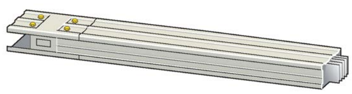


Figure 3-3 Straight trunking units without tap-off points

	Length	Type	
Standard lengths	1.25 m	BD2.-.-...-SO-1	
	2.25 m	BD2.-.-...-SO-2	
	3.25 m	BD2.-.-...-SO-3	
Optional lengths W	0.50 … 1.24 m	BD2.-.-WO-1W*	
	1.26 … 2.24 m	BD2.-.-WO-2W*	
	2.26 … 3.24 m	BD2.-.-WO-3W*	
Non-standard lengths (can be cut to length)	1.25 m	160 … 400 A	BD2.-400-WO-AL
		630 … 1250 A	BD2A-1000-WO-AL BD2C-1250-WO-AL

Straight trunking units with tap-off points for horizontal and vertical installation

160 to 1250 A

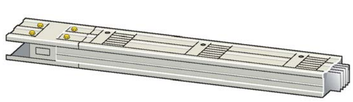


Figure 3-4 Straight trunking units with tap-off points

BD2.-2 and BD2.-3	Length	Type
Standard lengths with 12 tap-off points	3.25 m	BD2.-.-...-SB-3
Standard lengths with 8 tap-off points	2.25 m	BD2.-.-...-SB-2
Standard lengths with 4 tap-off points	1.25 m	BD2.-.-...-SB-1
Optional lengths with 8 to 12 tap-off points	2.26 … 3.24 m	BD2.-.-...-WB-3W*
Optional lengths with 4 to 8 tap-off points	1.26 … 2.24 m	BD2.-.-...-WB-2W*

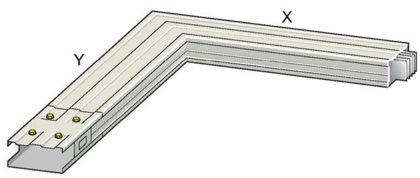
S: Standard length; O: Without tap-off point; W: Optional length; *: Optional length in m;

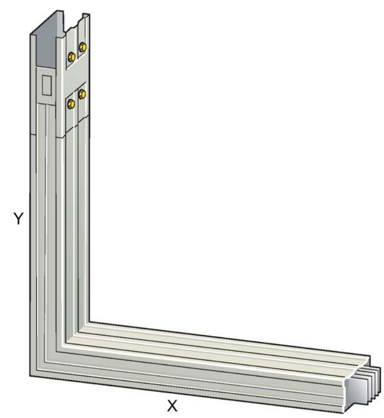
B: Tap-off points on both sides

3.2.4 Junction units

Junction units are used to adapt the layout to prevailing structural conditions.

Angled trunking units

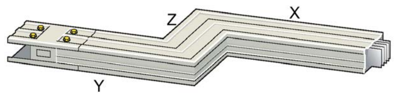


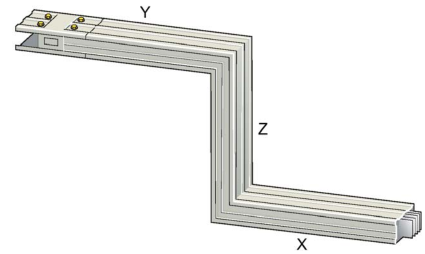


	Length	Type	
Standard length	X and Y = 0.36 m	160 … 400 A	BD2.-400-L...
		630 … 1250 A	BD2A-1000-L... BD2C-1250-L...
Optional length	X or Y = 0.36 ... 1.25 m	160 … 400 A	BD2.-400-L...-X*/Y*
		630 … 1250 A	BD2A-1000-L...-X*/Y* BD2C-1250-L...-X*/Y*

* Optional length in m

Z trunking units

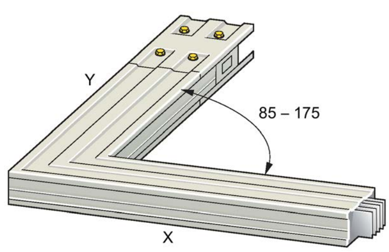


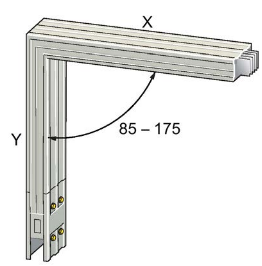


	Length	Type	
Optional length	X or Y = 0.36 ... 0.6 m	160 … 400 A	BD2.-400-Z.-X*/Y*/Z*
	Z ≤ 1.25 m	630 … 1250 A	BD2A-1000-Z.-X*/Y*/Z*
			BD2C-1250-Z.-X*/Y*/Z*

* Optional length in m

Angled trunking units with angle configurable between 85° and 175° in 5° increments

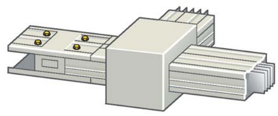




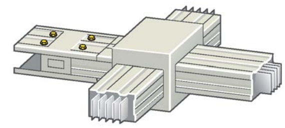
	Length	Type	
Standard length	X and Y = 0.36 m	160 … 400 A	BD2.-400-L.-G*
		630 … 1250 A	BD2A-1000-L.-G*
			BD2C-1250-L.-G*
Optional length	X or Y = 0.36 ... 1.25 m	160 … 400 A	BD2.-400-L.-X*/Y*-G*
		630 … 1250 A	BD2A-1000-L.-X*/Y*-G*
			BD2C-1250-L.-X*/Y*-G*

X*, Y*: Optional length in m; G*: Required number of degrees

T and K units



T-unit

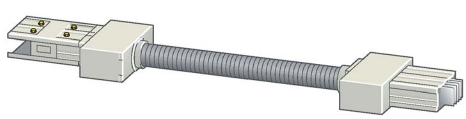


K-unit

Length per leg	K unit type	
0.36 m	160 … 400 A	BD2.-400-T.
	630 … 1250 A	BD2A-1000-T. BD2C-1250-TV(TH)

Length per leg	T unit type	
0.36 m	160 … 400 A	BD2.-400-K..
	630 … 1250 A	BD2A-1000-K.. BD2C-1250-KVH

Flexible movable trunking units in X/Y/Z direction



Length	Type	
1.25 m	160 … 400 A	BD2-400-R
1.75 m	630 … 800 A	BD2-800-R
Custom lengths up to 3.25 m are possible		

3.2.5 Feeder units

Feeder units are used to feed power into the busbar trunking system with single-core or multi-core cables as well as to feed power directly to low-voltage distribution equipment. The incoming supply can be set up as an end feed or a centre feed.

3.2.5.1 End feeder units

Common features

All end feeder units have the following common features:

Cables can be fed in from the front end. Units with cable compartments support cable entry from the side. In the case of multi-core conductor entry, a sectional entry flange with cable sleeves and cable propping bar is standard; in the case of single-core conductor entry, an aluminium plate is standard. The cables are connected using lugs and bolts. The bolts are supplied with the unit. When connecting 5-conductor cables you will need to remove the bridge between PE and N which will have been fitted prior to delivery. The phasing can be changed locally.

Incoming cable connection unit: Multi-core entry BD2.-...-EE, single-core design BD2.-...-EE-EBAL

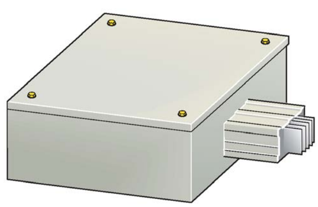


Figure 3-5 End feeder units: Incoming cable connection unit

Version	Type
160 … 250 A	BD2.-250-EE(-EBAL)
160 … 400 A	BD2.-400-EE(-EBAL)
630 … 1000 A	BD2.-1000-EE(-EBAL)
630 … 1250 A	BD2C-1250-EE(-EBAL)

Incoming cable connection unit: Multi-core entry with cable compartment BD2.-...-EE-KR, single-core design with cable compartment BD2.-...-EE-KR-EBAL

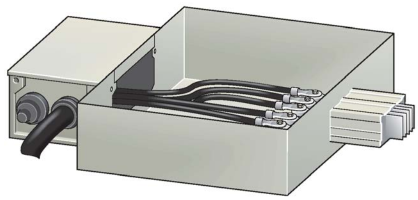


Figure 3-6 End feeder units: Cable entry from the side

Version	Type
160 … 400 A	BD2.-400-EE-KR(-EBAL)
630 … 1000 A	BD2.-1000-EE-KR(-EBAL)
630 … 1250 A	BD2C-1250-EE-KR(-EBAL)

Incoming cable connection unit with switch disconnector

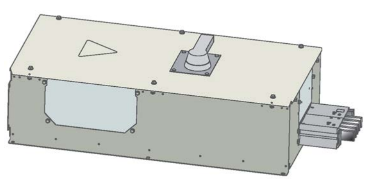


Figure 3-7 End feeder unit with switch disconnector

Version		Type
250 A	with 3-pole switch disconnector	BD2C-250-EESC
315 A	with 3-pole switch disconnector	BD2C-315-EESC
400 A	with 3-pole switch disconnector	BD2C-400-EESC
630 A	with 3-pole switch disconnector	BD2C-630-EESC
800 A	with 3-pole switch disconnector	BD2C-800-EESC

Cables can be fed in from three sides.

3.2.5.2 Centre feeder units

Common features

All centre feeder units have the following common features:

Cables can be fed in from three sides. The sectional entry flange with integrated strain relief can be converted to these positions. Aluminium cable entry plates for single-core cables as an alternative option. The cables are connected using lugs and bolts. When connecting 5-conductor cables you will need to remove the bridge between PE and N which will have been fitted prior to delivery.

Figure 3-8 Centre feed

Version	Type
160 ... 400 A	BD2.-400-ME
630 ... 1000 A	BD2.-1000-ME
160 ... 400 A	BD2.-400-ME-MBAL
630 ... 1000 A	BD2.-1000-ME-MBAL

Important planning information:

A centre feed might be the best option for the distribution of high powers with small busbar cross sections. It is mounted in the centre of a trunking run between two trunking units. A single power supply cable provides power to the left-hand and right-hand trunking runs simultaneously. This means, for example, that a 1000 A centre feed can feed in 2000 A. In such cases you need to pay particular attention to the busbar system's overload and short-circuit protection.

You will need to provide protective measures in the following instances:

- If short-circuit protection is not provided by the upstream protective device and/or
- If the overload is not set by the type and number of loads.

There are two possible protective measures:

1. Use a centre feed unit with one coupling unit on the left of the incoming feeder and another on the right. The coupling unit is fitted with a protective device (fuse or circuit breaker) providing short-circuit and overload protection.
2. Use two end feeder units located in the centre of the trunking run. The two supply lines are fused separately in the distribution system.

3.2.6 Distribution board feeder

The distribution board feeder supports direct connection to a low-voltage distribution board. The cables or Cu strips are connected using the bolts supplied with the feeders.

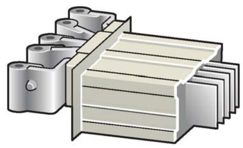


Figure 3-9 Distribution board feeder

Version	Type
160 … 250 A	BD2.-250-VE
160 … 400 A	BD2.-400-VE
630 … 1000 A	BD2.-1000-VE
630 … 1250 A	BD2C-1250-VE

3.2.7 Coupling units

Features of coupling units

Coupling units are used if devices or sections of the power supply need to be disconnected or connected accordingly. To adapt the busbar trunking system to the actual load, the busbar cross section can be reduced and protected against short circuits and overloads with a coupling unit.

Coupling units can be fitted with load disconnect switches up to 630 A or circuit-breakers up to 1250 A as appropriate for the application concerned.

The maximum installation length in the busbar trunking run is 1500 mm. The dimensions of the coupling unit must not exceed 1250 x 500 x 500 mm (W x H x D).

Coupling units with circuit-breaker

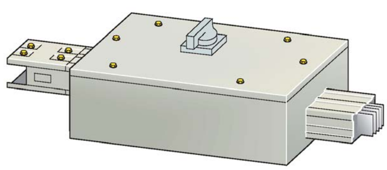


Figure 3-10 Coupling unit with circuit-breaker

BD2.-...-K...-3VL...: On request

Coupling units with fuse switch disconnector

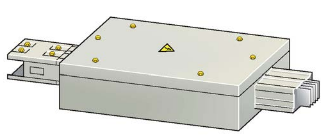


Figure 3-11 Coupling unit with fuse switch disconnector

BD2.-...-K...-ST...: On request

3.2.8 Tap-off units

Tap-off units are used to supply power to loads and outgoing current feeders, e.g. for incoming power supplies to smaller busbar trunking systems.

3.2.8.1 Tap-off units up to 25 A

Special features

- Tap-off units with fuses, miniature circuit breakers and sockets
- Insulation-enclosed, light grey in colour, RAL 7035
- Transparent cover which can be operated from the outside for the protective devices
- Load switching capacity AC 22 B (400 V) of tap contacts
- Multi-core cables can be fed in from three sides
- Knockouts
- Cable grommet and integrated strain relief (standard)
- The tap-off unit must be disassembled in order to open the unit and connect the cables.
- Anti-rotation feature prevents incorrect mounting.
- You can find the connector cross-sections in the chapter "Tap-off units (Page 72)"

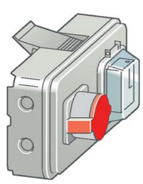


Figure 3-12 Tap-off units up to 25 A

I_{nc} [A]	U_e [V]	Version	Type
25	400	Fuse base 3 x D02	BD2-AK1/S18
16	400	Fuse base 3 x D01	BD2-AK1/S14
16	400	3-pole miniature circuit breaker 16 A, characteristic C	BD2-AK1/A163
16	230	Fuse base 2 x D01 and 2 x 3-pole sockets CEE 16	BD2-AK1/2CEE163S14
16	400	Fuse base 3 x D01 and 1 x 5-pole socket CEE 16	BD2-AK1/CEE165S14
16	230	2 x 16 A miniature circuit breakers, 1-pole, characteristic B and 2 sockets CEE 16, 3-pole	BD2-AK1/2CEE163A161
16	400	3-pole 16 A miniature circuit breaker, characteristic C and 1 socket CEE 16, 5-pole	BD2-AK1/CEE165A163
16	230	Fuse base 3 x D01 and 3 x 16 A socket outlets with earthing contact	BD2-AK1/3SD163S14
16	230	3 x 16 A miniature circuit breakers, 1-pole, characteristic B and 3 x 16 A socket outlets with earthing contact	BD2-AK1/3SD163A161

3.2.8.2 Tap-off units up to 63 A

Tap-off units with 63 A, with cover integrated load disconnector

Special features

- Tap-off units with fuses, miniature circuit breakers and sockets
- Sheet-steel enclosure, hot-dip galvanised and cover with powdered paint finish, light grey colour, RAL 7035
- The cover has to be opened prior to mounting and removing the unit
- Multi-core cables can be fed in from three sides, knockouts
- Anti-rotation feature prevents incorrect mounting.
- Switch disconnector integrated into cover, switching capacity AC 22 B (400 V) ensures zero voltage and zero load when the cover is opened
- You can find the connector cross-sections in the chapter "Tap-off units (Page 72)"

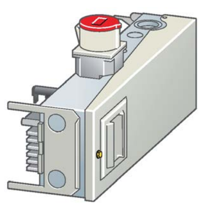


Figure 3-13 Tap-off units up to 63 A, with cover integrated load disconnector

I_{nc} [A]	U_e [V]	Version	Type
63	400	3-pole fuse base D02 up to 63 A	BD2-AK2X/S18
25	500	3-pole fuse base S27 up to 25 A	BD2-AK2X/S27
63	500	3-pole fuse base S33 up to 63 A	BD2-AK2X/S33
32	400	3-pole miniature circuit breaker 32 A, characteristic C	BD2-AK2M2/A323
32	400	3-pole fuse base S33 and 1 x 5-pole socket CEE 32	BD2-AK2X/CEE325S33
63	400	3-pole fuse base S33 and 1 x 5-pole socket CEE 63	BD2-AK2X/CEE635S33
32	400	3-pole 32 A miniature circuit breaker, characteristic C and 1 x 5-pole socket CEE 32	BD2-AK2M2/CEE325A323
16	400	2 x 3-pole fuse bases D01 and 2 x 5-pole sockets CEE 16	BD2-AK2X/2CEE165S14
16	400	2 x 3-pole 16 A miniature circuit breakers, characteristic C and 2 x 5-pole sockets CEE 16	BD2-AK2M2/2CEE165A163
16	230	1 x 3-pole miniature circuit breaker 16 A, characteristic C and 2 x 1-pole miniature circuit breaker 16 A, characteristic C and 1 x 5-pole socket CEE 16 and 2 x 16 A sockets with earthing contact	BD2-AK2M2/2SD163CEE165A163

Tap-off units up to 63 A, without cover integrated load disconnector

Special features

- Tap-off units with fuses or miniature circuit breakers
- Sheet-steel enclosure, hot-dip galvanised and cover with powdered paint finish, light grey colour, RAL 7035
- Anti-rotation feature prevents incorrect mounting.
- The unit can be mounted and removed with the cover open and closed
- If the cover is open, the installed devices will remain live (test option). IP20 protection / finger safety is assured.
- Multi-core cables can be fed in from three sides via knockouts
- You can find the connector cross-sections in the chapter "Tap-off units (Page 72)"

Note

You are not permitted to connect or disconnect the tap-off unit under load.

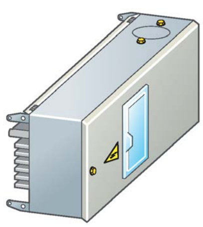


Figure 3-14 Tap-off units up to 63 A, without cover integrated load disconnector

I_{nc} [A]	U_e [V]	Version	Type
63	400	3-pole fuse base D02 up to 63 A	BD2-AK02X/S18
25	500	3-pole fuse base S27 up to 25 A	BD2-AK02X/S27
63	500	3-pole fuse base S33 up to 63 A	BD2-AK02X/S33
25	400	3-pole fuse base SP38 for cylindrical fuse-link 10 x 38 mm	BD2-AK02X/F1038-3
25	400	4-pole fuse base SP38 for cylindrical fuse-link 10 x 38 mm	BD2-AK02X/F1038-3N
32	400	3-pole fuse base SP51 for cylindrical fuse-link 14 x 51 mm	BD2-AK02X/F1451-3
32	400	4-pole fuse base SP51 for cylindrical fuse-link 14 x 51 mm	BD2-AK02X/F1451-3N
63	400	3-pole fuse base SP58 for cylindrical fuse-link 22 x 58 mm	BD2-AK02X/F2258-3
63	400	4-pole fuse base SP58 for cylindrical fuse-link 22 x 58 mm	BD2-AK02X/F2258-3N
32	400	3-pole miniature circuit breaker 32 A, characteristic C	BD2-AK02M2/A323
32	400	3+N-pole miniature circuit breaker 32 A, characteristic C	BD2-AK02M2/A323N
63	400	3-pole miniature circuit breaker 63 A, characteristic C	BD2-AK02M2/A633
63	400	3+N-pole miniature circuit breaker 63 A, characteristic C	BD2-AK02M2/A633N

3.2.8.3 Tap-off units up to 125 A

Tap-off units up to 125 A, with cover integrated load disconnector

Special features

- With fuse base and fuse switch disconnector
- Sheet-steel enclosure, hot-dip galvanised and cover with powdered paint finish, light grey colour, RAL 7035
- Anti-rotation feature prevents incorrect mounting.
- Cover interlock for circuit breaker and fuse switch disconnector
- Multi-core cables can be fed in from three sides via knockouts
- Conductor cross-sections in the chapter "Tap-off units (Page 72)".

Note

If you are using fuse bases, you must disconnect the load prior to removing the enclosure cover.

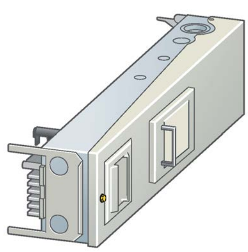


Figure 3-15 Tap-off units up to 125 A, with cover integrated load disconnector

I_{nc} [A]	U_e [V]	Version	Type
125	690	3-pole LV HRC fuse base size 00	BD2-AK3X/GS00
125	690	3-pole LV HRC fuse switch disconnector size 00	BD2-AK3X/GSTZ00

Tap-off units up to 125 A, without cover integrated load disconnector

Special features

- With miniature circuit breaker, circuit breaker, fuse switch, fuse base and fuse switch disconnector
- Sheet-steel enclosure, hot-dip galvanised and cover with powdered paint finish, light grey colour, RAL 7035
- Anti-rotation feature prevents incorrect mounting.
- The unit can be mounted and removed with the cover open and closed
- If the cover is open, the installed devices will remain live (test option). IP20 protection / finger safety is assured.
- Cover interlock on units with circuit breaker and fuse switch disconnector
- Multi-core cables can be fed in from three sides via knockouts
- You can find the connector cross-sections in the chapter "Tap-off units (Page 72)"

Note

You are not permitted to connect or disconnect the tap-off units under load.

Please note the reduced switching capacity when using the tap-off units with circuit breakers at U_e = 690 V.

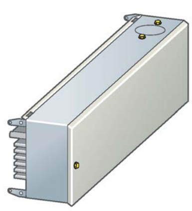


Figure 3-16 Tap-off unit up to 125 A, without cover integrated load disconnector

I_{nc} [A]	U_e [V]	Version	Type
125	400	with 3-pole miniature circuit breaker 125 A, characteristic C	BD2-AK03M2/A1253
125	400	with 3-N-pole miniature circuit breaker 125 A, characteristic C	BD2-AK03M2/A1253N
125	400	with 3-pole fuse switch disconnector GSTA00	BD2-AK03X/GSTA00
125	400	with 3-pole fuse base SP58	BD2-AK03X/F2258-3
125	400	with 4-pole fuse base SP58	BD2-AK03X/F2258-3N
125	400	with 3-pole IEC - with fuse switch disconnector	BD2-AK03X/FS125IEC-3
125	400	with 3-pole BS - with fuse switch disconnector	BD2-AK03X/FS125BS-3
125	400	with 4-pole IEC - with fuse switch disconnector	BD2-AK03X/FS125IEC-4
125	400	with 4-pole BS - with fuse switch disconnector	BD2-AK03X/FS125BS-4
40	400	with 40 A 3-pole circuit breaker	BD2-AK03X/LSD-DC40-N
63	400	with 63 A 3-pole circuit breaker	BD2-AK03X/LSD-DC(AE)63-N
80	400	with 80 A 3-pole circuit breaker	BD2-AK03X/LSD-DC(AE)80-N
100	400	with 100 A 3-pole circuit breaker	BD2-AK03X/LSD-DC100-N
125	400	with 125 A 3-pole circuit breaker	BD2-AK03X/LSD-DC125-N
40	400	with 40 A 4-pole circuit breaker	BD2-AK03X/LSD-EM40-N
63	400	with 63 A 4-pole circuit breaker	BD2-AK03X/LSD-EM63-N
80	400	with 80 A 4-pole circuit breaker	BD2-AK03X/LSD-EM80-N
100	400	with 100 A 4-pole circuit breaker	BD2-AK03X/LSD-EM100-N
125	400	with 125 A 4-pole circuit breaker	BD2-AK03X/LSD-EM125-N

3.2.8.4 Tap-off units up to 250 A

Special features

- Tap-off units with circuit breaker, fuse switch disconnector and fuse base
- Sheet-steel enclosure, hot-dip galvanised and painted, light grey colour, RAL 7035
- Multi-core or single-core cables can be fed in from 3 sides
- The cover has to be opened prior to mounting and removing the unit
- Anti-rotation feature prevents incorrect mounting.
- You can find the connector cross-sections in the chapter "Tap-off units (Page 72)"

Note

Please note the reduced switching capacity when using the tap-off units with circuit breakers at U_e = 690 V.

You are not permitted to connect or disconnect the tap-off unit under load.

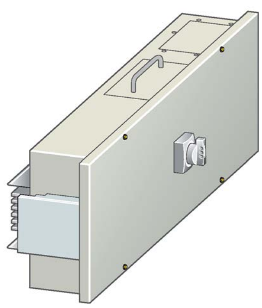


Figure 3-17 Tap-off units up to 250 A

I_{nc} [A]	U_e [V]	Version	Type
160	400	with 160 A 3-pole circuit breaker	BD2-AK04/LSD-DC(AE)-160-N
160	400	with 160 A 4-pole circuit breaker	BD2-AK04/LSD-EC-160-N
200	400	with 200 A 3-pole circuit breaker	BD2-AK04/LSD-DC(AE)-200-N
200	400	with 200 A 4-pole circuit breaker	BD2-AK04/LSD-EC-200-N
250	400	with 250 A 3-pole circuit breaker	BD2-AK04/LSD-DC(AE)-250-N
250	400	with 250 A 4-pole circuit breaker	BD2-AK04/LSD-EC-250-N
225	400	with 250 A 3-pole fuse switch disconnector	BD2-AK04/FS250IEC(BS)-3
225	400	with 250 A 4-pole fuse switch disconnector	BD2-AK04/FS250IEC(BS)-4
250	690	with 3-pole NH1 fuse base	BD2-AK04/SNH1

3.2.8.5 Tap-off units up to 400 A

Tap-off units up to 400 A, for BD2 systems 630 to 1250 A only

Special features

- Tap-off units with circuit breaker, fuse switch disconnector and fuse base
- Sheet-steel enclosure, hot-dip galvanised and painted, light grey colour, RAL 7035
- Multi-core or single-core cables can be fed in from 3 sides
- The cover has to be opened prior to mounting and removing the unit
- Anti-rotation feature prevents incorrect mounting.
- You can find the connector cross-sections in the chapter "Tap-off units (Page 72)"

Note

Please note the reduced switching capacity when using the tap-off units with circuit breakers at U_e = 690 V.

You are not permitted to connect or disconnect the tap-off unit under load.

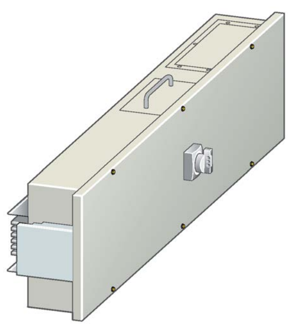


Figure 3-18 Tap-off units up to 400 A, for BD2 systems 630 to 1250 A only

I_{nc} [A]	U_e [V]	Version	Type
400	400	with 400 A 3-pole circuit breaker	BD2-AK05/LSD-DC(AE)-400-N
400	400	with 400 A 4-pole circuit breaker	BD2-AK05/LSD-EC-400-N
320	400	with 400 A 3-pole fuse switch disconnector	BD2-AK05/FS400IEC(BS)-3
320	400	with 400 A 4-pole fuse switch disconnector	BD2-AK05/FS400IEC(BS)-4
400	690	with 3-pole NH2 fuse base	BD2-AK05/SNH2

3.2.8.6 Tap-off units up to 530 A

Tap-off units up to 530 A, for BD2 systems 630 to 1250 A only

Special features

- Tap-off units with circuit breaker and fuse base
- Sheet-steel enclosure, hot-dip galvanised and painted,
- Colour light grey, RAL 7035
- Multi-core or single-core cables can be fed in from 3 sides
- The cover has to be opened prior to mounting and removing the unit
- Anti-rotation feature prevents incorrect mounting.
- Conductor cross-sections in the chapter "Tap-off units (Page 72)".

Note

Please note the reduced switching capacity when using the tap-off units with circuit breakers at U_e = 690 V.

You are not permitted to connect or disconnect the tap-off unit under load.

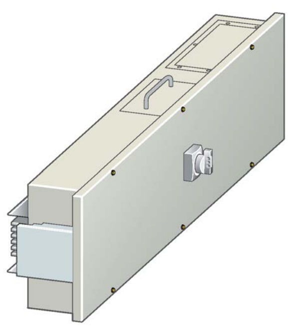


Figure 3-19 Tap-off units up to 530 A, for BD2 systems 630 to 1250 A only

I_{nc} [A]	U_e [V]	Version	Type
530	400	with 630 A 3-pole circuit breaker	BD2-AK06/LSD-DC(AE)-630-N
530	400	with 630 A 4-pole circuit breaker	BD2-AK06/LSD-EC-630-N
530	690	with 3-pole NH3 fuse base	BD2-AK06/SNH3

3.2.9 Ancillary equipment units

Special features

- The enclosure is made of hot-dip galvanised sheet steel and has a painted cover. It is light grey in colour (RAL 7035).
- Cables can be inserted from 3 sides via knockouts (plastic cable glands with strain relief must be used, these are not included in the scope of supply).
- Can be combined with tap-off units (BD2-AK02, AK2, AK03, AK3)
- A standard rail is integrated for installation of the device.
- 1 size with 8 WM (1 WM = 18 mm space requirement).
- With or without device installation unit for external operation (1 size with space units for 8 WM)
- Installation of devices (e.g. circuit breakers) according to DIN 43871 up to and including 63 A is possible.

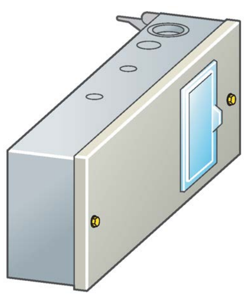


Figure 3-20 Ancillary equipment unit

U_e [V]	Version	Type
400	-	BD2-GK2X/F
400	-	BD2-GKM2/F

3.2.10 Additional equipment

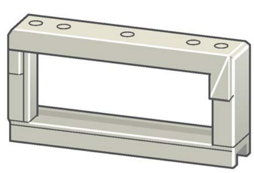
3.2.10.1 Additional equipment for increased degree of protection IP54 and IP55

Flanges for increased degree of protection

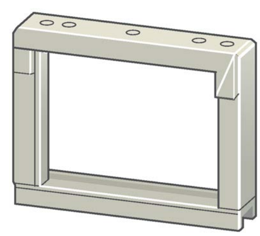
In both the horizontal and vertical mounting positions, the BD2 busbar trunking system has degree of protection IP52. This can be increased to IP54 or IP55 by fitting additional flanges. Detailed information about degree of protection flanges appears in the LV 70 Catalogue.

3.2.10.2 Fixing accessories

The following fixing brackets are available for edgewise and flat mounting of busbar trunking systems in horizontal busbar trunking runs:



Fixing bracket BD2-400-BB



Fixing bracket BD2-1250-BB

Fixing accessories

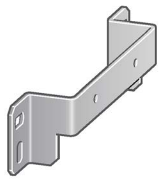
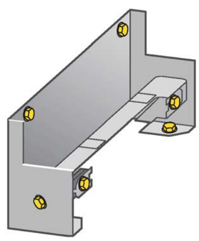


Figure 3-21 Fixing bracket for vertical mounting BD2-BVF

For the fixing of vertical busbar trunking runs



Wall fixing BD2-BWV

Wall fixing BD2-BVC

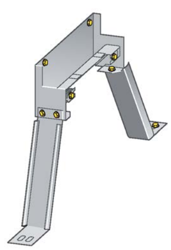


Figure 3-22 Ceiling fixing BD2-BDV

Compensation of wall or ceiling unevenness between 30 and 82 mm

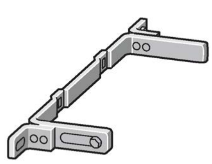


Figure 3-23 Spacer bracket BD2-BD

The spacer bracket is combined with the BD2-400(1250)-BB fixing bracket.

3.3 Technical specifications

3.3.1 BD2 general data

			BD2-...
Standards and regulations			IEC / EN 61439-1 and -6
Rated insulation voltage U_i	AC / DC	V	690 / 800
Overvoltage category / pollution degree			III/3
Rated operating voltage U_e	AC	V	690
Frequency		Hz	50 … 60[1)]
Rated current I_{nA}			
Aluminium bars		A	160 … 1000
Copper busbars		A	160 … 1250
Resistance to extreme climates			
Damp heat, constant, acc. to IEC 60068-2-78			40 °C / 93 % RH / 56d
Damp heat, cyclic, acc. to IEC 60068-2-30			56 x (25 ... 40 °C / 3 h; 40 °C / 9 h; 40 … 25 °C / 3_…_6 h; 25 °C / 6 h) 95 % RH
Cold according to IEC 60068-2-1			-45 °C, 16 h
Temperature change in accordance with IEC 60068-2-14			-45 °C … 55 °C; 5 cycles (1 °C / min); holding time min. 30 min
Salt spray test in accordance with IEC 60068-2-52			Degree of severity 3
Ice formation acc. to IEC 60068-2-61			Testing based on a combination of moist heat, cyclic + low temperature
Ambient temperature min. / max. / 24 hour average		°C	–5 / +40 / +35
Environmental classes in accordance with IEC 60721 as derived from climatic proofing tests			
Climatic			1K5 (storage) = 3K7L (operation without direct sunlight); 2K2 (transport)
Chemically active			Salt spray, other contaminants optional, 1C2 (storage) = 3C2 (operation) = 2C2 (transport)
Biological			Covered by IP degrees of protection and packaging method 1B2 (storage) = 3B2 (operation) = 2B2 (transport)
Mechanically active			Covered by IP degrees of protection and packaging method. 1S2 (storage) = 3S2 (operation); 2S2 (transport)

	BD2-...
Degree of protection acc. to IEC / EN 60529 (type 2)	
Trunking units	IP52
Trunking units with additional equipment on busbar trunking run	IP54, IP55
Feeder units	IP55
Tap-off units	IP54
Tap-off units with additional equipment	IP55
Distribution board feeders	IP00
Material	
Trunking units, feeder units, tap-off units	Hot-dip galvanised, painted sheet steel, light-grey (RAL 7035) Enclosure of hot-dip galvanised sheet steel, cover painted, colour light-grey, RAL 7035
Exception: Tap-off units BD2-AK1/...	Moulded-plastic enclosure, light grey (RAL 7035)
Busbars: • Aluminium • Copper	 Nickel-plated and tinned aluminium bars Tinned copper bars
Mounting position	Edgewise, flat, vertical

[1)] In accordance with EN 61439-1, a reduction to 95 % must be taken into account for currents > 800 A at a frequency of 60 Hz.

3.3.2 Tap-off units

Type	BD2-AK2..., BD2-AK3...				
Rated current I_{nc}	**25 A**	**63 A**	**125 A**	**250 A**	**400 A**
Switching capacity of the contact mechanism	AC-22B	–	–	–	–
Switching capacity of the built-in switch disconnector acc. to DIN EN 60947-3 at 400 V	–	AC-22B	AC-21B	–	–

Important planning guideline

It is not the case that every tap-off unit has a rated voltage of 690 V and a short-circuit rating in accordance with the system size.

The tap-off units used must be compatible with the values required by the equipment as far as their short-circuit rating and rated voltage are concerned.

If the tap-off unit is not compatible with the rated voltage, a unit with appropriate internal components must be selected. Higher short-circuit currents must be limited by means of upstream protection devices (e.g. circuit breakers).

3.3.3 Trunking units BD2A (aluminium)

				BD2A-.-160	BD2A-.-250	BD2A-.-400
Conducting paths						
Rated insulation voltage U_i		AC / DC	V	690 / 800	690 / 800	690 / 800
Overvoltage category / pollution degree				III/3	III/3	III/3
Rated operating voltage U_e		AC	V	690	690	690
Frequency			Hz	50 … 60	50 … 60	50 … 60
Rated current I_{nA} = therm. rated current at max. 40 °C and 35 °C average over 24 hours			A	160	250	400
Impedance of conducting paths at 50 Hz and 20°C ambient temperature (with cold busbars)						
Resistance		R_{20}	mΩ/m	0.484	0.302	0.167
Reactance		X_{20}	mΩ/m	0.162	0.131	0.123
Impedance		Z_{20}	mΩ/m	0.511	0.330	0.207
Impedance of conducting paths at 50 Hz and 20°C ambient temperature (with busbars at normal operating temperature)						
Resistance		R_1	mΩ/m	0.588	0.375	0.215
Reactance		X_1	mΩ/m	0.160	0.128	0.122
Impedance		Z_1	mΩ/m	0.610	0.397	0.247
Impedance of conducting paths under fault conditions						
AC resistance per unit length		R_F	mΩ/m	0.959	0.673	0.548
Reactance		X_F	mΩ/m	0.681	0.487	0.456
Impedance		Z_F	mΩ/m	1.159	0.831	0.713
Zero impedance acc. to DIN EN 60909-0/VDE 0102	Phase N	R_0	mΩ/m	2.050	1.340	1.217
		X_0	mΩ/m	0.884	0.750	0.640
		Z_0	mΩ/m	2.232	1.535	1.375
	Phase PE	R_0	mΩ/m	2.018	1.071	1.059
		X_0	mΩ/m	0.416	0.567	0.518
		Z_0	mΩ/m	2.061	1.212	1.179
Short-circuit rating						
Rated peak withstand current I_{pk}			kA	17	32	40
Rated short-time withstand current I_{cw}		t = 1 s	kA	5.5	10	16
		t = 0.1 s	kA	10	16	20
Conductors						
Number of conductors				5	5	5
Conductor cross-section		L1, L2, L3	mm^2	63	108	205
		N	mm^2	63	108	205
		PE	mm^2	63	108	205
		1/2 PE	mm^2	63	108	205
Conductor material				Al	Al	Al

		BD2A-.-160	BD2A-.-250	BD2A-.-400
Max. fixing distances for trunking units under conventional mechanical load				
Edgewise	m	4	4	4
Edgewise with BD2-BD [1]	m	4	4	4
Flat	m	3.5	3.5	3.5
Fire load[2]	kWh/m	1.32	1.32	1.32
Weight[3]	kg/m	5.3	5.8	7.5

[1] When using spacer brackets BD2-BD

[2] Values for trunking units with tap-off points

[3] Weights without joint block (weight of joint block BD2-400-EK: 3.5 kg, BD2-1250-EK: 6.5 kg

Type				**BD2A-.-630**	**BD2A-.-800**	**BD2A-.-1000**
Conducting paths						
Rated insulation voltage U_i		AC / DC	V	690 / 800	690 / 800	690 / 800
Overvoltage category / pollution degree				III/3	III/3	III/3
Rated operating voltage U_e		AC	V	690	690	690
Frequency			Hz	50 … 60	50 … 60	50 … 60[1]
Rated current I_{nA} = therm. rated current at max. 40 °C and 35 °C average over 24 hours			A	630	800	1000
Impedance of conducting paths at 50 Hz and 20°C ambient temperature (with cold busbars)						
Resistance		R_{20}	mΩ/m	0.093	0.073	0.051
Reactance		X_{20}	mΩ/m	0.065	0.058	0.058
Impedance		Z_{20}	mΩ/m	0.113	0.094	0.077
Impedance of conducting paths at 50 Hz and 20°C ambient temperature (with busbars at normal operating temperature)						
Resistance		R_1	mΩ/m	0.134	0.098	0.066
Reactance		X_1	mΩ/m	0.065	0.057	0.057
Impedance		Z_1	mΩ/m	0.149	0.114	0.088
Impedance of conducting paths under fault conditions						
AC resistance per unit length		R_F	mΩ/m	0.199	0.225	0.157
Reactance		X_F	mΩ/m	0.179	0.239	0.240
Impedance		Z_F	mΩ/m	0.268	0.328	0.287
Zero impedance acc. to DIN EN 60909-0/VDE 0102	Phase N	R_0	mΩ/m	0.429	0.494	0.340
		X_0	mΩ/m	0.377	0.312	0.301
		Z_0	mΩ/m	0.571	0.584	0.454
	Phase PE	R_0	mΩ/m	0.432	0.438	0.408
		X_0	mΩ/m	0.329	0.280	0.273
		Z_0	mΩ/m	0.543	0.520	0.491
Short-circuit rating						
Rated peak withstand current I_{pk}			kA	64	84	90
Rated short-time withstand current I_{cw}		t = 1 s	kA	26	32	34
		t = 0.1 s	kA	32	40	43

Type			**BD2A-.-630**	**BD2A-.-800**	**BD2A-.-1000**
Conductors					
Number of conductors			5	5	5
Conductor cross-section	L1, L2, L3	mm^2	381	446	699
	N	mm^2	381	446	699
	PE	mm^2	381	446	699
	1/2 PE	mm^2	381	381	446
Conductor material			Al	Al	Al
Max. fixing distances for trunking units under conventional mechanical load					
Edgewise		m	3.5	3.5	3
Edgewise with BD2-BD [2)]		m	1.75	1.75	1.5
Flat		m	3	3	2.5
Fire load[3)]		kWh/m	2	2	2
Weight[4)]		kg/m	12.3	12.4	15.8

1) In accordance with EN 61439-1, a reduction to 95 % must be taken into account for currents > 800 A at a frequency of 60 Hz.

2) When using spacer brackets BD2-BD

3) Values for trunking units with tap-off points

4) Weights without joint block (weight of joint block BD2-400-EK: 3.5 kg, BD2-1250-EK 6.5 kg)

3.3.4 Trunking units BD2C (copper)

				BD2C-.-160	BD2C-.-250	BD2C-.-400
Conducting paths						
Rated insulation voltage U_i		AC / DC	V	690 / 800	690 / 800	690 / 800
Overvoltage category / pollution degree				III/3	III/3	III/3
Rated operating voltage U_e		AC	V	690	690	690
Frequency			Hz	50 … 60	50 … 60	50 … 60
Rated current I_{nA} = therm. rated current at max. 40 °C and 35 °C average over 24 hours			A	160	250	400
Impedance of conducting paths at 50 Hz and 20°C ambient temperature (with cold busbars)						
Resistance		R_{20}	mΩ/m	0.303	0.295	0.144
Reactance		X_{20}	mΩ/m	0.157	0.158	0.119
Impedance		Z_{20}	mΩ/m	0.341	0.335	0.187
Impedance of conducting paths at 50 Hz and 20°C ambient temperature (with busbars at normal operating temperature)						
Resistance		R_1	mΩ/m	0.333	0.383	0.181
Reactance		X_1	mΩ/m	0.157	0.159	0.120
Impedance		Z_1	mΩ/m	0.368	0.419	0.217
Impedance of conducting paths under fault conditions						
AC resistance per unit length		R_F	mΩ/m	0.666	0.674	0.364
Reactance		X_F	mΩ/m	0.511	0.530	0.461
Impedance		Z_F	mΩ/m	0.839	0.858	0.587
Zero impedance acc. to DIN EN 60909-0 / VDE 0102	Phase N	R_0	mΩ/m	1.419	1.429	0.718
		X_0	mΩ/m	0.691	0.703	0.658
		Z_0	mΩ/m	1.579	1.593	0.974
	Phase PE	R_0	mΩ/m	1.027	1.139	0.672
		X_0	mΩ/m	0.641	0.530	0.503
		Z_0	mΩ/m	1.211	1.256	0.839
Short-circuit rating						
Rated peak withstand current I_{pk}			kA	17	32	40
Rated short-time withstand current I_{cw}		t = 1 s	kA	5.5	10	16
		t = 0.1 s	kA	10	16	20
Conductors						
Number of conductors				5	5	5
Conductor cross-section		L1, L2, L3	mm²	63	63	146
		N	mm²	63	63	146
		PE	mm²	63	63	146
		1/2 PE	mm²	63	63	146
Conductor material				Cu	Cu	Cu

		BD2C-.-160	BD2C-.-250	BD2C-.-400
Max. fixing distances for trunking units under conventional mechanical load				
Edgewise	m	4	4	4
Edgewise with BD2-BD [1)]	m	4	4	4
Flat	m	3.5	3.5	3.5
Fire load[2)]	kWh/m	1.32	1.32	1.32
Weight[3)]	kg/m	7.3	7.5	9.5

1) When using spacer brackets BD2-BD

2) Values for trunking units with tap-off points

3) Weights without joint block (weight of joint block BD2-400-EK: 3.5 kg, BD2-1250-EK 6.5 kg)

Type				**BD2C-.-630**	**BD2C-.-800**	**BD2C-.-1000**	**BD2C-.-1250**
Conducting paths							
Rated insulation voltage U_i		AC / DC	V	690 / 800	690 / 800	690 / 800	690 / 800
Overvoltage category / pollution degree				III/3	III/3	III/3	III/3
Rated operating voltage U_e		AC	V	690	690	690	690
Frequency			Hz	50 … 60	50 … 60	50 … 60[1)]	50 … 60[1)]
Rated current I_{nA} = therm. rated current at max. 40 °C and 35 °C average over 24 hours			A	630	800	1000	1250
Impedance of conducting paths at 50 Hz and 20°C ambient temperature (with cold busbars)							
Resistance		R_{20}	mΩ/m	0.053	0.053	0.043	0.032
Reactance		X_{20}	mΩ/m	0.064	0.064	0.056	0.054
Impedance		Z_{20}	mΩ/m	0.083	0.083	0.071	0.063
Impedance of conducting paths at 50 Hz and 20°C ambient temperature (with busbars at normal operating temperature)							
Resistance		R_1	mΩ/m	0.076	0.076	0.056	0.041
Reactance		X_1	mΩ/m	0.064	0.064	0.056	0.054
Impedance		Z_1	mΩ/m	0.100	0.100	0.079	0.068
Impedance of conducting paths under fault conditions							
AC resistance per unit length		R_F	mΩ/m	0.102	0.102	0.118	0.094
Reactance		X_F	mΩ/m	0.146	0.146	0.234	0.229
Impedance		Z_F	mΩ/m	0.178	0.178	0.262	0.248
Zero impedance acc. to DIN EN 60909-0 / VDE 0102	Phase N	R_0	mΩ/m	0.280	0.280	0.234	0.186
		X_0	mΩ/m	0.377	0.377	0.286	0.275
		Z_0	mΩ/m	0.470	0.470	0.370	0.332
	Phase PE	R_0	mΩ/m	0.289	0.289	0.230	0.174
		X_0	mΩ/m	0.321	0.321	0.278	0.265
		Z_0	mΩ/m	0.431	0.431	0.361	0.317

Type			BD2C-.-630	BD2C-.-800	BD2C-.-1000	BD2C-.-1250
Short-circuit rating						
Rated peak withstand current I_{pk}		kA	64	84	90	90
Rated short-time withstand current I_{cw}	t = 1 s	kA	26	32	34	34
	t = 0.1 s	kA	32	40	43	43
Conductors						
Number of conductors			5	5	5	5
Conductor cross-section	L1, L2, L3	mm²	415	415	468	699
	N	mm²	415	415	468	699
	PE	mm²	415	415	468	699
	1/2 PE	mm²	415	415	415	468
Conductor material			Cu	Cu	Cu	Cu
Max. fixing distances for trunking units under conventional mechanical load						
Edgewise		m	4	3.5	3	2
Edgewise with BD2-BD [2)]		m	2	1.75	1.5	1
Flat		m	3.5	3	2.5	1.5
Fire load[3)]		kWh/m	2	2	2	2
Weight[4)]		kg/m	15.6	18.9	25.1	37.6

1) In accordance with EN 61439-1, a reduction to 95 % must be taken into account for currents > 800 A at a frequency of 60 Hz.

2) When using spacer brackets BD2-BD

3) Values for trunking units with tap-off points

4) Weights without joint block (weight of joint block BD2-400-EK: 3.5 kg, BD2-1250-EK 6.5 kg)

3.3.5 Conductor cross sections

3.3.5.1 Feeder units

Conductor cross-sections[2)]

Design	Type	L1, L2, L3		N		PE		Size of fixing screws, bolts
		min. mm²	max. mm²	min. mm²	max. mm²	min. mm²	max. mm²	L1, L2, L3, N, PE
Feeder units with bolt connection	BD2.-250-EE	1 × 6	1 × 150, 2 × 70	1 × 6	1 × 150, 2 × 70	1 × 6	1 × 150, × 70	M10
	BD2.-400-EE	1 × 10[1)]	1 × 240, 2 × 120	1 × 10[1)]	1 × 240, 2 × 120	1 × 10[1)]	1 × 240, 2 × 120	M12
	BD2.-1000-EE	1 × 10[1)]	3 × 240	1 × 10[1)]	3 × 240	1 × 10[1)]	3 × 240	M12
	BD2.-1250-EE	1 × 10[1)]	3 × 300, 4 × 240	1 × 10[1)]	3 × 300, 4 × 240	1 × 10[1)]	3 × 300, 4 × 240	M12
Feeder units with switch disconnector	BD2C-250(315)-EESC	1 x 10[1)]	1 x 240	1 x 10[1)]	1 x 240	Armouring		M10
	BD2C-400-EESC	1 x 10[1)]	1 x 240, 2 x 120	1 x 10[1)]	1 x 240, 2 x 120	Armouring		M12
	BD2C-630(800)-EESC	1 x 10[1)]	2 x 240	1 x 10[1)]	2 x 240	Armouring		M12
Centre feeder units with bolt connection	BD2.-400-ME	1 × 10[1)]	2 × 240, 3 × 185	1 × 10[1)]	2 × 240, 3 × 185	1 × 10[1)]	2 × 240, 3 × 185	M12
	BD2.-1000-ME	1 × 10[1)]	(1 - 5) × 300	1 × 10[1)]	(1 - 5) × 300	1 × 10[1)]	(1 - 5) × 300	M12

1) Minimum permissible cable cross section for cable lugs

2) Connection cross-sections refer to copper cables, cross-sections and diameters for aluminium cables on request

Cable and wire entries

Type		BD2.-250-EE	BD2.-400-EE	BD2.-1000-EE, BD2.-400-ME	BD2.-1000-ME	BD2.-1250-EE
Cable grommets for cable diameters		1 x KT3[1)]	2 x KT4 [1)]	3 x KT4 [1)]	6 x KT4 [1)]	4 x KT4[1)]
	mm	14 … 54	14 … 68	14 … 68	14 … 68	14 … 68

1) With strain relief

Cable entry plate single-core system (undrilled cable entry plates)

Type	BD2.-250-EE	BD2.-400-EE	BD2.-1000-EE	BD2.-1250-EE
Cable entry plate	BD2-250-EBAL	BD2-400-EBAL	BD2-1000-EBAL	BD2-1250-EBAL
No. 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

Plastic cable glands with strain relief must be used (these are not included in the scope of supply).

Cable entry plate single-core system for centre feeder units (undrilled cable entry plates)

Type	BD2.-400-ME...	BD2.-1000-ME
Cable entry plate	BD2-400-MBAL	BD2-1000-MBAL
No. of cable entries (maximum)	12 x M40 and 3 x M32, 6 x M50 and 4 x M40	31 x M40, 16 x M50 and 4 x M40

Plastic cable glands with strain relief must be used (these are not included in the scope of supply).

Cable entry plate feeder unit with switch disconnector (undrilled cable entry plates)

Type	BD2C-250(315, 400)-EESC	BD2C-630(800)-EESC
No. of cable entries (maximum)	1 x 65.7 mm	2 x 65.7 mm

3.3.5.2 Tap-off units

Conductor cross-sections[1)]

Designa-tion	Type	L1, L2, L3		N		PE		Size of fixing screws, bolts
		min mm²	max mm²	min mm²	max mm²	min mm²	max mm²	L1, L2, L3
Up to 25 A	BD2-AK1/S14	0.5 (f, m)	4 (e)	1 (e, f, m)	6 (e, m)	1 (e, f, m)	6 (e, m)	–
	BD2-AK1/S18	0.5 (f, m)	16 (e, f, m)	1 (e, f, m)	6 (e, m)	1 (e, f, m)	6 (e, m)	–
	BD2-AK1/A...	0.75 (e, m)	16 (e)	1 (e, f, m)	6 (e, m)	1 (e, f, m)	6 (e, m)	–
	BD2-AK1/A...N	0.75 (e, m)	16 (e)	0.75 (e, m)	16 (e)	1 (e, f, m)	6 (e, m)	–
	BD2-AK1/F...	0.75 (e, m)	16 (e)	1 (e, m)	6 (e)	1 (e, f, m)	6 (e, m)	–
	BD2-AK1/F...N	0.75 (e, m)	16 (e)	0.75 (e, m)	16 (e)	1 (e, f, m)	6 (e, m)	–
Up to 63 A	BD2-AK.2X/S18	0.5 (f, m)	25 (f, m)	1 (e, f, m)	6 (e, m)	1 (e, f, m)	6 (e, m)	–
	BD2-AK.2X/S27	0.75 (f, m)	10 (e, f, m)	1 (e, f, m)	6 (e, m)	1 (e, f, m)	6 (e, m)	–
	BD2-AK.2X/S33	1.5 (f, m)	25 (f, m)	2.5 (e, f, m)	16 (e, m)	2.5 (e, f, m)	16 (e, m)	–
	BD2-AK.2M2/A...	0.75 (e, m)	25 (m)	2.5 (e, f, m)	25 (m)	2.5 (e, f, m)	25 (m)	–
	BD2-AK.2M2/A...N	0.75 (e, m)	25 (m)	0.75 (e, f, m)	25 (m)	2.5 (e, f, m)	25 (m)	–
	BD2-AK.2X/F...	0.75 (e, m)	25 (m)	2.5 (e, f, m)	25 (m)	2.5 (e, f, m)	25 (m)	–
Up to 125 A	BD2-AK03X/F…(FS…)	2.5 (e, m)	50 (m)	2.5 (e, m)	50 (m)	2.5 (e, m)	50 (m)	–
	BD2-AK.03X/LS....	2.5 (e, m)	50 (m)	2.5 (e, m)	50 (m)	2.5 (e, m)	50 (m)	–
	BD2-AK3X/GS00	16	70	16	70	10	70	M8
	BD2-AK.3X/GSTZ(A)00	16	70	16	70	10	70	M8
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 (m)	6 (e, m)	150	6	150	M8
Up to 400 A	BD2-AK05/SNH2	10	2 × 120	10	2 × 120	10	2 × 120	M10
	BD2-AK05/FS...	10	2 × 120	10	2 × 120	10	2 × 120	M10
	BD2-AK05/LS...	10	2 × 120	10	2 × 120	10	2 × 120	M8
Up to 630 A	BD2-AK06/SNH3	10	2 × 240	10	2 × 240	10	2 × 240	M12
	BD2-AK06/LS...	10	2 × 240	10	2 × 240	10	2 × 240	M10

e = solid, m = stranded, f = finely-stranded with end sleeve

1) Conductor cross-sections refer to copper cables, cross-sections and diameters for aluminium cables on request

Cable and wire entries

Type		BD2-AK1/...	BD2-AK.2...	BD2-AK.3...	BD2-AK04	BD2-AK05	BD2-AK06
Cable grommets		M25 2)	—	—	KT3 3)	2 × KT4 3)	2 × KT4 3)
Cable glands 1)		—	M25, M32, M40	M25, M40, M63	—	—	—
For cable diameters	mm	11 … 6	11 … 27	11 … 42	14 … 54	14 … 68	14 … 68
Min./max. insertable cable cross-sections for NYY and NYCWY with multi-core cable for							
• NYY...	mm^2	5 × 1.5 … 5 × 4	5 × 1.5 … 5 × 16	5 × 1.5 … 5 × 25	—	—	—
• NYCWY... 4)	mm^2	4 × 1.5 … 4 × 2.5	4 × 1.5 … 4 × 16	4 × 1.5 … 4 × 70	5 × 1.5 … 4 × 150	2 × 5 × 1.5 … 2 × 4 × 150	2 × 5 × 10 … 2 × 4 × 240
Cable entry plate for single-core cable (add-on plates, undrilled)							
No. of cable entries, max.		—	—	—	10 × M40	10 × M32, 5 × M40	10 × M40

1) For cable glands: Plastic cable glands with strain relief must be used (these are not included in the scope of supply).

2) Strain relief in the BD2-AK1/...

3) With strain relief

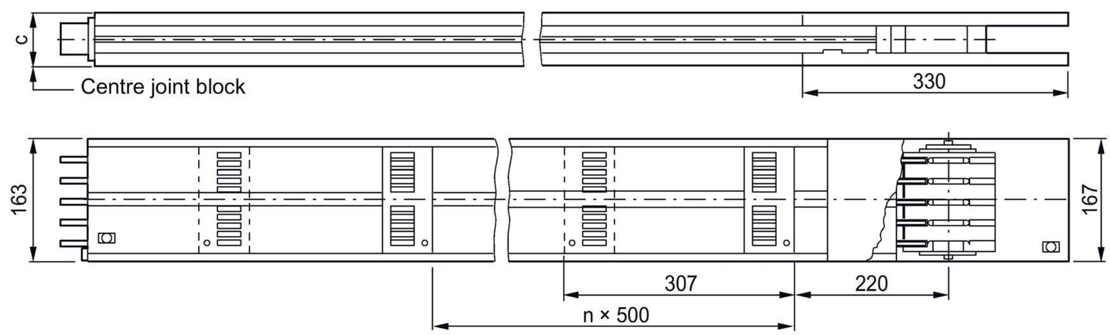
4) Fifth conductor: concentric conductor.

3.4 Dimension drawings

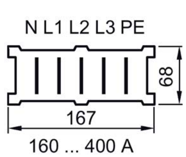
Unless otherwise specified, all dimensions are in mm.

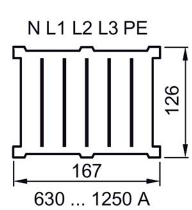
3.4.1 Straight trunking units

BD2.-.-...



Length [m]	No. of tap-off units on both sides n x 500
0.5 … 1.25	-
1.26 … 2.25	4 … 8
2.26 … 3.25	8 … 12
	In the case of optional lengths, tap-off units cannot be connected at all tap-off points.





3.4.2 Junction units

L units

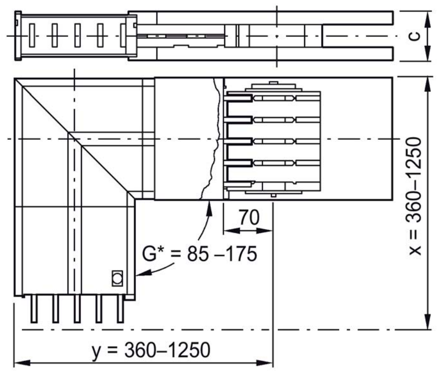


Figure 3-24 BD2.-....-LR-...(-G*), BD2.-...-LL-...(-G*)

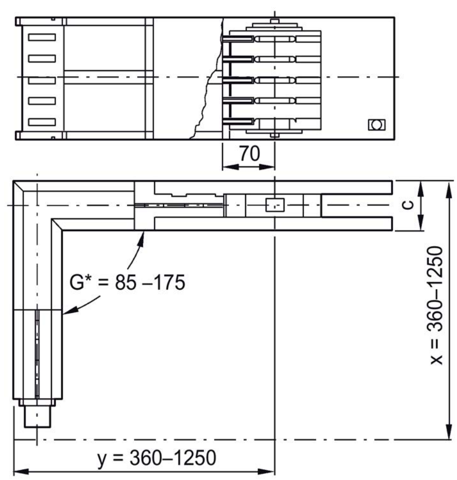


Figure 3-25 BD2.-...-LV...(-G*), BD2.-...-LH-...(-G*)

Rated current [A]	c [mm]
160 … 400	68
630 … 1250	126

Z units

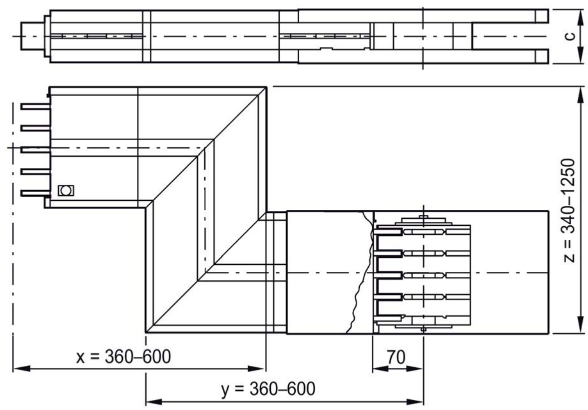


Figure 3-26 BD2.-...-ZR-..., BD2.-...-ZL-...

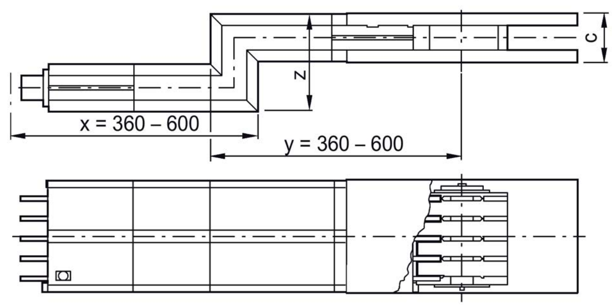


Figure 3-27 BD2.-...-ZV, BD2.-...-ZH-...

Rated current [A]	z [mm]
160 … 400	140 … 1250
630 … 1250	260 … 1250

T units

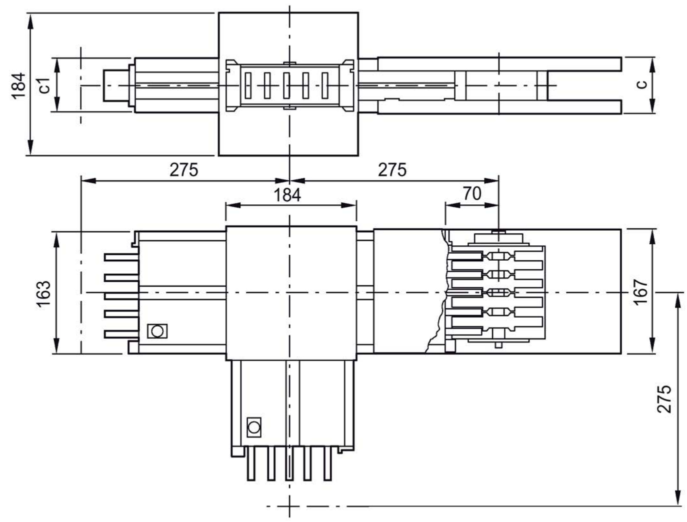


Figure 3-28 BD2.-...-TR, BD2.-...-TL

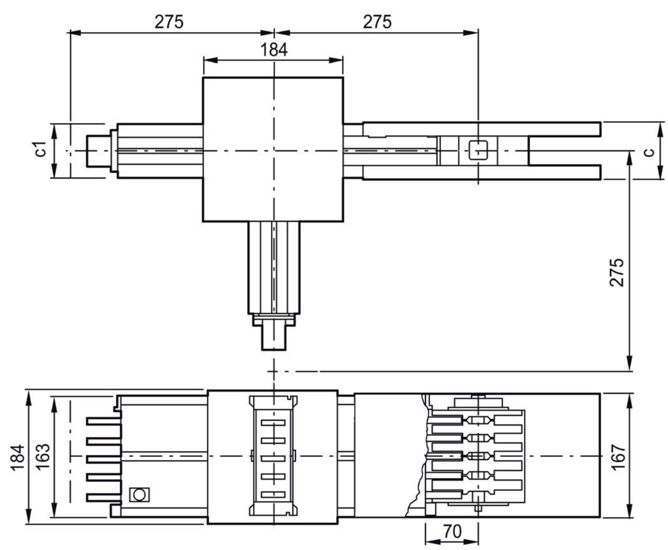


Figure 3-29 BD2.-...-TV, BD2.-...-TH

Rated current [A]	c [mm]	c1 [mm]
160 … 400	68	64
630 … 1250	126	122

K units

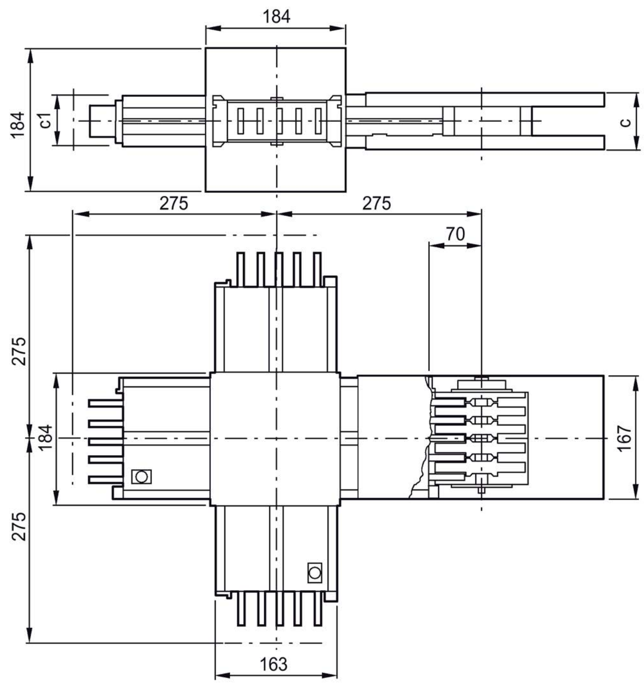


Figure 3-30 K units BD2.-...-KRL

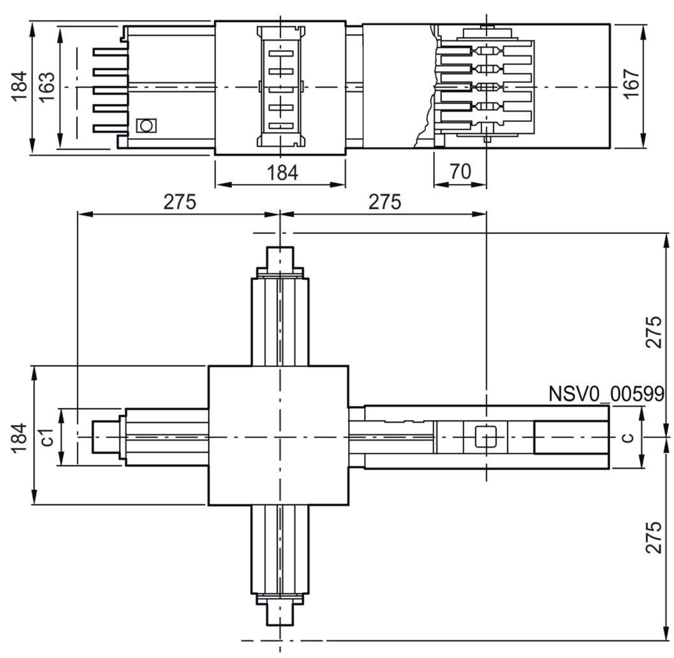


Figure 3-31 K units BD2.-...-KVH

Rated current [A]	c [mm]	c1 [mm]
160 … 400	68	64
630 … 1250	126	122

Movable junction units

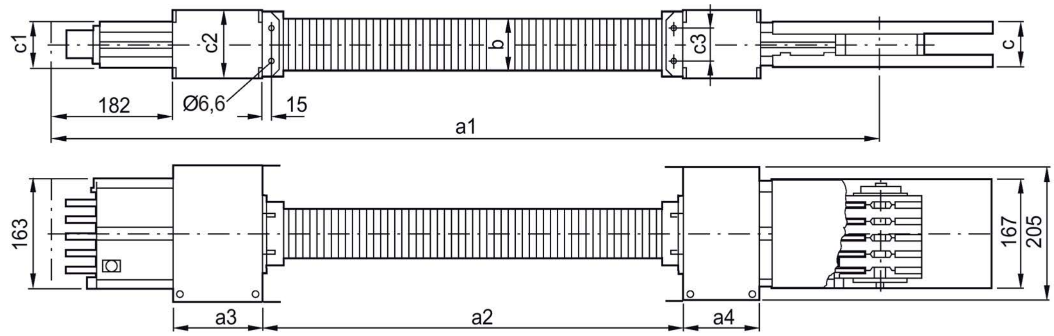
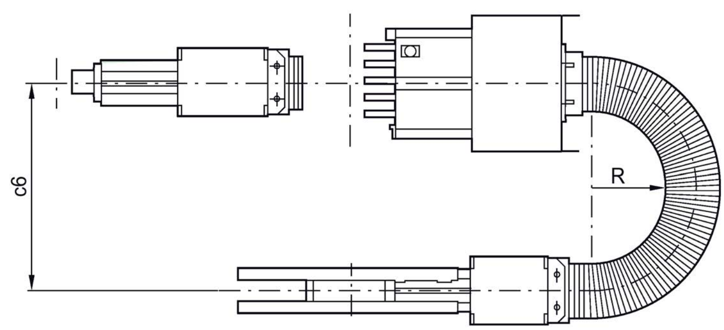


Figure 3-32 BD2-400-R, BD2-800-R

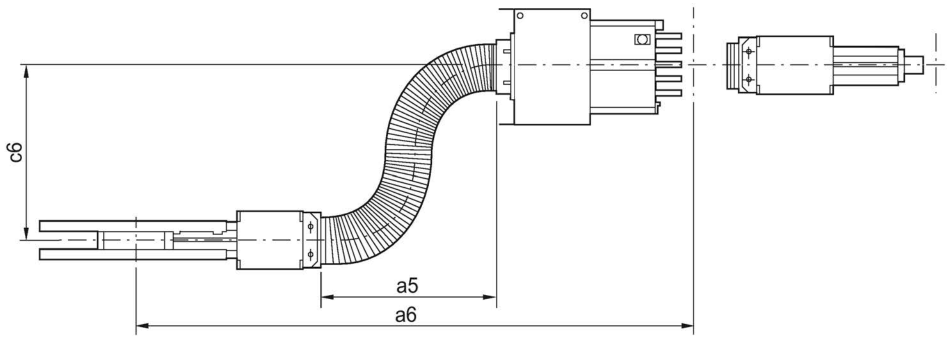
Type	a1	a2	a3	a4	b	c	c1	c2	c3
BD2-400-R	1250	512	187	187	79	68	64	101	50
BD2-800-R	1750	786	350	250	146.5	126	122	195	145

U shape



Type	c6	R_{min}
BD2-400-R	220	110
BD2-800-R	340	170

Z shape



Type	a5	a6	c6	R_{min}
BD2-400-R	175	1000	355	110
BD2-800-R	530	1590	400	170

3.4.3 Distribution board feeder

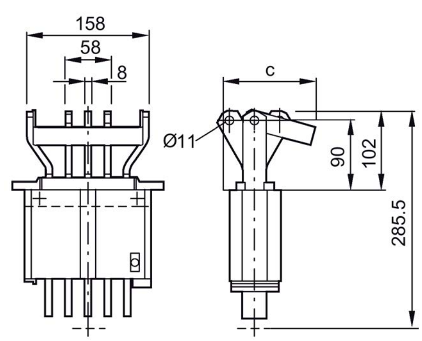


Figure 3-33 BD2.-250-VE

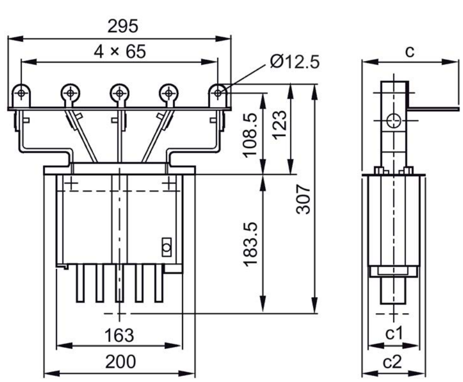


Figure 3-34 BD2.-400-VE, BD2.-1000-VE

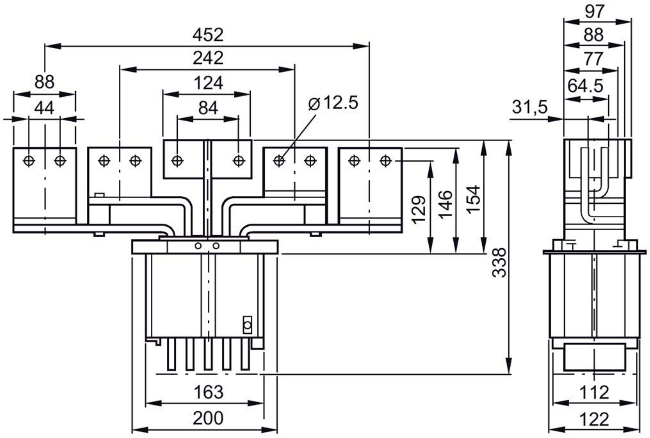
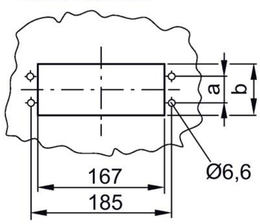


Figure 3-35 BD2.-1250-VE

Device 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

3.4.4 End feeder units

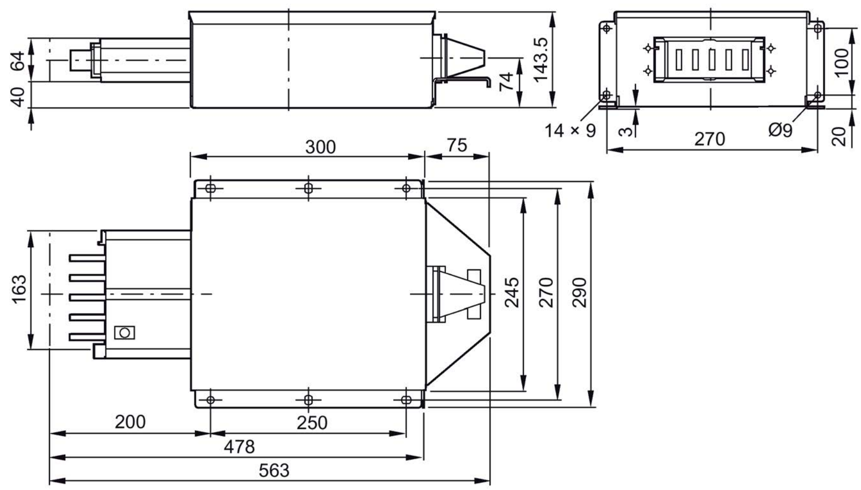


Figure 3-36 BD2.-250-EE

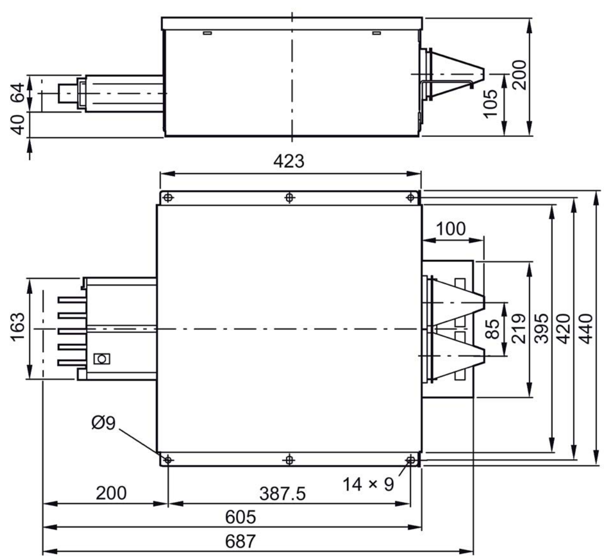


Figure 3-37 BD2.-400-EE

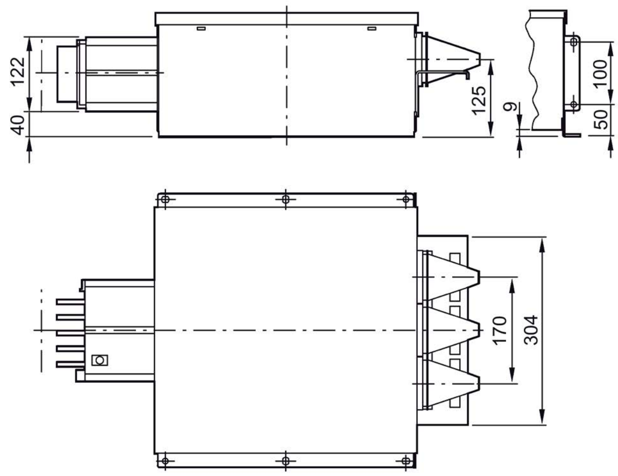


Figure 3-38 BD2.-1000-EE

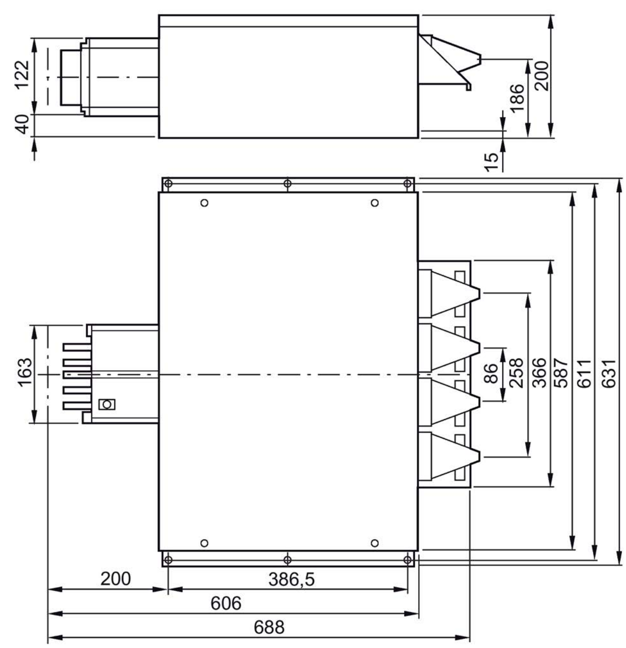


Figure 3-39 BD2.-1250-EE

End feeder units with switch disconnector

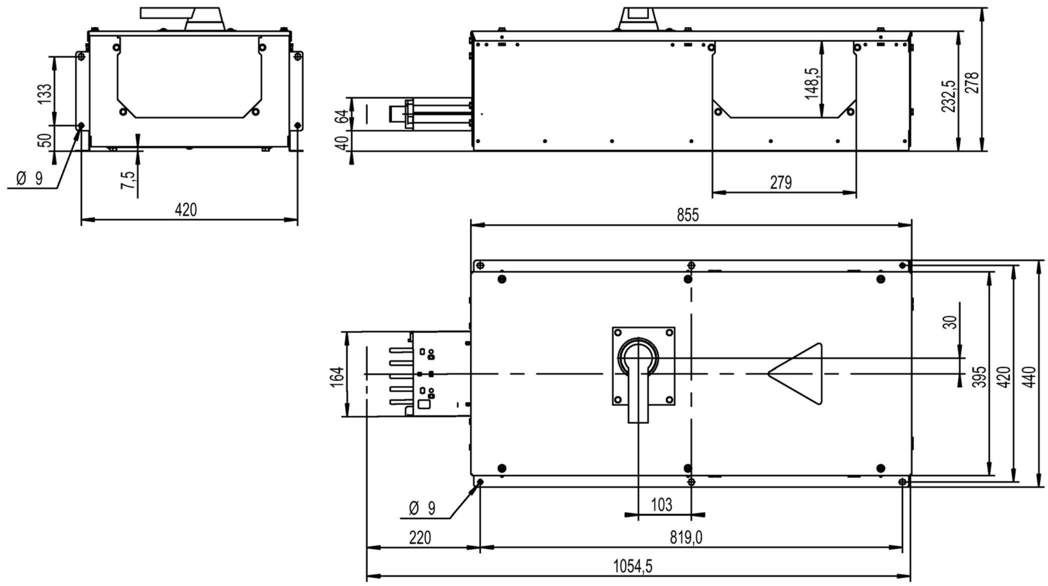


Figure 3-40 BD2C-250-EESC, BD2C-315-EESC

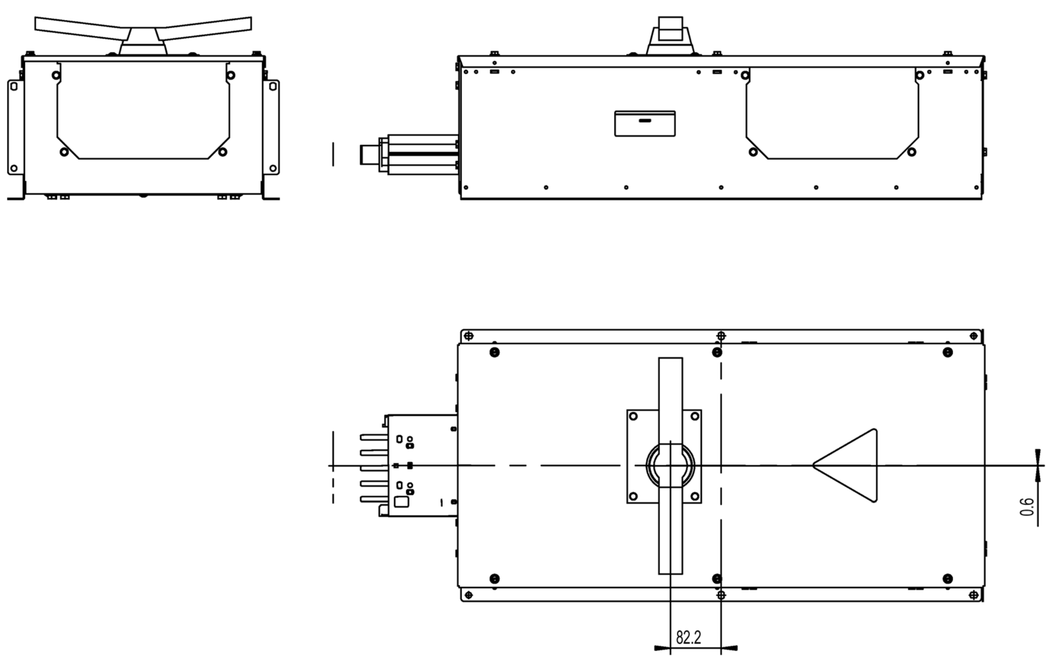


Figure 3-41 BD2-400-EESC

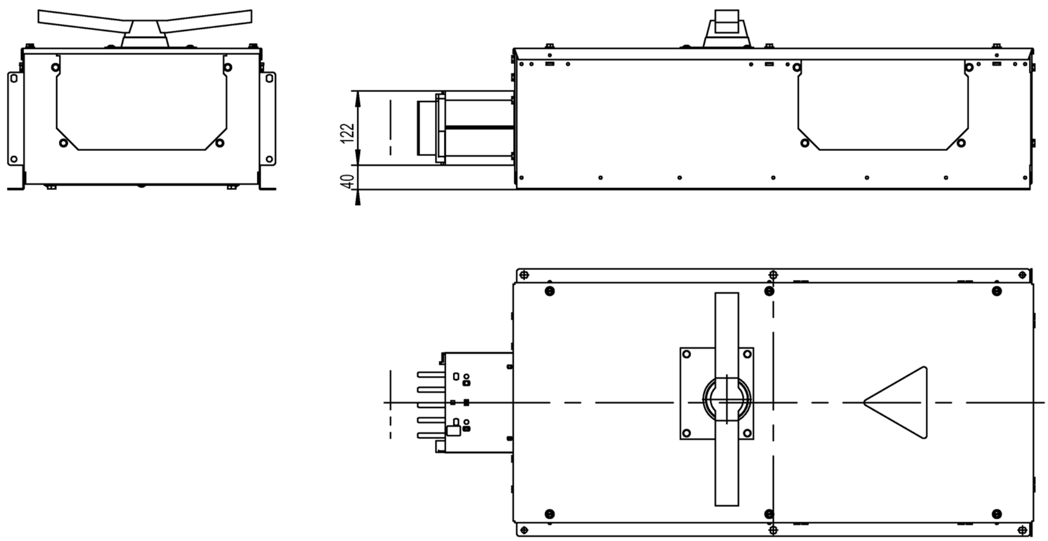


Figure 3-42 BD2-630-EESC, BD2-800-EESC

3.4.5 Cable compartments

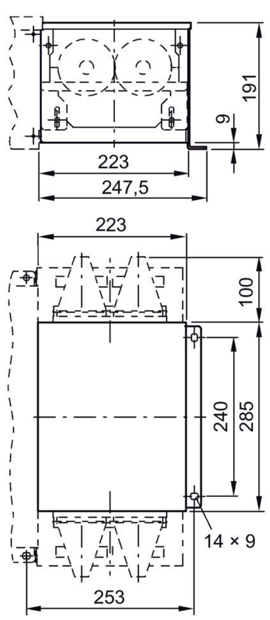


Figure 3-43 BD2-400-KR (BD2.-400-EE)

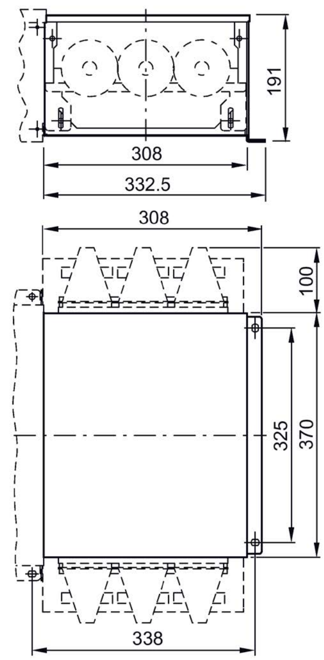


Figure 3-44 BD2-1000-KR (BD2.-1000-EE)

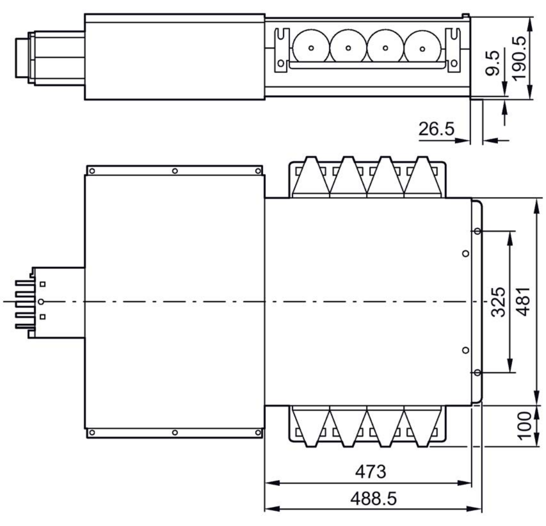


Figure 3-45 BD2-1250-KR (BD2.-1250-EE)

3.4.6 Centre feed

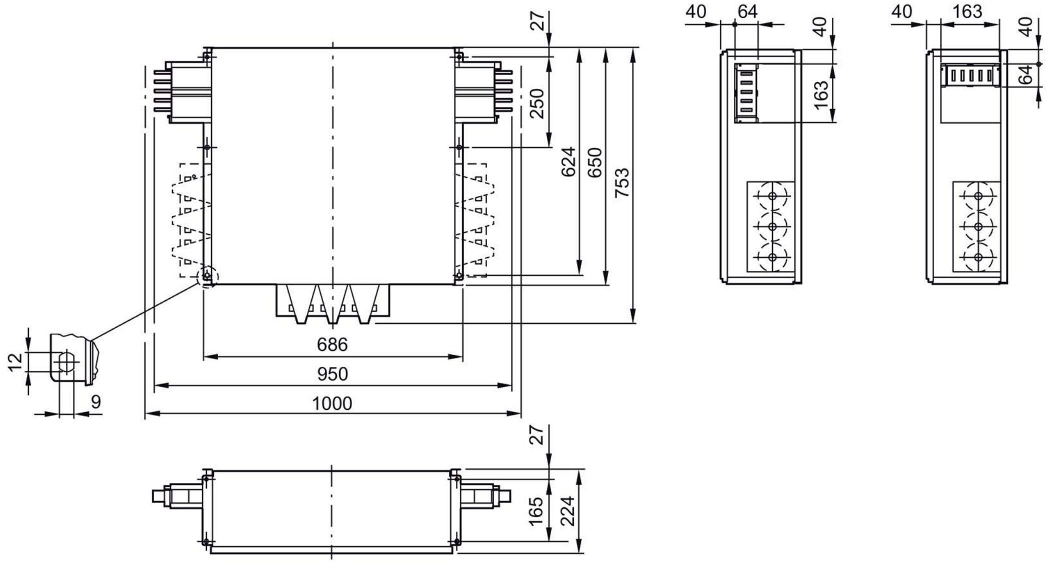


Figure 3-46 BD2.-400-ME

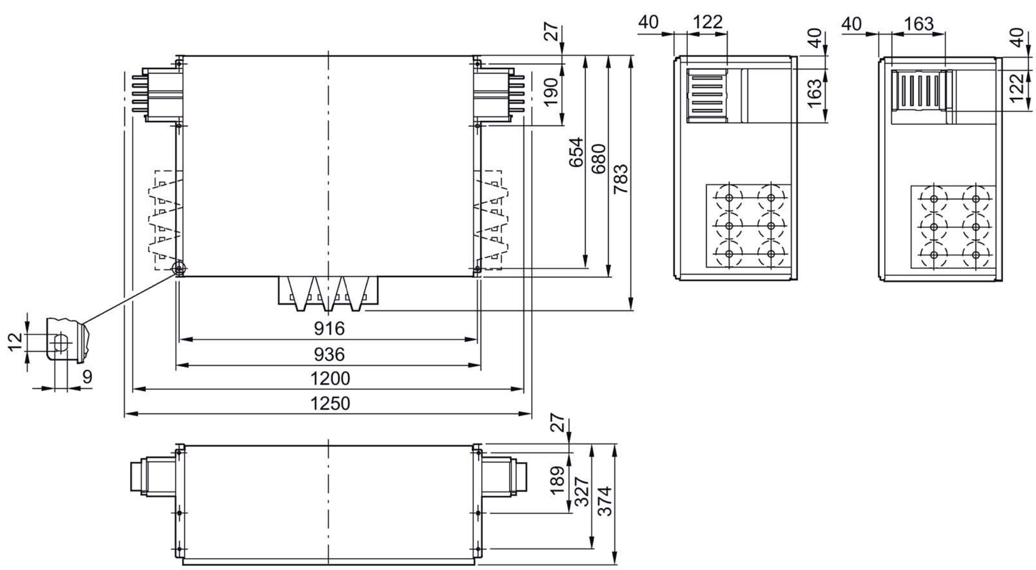


Figure 3-47 BD2.-1000-ME

3.4.7 Tap-off units

3.4.7.1 Tap-off units up to 25 A

Size 1 up to 25 A

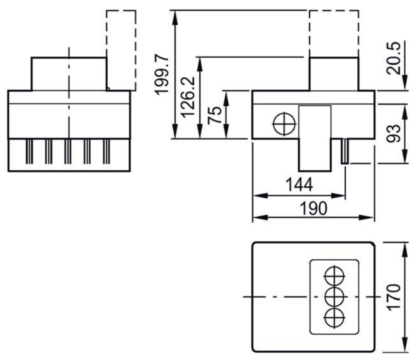


Figure 3-48 BD2-AK1/...

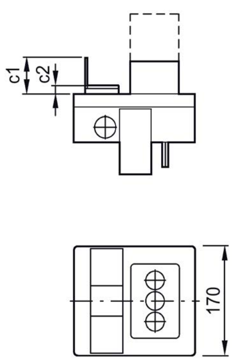


Figure 3-49 BD2-AK1/3SD163...

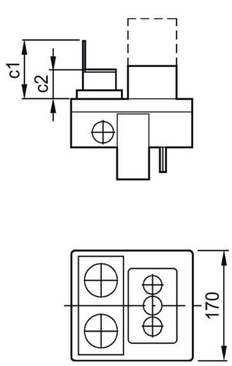


Figure 3-50 BD2-AK1/2CEE163...

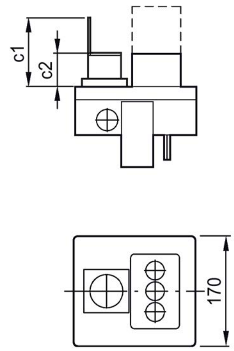


Figure 3-51 BD2-AK1/CEE165...

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

3.4.7.2 Tap-off units up to 63 A

Size 02 up to 63 A

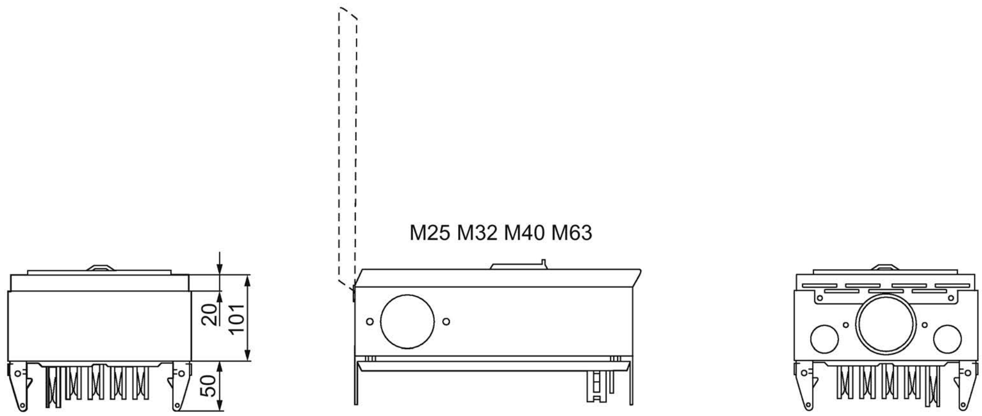


Figure 3-52 Size 02 up to 63 A

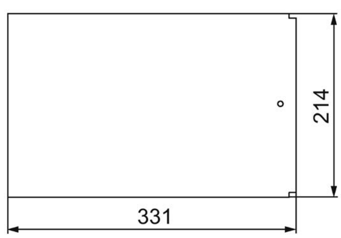


Figure 3-53 BD2-AK02X/F..., BD2-AK02X/S...

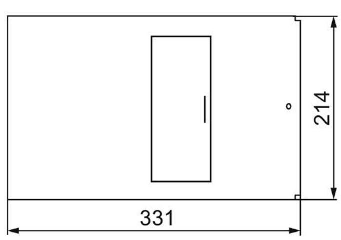


Figure 3-54 BD2-AK02M2/A..., BD2-AK02M2/F...

Size 2 up to 63 A

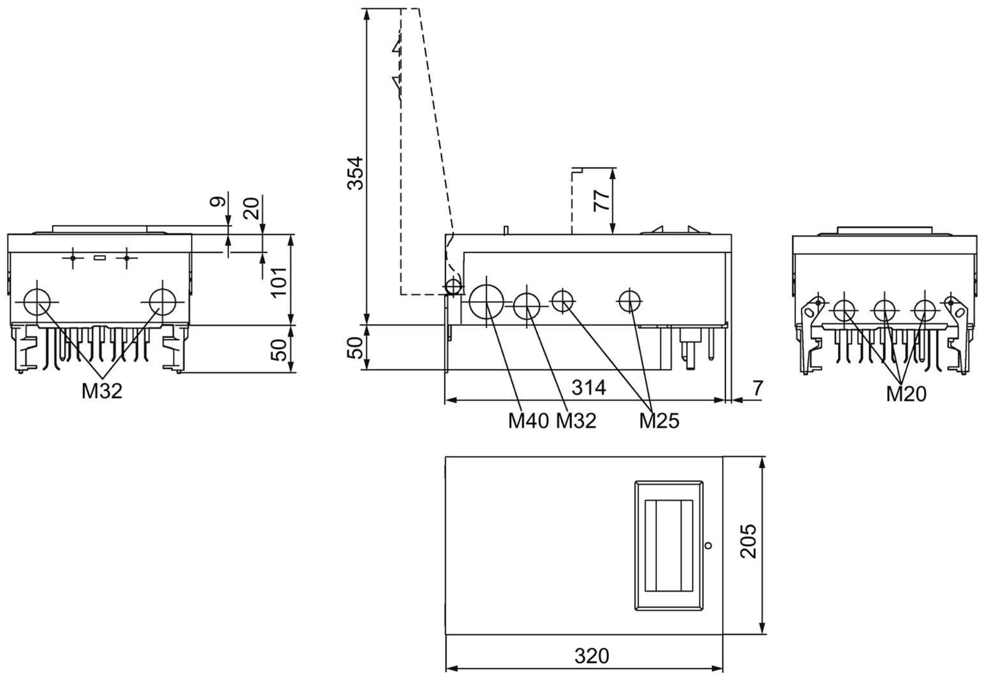


Figure 3-55 BD2-AK2X/F..., BD2-AK2X/S...

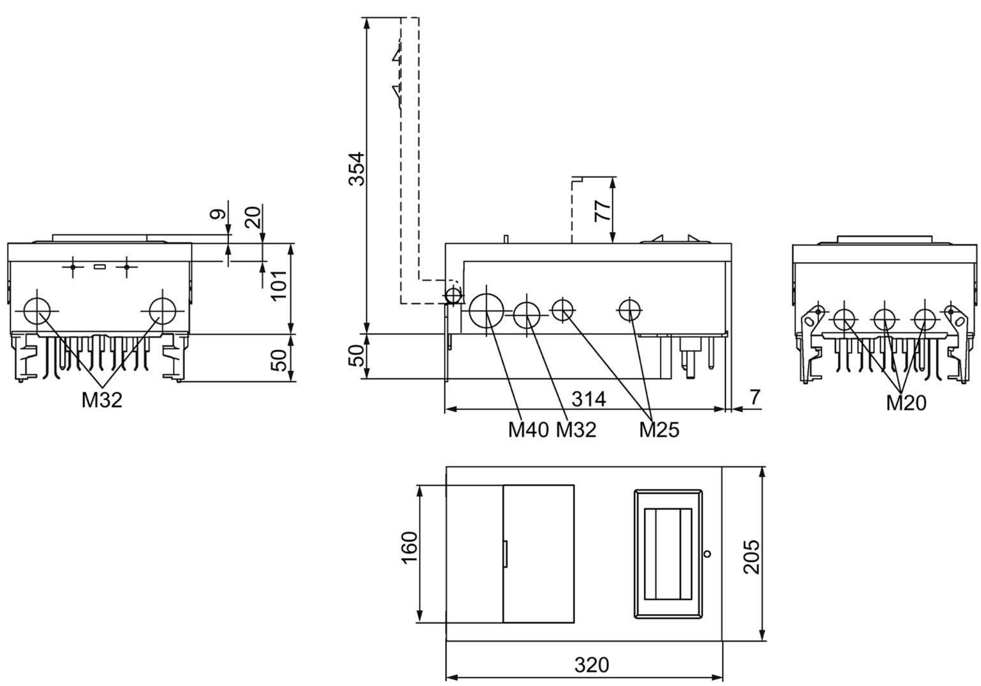


Figure 3-56 BD2-AK2M2/A..., BD2-AK2M2/F...

Designs with CEE sockets and sockets with earthing contacts

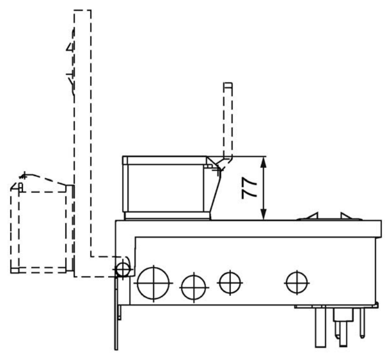
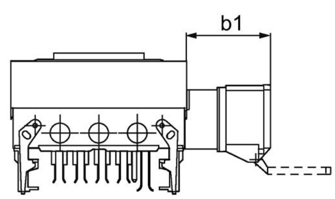
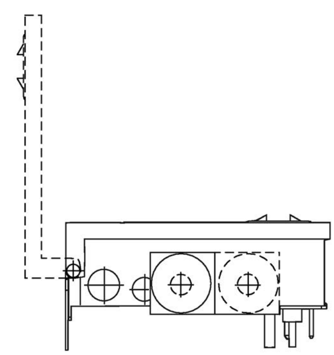


Figure 3-57 BD2-AK2X/CEE635S33



BD2-AK2X/CEE..., BD2-AK2M2/CEE...



BD2-AK2X/CEE..., BD2-AK2M2/CEE...

BD2-AK2X/CEE325S33
BD2-AK2M2/CEE325A323
BD2-AK2X/2CEE165S14
BD2-AK2M2/2CEE165A163
BD2-AK2X/2CEE165S27 (/FORMP)
BD2-AK2M2/CEE165...
BD2-AK2M2/CEE325...

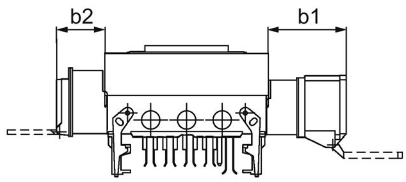


Figure 3-58 BD2-AKM2/2SD163CEE165/A163

Type	b1	b2
BD2-AK2X/CEE325S33 BD2-AK2M2/CEE325A323 BD2-AK2X/2CEE165S14 BD2-AK2M2/CEE325	98	-
BD2-AK2X/2CEE165S27 (/FORMP) BD2-AK2M2/2CEE165A163 BD2-AK2M2/CEE165	86	-
BD2-AK2M2/2SD163CEE165A163	86	54

3.4.7.3 Tap-off units up to 125 A

Size 03 up to 125 A

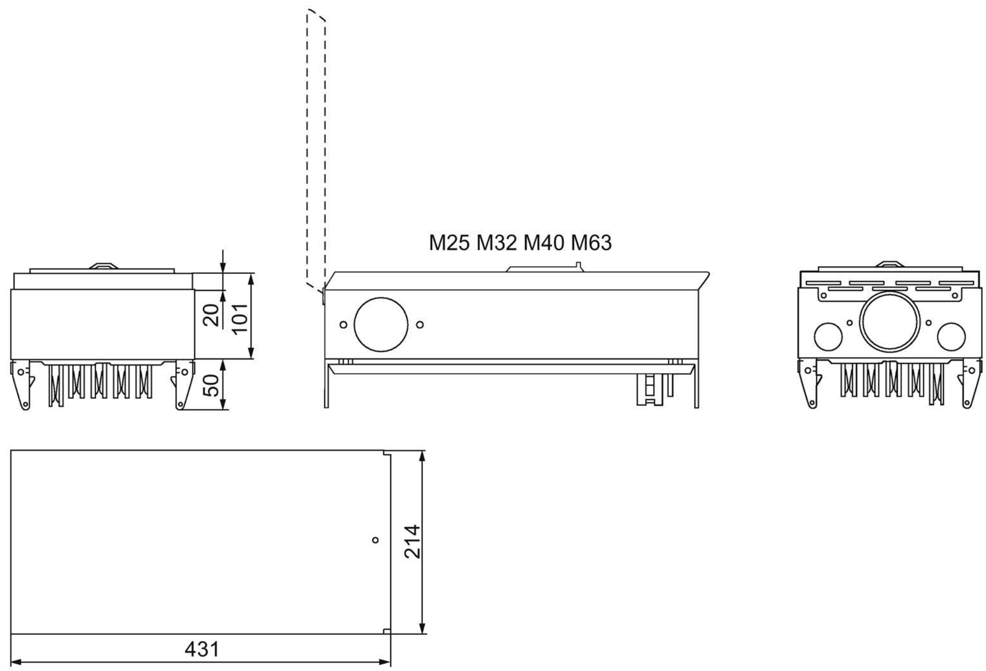


Figure 3-59 BD2-AK03X/F...

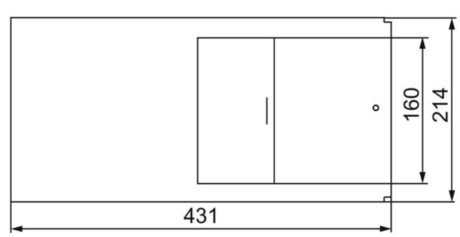
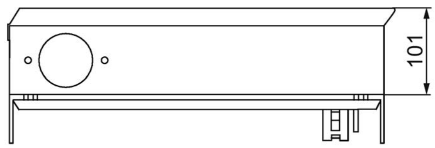
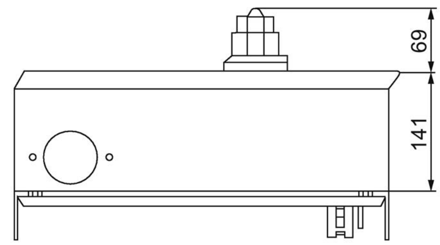


Figure 3-60 BD2-AK03M2/A...

Designs with fuse switch disconnector and circuit breaker



BD2-AK03X/GSTA00



BD2-AK03X/FS...

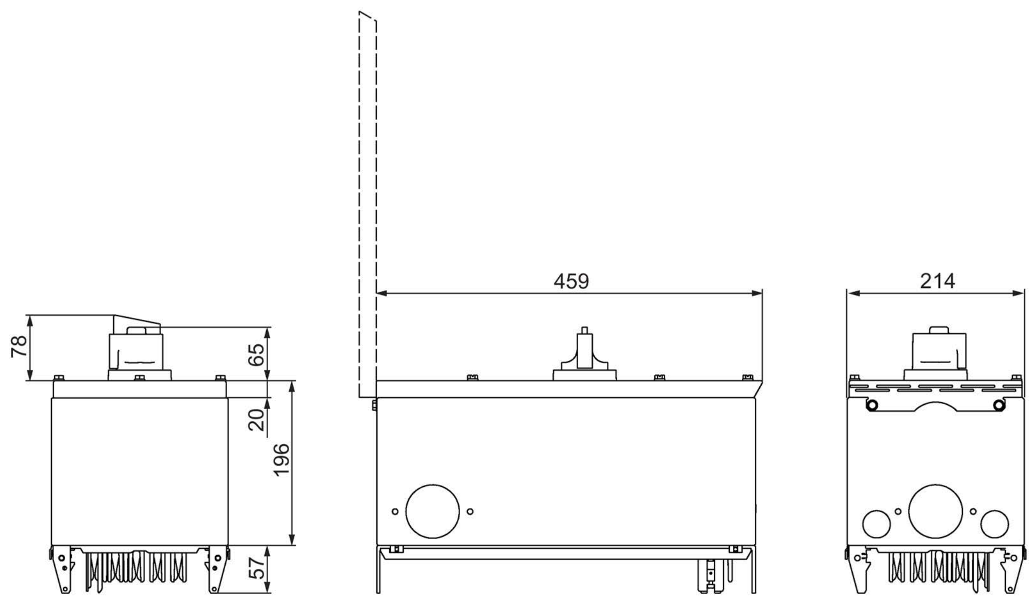


Figure 3-61 BD2-AK03X/LSD...

Size 3 up to 125 A

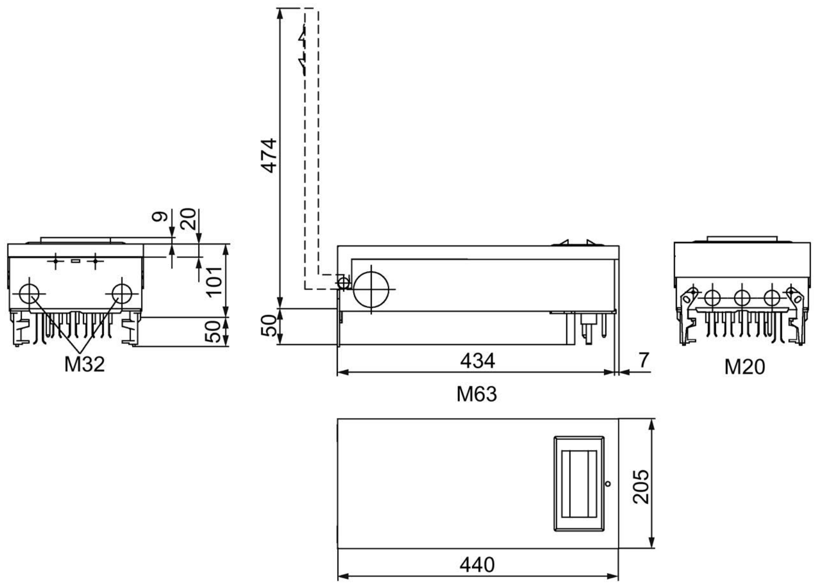


Figure 3-62 BD2-AK3X/GS00

Design with fuse switch disconnector

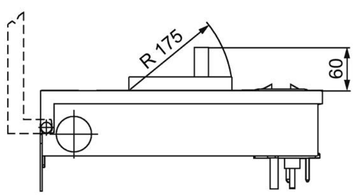


Figure 3-63 BD2-AK3X/GSTZ00

3.4.7.4 Tap-off units up to 250 A

Size 04 up to 250 A

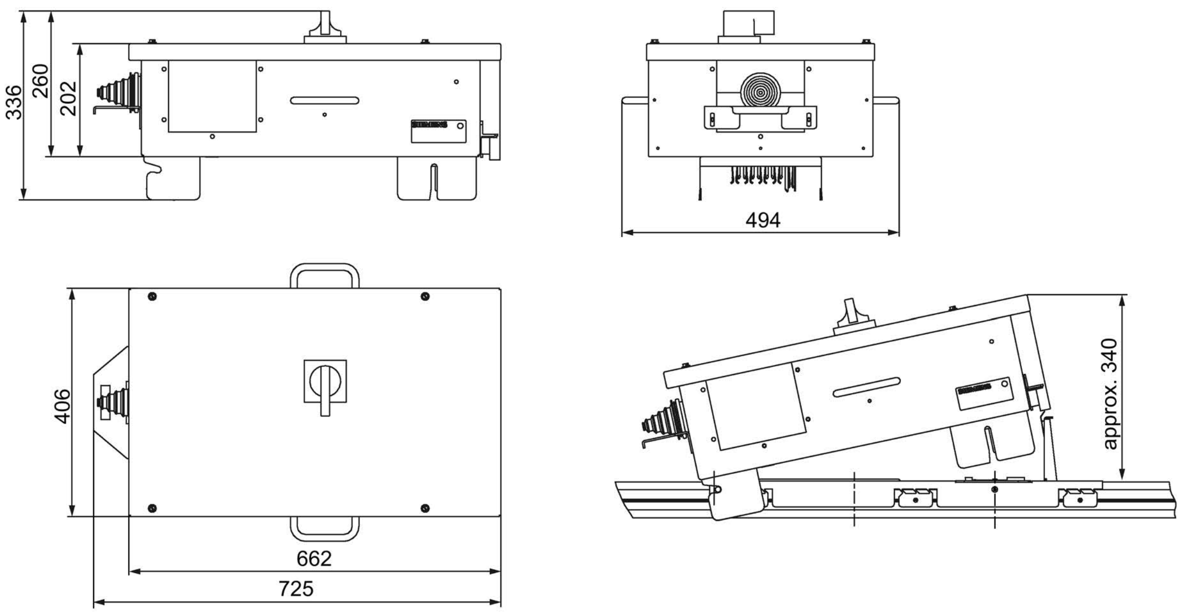


Figure 3-64 BD2-AK04/LSD...

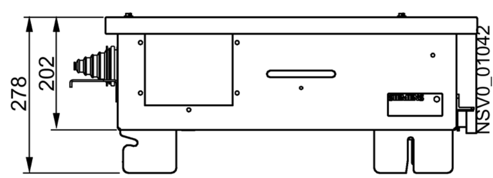


Figure 3-65 BD2-AK04/SNH1

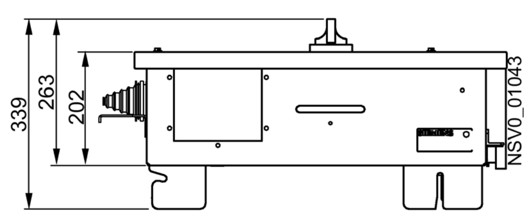


Figure 3-66 BD2-AK04/FS...

3.4.7.5 Tap-off units up to 530 A

Sizes 05, 06 up to 530 A

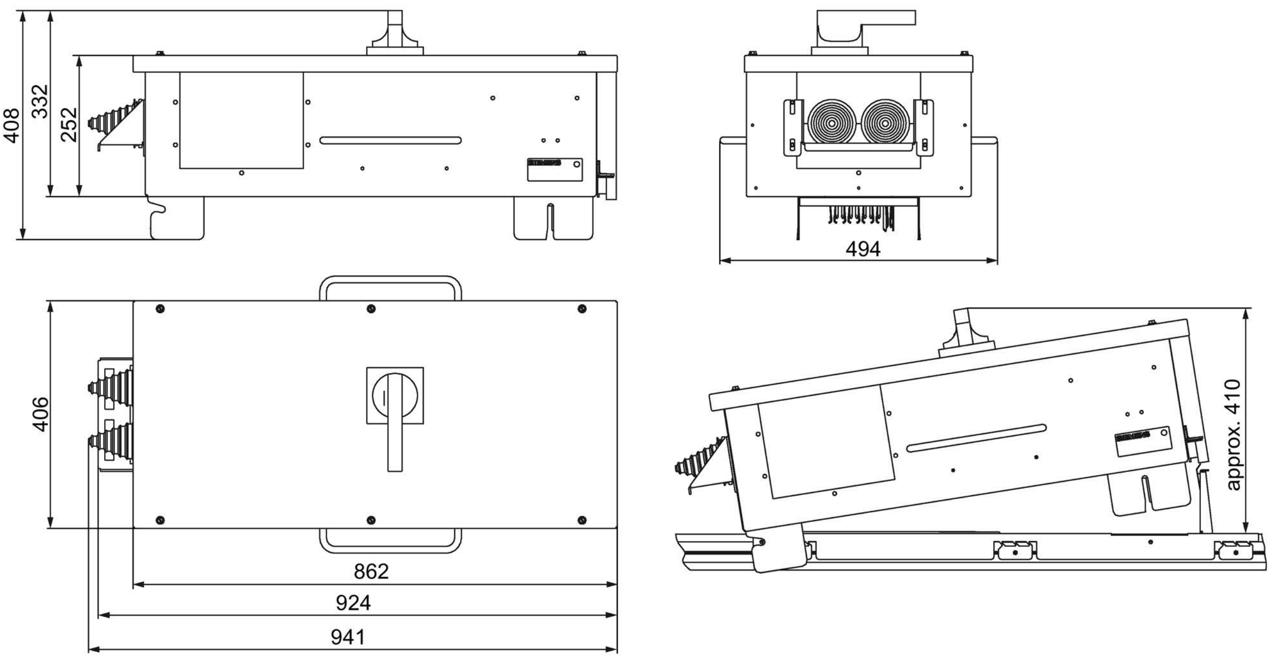


Figure 3-67 BD2-AK05/LSD..., BD2-AK06/LSD...

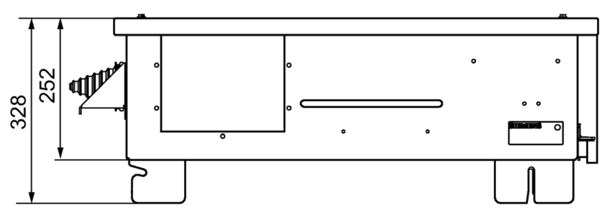


Figure 3-68 BD2-AK05/SNH2, BD2-AK06/SNH3

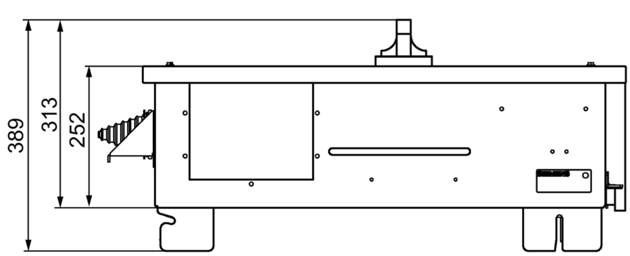
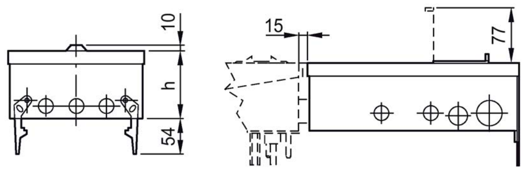


Figure 3-69 BD2-AK05/FS...

3.4.8 Ancillary equipment units



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

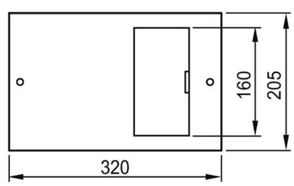


Figure 3-70 BD2-GKM2/F

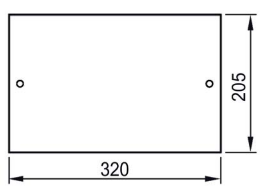
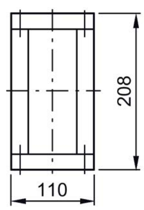
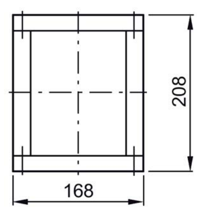


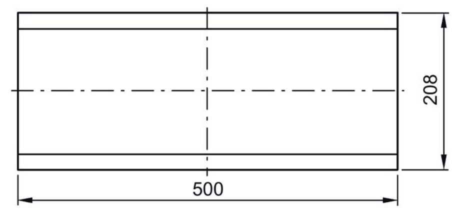
Figure 3-71 BD2-GKX/F

3.4.9 Additional equipment

Bushing protector



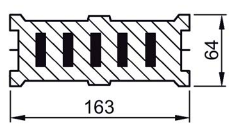


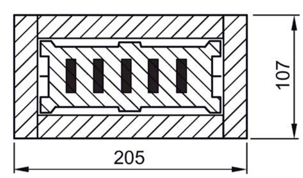


BD2-400-D BD2-1250-D BD2-...-D

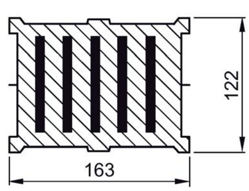
Fire protection

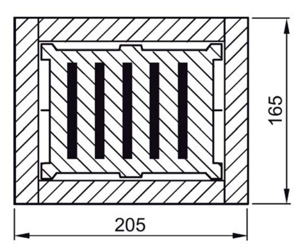
+BD2-S90 (S120)-...





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





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

Joint block

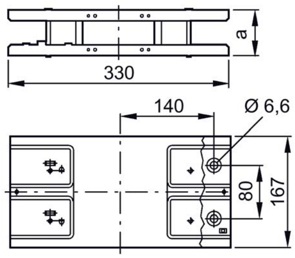
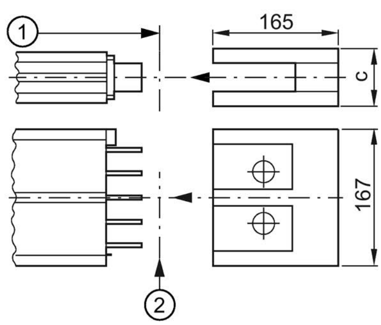


Figure 3-72 BD2-400-EK, BD2-1250-EK

Type	a [mm]
BD2-400-EK	68
BD2-1250-EK	126



① Length of trunking unit
② End of end cap = centre of joint block

Figure 3-73 BD2-400-FE, BD2-1250-FE

Type	c [mm]
BD2-400-FE	68
BD2-1250-FE	126

Mounting

Fixing bracket, flat and edgewise

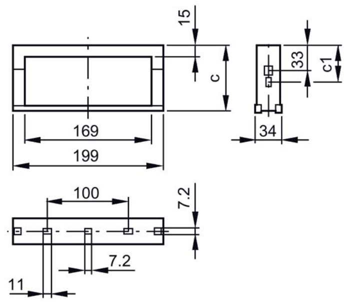


Figure 3-74 BD2-400-BB, BD2-1250-BB

Type	c [mm]	c1 [mm]
BD2-400-BB	86.5	48
BD2-1250-BB	144.5	77

Spacer

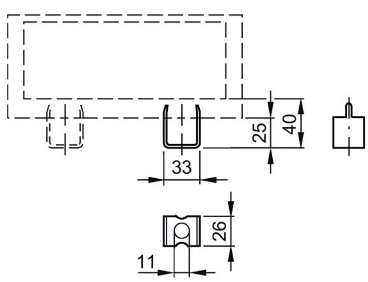


Figure 3-75 BD2-DSB

Spacer bracket

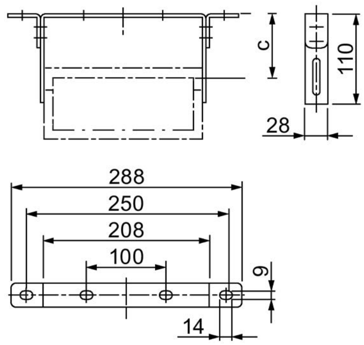


Figure 3-76 BD2-BD

Type	c [mm]
BD2-400-BD	30 … 82
BD2-1250-BD	50 … 82

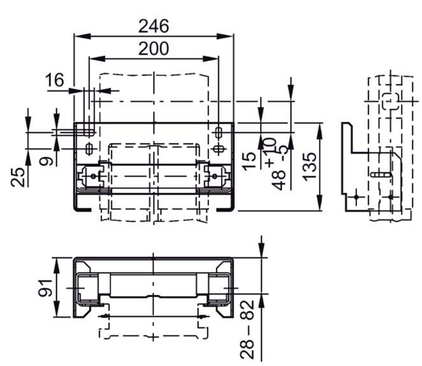
Note

Mounting on a concrete wall

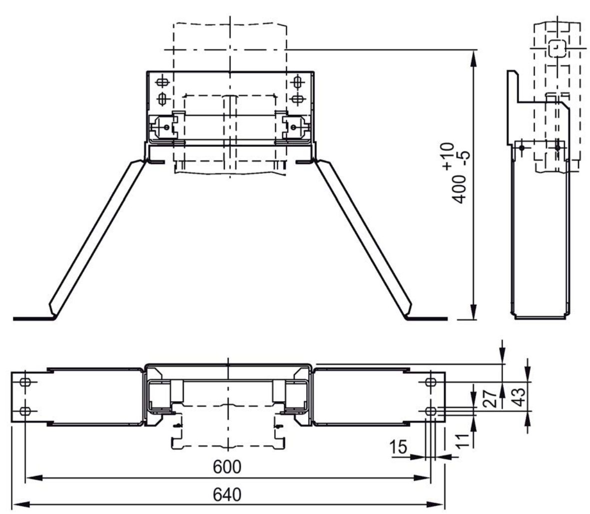
In the case of mounting directly on a concrete wall, use only steel and straddling dowel pins compliant with building regulations, e.g.:

- Order no. 15J1-A08/40 by RICO
- SLM8N item no. 50521 by Fischerwerke

Vertical fixing elements

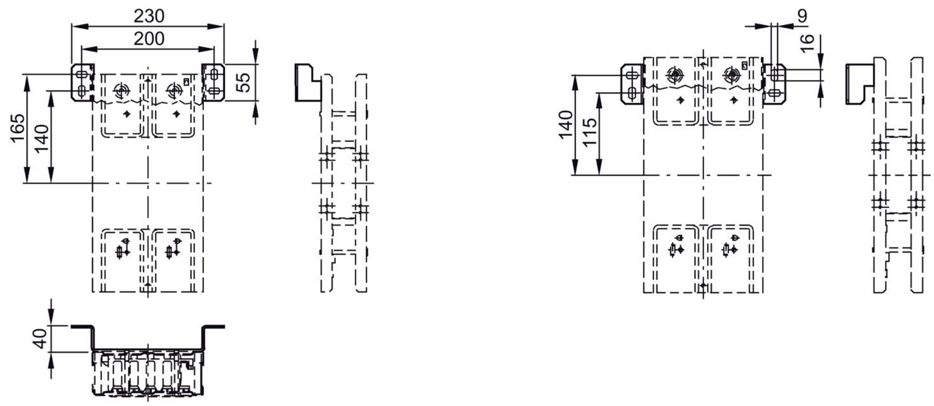


BD2-BWV



BD2-BDV

Vertical fixing bracket



BD2-BVF

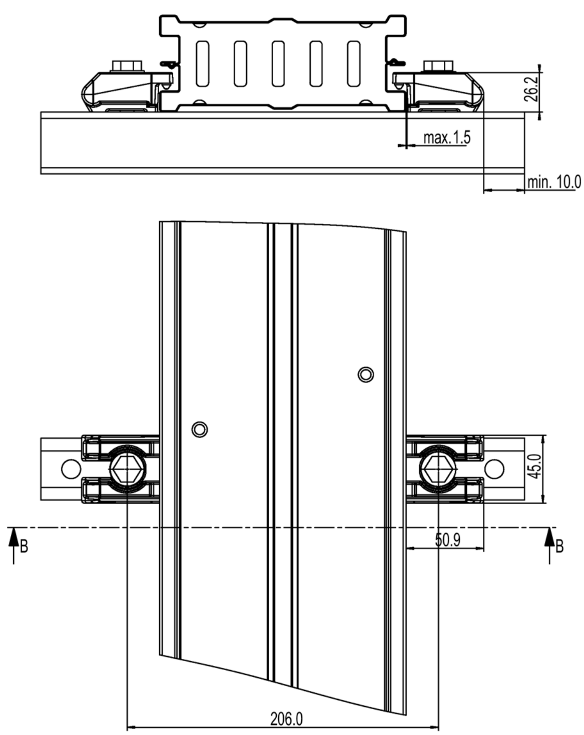
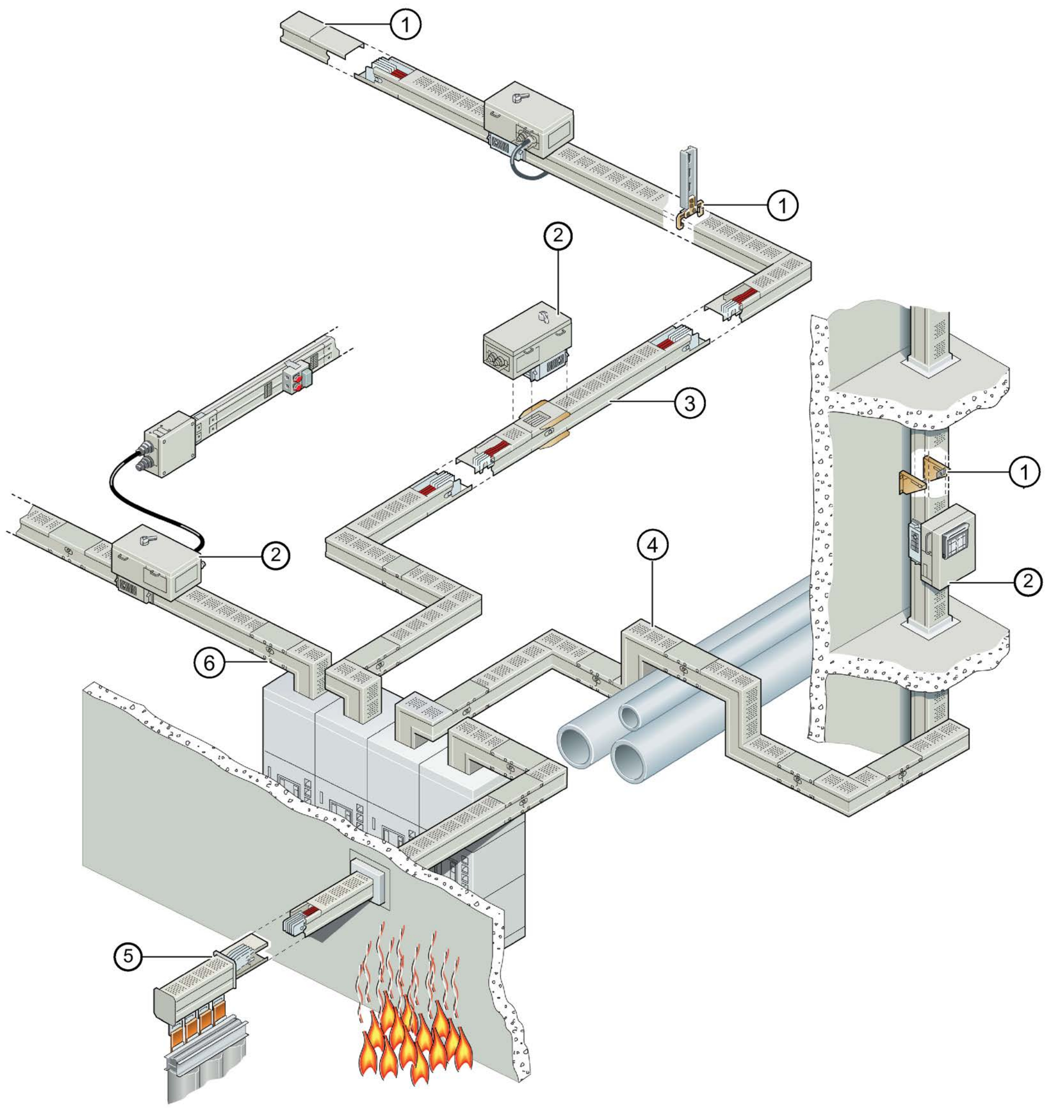


Figure 3-77 BD2-BVC

Planning with LD

4

4.1 System description



①	Additional equipment	④	Junction units
②	Tap-off units	⑤	Infeeds
③	Straight trunking units	⑥	Distribution board connection units

Figure 4-1 Overview of LD busbar trunking system

The LD busbar trunking system is used for both power transmission and distribution. The system offers a high short-circuit rating and is particularly suited for the connection of transformers to low-voltage main distribution boards and sub-distribution boards.

In applications where high powers are required, conventional systems frequently require the use of parallel cables. The LD system offers optimal power distribution for both horizontal and vertical busbar runs. Coded plug-in tap-off units up to 1250 A that meet extremely high safety standards are available for this purpose.

4.2 System components

4.2.1 Preliminary technical descriptions for specifications

The busbar trunking systems are to be offered as type-tested low-voltage switchgear assemblies in accordance with IEC / EN 61439-1 and -6, and as sheet-steel-enclosed ready-to-use distribution boards.

The distribution systems must be suitable forpower transmission, e.g. between transformer and low-voltage main distribution boards, as well as for power distribution providing a supply of power to an entire area.

The brand offered must be a complete system consisting of system modules, including transformers and elements for connection to the distribution boards, as well as such as brackets, straight trunking units and junction units. All components should be available both in straight and offset versions.

Trunking units with tap-off openings should be able to be equipped with coded tap-off units. Tap-off units are protected against incorrect mounting. Depending on the type, the isolation of the tap-off units during removal is assured by a compulsory sequence of operations or by cautionary instructions.

If required, the busbar trunking system should be capable of being equipped with asbestos-free fire barriers which comply with fire resistance class S120 (EI120 available soon), and which have been certified by the local or government authority responsible for building standards. The trunking unit's steel enclosure is made of moulded steel profiles to permit large fixing distances between suspension points. The enclosure is galvanised and painted in a light grey colour (RAL 7035).

The external dimensions may not exceed 180 x 180 (240) mm.

The individual system modules are connected by hanging a hook from a bolt and tightening a state-of-the-art maintenance-free single-bolt clamp. The conductor between two system units should not be connected with screws.

The conductor material is made of aluminium or of copper if the rated current requires. The aluminium conductor must be nickel-plated and tinned, and the copper conductor must be tinned and provided with an additional insulating layer of epoxy-resin.

The fire load must not exceed the value specified in the technical data. Junction units with flexible connections or cable connections are not permitted.

The following certificates or declarations of conformity must accompany the offer:

- DIN ISO 9001 QA certification
- Proof of sprinkler testing
- Proof of prevention of propagation of an arcing fault
- Proof that the system is maintenance-free

Following the general information, a precisedescription of the system based on the technical requirements should be provided as follows:

Technical data for LD busbar trunking system

		LD..
Rated current		_________1)
Degree of protection		IP34 / IP54
Mounting position		Horizontal / vertical [2]
Rated insulation voltage	AC / DC	1000 V
Rated operating voltage	AC	1000 V
Rated frequency		50 / 60 Hz [3]
Rated peak withstand current I_{pk}		_________[1]
Rated short-time withstand current I_{cw} (1 s)		_________[1]
Conductor material		Al / Cu [2]
No. of conductors		L1 – L3 and PEN (4 bars/4-pole) L1 – L3 and ½ PEN (7 bars/4-pole) L1 – L3 and PEN (8 bars/4-pole) L1 – L3, N, PE (5 bars/5-pole) L1 – L3, ½ N, ½ PE (8 bars/5-pole) L1 – L3, N, ½ PE (9 bars/5-pole)
Fire load without tap-off points		_________[1]
Enclosure dimensions	LDA1 … LDC3	180 x 180 mm [2]
	LDA4 … LDC8	240 x 180 mm [2]

[1] Enter data for selected systems. See technical data for values.

[2] Please delete as appropriate.

[3] In accordance with EN 61439-1, a reduction to 95 % must be taken into account for currents > 800 A at a frequency of 60 Hz.

Important planning information

The nominal mounting position of the busbar trunking system is horizontal and edgewise for the busbars. In very rare cases, due to a specific trunking run or the option of connecting tap-off units on the side, the busbars might have to be laid flat. The resulting increase in the internal heat rise of the system necessitates a reduction in rated current. The same applies to vertical height rises > 1.3 m (see the table in the chapter "Type code (Page 108)").

The LD busbar trunking system is a ventilated system. When the degree of protection is increased from IP34 to IP54 (enclosed system), the rated current must be derated as specified in the tables in the next chapter.

4.2.2 Type code

Definition of the required system using the type code

The basic components of the LD system are determined using a type code. The type is specified and selected on the basis of rated current, conductor material, system type and degree of protection.

The resulting type code enables the required system to be precisely defined.

Ordering type

Basic type | Fire protection

LD ☐ ☐ ☐ ☐ ☐ - ... +LD - L ☐ - ☐

Conductor material

Al	A
Cu	C

Rated current I_{nA} [A]

IP34						IP54				
Horizontal edgewise incl. height rises						Horizontal Edgewise and vertical		Horizontal Flat		
< 1,3m		> 1,3m		Vertical						
Al	Cu	Al	Cu	Al	Cu	Al	Cu	Al	Cu	
1100		950		950		900		700		1
1250	2000	1100	1650	1100	1650	1000	1600	750	1200	2
1600	2600	1250	2100	1250	2100	1200	2000	1000	1550	3
2000		1700		1700		1500		1200		4
2500		2100		2100		1800		1700		5
3000	3400	2300	2700	2300	2700	2000	2600	1800	2000	6
3700	4400	2800	3500	2800	3500	2400	3200	2200	2600	7
4000	5000	3400	4250	3400	4250	2700	3600	2350	3000	8

Version

4-conductor	4
5-conductor	6

N / PEN

$^1/_2$ L	1
L	2

Degree of protection

IP 34	3
IP 54	5

Fire protection

LDA1 - LDA3 LDC2 - LDC3	120A
LDA4 - LDA8 LDC6 - LDC8	120B

Fire protection

Positioning (X*, Y*, Z*)	

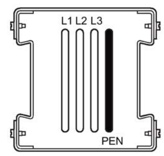
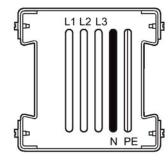
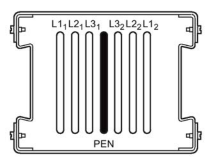
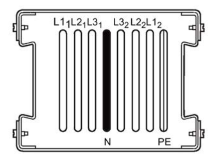
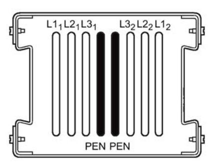
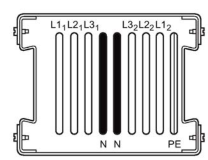
Selection example

A rated current of 2500 A is calculated for a project. Aluminium conductors shall be used. A 4-pole system also has to be used. The cross section of the protective conductor needs to be equal to the cross section of the phase conductor. The required degree of protection is IP34. The mounting position is horizontal, edgewise, without height rises. Use of the above table results in the selection of the following type:

LDA 5423

4.2.3 Sizes, conductor configurations and structure of the busbar package

The LD busbar trunking system is available in two sizes. You can also select the line system configuration (4-pole / 5-pole) and the size of the N/PEN cross section as appropriate for your application.

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.		
240 mm x 180 mm	PEN = ½ L	PE = N = ½ L
LDA4.1. to LDA8.1. LDC6.1. to LDC8.1.		
240 mm x 180 mm	PEN = L	PE = ½ L, N = L
LDA4.2 to LDA8.2. LDC6.2. to LDC8.2.		

Structure of the busbar package

An example a 7-bar system (sectional view) is illustrated below. The positions of the individual phases and the protective conductor PEN are indicated. You can also see the enclosure profile.

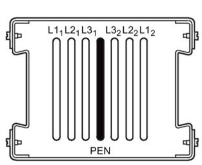
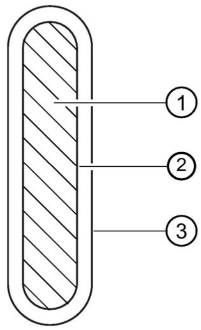


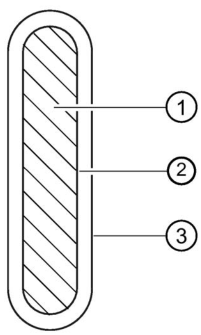
Figure 4-2 Sectional drawing of a 7-bar system

LD busbar systems are available with aluminium (LDA....) and also copper (LDC....) conductor materials. Due to the conductors' special surface finishing, trunking units with different conductor materials can be combined. In addition to tinning, aluminium bars are also coated with a layer of nickel.



① Aluminium bar
② Nickel layer, tinning
③ Moulded-plastic coating with high heat resistance

Figure 4-3 LDA busbar systems with aluminium conductors



① Copper bar
② Tinning
③ Moulded-plastic coating with high heat resistance

Figure 4-4 LDC busbar systems with copper conductors

In order for short-circuit rating to be assured and for the pitch of the bars to be maintained, bar supports are fitted every 200 mm (see diagram):

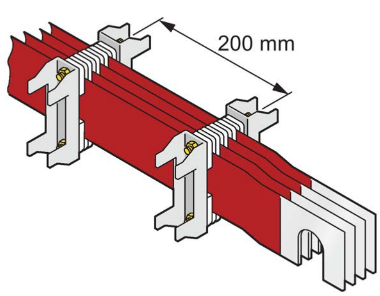
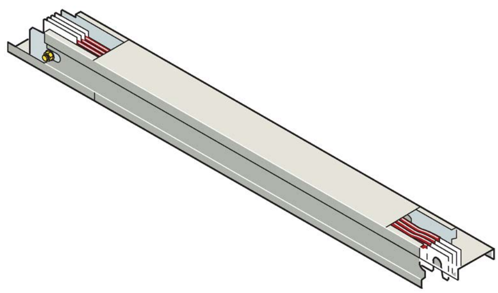


Figure 4-5 Bar supports fitted

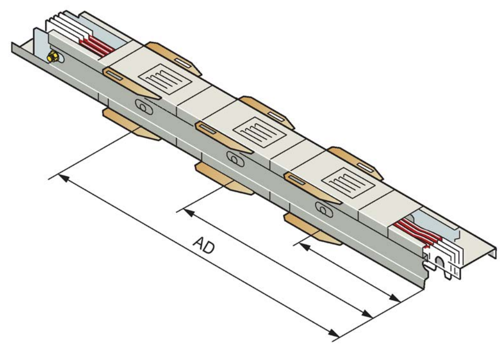
4.2.4 Straight trunking units

Straight trunking units are used to transmit electrical power and to supply loads.

Straight trunking units for horizontal installation



Without tap-off points



With tap-off points

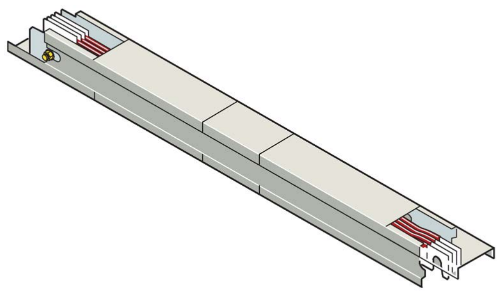
	Length	Type
Standard lengths	1.6 m	LD.....-1.6
	2.4 m	LD.....-2.4
	3.2 m	LD.....-3.2
Optional lengths	0.50 … 0.89 m	LD.....-1W*
	0.90 … 1.59 m	LD.....-2W*
	1.61 … 2.39 m	LD.....-3W*
	2.41 … 3.19 m	LD.....-4W*
Straight trunking unit for expansion compensation	1.2 m	LD.....-D
Standard lengths with 1, 2 or 3 tap-off points	3.2 m	LD.....-K-3, 2-3AD 3 tap-off points
	3.2 m	LD.....-K-3,2-2AD 2 tap-off points
	3.2 m	LD.....-K-3.2-AD 1 tap-off point
Optional lengths with 2 tap-off points	2.20 … 2.40 m	LD.....-K-2W*-2AD
	2.41 … 3.20 m	LD.....-K-3W*-2AD
Optional lengths with 1 tap-off point	1.20 … 1.60 m	LD.....-K-1W*-AD
	1.61 … 2.40 m	LD.....-K-2W*-AD
	2.41 … 3.20 m	LD.....-K-3W*-AD

W = optional length

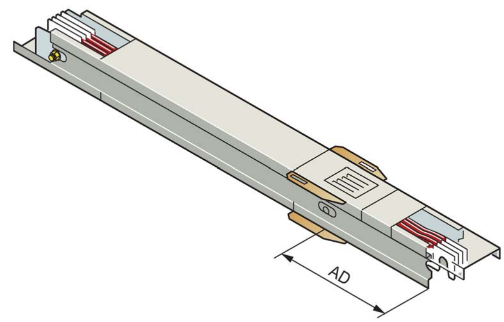
* = length in m

AD = Tap-off point

Straight trunking units for vertical installation



Without tap-off points with integrated expansion compensation



With 1 tap-off point and integrated expansion compensation

	Length	Type
Standard length	2.4 m	LD.....-V-2.4
	3.2 m	LD.....-V-3.2
Optional lengths	2.29 ... 2.80 m	LD.....-V-1W*
	2.81 ... 3.00 m	LD.....-V-2W*
	3.01 ... 3.19 m	LD.....-V-3W*
Standard lengths with 1 tap-off point	2.4 m	LD.....-K-V-2.4-AD
	3.2 m	LD.....-K-V-3.2-AD
Optional lengths with 1 tap-off point	2.29 ... 2.80 m	LD.....-K-V-1W*-AD
	2.81 ... 3.00 m	LD.....-K-V-2W*-AD
	3.01 ... 3.19 m	LD.....-K-V-3W*-AD

W = optional length

* = length in m

AD = Tap-off point

Note

Expansion compensation

Due to heat dissipation at rated load, the busbars in the trunking unit expand. To compensate this expansion in length, you need to include expansion compensation units at defined intervals when planning your horizontal installation.

With trunking units for vertical installation, the expansion compensation is integrated.

When planning horizontal busbar runs, please remember:

- A straight trunking run without expansion compensation between two junction units must not exceed 10 m in length.
- A straight trunking run between a junction unit and the end cap must not exceed 25 m in length. In the case of longer trunking run lengths, planning provision has to be made accordingly for expansion compensation units.

Tap-off points

Tap-off points are only possible on straight trunking units (both standard lengths and optional lengths possible). Options are:

- Tap-off points at the TOP: ...-AD
- Tap-off points at the BOTTOM: ...-ADU
- Tap-off points at the TOP and BOTTOM: ...-ADO+U

With a trunking unit with a tap-off point at the TOP and BOTTOM, only one tap-off unit can be used at a time. The required distance between tap-off points is 1 m.

The required type should be determined during engineering, based on the mounting position of the busbar.

In the case of optional trunking units with tap-off point, a minimum clearance of 0.6 m is required between the end of the busbar and a tap-off point.

A coding bracket is located on both sides of a tap-off point. This guarantees non-interchangeability and correct phasing sequence installation of the tap-off units.

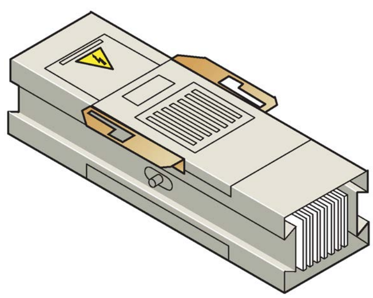
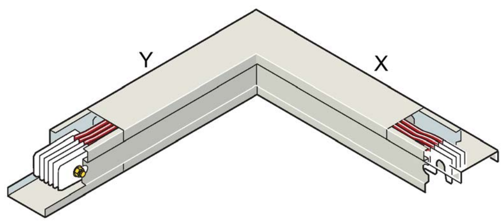


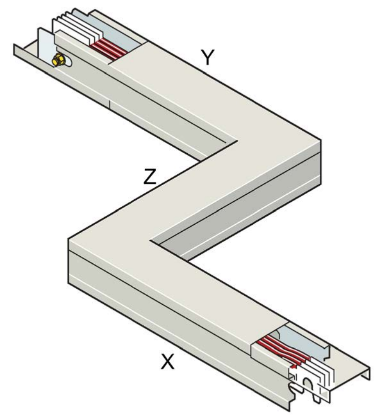
Figure 4-6 Trunking unit with tap-off point

4.2.5 Junction units

Junction units for horizontal installation



Elbow LD.....-L...



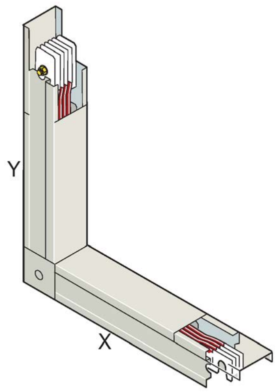
Z unit LD.....-Z.-Z*

Length	Type
X = 0.5 … 1.24 m	LD.....-L...
Y = 0.5 … 1.24 m	

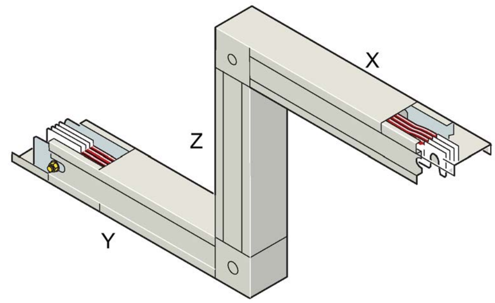
Length		System	Trunking unit	Type
X/Y = 0.5 m	Z = 0.36 ... 0.99 m	LD.1 … LD.3	180 x 180 mm	LD.....-Z.-Z*
	Z = 0.48 ... 0.99 m	LD.4 … LD.8	240 x 180 mm	

* = optional length in mm

Junction units for horizontal and vertical installation



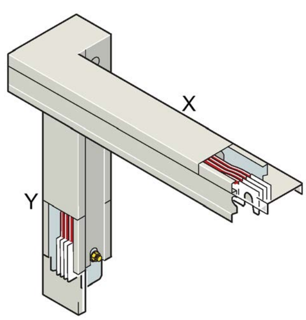
Elbow LD.....-L.



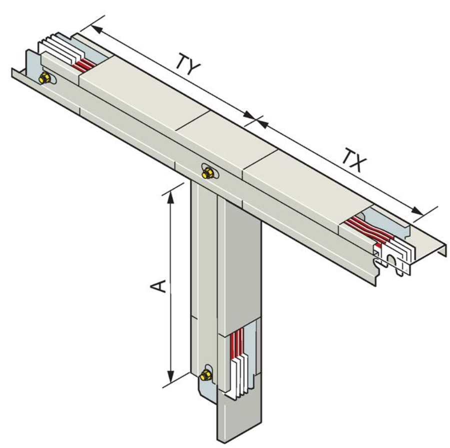
Z unit LD.....-Z.-Z*

Length	Type
X = 0.5 … 1.24 m Y = 0.5 … 1.24 m	LD.....-L...
X = 0.5 … 1.24 m Y = 0.5 … 1.24 m Z = 0.36 … 0.99 m	LD.....-Z.-Z*

* = optional length in mm



Offset knee LD.....-L.



T unit LD.....-T.

Length	Type
X = 0.5 … 1.24 m Y = 0.5 … 1.24 m	LD.....-L...
TX = 0.58 m TY = 0.62 m A = 0.5 m	LD.....-T.

4.2.6 Distribution link for Siemens power distribution boards

Connection to the Siemens SIVACON power distribution system as type-tested low-voltage switchgear assemblies in accordance with IEC / EN 61439-1 and -6.

The busbar trunking system can be linked to the distribution system from above or below. The link between the busbar trunking system and the SIVACON S8 distribution systems ensures high short-circuit strength backed up by type testing and a high level of reliability as regards power transmission.

Rated currents

All modules have been type tested for rated currents up to 5000 A.

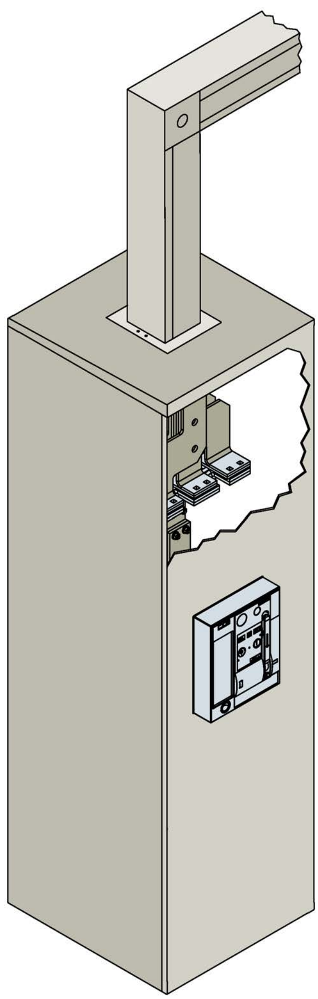


Figure 4-7 Distribution board link

4.2.7 Busbar connection unit for non-Siemens distribution boards

If you wish to connect the busbar trunking system to a non-Siemens distribution board, you can establish this connection using an LD. .... - FA1 connection unit for non-Siemens distribution boards. The connection unit is built into the distribution board and serves as an interface to the copper connections of the distribution system.

Rated currents

- The maximum rated currents are listed in the chapter "Technical specifications (Page 128)".
- The temperature limit of busbars coated with insulating materials is 135 °C.
- You can find possible conductor cross-sections for the copper connections in the chapter "Technical specifications (Page 128)".

Installation of the busbar connection unit

The busbar connection unit in the distribution board must be copper-plated by the board manufacturer or in compliance with that manufacturer's specifications. The board manufacturer must ensure that the required short-circuit strength is achieved and the permissible temperature limit of the busbar connection unit for non-Siemens distribution boards is not exceeded.

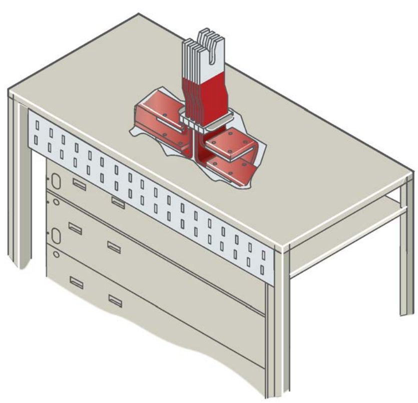
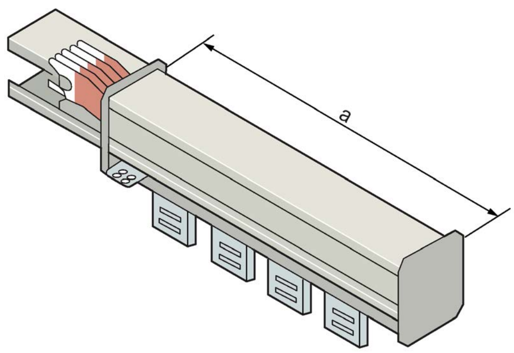


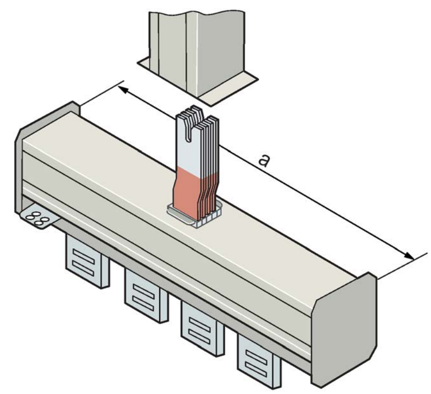
Figure 4-8 Busbar connection unit for non-Siemens distribution boards

4.2.8 Connection unit for transformers and distribution boards

There are four different transformer connection pieces (LD.....-AS.) available for all rated current ranges to connect various transformers to a busbar trunking system:



Connection unit LD.....-AS...



Connection unit LD.....-AS.-T

Connection unit type	Selectable phase clearance	Possible phase sequences
LD.....-AS1(-T)	150 … 180 mm a = 725 mm	L1, L2, L3, PEN PEN, L3, L2, L1
LD.....-AS2(-T)	190 … 380 mm a = 1085 mm	L1, L2, L3, PEN PEN, L3, L2, L1
LD.....-AS3(-T)	450 … 750 mm a = 1430 mm	Lx, PEN, L2, Lx Lx, L2, PEN, Lx Lx = L1 or L3
LD.....-AS4(-T)	450 … 750 mm a = 1930 mm	L1, L2, L3, PEN PEN, L3, L2, L1

We recommend a maximum clearance of 200 mm between the tags on the connection unit.

The universal connection unit can also be used to connect distribution boards.

4.2.9 Incoming cable connection unit

If power needs to be supplied to the busbar trunking system via cables, you should use an LDA(C)....-KE incoming cable connection unit.

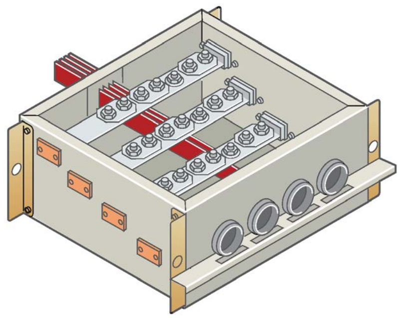


Figure 4-9 Incoming cable connection unit

The incoming cable connection unit is designed for the following rated currents:

- 1100 to 2600 A (with IP34)
- 900 to 2000 A (with IP54).

Enclosure sizes

Depending on the system, three sizes can be selected:

Size 1:	LDA1...-KE to LDA2...-KE
Size 2:	LDA3...-KE and LDA4...-KE LDC2...-KE
Size 3:	LDA5...-KE. LDC3...-KE.

The maximum dimensions are 920 mm x 639 mm x 490 mm (W x H x D).

IP34 or IP54 degree of protection can be selected.

You can connect single-core or multi-core cables. You can connect cross-sections up to 300 mm^2 (bolted connection) directly to the connection bars of the incoming cable connection unit.

The sheet steel flange plates and the cable sleeves are included in the scope of supply of the standard product. Single-core cables are supplied with an undrilled aluminium plate for cable entry.

4.2.10 Coupling units

Coupling units are used if devices or sections of the power supply need to be disconnected or connected accordingly. To adapt the busbar trunking system to the actual load, the busbar cross section can be reduced and protected against short circuits and overloads with a coupling unit.

Coupling units can be fitted with switch disconnectors or circuit breakers as appropriate for their application. Coupling units resistant to accidental arcs can be supplied as an option.

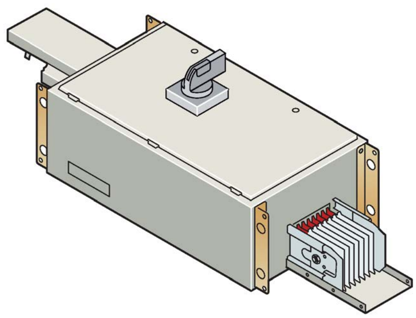


Figure 4-10 Coupling units

Rated currents

Rated currents adapted to the systems between 1100 and 3000 A can be supplied as appropriate for the application.

Operator control

The coupling units can be operated using a handle or even a motor drive.

Dimensions

The installation length in the busbar trunking run is 1600 mm.

The dimensions are dependent on the device type and the current size and must be obtained project-specifically.

4.2.11 Tap-off units

4.2.11.1 Tap-off units

Tap-off for different current ratings

Tap-offs for different current ratings are required, depending on the application and type and size of loads. These tap-offs are implemented in the form of tap-off units with fuse switch-disconnectors or with circuit breakers.

There are basically two types of tap-off unit:

- With fuse switch disconnector
- With circuit breaker

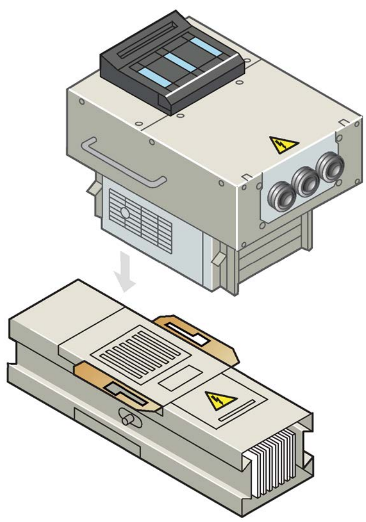


Figure 4-11 Tap-off unit with fuse switch disconnector and trunking unit with tap-off point

Early-make PE/PEN

The current tap in the tap-off unit is implemented as an early-make (mounting) or late-break (removal) PE/PEN conductor contact.

In a 4-conductor system, this is ensured by a longer PEN bar at the contact mechanism. In a 5-conductor system the PE connection is established via grinding contacts on the coding brackets.

Anti-rotation feature and non-interchangeability

The coding brackets on the tap-off unit and on the trunking unit's tap-off point (lock-and-key principle) ensure:

- Non-interchangeability and correct assignment of 4 or 5-pole tap-off units to the associated LD systems
- Anti-rotation feature to prevent incorrect mounting of the tap-off units on the tap-off points

4.2.11.2 Tap-off units with fuse switch disconnector

Rated currents

Tap-off units 125 A, 2 x 125 A, 250 A, 400 A and 630 A are available for selection.

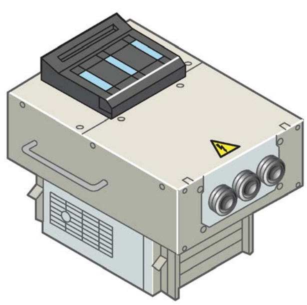
Depending on the current level, LV HRC fuses size NH 00, NH 1, NH 2 or NH 3 are used. The compact dimensions mean that only one enclosure size is required for all rated current ranges.

Operator control

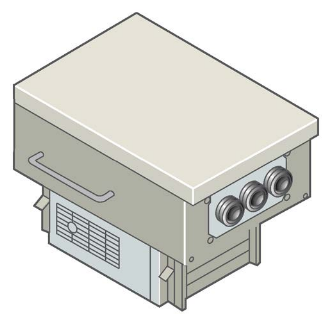
The tap-off units with fuse switch disconnector are operated by hand using a swivel mechanism.

Degree of protection

The standard degree of protection is IP30. IP54 degree of protection can be provided as an option.



Degree of protection IP30



Degree of protection IP54

Cable compartment / cable entry

A bolted connection is used for cables with cross sections up to 2 x 240 mm². In the standard version, the cable entry is on the front face. Adding a cable compartment enables cable entry from the side. The cables are routed via an integrated cable propping bar in the tap-off unit (cleats to be provided by the customer). The sectional flange plate facilitates the laying of the cables.

Opening the tap-off unit

Do not open the cable compartment cover until you have removed the fuse switch disconnector handle and, consequently, the fuse. This will ensure that the cable compartment is voltage-free when the cover is removed. The part of the contact device in the front of the tap-off unit is "finger-proof".

Type designation

The type designation for tap-off units with LV HRC fuse switch disconnectors is LD-.AK/3ST...

4.2.11.3 Tap-off units resistant to accidental arcs and with fuse switch disconnector

Rated currents

Tap-off units for 250 A, 400 A and 540 A are available for selection for use with LV HRC fuses.

Operator control

The LV HRC fuse links of sizes NH 2 (250 A) and NH 3 (400 A and 540 A) are switched on and off via the door-coupling operating mechanism.

Degree of protection

The standard degree of protection is IP54.

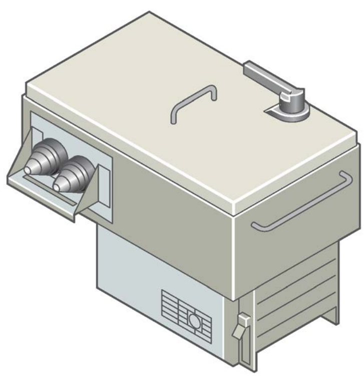


Figure 4-12 Degree of protection IP54

Cable compartment / cable entry

A bolted connection is used for cables with cross sections up to 2 x 4 x 240 mm². Cables can be fed in on both sides. In the case of a single-core cable entry, an aluminium plate fitted with metric screwed joints is included in the scope of supply.

Resistance to arc faults

The tap-off units are resistant to arc faults. This has been verified by means of accidental arc testing to IEC / TR 61641, and confirmed by a test report.

Type designation

The type designation for tap-off units with LV HRC switch disconnector is:

LD-K-.AK./FSAM...

4.2.11.4 Tap-off units with circuit-breakers

On tap-off units with circuit breakers you can select the switching capacity, the number of actively switched poles, the type of operator control and the signalling options:

- Rated currents from 100 A to 1250 A.
- 3 or 4-pole designs
- Switching capacity: normal, strong or high (see "Tap-off units with circuit-breaker (Page 146)").

Circuit breaker with manual operating mechanism

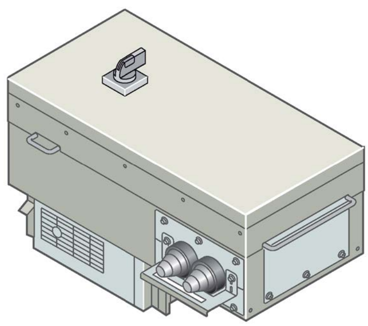


Figure 4-13 Circuit breaker with manual operating mechanism

This type of tap-off unit has a circuit breaker which can be controlled from the outside using a handle.

Degree of protection

The tap-off units have IP54 degree of protection.

Opening the tap-off unit

The contact compartment and the copper connections between the contact mechanism and the circuit breaker are encapsulated in a finger-proof casing. The cover can only be opened if the breaker has been deactivated. This ensures voltage-free load when the cover is removed.

Cable connection

On the load side, the outgoing cables are routed directly via the circuit breaker. The PE/PEN conductor is fixed to a bolted connection as appropriate for the cross section. Single-core or multi-core cables can be fed in from the side or via the front face. The sectional flange plate facilitates the laying of the cables.

Circuit breaker with door handle, also available with motor drive

This version has a motor drive instead of a door handle.

Furthermore, you can choose either an undervoltage or a shunt release as appropriate for your application. The operating voltage of the motorised operating mechanism must be ensured externally (220 V AC to 250 V AC). The connections for the motor drive are designed for terminal connection.

The feeder compartment and the copper connections between the contact mechanism and the circuit breaker are encapsulated in a finger-proof casing. The connection on the load side is made in the same way as on the version with door handle.

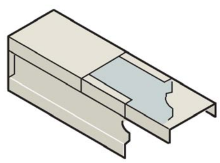
Type designation

The type designation for tap-off units with circuit breakers is: LD-.AK./LS.

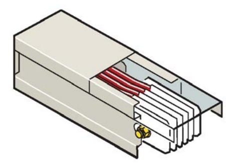
4.2.12 Additional equipment

End caps

You will need to install an end cap with a hook or a bolt at the end of a busbar run depending on the version of the trunking unit.



End cap with hook



End cap with bolt

Suspension bracket

The LD-B1/B2 suspension bracket is used to mount the busbar trunking system in a horizontal installation.

- B1 for enclosure dimensions 180 mm x 180 mm
- B2 for enclosure dimensions 240 mm x 180 mm

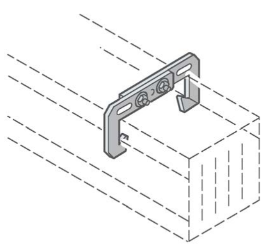


Figure 4-14 Suspension bracket

Fixing bracket

If you install the LD system vertically, you must use the LD-BV fixing bracket. You can find the fixing distances in the chapter "Dimension drawings (Page 149)").

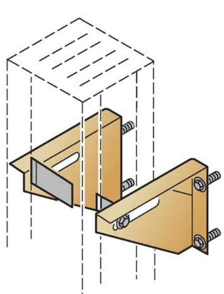


Figure 4-15 Fixing bracket

4.3 Technical specifications

4.3.1 LD general data

		LD...
Standards and regulations		IEC / EN 61439-1 and -6
Resistance to extreme climates		
Damp heat, constant, acc. to IEC 60068-2-78		40 °C / 93 % RH / 56d
Damp heat, cyclic, acc. to IEC 60068-2-30		56 x (25 ... 40 °C / 3 h; 40 °C / 9 h; 40 … 25 °C / 3_…_6 h; 25 °C / 6 h) 95 % RH
Cold according to IEC 60068-2-1		45 °C, 16 h
Temperature change in accordance with IEC 60068-2-14		45 °C … 55 °C; 5 cycles (1 °C / min); holding time min. 30 min
Salt spray test in accordance with IEC 60068-2-52		Degree of severity 3
Ice formation acc. to IEC 60068-2-61		Testing based on a combination of moist heat, cyclic + low temperature
Ambient temperature min. / max. / 24-hour average	°C	–5 / +40 / +35
Environmental classes in accordance with IEC 60721 as derived from climatic proofing tests		
Climatic		1K5 (storage) = 3K7L (operation without direct sunlight); 2K2 (transport)
Chemically active		Salt spray, other contaminants optional, 1C2 (storage) = 3C2 (operation) = 2C2 (transport)
Biological		Covered by IP degrees of protection and packaging method. 1B2 (storage) = 3B2 (operation) = 2B2 (transport)
Mechanically active		Covered by IP degrees of protection and packaging method. 1S2 (storage) = 3S2 (operation); 2S2 (transport)
System-specific data		
Degree of protection		IP31 ventilated (with busbars installed horizontally and flat) IP34 ventilated (with busbars installed horizontally and edgewise) IP54 enclosed
Standard mounting position		Busbars installed edgewise in trunking units with horizontal installation
Torque for single-bolt terminal	Nm	80
Busbar surface treatment		Entire length coated with insulating material, nickel-plated and tinned: LDA; tinned: LDC
Material trunking units, tap-off units		Sheet steel with powdered paint finish
Colour of trunking units, tap-off units		RAL 7035 (light grey)
Dimensions		See "Dimension drawings (Page 149)"
Weight		See the chapter "Weights (Page 148)"
Rated insulation voltage to DIN EN 61439-1 AC / DC	V	1000

			LD...
Rated operational voltage (power transmission)			
with overvoltage category III/3	AC	V	1000
with overvoltage category IV/3	AC	V	690
Rated operational voltage (power distribution)			
with overvoltage category III/3	AC	V	400 (690)[1]
Rated frequency		Hz	50 / 60[2]

1) Tap-off units on request

2) In accordance with EN 61439-1, a reduction to 95 % must be taken into account for currents > 800 A at a frequency of 60 Hz.

4.3.2 LDA.4.. trunking units (4-pole, aluminium)

System-specific data				LDA142.	LDA242.	LDA342.	LDA441.	LDA442.	LDA541.	LDA542.
				PEN=L	PEN=L	PEN=L	PEN=½L	PEN=L	PEN=½L	PEN=L
Rated current I_{nA} [1]										
Horizontal / edgewise[2]	IP34	I_{nA}	A	1100	1250	1600	2000	2000	2500	2500
	IP54	I_{nA}	A	900	1000	1200	1500	1500	1800	1800
Vertical	IP34	I_{nA}	A	950	1100	1250	1700	1700	2100	2100
	IP54	I_{nA}	A	900	1000	1200	1500	1500	1800	1800
Horizontal / flat	IP31 / IP54	I_{nA}	A	700	750	1000	1200	1200	1700	1700
Impedance										
of the conducting paths at 50 Hz and + 20 °C busbar temperature	Resistance	R_{20}	mΩ/m	0.061	0.047	0.047	0.029	0.031	0.032	0.034
	Reactance	X_{20}	mΩ/m	0.052	0.043	0.043	0.03	0.031	0.024	0.029
	Impedance	Z_{20}	mΩ/m	0.079	0.064	0.064	0.041	0.043	0.040	0.044
of the conducting paths at 50 Hz and final heating of busbars	Resistance	R_1	mΩ/m	0.072	0.054	0.057	0.035	0.036	0.036	0.034
	Reactance	X_1	mΩ/m	0.051	0.043	0.043	0.028	0.031	0.021	0.027
	Impedance	Z_1	mΩ/m	0.088	0.069	0.072	0.044	0.047	0.042	0.044
of the conducting paths for 4-pole systems under fault conditions acc. to EN 61439-6	Resistance	R_F	mΩ/m	0.144	0.106	0.106	0.085	0.083	0.079	0.062
	Reactance	X_F	mΩ/m	0.167	0.178	0.178	0.113	0.117	0.094	0.104
	Impedance	Z_F	mΩ/m	0.218	0.207	0.207	0.147	0.144	0.123	0.121
Zero impedance										
for 4-pole systems acc. to DIN EN 60909-0 / VDE 0102	-	R_0	mΩ/m	0.282	0.217	0.217	0.168	0.171	0.193	0.126
	-	X_0	mΩ/m	0.233	0.200	0.200	0.178	0.175	0.179	0.163
	-	Z_0	mΩ/m	0.367	0.295	0.295	0.249	0.244	0.264	0.206
Short-circuit rating										
Rated short-time withstand current	rms value t = 0.1 s	I_{cw}	kA	55	70	80	110	110	125	125
	rms value t = 1 s	I_{cw}	kA	40	55	58	80	80	110	110
Rated impulse withstand current	Peak value	I_{pk}	kA	121	154	176	242	242	275	275

Conductor material				Aluminium						
No. of busbars				4	4	4	7	8	7	8
Conductor cross-section	L1, L2, L3	A	mm²	530	706	706	1060	1060	1232	1232
	PEN	A	mm²	530	706	706	530	1060	616	1232

System-specific data		**LDA142.**	**LDA242.**	**LDA342.**	**LDA441.**	**LDA442.**	**LDA541.**	**LDA542.**
		PEN=L	**PEN=L**	**PEN=L**	**PEN=½L**	**PEN=L**	**PEN=½L**	**PEN=L**
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
Max. fixing distances for conventional mechanical load	m	6	6	6	5	5	5	5

1) Dependent upon degree of protection and laying method

2) Incl. height rises ≤ 1.3 m

System-specific data				**LDA641.**	**LDA642.**	**LDA741.**	**LDA742.**	**LDA841.**	**LDA842.**
				PEN=½L	**PEN=L**	**PEN=½L**	**PEN=L**	**PEN=½L**	**PEN=L**
Rated current I_{nA} 1)									
Horizontal / edgewise 2)	IP34	I_{nA}	A	3000	3000	3700	3700	4000	4000
	IP54	I_{nA}	A	2000	2000	2400	2400	2700	2700
Vertical	IP34	I_{nA}	A	2300	2300	2800	2800	3400	3400
	IP54	I_{nA}	A	2000	2000	2400	2400	2700	2700
Horizontal / flat	IP31 / IP54	I_{nA}	A	1800	1800	2200	2200	2350	2350
Impedance									
of the conducting paths at 50 Hz and + 20 °C busbar temperature	Resistance	R_{20}	mΩ/m	0.023	0.024	0.017	0.016	0.015	0.013
	Reactance	X_{20}	mΩ/m	0.023	0.029	0.019	0.022	0.017	0.019
	Impedance	Z_{20}	mΩ/m	0.033	0.037	0.026	0.027	0.023	0.023
of the conducting paths at 50 Hz and final heating of busbars	Resistance	R_1	mΩ/m	0.030	0.029	0.021	0.020	0.018	0.016
	Reactance	X_1	mΩ/m	0.024	0.029	0.019	0.022	0.017	0.019
	Impedance	Z_1	mΩ/m	0.038	0.041	0.029	0.030	0.025	0.025
of the conducting paths for 4-pole systems under fault conditions acc. to EN 61439-6	Resistance	R_F	mΩ/m	0.075	0.056	0.055	0.041	0.049	0.038
	Reactance	X_F	mΩ/m	0.109	0.119	0.083	0.093	0.086	0.080
	Impedance	Z_F	mΩ/m	0.132	0.131	0.099	0.101	0.099	0.088
Zero impedance									
for 4-pole systems acc. to DIN EN 60909-0 / VDE 0102	-	R_0	mΩ/m	0.180	0.120	0.126	0.090	0.110	0.075
	-	X_0	mΩ/m	0.154	0.153	0.097	0.119	0.086	0.087
	-	Z_0	mΩ/m	0.237	0.194	0.159	0.149	0.140	0.115

System-specific data				LDA641.	LDA642.	LDA741.	LDA742.	LDA841.	LDA842.
				PEN=½L	PEN=L	PEN=½L	PEN=L	PEN=½L	PEN=L
Short-circuit rating									
Rated short-time withstand current	rms value t = 0.1 s	I_{cw}	kA	130	130	130	130	130	130
	rms value t = 1 s	I_{cw}	kA	116	116	116	116	116	116
Rated impulse withstand current	Peak value	I_{pk}	kA	286	286	286	286	286	286

Conductor material				Aluminium					
No. of busbars				7	8	7	8	7	8
Conductor cross section	L1, L2, L3	A	mm²	1412	1412	2044	2044	2464	2464
	PEN	A	mm²	706	1412	1022	2044	1232	2464
Fire load									
			KWh/m	10.87	11.99	10.87	11.99	10.87	11.99
			KWh	12.04	12.96	12.04	12.96	12.04	12.96
Max. fixing distances for conventional mechanical load			m	5	5	5	5	5	5

1) Dependent upon degree of protection and laying method

2) Incl. height rises ≤ 1.3 m

4.3.3 LDA.6.. trunking units (5-pole, aluminium)

System-specific data				LDA162.	LDA262.	LDA362.	LDA461.	LDA462.	LDA561.	LDA562.
				N=L	N=L	N=L	N=½L	N=L	N=½L	N=L
Rated current I_{nA} 1)										
Horizontal / edgewise 2)	IP34	I_{nA}	A	1100	1250	1600	2000	2000	2500	2500
	IP54	I_{nA}	A	900	1000	1200	1500	1500	1800	1800
Vertical	IP34	I_{nA}	A	950	1100	1250	1700	1700	2100	2100
	IP54	I_{nA}	A	900	1000	1200	1500	1500	1800	1800
Horizontal / flat	IP31 / IP54	I_{nA}	A	700	750	1000	1200	1200	1700	1700
Impedance										
of the conducting paths at 50 Hz and + 20 °C busbar temperature	Resistance	R_{20}	mΩ/m	0.061	0.048	0.048	0.030	0.030	0.027	0.029
	Reactance	X_{20}	mΩ/m	0.052	0.043	0.043	0.031	0.031	0.026	0.033
	Impedance	Z_{20}	mΩ/m	0.079	0.064	0.064	0.043	0.043	0.038	0.044
of the conducting paths at 50 Hz and final heating of busbars	Resistance	R_1	mΩ/m	0.072	0.054	0.059	0.036	0.036	0.032	0.036
	Reactance	X_1	mΩ/m	0.051	0.043	0.042	0.031	0.031	0.026	0.031
	Impedance	Z_1	mΩ/m	0.088	0.069	0.072	0.047	0.047	0.042	0.047
of the conducting paths for 5-pole systems (PE) under fault conditions acc. to EN 61439-6	Resistance	R_F	mΩ/m	0.162	0.108	0.108	0.109	0.109	0.101	0.089
	Reactance	X_F	mΩ/m	0.231	0.201	0.201	0.126	0.128	0.133	0.133
	Impedance	Z_F	mΩ/m	0.283	0.228	0.228	0.168	0.168	0.167	0.160
of the conducting paths for 5-pole systems (N) under fault conditions acc. to EN 61439-6	Resistance	R_F	mΩ/m	0.147	0.108	0.108	0.112	0.067	0.092	0.067
	Reactance	X_F	mΩ/m	0.197	0.173	0.173	0.108	0.109	0.102	0.113
	Impedance	Z_F	mΩ/m	0.246	0.204	0.204	0.155	0.128	0.137	0.131
Zero impedance										
for 5-pole systems (PE) acc. to DIN EN 60909-0 / VDE 0102	-	R_0	mΩ/m	0.310	0.240	0.240	0.250	0.250	0.238	0.264
	-	X_0	mΩ/m	0.415	0.200	0.200	0.235	0.235	0.211	0.272
	-	Z_0	mΩ/m	0.518	0.295	0.295	0.343	0.343	0.318	0.379
for 5-pole systems (N) acc. to DIN EN 60909-0 / VDE 0102	-	R_0	mΩ/m	0.293	0.231	0.231	0.267	0.146	0.195	0.136
	-	X_0	mΩ/m	0.260	0.219	0.219	0.144	0.144	0.135	0.161
	-	Z_0	mΩ/m	0.392	0.319	0.319	0.303	0.205	0.237	0.211

System-specific data				LDA162.	LDA262.	LDA362.	LDA461.	LDA462.	LDA561.	LDA562.
				N=L	N=L	N=L	N=½L	N=L	N=½L	N=L
Short-circuit rating										
Rated short-time withstand current	rms value t = 0.1 s	I_{cw}	kA	55	70	80	110	110	125	125
	rms value t = s	I_{cw}	kA	40	55	58	80	80	110	110
Rated impulse withstand current	Peak value	I_{pk}	kA	121	154	176	242	242	275	275
Rated short-time withstand current of the 5th conductor	rms value t = 0.1 s	I_{cw}	kA	33	42	48	66	66	75	75
	rms value t = 1 s	I_{cw}	kA	24	33	35	48	48	66	66

Conductor material				Aluminium						
No. of busbars				5	5	5	8	9	8	9
Conductor cross section	L1, L2, L3	A	mm²	530	706	706	1060	1060	1232	1232
	N	A	mm²	530	706	706	530	1060	616	1232
	PE	A	mm²	530	706	706	530	530	616	616
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
Max. fixing distances for conventional mechanical load	-	-	m	6	6	6	5	5	5	5

1) Dependent upon degree of protection and laying method

2) Incl. height rises ≤ 1.3 m

System-specific data				LDA661.	LDA662.	LDA761.	LDA762.	LDA861.	LDA862.
				N=½L	N=L	N=½L	N=L	N=½L	N=L
Rated current I_{nA}[1)]									
Horizontal / edgewise[2)]	IP34	I_{nA}	A	3000	3000	3700	3700	4000	4000
	IP54	I_{nA}	A	2000	2000	2400	2400	2700	2700
Vertical	IP34	I_{nA}	A	2300	2300	2800	2800	3400	3400
	IP54	I_{nA}	A	2000	2000	2400	2400	2700	2700
Horizontal / flat	IP31 / IP54	I_{nA}	A	1800	1800	2200	2200	2350	2350
Impedance									
of the conducting paths at 50 Hz and +20 °C busbar temperature	Resistance	R_{20}	mΩ/m	0.023	0.023	0.017	0.018	0.014	0.015
	Reactance	X_{20}	mΩ/m	0.024	0.029	0.019	0.025	0.022	0.021
	Impedance	Z_{20}	mΩ/m	0.033	0.037	0.026	0.030	0.026	0.026
of the conducting paths at 50 Hz and final heating of busbars	Resistance	R_1	mΩ/m	0.029	0.030	0.020	0.021	0.017	0.018
	Reactance	X_1	mΩ/m	0.024	0.031	0.020	0.025	0.021	0.021
	Impedance	Z_1	mΩ/m	0.037	0.043	0.028	0.033	0.027	0.027
of the conducting paths for 5-pole systems (PE) under fault conditions acc. to EN 61439-6	Resistance	R_F	mΩ/m	0.092	0.084	0.068	0.065	0.055	0.056
	Reactance	X_F	mΩ/m	0.134	0.133	0.110	0.114	0.102	0.105
	Impedance	Z_F	mΩ/m	0.163	0.157	0.129	0.131	0.116	0.119
of the conducting paths for 5-pole systems (N) under fault conditions acc. to EN 61439-6	Resistance	R_F	mΩ/m	0.076	0.057	0.053	0.042	0.049	0.037
	Reactance	X_F	mΩ/m	0.106	0.113	0.080	0.091	0.084	0.086
	Impedance	Z_F	mΩ/m	0.130	0.127	0.096	0.100	0.097	0.094
Zero impedance									
for 5-pole systems (PE) acc. to DIN EN 60909-0 / VDE 0102	-	R_0	mΩ/m	0.217	0.212	0.163	0.166	0.145	0.146
	-	X_0	mΩ/m	0.202	0.263	0.175	0.220	0.196	0.196
	-	Z_0	mΩ/m	0.297	0.338	0.240	0.275	0.243	0.244
for 5-pole systems (N) acc. to DIN EN 60909-0 / VDE 0102	-	R_0	mΩ/m	0.181	0.122	0.130	0.089	0.115	0.079
	-	X_0	mΩ/m	0.128	0.155	0.102	0.093	0.095	0.100
	-	Z_0	mΩ/m	0.221	0.198	0.165	0.129	0.149	0.127
Short-circuit rating									
Rated short-time withstand current	rms value t = 0.1 s	I_{cw}	kA	130	130	130	130	130	130
	rms value t = 1 s	I_{cw}	kA	116	116	116	116	116	116
Rated impulse with-stand current	Peak value	I_{pk}	kA	286	286	286	286	286	286
Rated short-time withstand current of the 5th conductor	rms value t = 0.1 s	I_{cw}	kA	78	78	78	78	78	78
	rms value t = 1 s	I_{cw}	kA	70	70	70	70	70	70

System-specific data				**LDA661.**	**LDA662.**	**LDA761.**	**LDA762.**	**LDA861.**	**LDA862.**
				N=½L	**N=L**	**N=½L**	**N=L**	**N=½L**	**N=L**
Conductor material				Aluminium					
No. of busbars				8	9	8	9	8	9
Conductor cross-section	L1, L2, L3	A	mm^2	1412	1412	2044	2044	2464	2464
	N	A	mm^2	706	1412	1022	2044	1232	2464
	PE	A	mm^2	706	706	1022	1022	1232	1232
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
Max. fixing distances for conventional mechanical load	-	-	m	5	5	5	5	5	5

1) Dependent upon degree of protection and laying method

2) Incl. height rises ≤ 1.3 m

4.3.4 LDC.4.. trunking units (4-pole, copper)

System-specific data				**LDC242.**	**LDC342.**	**LDC641.**	**LDC642.**
				PEN=L	**PEN=L**	**PEN=½L**	**PEN=L**
Rated current I_{nA}[1]							
Horizontal / edgewise[2]	IP34	I_{nA}	A	2000	2600	3400	3400
	IP54	I_{nA}	A	1600	2000	2600	2600
Vertical	IP34	I_{nA}	A	1650	2100	2700	2700
	IP54	I_{nA}	A	1600	2000	2600	2600
Horizontal / flat	IP31 / IP54	I_{nA}	A	1200	1550	2000	2000
Impedance							
of the conducting paths at 50 Hz and + 20 °C busbar temperature	Resistance	R_{20}	mΩ/m	0.030	0.026	0.015	0.015
	Reactance	X_{20}	mΩ/m	0.042	0.035	0.026	0.026
	Impedance	Z_{20}	mΩ/m	0.052	0.043	0.030	0.030
of the conducting paths at 50 Hz and final heating of busbars	Resistance	R_1	mΩ/m	0.037	0.028	0.017	0.018
	Reactance	X_1	mΩ/m	0.042	0.036	0.026	0.027
	Impedance	Z_1	mΩ/m	0.056	0.046	0.031	0.032
of the conducting paths for 4-pole systems under fault conditions acc. to EN 61439-6	Resistance	R_F	mΩ/m	0.075	0.056	0.048	0.037
	Reactance	X_F	mΩ/m	0.170	0.163	0.107	0.107
	Impedance	Z_F	mΩ/m	0.186	0.173	0.117	0.113
Zero impedance							
acc. to DIN EN 60909-0/VDE 0102		R_0	mΩ/m	0.144	0.114	0.116	0.079
		X_0	mΩ/m	0.199	0.225	0.124	0.130
		Z_0	mΩ/m	0.246	0.252	0.169	0.152
Short-circuit rating							
Rated short-time withstand current	rms value t = 0.1 s	I_{cw}	kA	80	80	130	130
	rms value t = 1 s	I_{cw}	kA	58	58	116	116
Rated impulse withstand current	Peak value	I_{pk}	kA	176	176	286	286

Conductor material				Copper			
No. of busbars				4	4	7	8
Conductor cross-section	L1, L2, L3	A	mm²	706	1022	1412	1412
	PEN	A	mm²	706	1022	706	1412
Fire load							
Trunking unit without tap-off point	-	-	KWh/m	7.09	7.09	10.87	11.99
per tap-off point	-	-	KWh	8.32	8.32	12.04	12.96
Max. fixing distances for conventional mechanical load	-	-	m	5	4	4	4

[1] Dependent upon degree of protection and laying method

[2] Incl. height rises ≤ 1.3 m

System-specific data				LDC741.	LDC742.	LDC841.	LDC842.
				PEN=½L	PEN=L	PEN=½L	PEN=L
Rated current I_{nA} 1)							
Horizontal / edgewise 2)	IP34	I_{nA}	A	4400	4400	5000	5000
	IP54	I_{nA}	A	3200	3200	3600	3600
Vertical	IP34	I_{nA}	A	3500	3500	4250	4250
	IP54	I_{nA}	A	3200	3200	3600	3600
Horizontal / flat	IP31 / IP54	I_{nA}	A	2600	2600	3000	3000
Impedance							
of the conducting paths at 50 Hz and + 20 °C busbar temperature	Resistance	R_{20}	mΩ/m	0.012	0.008	0.008	0.009
	Reactance	X_{20}	mΩ/m	0.023	0.021	0.021	0.018
	Impedance	Z_{20}	mΩ/m	0.026	0.024	0.022	0.020
of the conducting paths at 50 Hz and final heating of busbars	Resistance	R_1	mΩ/m	0.012	0.013	0.011	0.011
	Reactance	X_1	mΩ/m	0.023	0.022	0.020	0.018
	Impedance	Z_1	mΩ/m	0.026	0.025	0.023	0.021
of the conducting paths for 4-pole systems under fault conditions acc. to EN 61439-6	Resistance	R_F	mΩ/m	0.036	0.027	0.031	0.026
	Reactance	X_F	mΩ/m	0.090	0.086	0.073	0.080
	Impedance	Z_F	mΩ/m	0.097	0.090	0.079	0.085
Zero impedance							
acc. to DIN EN 60909-0/VDE 0102	-	R_0	mΩ/m	0.083	0.056	0.070	0.050
	-	X_0	mΩ/m	0.072	0.093	0.088	0.106
	-	Z_0	mΩ/m	0.109	0.109	0.113	0.118
Short-circuit rating							
Rated short-time withstand current	rms value t = 0.1 s	I_{cw}	kA	130	130	130	130
	rms value t = 1 s	I_{cw}	kA	116	116	116	116
Rated impulse withstand current	Peak value	I_{pk}	kA	286	286	286	286

Conductor material				Copper			
No. of busbars				7	8	7	8
Conductor cross-section	L1, L2, L3	A	mm²	2044	2044	2464	2464
	PEN	A	mm²	1022	2044	1232	2464
Fire load							
Trunking unit without tap-off point	-	-	KWh/m	10.87	11.99	10.87	11.99
per tap-off point	-	-	KWh	12.04	12.96	12.04	12.96
Max. fixing distances for conventional mechanical load	-	-	m	3	3	2	2

1) Dependent upon degree of protection and laying method

2) Incl. height rises ≤ 1.3 m

4.3.5 LDC.6.. trunking units (5-pole, copper)

System-specific data				LDC262.	LDC362.	LDC661.	LDC662.
				N=L	N=L	N=½L	PEN=L
Rated current I_{nA} [1]							
Horizontal / edgewise [2]	IP34	I_{nA}	A	2000	2600	3400	3400
	IP54	I_{nA}	A	1600	2000	2600	2600
Vertical	IP34	I_{nA}	A	1650	2100	2700	2700
	IP54	I_{nA}	A	1600	2000	2600	2600
Horizontal / flat	IP31 / IP54	I_{nA}	A	1200	1550	2000	2000
Impedance							
of the conducting paths at 50 Hz and + 20 °C busbar temperature	Resistance	R_{20}	mΩ/m	0.036	0.029	0.015	0.017
	Reactance	X_{20}	mΩ/m	0.043	0.037	0.027	0.027
	Impedance	Z_{20}	mΩ/m	0.056	0.047	0.031	0.032
of the conducting paths at 50 Hz and final heating of busbars	Resistance	R_1	mΩ/m	0.037	0.031	0.017	0.018
	Reactance	X_1	mΩ/m	0.043	0.038	0.028	0.028
	Impedance	Z_1	mΩ/m	0.057	0.049	0.033	0.034
of the conducting paths for 5-pole systems (PE) under fault conditions acc. to EN 61439-6	Resistance	R_F	mΩ/m	0.081	0.060	0.062	0.058
	Reactance	X_F	mΩ/m	0.204	0.186	0.139	0.124
	Impedance	Z_F	mΩ/m	0.220	0.195	0.153	0.137
of the conducting paths for 5-pole systems (N) under fault conditions acc. to EN 61439-6	Resistance	R_F	mΩ/m	0.078	0.059	0.048	0.037
	Reactance	X_F	mΩ/m	0.193	0.149	0.110	0.105
	Impedance	Z_F	mΩ/m	0.208	0.160	0.120	0.112
Zero impedance							
for 5-pole systems (PE) acc. to DIN EN 60909-0 / VDE 0102	-	R_0	mΩ/m	0.179	0.134	0.149	0.149
	-	X_0	mΩ/m	0.387	0.357	0.238	0.248
	-	Z_0	mΩ/m	0.426	0.381	0.281	0.289
for 5-pole systems (N) acc. to DIN EN 60909-0 / VDE 0102	-	R_0	mΩ/m	0.150	0.110	0.119	0.080
	-	X_0	mΩ/m	0.189	0.180	0.145	0.135
	-	Z_0	mΩ/m	0.241	0.211	0.187	0.157
Short-circuit rating							
Rated short-time withstand current	rms value t = 0.1 s	I_{cw}	kA	80	80	130	130
	rms value t = 1 s	I_{cw}	kA	58	58	116	116
Rated impulse withstand current	Peak value	I_{pk}	kA	176	176	286	286
Rated short-time withstand current of the 5th conductor	rms value t = 0.1 s	I_{cw}	kA	48	48	78	78
	rms value t = 1 s	I_{cw}	kA	35	35	70	70

Conductor material				Copper			
No. of busbars				5	5	8	9
Conductor cross-section	L1, L2, L3	A	mm²	706	1022	1412	1412
	N	A	mm²	706	1022	706	1412
	PE	A	mm²	706	1022	706	706

System-specific data				LDC262.	LDC362.	LDC661.	LDC662.
				N=L	N=L	N=½L	PEN=L
Fire load							
Trunking unit without tap-off point	-	-	KWh/m	7.29	7.29	10.87	11.99
per tap-off point	-	-	KWh	8.32	8.32	12.04	12.96
Max. fixing distances for conventional mechanical load	-	-	m	5	4	4	4

1) Dependent upon degree of protection and laying method

2) Incl. height rises ≤ 1.3 m

System-specific data				LDC761.	LDC762.	LDC861.	LDC862.
				N=½L	N=L	N=½L	N=L
Rated current I_{nA} 1)							
Horizontal / edgewise 2)	IP34	I_{nA}	A	4400	4400	5000	5000
	IP54	I_{nA}	A	3200	3200	3600	3600
Vertical	IP34	I_{nA}	A	3500	3500	4250	4250
	IP54	I_{nA}	A	3200	3200	3600	3600
Horizontal / flat	IP31 / IP54	I_{nA}	A	2600	2600	3000	3000
Impedance							
of the conducting paths at 50 Hz and + 20 °C busbar temperature	Resistance	R_{20}	mΩ/m	0.011	0.014	0.012	0.012
	Reactance	X_{20}	mΩ/m	0.023	0.021	0.018	0.020
	Impedance	Z_{20}	mΩ/m	0.025	0.025	0.022	0.023
of the conducting paths at 50 Hz and final heating of busbars	Resistance	R_1	mΩ/m	0.013	0.015	0.013	0.013
	Reactance	X_1	mΩ/m	0.024	0.022	0.020	0.020
	Impedance	Z_1	mΩ/m	0.027	0.027	0.024	0.024
of the conducting paths for 5-pole systems (PE) under fault conditions acc. to EN 61439-6	Resistance	R_F	mΩ/m	0.048	0.050	0.045	0.048
	Reactance	X_F	mΩ/m	0.118	0.133	0.123	0.119
	Impedance	Z_F	mΩ/m	0.127	0.142	0.131	0.128
of the conducting paths for 5-pole systems (N) under fault conditions acc. to EN 61439-6	Resistance	R_F	mΩ/m	0.038	0.027	0.031	0.025
	Reactance	X_F	mΩ/m	0.092	0.089	0.082	0.079
	Impedance	Z_F	mΩ/m	0.100	0.093	0.088	0.083
Zero impedance							
for 5-pole systems (PE) acc. to DIN EN 60909-0 / VDE 0102	-	R_0	mΩ/m	0.116	0.100	0.103	0.103
	-	X_0	mΩ/m	0.186	0.216	0.188	0.184
	-	Z_0	mΩ/m	0.219	0.238	0.214	0.211
for 5-pole systems (N) acc. to DIN EN 60909-0 / VDE 0102	-	R_0	mΩ/m	0.087	0.058	0.072	0.050
	-	X_0	mΩ/m	0.105	0.112	0.093	0.091
	-	Z_0	mΩ/m	0.137	0.126	0.118	0.104

System-specific data				**LDC761.**	**LDC762.**	**LDC861.**	**LDC862.**
				N=½L	**N=L**	**N=½L**	**N=L**
Short-circuit rating							
Rated short-time withstand current	rms value t = 0.1 s	I_{cw}	kA	130	130	130	130
	rms value t = 1 s	I_{cw}	kA	116	116	116	116
Rated impulse withstand current	Peak value	I_{pk}	kA	286	286	286	286
Rated short-time withstand current of the 5th conductor	rms value t = 0.1 s	I_{cw}	kA	78	78	78	78
	rms value t = 1 s	I_{cw}	kA	70	70	70	70

Conductor material				Copper			
No. of busbars				8	9	8	9
Conductor cross-section	L1, L2, L3	A	mm²	2044	2044	2464	2464
	N	A	mm²	1022	2044	1232	2464
	PE	A	mm²	1022	1022	1232	1232
Fire load							
Trunking unit without tap-off point	-	-	KWh/m	10.87	11.99	10.87	11.99
per tap-off point	-	-	KWh	12.04	12.96	12.04	12.96
Max. fixing distances for conventional mechanical load	-	-	m	3	3	2	2

1) Dependent upon degree of protection and laying method

2) Incl. height rises ≤ 1.3 m

4.3.6 Feeder units

Busbar connection units for non-Siemens distribution boards, recommended cross-sections per conductor

	Recommended conductor cross-section per conductor [mm²]	Compatible LDA / LDC system
LDA2420	CU 2 x 60 x 10	LDA142. and LDA242.
LDA2620	CU 2 x 60 x 10	LDA162. and LDA262.
LDA3420	CU 100 x 15	LDA342.
LDA3620	CU 100 x 15	LDA362.
LDA5410	CU 2 x 60 x 10	LDA441. and LDA541.
LDA5610	CU 2 x 60 x 10	LDA461. and LDA561.
LDA7410	CU 2 x 100 x 10	LDA641. and LDA741.
LDA7610	CU 2 x 100 x 10	LDA661. and LDA761.
LDA8410	CU 4 x 100 x 12	LDA841.
LDA8610	CU 4 x 100 x 12	LDA861.
LDA5420	CU 2 x 60 x 10	LDA442. and LDA542.
LDA5620	CU 2 x 60 x 10	LDA462. and LDA562.
LDA7420	CU 2 x 100 x 10	LDA642. and LDA742.
LDA7620	CU 2 x 100 x 10	LDA662. and LDA762.
LDA8420	CU 4 x 100 x 12	LDA842.
LDA8620	CU 4 x 100 x 12	LDA862.
LDC2420	CU 100 x 15	LDC241.
LDC2620	CU 100 x 15	LDC262.
LDC3420	CU 100 x 15	LDC342.
LDC3620	CU 100 x 15	LDC362.
LDC6410	CU 2 x 100 x 10	LDC641.
LDC6420	CU 2 x 100 x 10	LDC642.
LDC6610	CU 2 x 100 x 10	LDC661
LDC6620	CU 2 x 100 x 10	LDC662.
LDC7410	CU 4 x 100 x 12	LDC741.
LDC7420	CU 4 x 100 x 12	LDC742.
LDC7610	CU 4 x 100 x 12	LDC761.
LDC7620	CU 4 x 100 x 12	LDC762.
LDC8410	CU 4 x 120 x 12	LDC841.
LDC8420	CU 4 x 120 x 12	LDC842.
LDC8610	CU 4 x 120 x 12	LDC861.
LDC8620	CU 4 x 120 x 12	LDC862.

4.3.7 Tap-off units with fuse switch disconnector

System-specific data							
Standards and regulations		IEC / EN 61439-1 and -6					
Resistance to extreme climates		Damp heat, constant, acc. to IEC 60068-2-78 Damp heat, cyclic, acc. to IEC 60068-2-30					
Degree of protection		IP30 standard, IP54 with retrofit kit					
Ambient temperature min. / max. / 24-hour average	°C	–5 / 40 / 35					
Rated insulation voltage U_i acc. to IEC / EN 61439-1 AC	V	400					
Overvoltage category / pollution degree		III/3					
Rated frequency	Hz	50 / 60[1)]					
Rated operating voltage U_e AC	V	400					
Typ LD-K-.AK./…….		31ST125	32ST125	3ST250	3ST400	3ST630
Fuse link		NH00	2 x NH00	NH1	NH2	NH3
Rated current I_{nc}		125	2 x 125	250	400	630
Max. rated current I_{max} of the fuse	A	125	2 x 125	250	400	630
Max. permissible operating current $I_{r\,max}$ with IP30	A	125	2 x 125	250	400	545
Max. permissible operating current $I_{r\,max}$ with IP54	A	125	2 x 100	200	315	520
Switching capacity of the installed fuse switch disconnector acc to EN 60947-3		AC-22 B	AC-22 B	AC-21 B	AC-22 B	AC-21 B
Short-circuit strength with fuse protection I_{cf} [2)]		80	80	80	80	80
Cable entries: • Entry on front without cable compartment • Entry on side with cable compartment						
Multi-core cable • Cable grommets (KT 4) for cable diameters from 14 to 68 mm		2	2	2	2	3
Single-core cable		Aluminium plate, undrilled for cable glands 10 × M50				
Bolted connection	mm	M8	M8	M10	M10	M10
L1, L2, L3	mm	min. 1 x 10	min. 1 x 10	min. 1 x 25	min. 1 x 25	min. 1 x 25
	mm	max. 1 x 95	max. 1 x 95	max. 1 x 150	max. 2 x 240	max. 2 x 240
N, PEN / PE	mm	min. 1 x 10	min. 1 x 10	min. 1 x 25	min. 1 x 25	min. 1 x 25
	mm	max. 1 x 95	max. 1 x 95	max. 1 x 150	max. 2 x 240	max. 2 x 240

System-specific data		
Colour of tap-off units		RAL 7035, light grey
Tap-off unit material		Sheet steel, zinc-plated and painted
Weights	kg	33

1) In accordance with EN 61439-1, a reduction to 95 % must be taken into account for currents > 800 A at a frequency of 60 Hz.

2) Fuses: IEC 269-1-2, NF EN 60269-1, NFC 63211, NFC 63210, VDE 0636-1, DIN 43620

4.3.8 Tap-off units resistant to accidental arcs and with fuse switch disconnector

			LD...		
Standards and regulations			IEC / EN 61439-1 and -6		
Resistance to extreme climates			Damp heat, constant, acc. to IEC 60068-2-78 Damp heat, cyclic, acc. to IEC 60068-2-30		
Degree of protection			IP54, IP40 (Version KS)		
Ambient temperature min. / max. / 24-hour average		°C	–5 / 40 / 35		
Rated insulation voltage U_i acc. to IEC / EN 61439-1	AC	V	400		
Overvoltage category / pollution degree			III/3		
Rated frequency		Hz	50		
Rated operating voltage U_e	AC	V	400		
Typ LD-K-.AK./…….			FSAM-250	FSAM-400	FSAM-630
Rated current I_{nc}		A	250	400	630
Max. rated current I_{max} of the fuse		A	250	400	630
Max. permissible operating current $I_{r\ max}$		A	230	400[1)]	540[2)]
Switching capacity of the installed fuse switch disconnector acc to EN 60947-3			AC 22 B	AC 22 B	AC 22 B
Short-circuit strength with fuse protection [3)]			110	110	110
Cable entries					
Multi-core cable with add-on cable compartment for cable entry from the side			2 cable grommets (KT 4) for cable diameters from 14 … 68 m	2 cable grommets (KT 4) for cable diameters from 14 … 68 m	2 cable grommets (KT 4) for cable diameters from 14 … 68 m
Single-core cable			Aluminium plate undrilled for cable diameters 21 … 35 mm	Aluminium plate with 5x M50 cable glands for cable diameters 21 … 35 mm	Aluminium plate with 5x M50 cable glands for cable diameters 21 … 35 mm
Conductor cross-sections (copper, bolted connection with cable lugs)					
L1, L2, L3		mm	1 x 25 to 1 x 300/2 x 240	1 x 25 to 1 x 300/2 x 240	1 x 25 to 1 x 300/2 x 240
N / PEN / PE		mm	1 x 25 to 1 x 300/2 x 240	1 x 25 to 1 x 300/2 x 240	1 x 25 to 1 x 300/2 x 240
Colour of tap-off units			RAL 7035, light grey		
Tap-off unit material			Sheet steel, zinc-plated and painted		
Weights		kg	45	69	75

1) For vertical installation of the tap-off units, a reduction by 5% is necessary (reduction factor 0.95)

2) For vertical installation of the tap-off units, a reduction by 12 % is necessary (reduction factor 0.88)

3) Fuses: IEC 269-1-2, NF EN 60269-1, NFC 63211, NFC 63210, VDE 0636-1, DIN 43620

4.3.9 Tap-off units with circuit-breaker

Size			**1**		**2**		**3**
Circuit breaker type			**VL160**	**VL250**	**VL400**	**VL630**	**VL1250**
Standards and regulations			IEC / EN 61439-1 and -6				
Resistance to extreme climates			Damp heat, constant, acc. to IEC 60068-2-78 Damp heat, cyclic, acc. to IEC 60068-2-30				
Degree of protection			IP54				
Ambient temperature		°C	–5 / 40 / 35 (min. / max. / 24-h average)				
Overvoltage category / pollution degree to DIN EN 61439-1			III/3				
Rated insulation voltage U_i acc. to IEC / EN 61439-1	AC	V	400				
Rated operating voltage U_e	AC	V	400				
Rated frequency		Hz	50 / 60[2)]				
Rated current I_{nc}		A	100, 125, 160	200, 250	315, 400	630	800, 1000, 1250
Max. permissible operating current $I_{r\ max}$			100[1)], 125[1)], 160[1)]	200[1)], 250[1)]	315[1)], 400[1)]	580[1)]	800, 1000, 1250[1)]
Switching capacity of the circuit breaker			H (70 kA) or L (100 kA)				L (100 kA)
Conditional rated short-circuit current I_{cc} (values for 690 V on request)		kA	70 or 100				100
Current setting of overload release							
AE design		A	40 … 100 64 … 160	80 … 200 100 … 250	126 … 315 160 … 400	252 … 630	400 … 1000 500 … 250
DC, EC design		A	80 … 100 100 … 125 125 … 160	160 … 200 200 … 250	215 … 315 320 … 400	500 … 630	-
Connections							
Cable entries							
Multi-core cable							
• Cable grommets			2 × KT 3		2 x KT 4		4 x KT 4
• Cable diameters		mm^2	14 … 54		14 … 68		14 … 68
Single-core cable							
• Aluminium plate undrilled, for cable glands			8 × M40		12 x M40		24 x M40
• Cable entry from the side			Yes		Yes		Yes

Size			**1**		**2**		**3**
Circuit breaker type			**VL160**	**VL250**	**VL400**	**VL630**	**VL1250**
Conductor cross-sections (copper)							
Connection system			Direct connection on the device		Tags		Cable connection system
Bolted connection			1 x M8	1 x M8	1 x M8	2 x M10[3)]	4 x M12[4)]
L1, L2, L3; N, PEN/PE	min.	mm^2	[5)]	[5)]	[5)]	[5)]	4 x (4) x 70
	max.	mm^2	[5)]	[5)]	[5)]	[5)]	4 x (4) x 240

Colour		RAL 7035 (light grey)				
Material		Sheet steel, zinc-plated / painted				
Weights	kg	-	37	58	61	107

1) For "suspended, bottom" installation of the tap-off units, a reduction by 10% is necessary (reduction factor 0.9).

2) In accordance with IEC / 61439-1, a reduction to 95 % must be taken into account for currents > 800 A at a frequency of 60 Hz.

3) For 2 cable lugs per conductor

4) For 4 cable lugs per conductor

5) In accordance with the valid standards

4.4 Weights

4.4.1 Trunking units

Trunking unit with aluminium conductors

The weights given are metre weights (kg/m) for trunking units without tap-off points in IP34 degree of protection. An additional 0.6 kg/m must be taken into account for degree of protection IP54. In the case of trunking units with tap-off points, an additional 7 kg per tap-off point must be taken into account.

	LDA1...	LDA2...	LDA3...	LDA4...	LDA5...	LDA6...	LDA7...	LDA8...
LDA.413	-	-	-	24.1	27.4	27.4	33.7	37.2
LDA.423	18.1	20.0	20.0	25.6	29.4	29.4	36.6	40.6
LDA.613	-	-		25.6	29.4	29.4	36.6	40.6
LDA.623	20.1	22.0	22.0	27.1	31.4	31.4	39.5	44.0

Trunking units with copper conductors

The weights given are metre weights (kg/m) for trunking units without tap-off points in IP34 degree of protection. In the case of trunking units with tap-off points, an additional 7 kg per tap-off point must be taken into account. An additional 0.6 kg/m must be taken into account for degree of protection IP54.

	LDC2...	LDC3...	LDC6...	LDC7...	LDC8...
LDC.413	-	-	60.3	82.0	100.2
LDC.423	38.8	51.2	67.0	91.8	112.6
LDC.613	-	-	67.0	91.8	112.6
LDC.623	45.5	61.0	73.7	101.6	125.0

4.5 Dimension drawings

Unless otherwise specified, all dimensions are in mm.

4.5.1 Trunking units

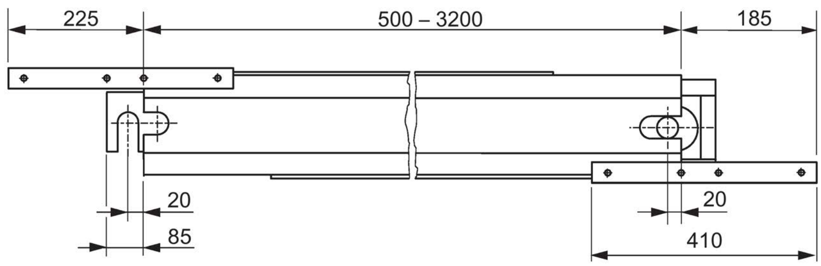


Figure 4-16 LDA(C)...-..., LDA(C)...-D-..., LDA(C)...-V-...

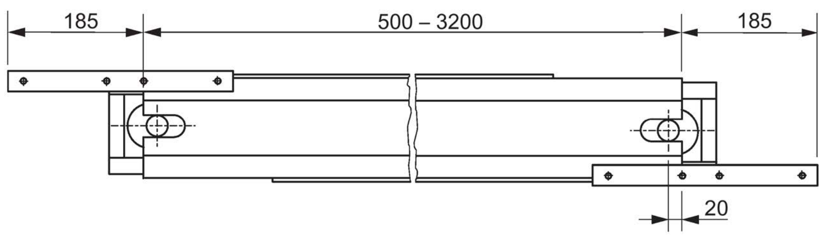
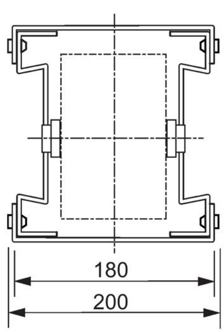
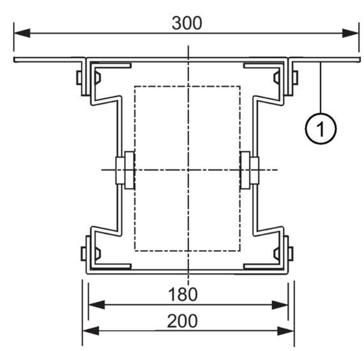


Figure 4-17 LDA(C)...-J-...

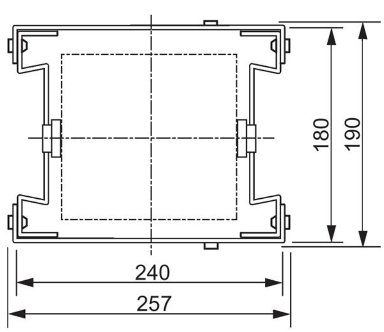


LDA(C)1... to LDA(C)3...

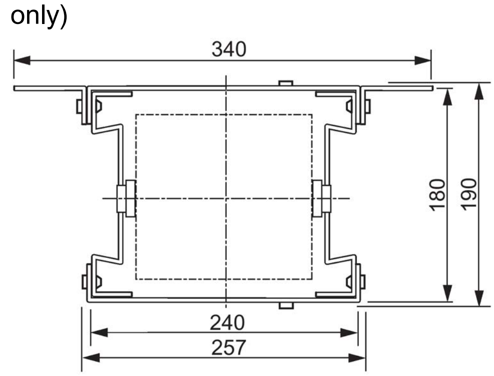


LDA(C)1...-K-... to LDA(C)3...-K-...

① Coding bracket (busbars with tap-off points only)

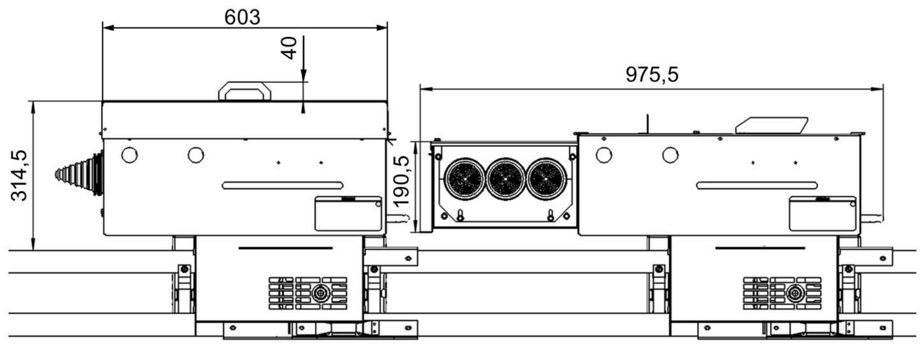


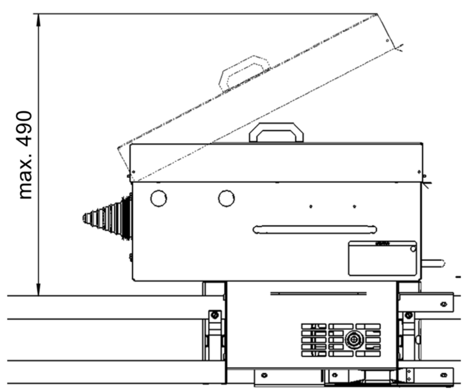
LDA(C)4... to LDA(C)8...



LDA(C)4...-K-... to LDA(C)8...-K-...

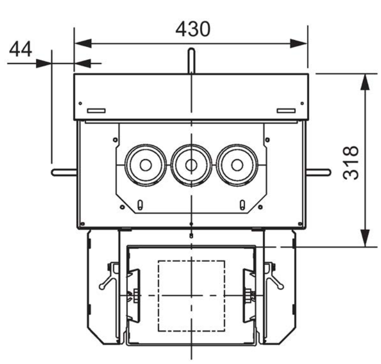
4.5.2 Tap-off units with fuse switch disconnector



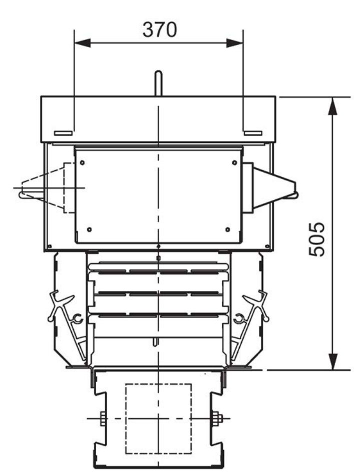


LD-K-.AK/.ST...
without cable compartment (cable entry from the front)

LD-K-.AK/.ST... +LD-KR
with cable compartment (cable entry from the side)



Tap-off unit mounted



Space requirements for mounting

4.5.3 Arc fault resistant tap-off units with fuse switch disconnector

LD-K-.AK./FSAM250

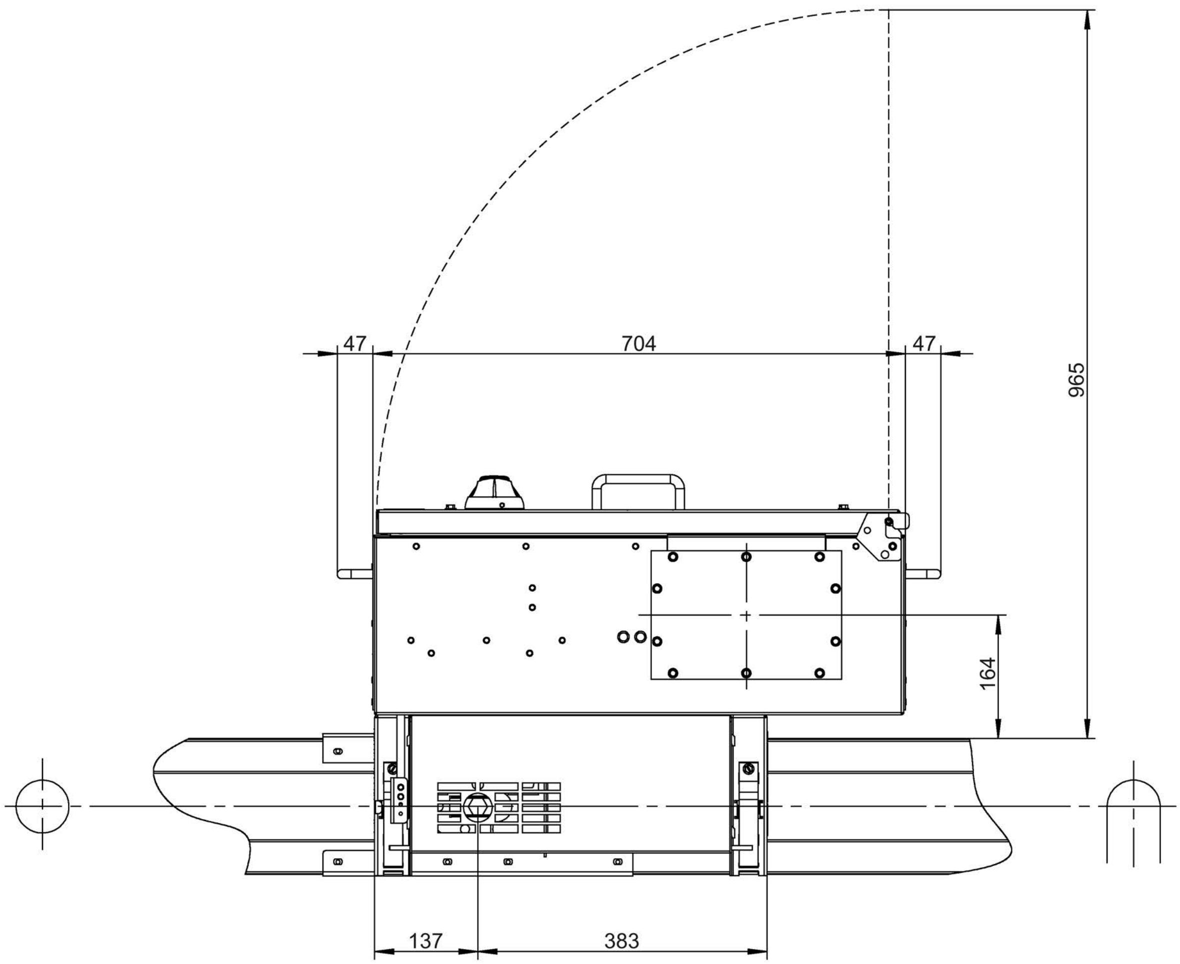
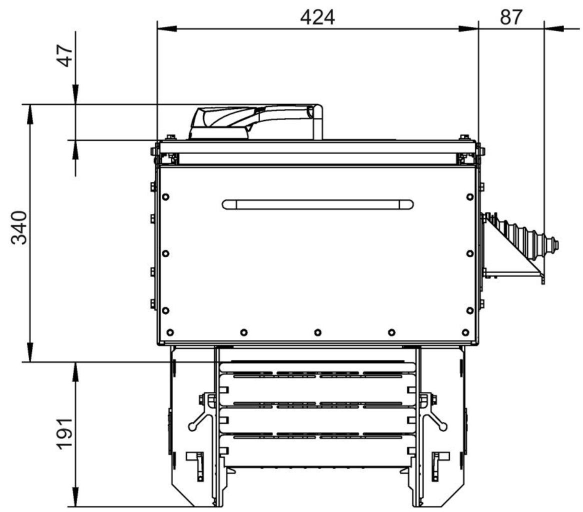
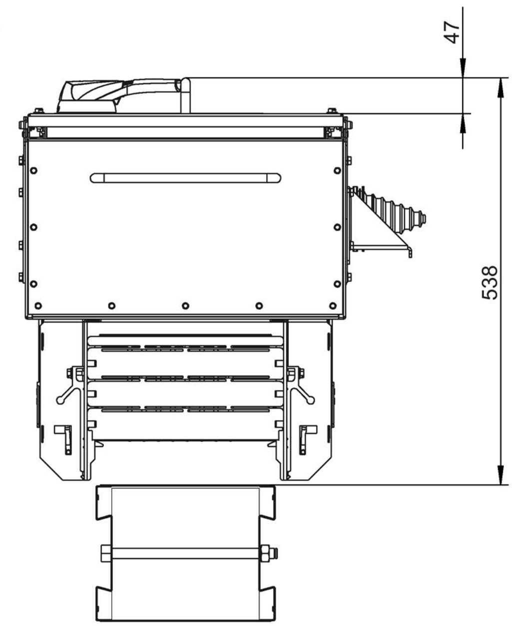


Figure 4-18 Tap-off units with LV HRC fuse switch disconnector



Tap-off unit mounted



Space requirements for mounting

4.5.4 Arc fault resistant tap-off units with fuse switch disconnector

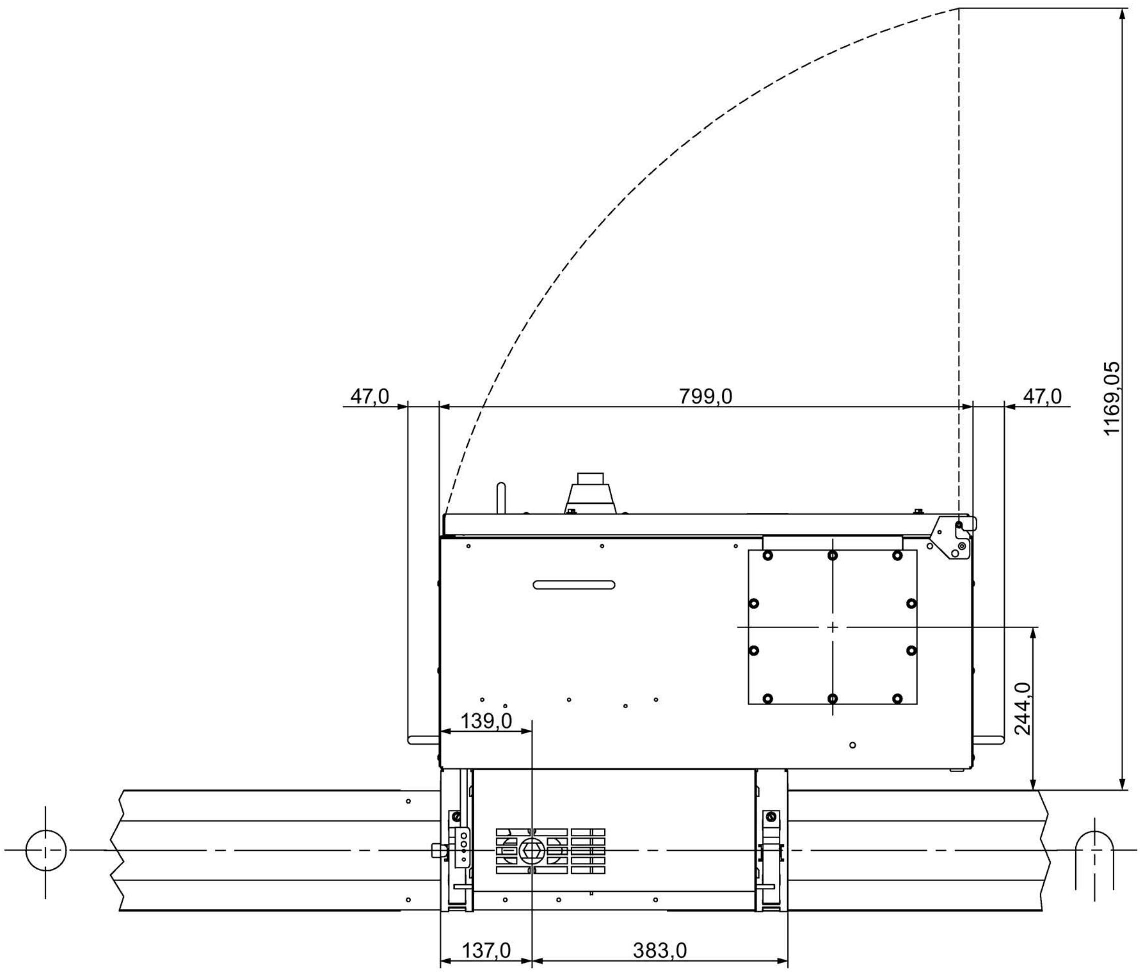
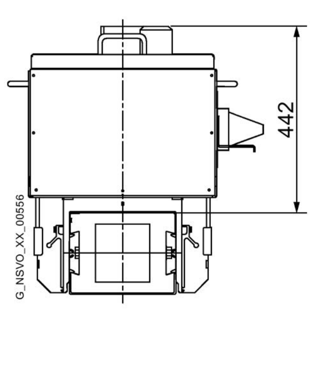
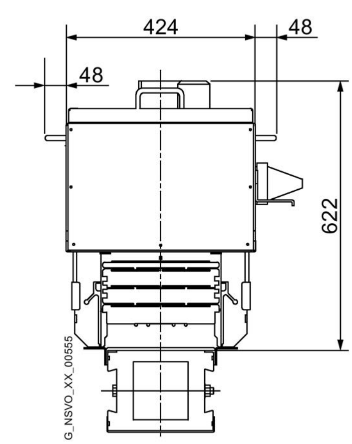


Figure 4-19 Tap-off units with fuse switch disconnector: LD-K-.AK./FSAM400(630)



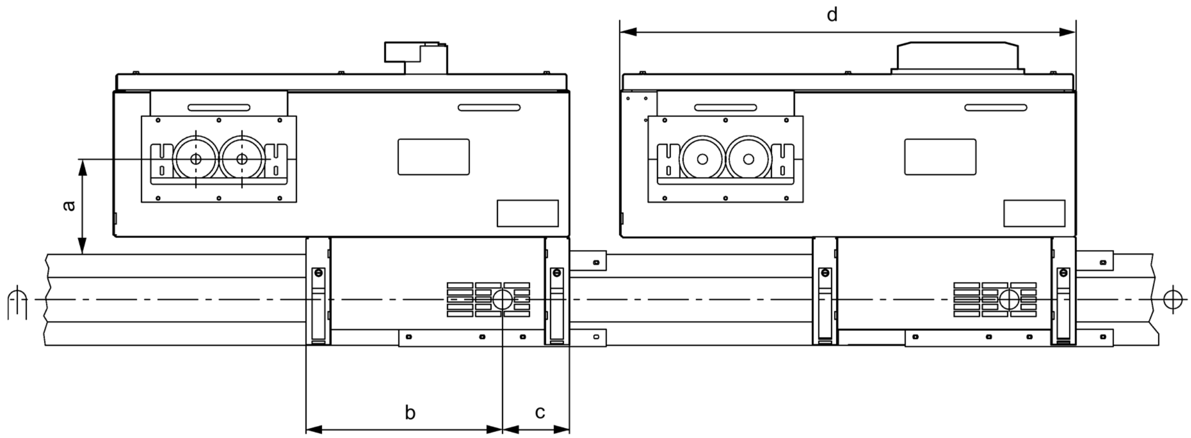
Tap-off unit mounted



Space requirements for mounting

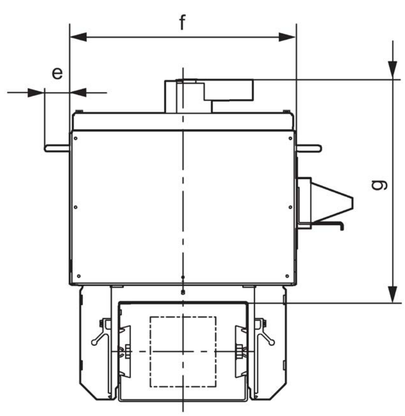
4.5.5 Tap-off units with circuit breaker

Sizes up to 250 A and 400 A to 630 A

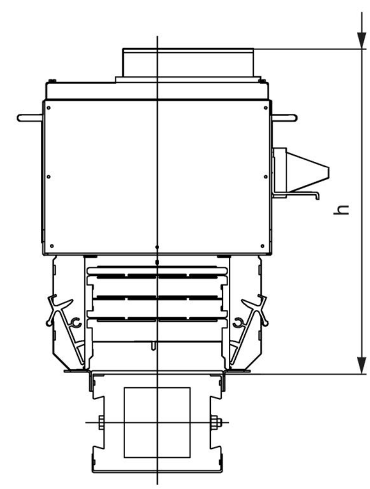


LD-K.AK./LSH-...-.

LD-K.AK/LSM-...-.



Tap-off unit mounted



Space requirements for mounting

	a	b	c	d	e	f	g	h
Size 1	158	317.5	136.5	600	47	424	410	559
Size 2	187	387.5	136.5	900	47	424	410	604

Tap-off units with SENTRON 3VL circuit breaker, sizes 800 A to 1250 A

LD-K.AK./LSH-.....-LS

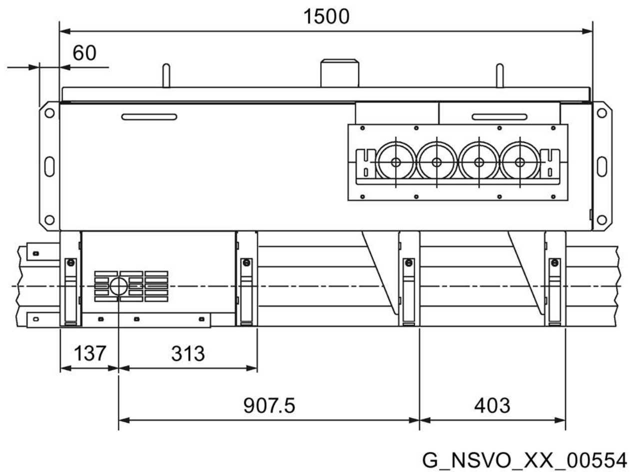
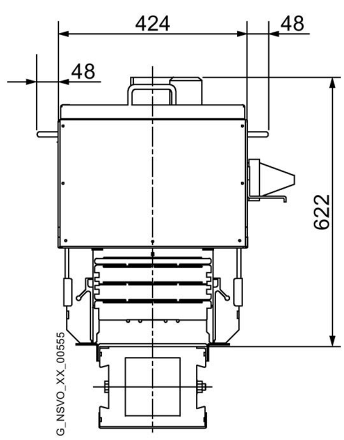
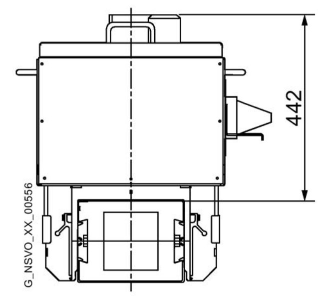


Figure 4-20 LD-K.AK./LSH-.....-LS





Tap-off units with circuit-breaker:	Tap-off units with circuit-breaker:
LD-K.AK./LSH-.....-LS space requirements for mounting	LD-K.AK./LSH-.....-LS tap-off unit mounted

LD-K.AK./LSM-.....-LS

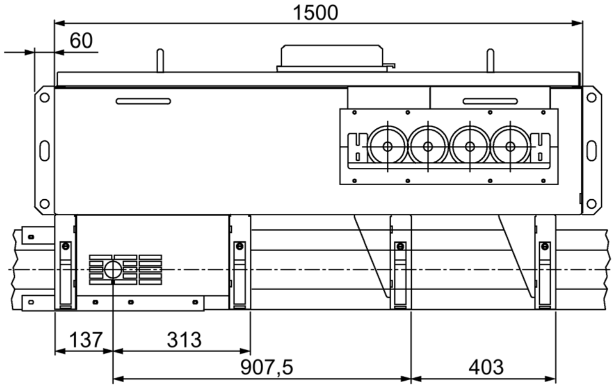
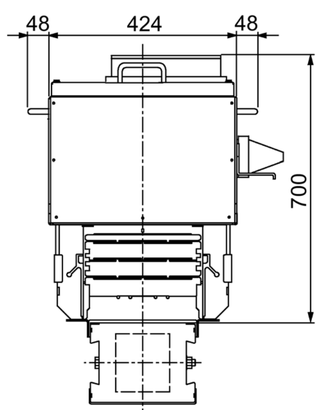
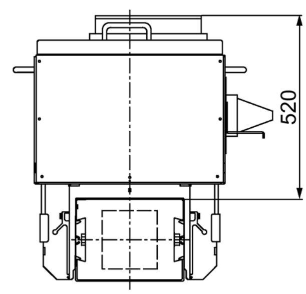


Figure 4-21 LD-K.AK./LSM-.....-LS



Tap-off units with circuit-breaker:

LD-K.AK./LSM-.....-LS space requirements for mounting

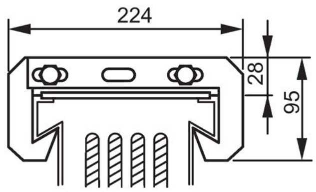


Tap-off units with circuit-breaker:

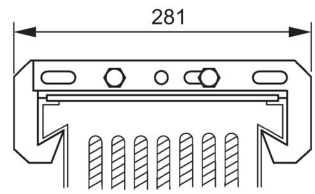
LD-K.AK./LSM-.....-LS tap-off unit mounted

4.5.6 Additional equipment

Suspension bracket for horizontal mounting

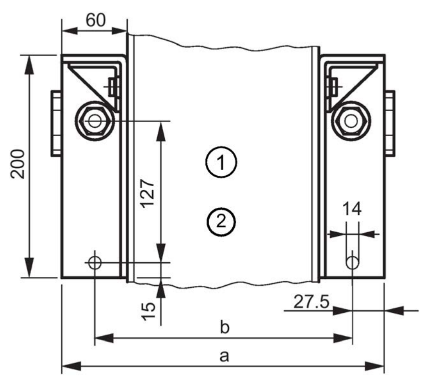


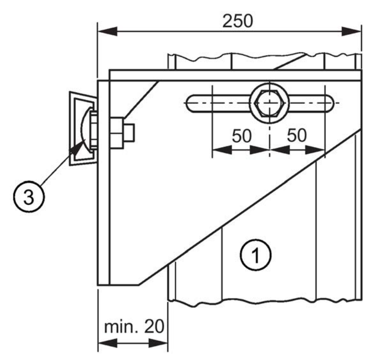
LD-B1



LD-B2

Fixing brackets for vertical mounting





LD-BV

① LD system

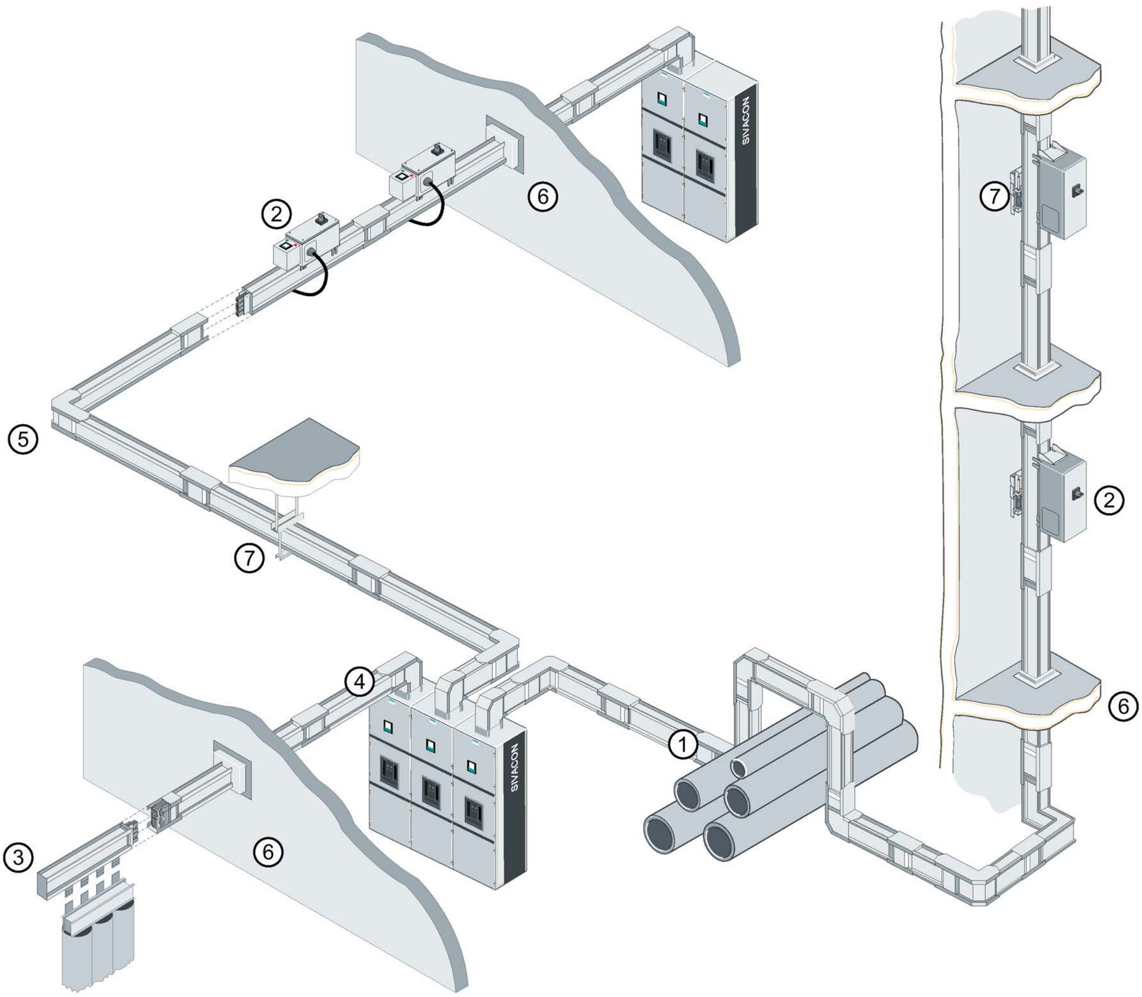
② Front

③ Site

Type	a [mm]	b [mm]
LDA1 … LDA3	300	245
LDC2 … LDC3	300	245
LDA4 … LDA8	357	302
LDC6 … LDC8	357	302

5 Planning with LI

5.1 System description



① Straight trunking units with and without tap-off points
② Tap-off units
③ Infeeds
④ Distribution board terminal boxes
⑤ Junction units
⑥ Fire protection
⑦ Additional equipment for installation

Figure 5-1 Overview of the LI-A, LI-C busbar trunking systems

The LI busbar trunking system is used for:

- Power transmission
- Power distribution

The system is characterised by a high degree of flexibility as it is not tied to a specific position and is particularly suitable for power distribution in multi-storey buildings. The high degree of protection up to IP55 and tap-off units up to 1250 A ensure reliable power supply in industrial applications with high power requirements.

5.2 System components

5.2.1 Preliminary technical descriptions for specifications

Basic description busbar trunking systems 800 A to 6300 A

Busbar trunking systems shall be supplied and installed as type-tested and ready-to-use low-voltage switchgear assemblies in accordance with IEC / EN 61439-1 and -6.

The following descriptions are part of the costing and contracts process. They must be considered when specifying individual systems and equipment, even if they are not subsequently referred to in more detail.

The busbar trunking systems must be suitable:

- For power transmission, e.g. between transformer and low-voltage main distribution board.
- For power distribution supplying an entire area
- For horizontal and vertical installation

The busbar trunking system must comprise standardized system components such as:

- Straight trunking units with and without tap-off points
- Feeder units for incoming transformer, distribution board and cable connection units
- Junction units with elbow, offset elbow, knee, offset knee, Z units and T units
- Tap-off units
- Accessories

All straight trunking units must be available in lengths up to 3 m ex-works. It is not permitted to set up flexible junction units and junction units using cable connections. Expansion units and fixed points must be planned as per requirements.

Tap-off units are connected to the tap-off openings on the trunking units as required. It must be possible to select the number and position of tap-off points.

If required, it must be possible to fit the busbar trunking system with an asbestos-free fireproof barrier for wall or ceiling mounting, that is tested to EN 1366-3 and that complies optionally with fire resistance class EI90 or EI120 in accordance with EN 13501.

If required, it must be possible to offer the busbar trunking system with functional endurance class E15, E30, E60 or E90 acc. to DIN 4102-12. Fire protection for functional endurance must be installed on-site by the installation engineer. The certificate for functional endurance must be included with the offer.

The enclosure consists of aluminium painted light grey (RAL 7035).

The individual system modules are connected by hanging a hook from a bolt and tightening a state-of-the-art maintenance-free bolt clamp. The torque of 50 Nm required for terminal connection must be indicated by shearing the outer part of the shear nut. If the shear nut is not tightened with 50 Nm, the cover of the terminal connection must not be put in place.

The busbars must be made of aluminium or copper and must be insulated along their entire length. The aluminium busbars are coated with nickel and tin, and the copper busbars are coated with tin. The moulded-plastic coating consists of Mylar or, optionally, a combination of epoxy resin and Mylar.

The conductor cross sections must not go below the values specified in the technical data.

5.3 Conformity and test certificates

The manufacturer of the busbar system must have in place and be able to prove compliance with a quality management system in accordance with EN ISO 9001.

Proof of compliance with the following requirements must be provided for the entire system in the form of certificates or declarations of conformity:

- Type test IEC / EN 61 439-1 and -6 (VDE 0660-600-1 and -6)
- Resistance to extreme climates IEC 60068-2 Part 1, Part 14, Part 30, Part 52, Part 61 and Part 78
- Fire protection, tested to EN 1366-3
- Functional endurance, tested to DIN 4102-12 (optional)
- Maintenance-free
- Silicone-free and halogen-free
- Suitable for sprinklers

Reliable proof of special additional characteristics of system components must be provided.

Technical data of the busbar trunking systems

Type		Value
Ambient temperature min. / max. / 24-hour average		-5 / +40 / +35 ° C
Degree of protection		IP55
Torque for joint block		50 ± 5 Nm
Busbar surface treatment		Insulated along entire length
Trunking unit material		Painted aluminium casing
Colour of trunking units		RAL 7035 (light grey)
Rated insulation voltage	AC	1000 V
Rated operating voltage	AC	Up to 1000 V for power transmission [1]
Rated operating voltage	AC	Up to 690 V for power distribution [1]
Rated frequency		50 / 60 Hz
Rated current		______ [2]
Rated short-time withstand current		
External conductor I_{CW} (1 s)		______ [2]
Neutral conductor I_{CW} (1 s)		______ [2]
5. Conductor I_{CW} (1 s)		______ [2]
Rated peak withstand current I_{pk}		______ [2]
Conductor material		Al / Cu [1]
No. of busbars		______ [2]
Conductor cross-section		
L1, L2, L3		______ [2]
N		______ [2]
PE (equivalent CU cross section)		______ [2]
Clean earth		______ [2]
Fire loads		
Trunking unit without tap-off point		______ 2)
Per tap-off point		0.98 kWh
Max. fixing distances		
Horizontal, edgewise		______ [2]
Horizontal, flat		2 m
Enclosure dimensions		______ [2]

[1] Please delete as appropriate.

[2] Enter data for selected systems. You will find the values in the technical specifications.

5.3.1 Type code

The basic components of the LI system are determined using a type code. The type is specified and selected on the basis of rated current, conductor material and system type or conductor configuration.

The following type code enables precise definition of the system.

Ordering type	LI	-					-		- ... -	

Conductor material	
Al	A
Cu	C

Insulation material	
Mylar foil	M
Epoxy hybrid[1]	E
No selection	N

Rated current I_{nA} [A]	
800 (Al only)	0800
1000	1000
1250	1250
1600	1600
2000	2000
2500	2500
3200	3200
4000	4000
5000	5000
6300 (Cu only)	6300

Configuration of the conductors	
L1 + L2 + L3 + PE[2]	3B
L1 + L2 + L3 + PEN[3]	4B
L1 + L2 + L3 + N + PE[2]	5B
L1 + L2 + L3 + N + N[4] + PE[2]	5C
L1 + L2 + L3 + N + PE[3] (PE bar 50 %)	5G[1]
L1 + L2 + L3 + N + PE[3] (PE bar 100 %)	5H
L1 + L2 + L3 + N + (PE)[5] + PE[2]	6B
L1 + L2 + L3 + N + N[4] + (PE)[5] + PE[2]	6C

Degree of protection	
IP00	00
IP40	40
IP55	55
IP66[6]	66

Busbar ends	
Hook - bolt	HB
Hook	H
Bolt	B

1) On request
2) PE conductor = enclosure
3) PE or PEN conductor = enclosure and additional busbar
4) An additional busbar doubles the cross section of the neutral conductor (200 %)
5) Separate PE conductor routed through additionally insulated busbar (clean earth)
6) For power transmission and interior installation

Figure 5-2 Type code of the LI system

Selection example

A rated current of 2500 A is calculated for a project. Aluminium shall be used as the conductor material, and Mylar as the insulation material. A 5-pole system has to be used. The cross section of the neutral conductor needs to be equal to the cross section of the phase conductor.

The following type is obtained:

LI-AM25005B

Sizes

Sizes are dependent upon rated current and conductor material. In total, there are ten sizes. Six sizes are set up as single systems and three as double systems for the version with aluminium and copper.

Single systems comprise one enclosure with between 3 and 6 aluminium or copper bars. Double systems have between 6 and 12 bars in two enclosures.

The precise number of bars is determined by the required conductor configuration.

Sizes (H x W), single system

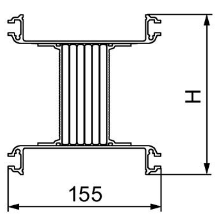


Figure 5-3 Sizes, single system SB

Table 5- 1 AL system

Height H [mm]	System
111	LI-A.0800
132	LI-A.1000
146	LI-A.1250
182	LI-A.1600
230	LI-A.2000
297	LI-A.2500

The width W is always 155 mm.

Table 5- 2 CU system

Height H [mm]	System
111	LI-C.1000
117	LI-C.1250
146	LI-C.1600
174	LI-C.2000
213	LI-C.2500
280	LI-C.3200

The width W is always 155 mm.

Sizes (H x W), double system

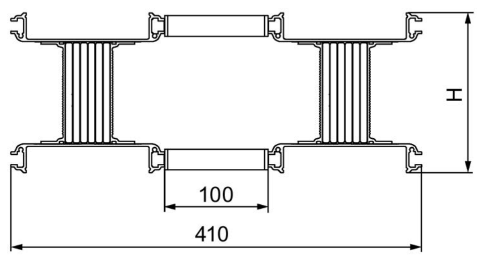


Figure 5-4 Sizes, double system DB

Table 5- 3 AL system

Height H [mm]	System
182	LI-A.3200
230	LI-A.4000
297	LI-A.5000

The width W is always 410 mm.

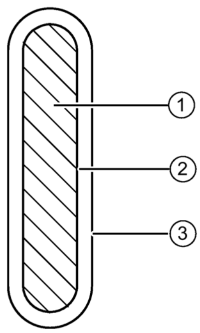
Table 5- 4 CU system

Height H [in mm]	System
174	LI-C.4000
213	LI-C.5000
280	LI-C.6300

The width W is always 410 mm.

Structure of the busbars

The bars in the LI busbar system are usually tinned and enclosed in a sleeve made of highly resistant insulating material. The LI-A system features aluminium conductors and the LI-C system copper conductors. In addition to tinning, aluminium bars are also coated with a layer of nickel.

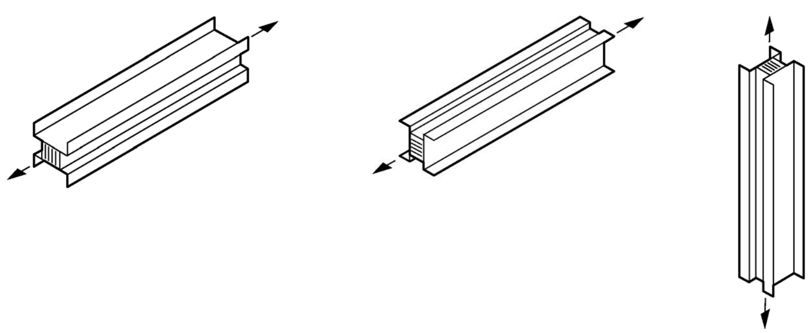


① Aluminium bar (LI-A), copper bar (LI-C)
② Nickel layer, tinning (LI-A), tinning (LI-C)
③ Insulating material sleeve with high heat resistance or epoxy resin coating and insulating material sleeve with high heat resistance (on request)

Figure 5-5 Structure of a busbar

Mounting positions and rated current

The sandwich design means that the current carrying capacity of the LI busbar system is not affected by the mounting position. This guarantees high flexibility for positioning the busbar runs. Current derating is not normally required for busbars in edgewise and flat positions on horizontal busbar runs or on rising main busbars (vertical busbar runs). Deviations for the horizontal flat mounting position are listed in the technical data of the respective system size.

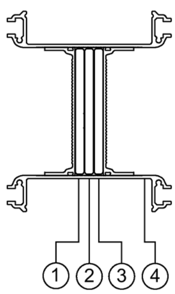
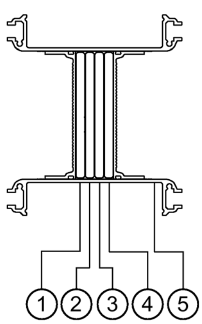
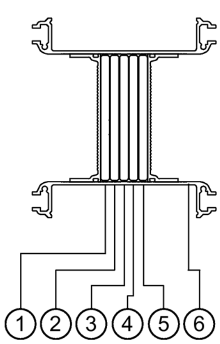
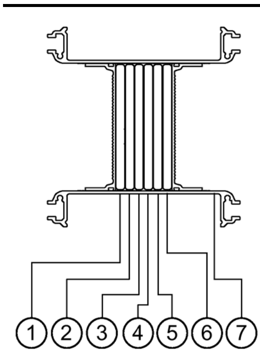


Horizontal busbar run, edgewise busbars	Horizontal busbar run, flat busbars	Vertical busbar run

5.4 Conductor configuration

The LI busbar system is available in eight different conductor configurations. The conductor configurations depend on the following:

- The line system configuration
- The size of the neutral and PE cross-section
- A possible additional insulated PE conductor (clean earth)

	System	Conductor configurations / bars							Enclosure
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	
	LI-...3B	L1	L2	L3	1)	-	-	-	is the PE conductor
	LI-...4B	PEN	L1	L2	L3	1)	-	-	Electrical connection between enclosure and PEN bus
	LI-...5B	N	L1	L2	L3	1)	-	-	is the PE conductor
	LI-...5C	N	N	L1	L2	L3	1)	-	is the PE conductor
	LI-...5G	N	L1	L2	L3	0.5 PE	1)	-	Electrical connection between enclosure and PE bus
	LI-...5H	N	L1	L2	L3	PE	1)	-	Electrical connection between enclosure and PE bus
	LI-...6B	N	L1	L2	L3	Clean earth	1)	-	is the PE conductor
	LI-...6C	N	N	L1	L2	L3	Clean earth	1)	is the PE conductor

1) Enclosure

5.4.1 Straight trunking units

Straight trunking units for horizontal installation without tap-off points

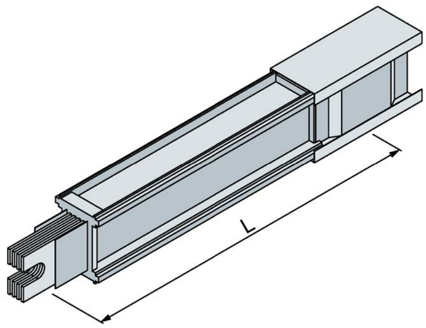


Figure 5-6 Without tap-off points

	Length	Type[1)]
Lengths	0.50 … 3.00 m	LI-......-L-...

1) Lengths L from 0.50 m to 3.00 m can be configured in 0.01 m intervals.

Straight trunking units for horizontal and vertical installation with tap-off points

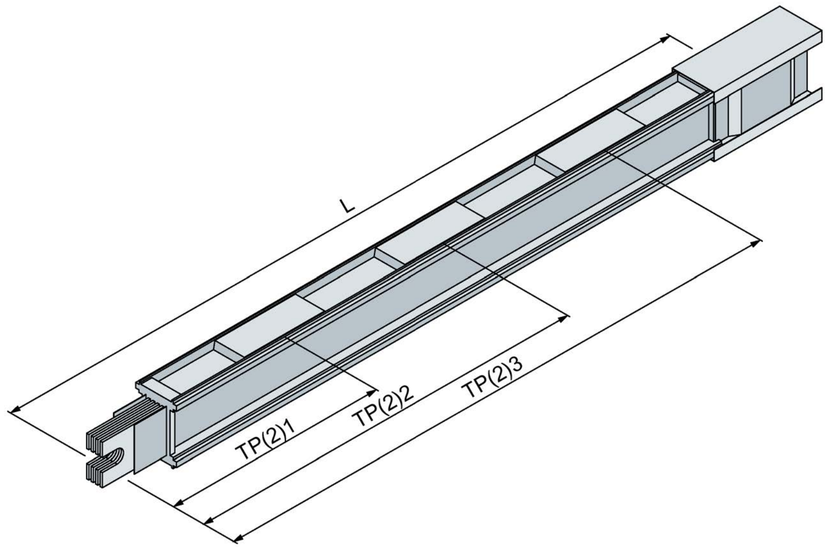


Figure 5-7 With tap-off points, single system

	Length	Type[1)]
Lengths, single system max, 3 tap-off points top or bottom selectable	1.15 … 3.00 m	LI-......-L-...
		Single-sided
		LI-......-LTP-10-... (1 tap-off point at top)
		LI-......-LTP-20-... (2 tap-off points at top)
		LI-......-LTP-30-... (3 tap-off points at top)
		LI-......-LTP-01-... (1 tap-off point at bottom)
		LI-......-LPT-02-... (2 tap-off points at bottom)
		LI-......-LPT-03-... (3 tap-off points at bottom)

1) Lengths L from 1.15 m to 3.00 m can be configured in 0.01 m intervals.

Tap-off points at the top can be selected between 670 and 2510 mm

Tap-off points at the bottom can be selected between 490 and 2330 mm

Spacing of tap-off points is 660 mm.

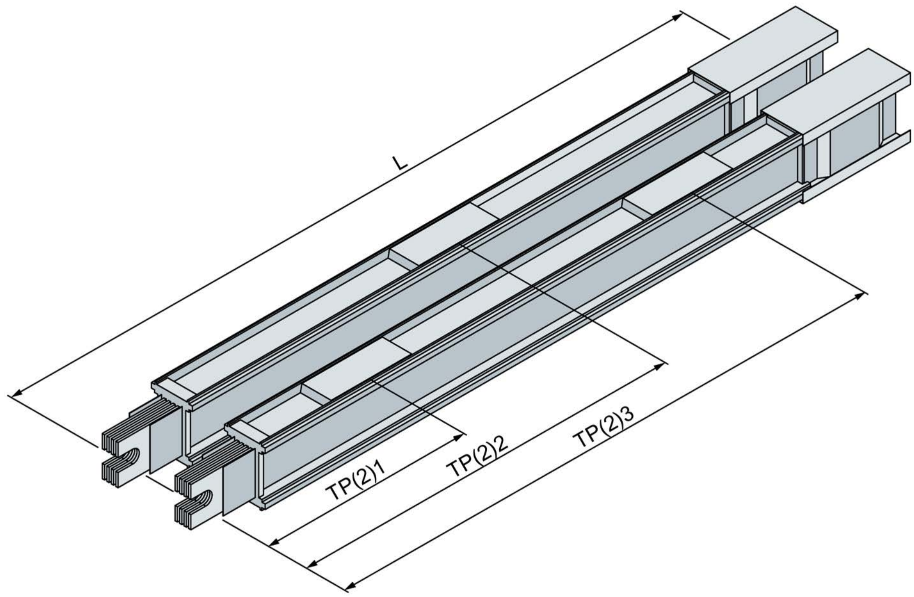


Figure 5-8 With tap-off points, double system

	Length	Type1)
Lengths, double system	1.15 … 3.00 m	LI-......-L-...
max, 6 tap-off points		Two-sided
top and bottom selectable		LI-......-LTP-11-... (1 tap-off point at top and 1 tap-off point at bottom)
		LI-......-LTP-12-... (1 tap-off point at top and 2 tap-off points at bottom)
		LI-......-LTP-13-... (1 tap-off point at top and 3 tap-off points at bottom)
		LI-......-LTP-21-... (2 tap-off points at top and 1 tap-off point at bottom)
		LI-......-LTP-22-... (2 tap-off points at top and 2 tap-off points at bottom)
		LI-......-LTP-23-... (2 tap-off points at top and 3 tap-off points at bottom)
		LI-......-LTP-31-... (3 tap-off points at top and 1 tap-off point at bottom)
		LI-......-LTP-32-... (3 tap-off points at top and 2 tap-off points at bottom)
		LI-......-LTP-33-... (3 tap-off points at top and 3 tap-off points at bottom)

[1] Lengths L from 1.15 m to 3.00 m can be configured in 0.01 m intervals.

Tap-off points at the top can be selected between 670 and 2510 mm

Tap-off points at the bottom can be selected between 490 and 2330 mm

Spacing of tap-off points is 660 mm.

On a double system, the tap-off points must always be distributed equally between the two busbar runs, at the top on one, and at the bottom on the other.

5.4.2 Junction units

Junction units for horizontal installation

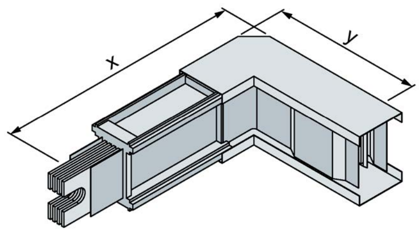


Figure 5-9 Elbow LI-......-LR(L)-FX(FY)-...

Length	System	Type
X = 0.48 … 1.90 m	LI-A.0800 … LI-A.2500	LI-......-LR(L)-FX(FY)-...
FY = 0.27 m	LI-C.1000 … LI-C.3200	
Y = 0.48 … 1.90 m		
FY = 0.27 m		
X = 0.74 … 1.90 m	LI-A.3200 … LI-A.5000	
FY = 0.525 m	LI-C.4000 … LI-C.6300	
Y = 0.74 … 1.90 m		
FY = 0.525 m		

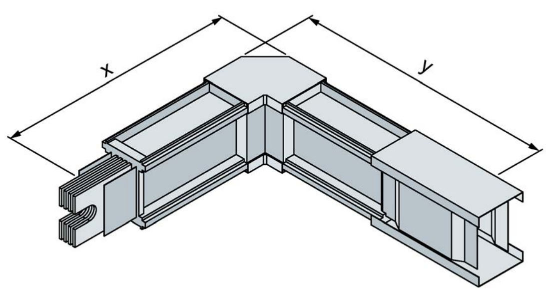


Figure 5-10 Elbow LI-......-LR(L)-...

Length	System	Type
X = 0.48 … 1.90 m	LI-A.0800 … LI-A.2500	LI-......-LR(L)-...
Y = 0.48 … 1.90 m	LI-C.1000 … LI-C.3200	
X = 0.74 … 1.90 m	LI-A.3200 … LI-A.5000	
Y = 0.74 … 1.90 m	LI-C.4000 … LI-C.6300	
Max. X, Y = 2800 mm		

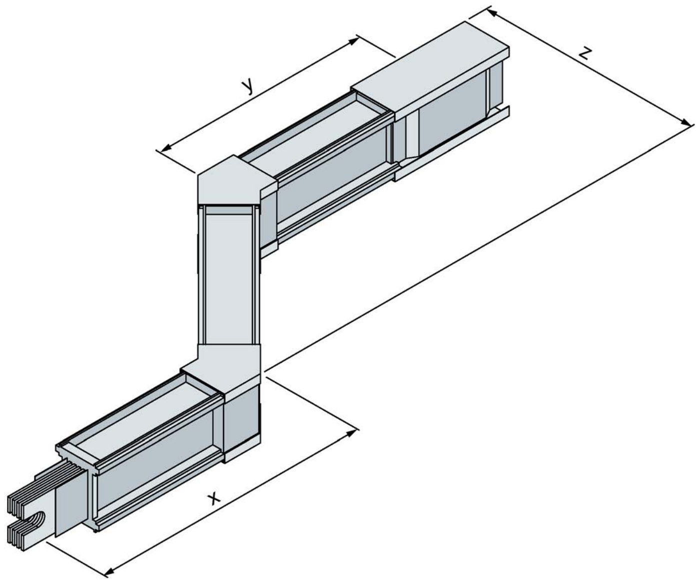


Figure 5-11 Z units LI......-ZR(L)45-.....

Length	System	Type
X/Y min = 0.40 m	LI-A.0800 … LI-A.2500	LI.....-ZR(L)45-.....
Z min. = 0.38 m	LI-C.1000 … LI-C.3200	
X/Y min = 0.50 m	LI-A.3200 … LI-A.5000	
Z min. = 0.63 m	LI-C.4000 … LI-C.6300	
Max. X + Y + Z = 2800 mm		
Max. Z = 1200 mm		
Max. X and Y = 1500 mm		

Junction units for horizontal and vertical installation

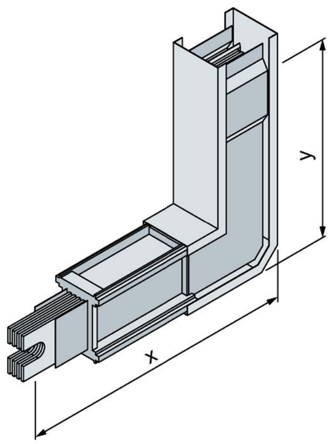


Figure 5-12 Knee LI-......-LV(H)-FX(FY)-...

Length	System	Type
X = 0.42 … 1.90 m FY = 0.30 m Y = 0.42 … 1.90 m FY = 0.30 m	LI-A.0800 / LI-C.1000	LI-......-LV(H)-FX(FY)
X = 0.43 … 1.90 m FY = 0.32 m Y = 0.43 … 1.90 m FY = 0.32 m	LI-A.1000 / LI.C.1250	
X = 0.45 … 1.90 m FY = 0.32 m Y = 0.45 … 1.90 m FY = 0.32 m	LI-A.1250 / LI-C.1600	
X = 0.48 … 1.90 m FY = 0.37 m Y = 0.48 … 1.90 m FY = 0.37 m	LI-A.1600 / LI-C.2000 LI-A.3200 / LI-C.4000	
X = 0.53 … 1.90 m FY = 0.42 m Y = 0.53 … 1.90 m FY = 0.42 m	LI-A.2000 / LI-C.2500 LI-A.4000 / LI-C.5000	
X = 0.60 … 1.90 m FY = 0.47 m Y = 0.60 … 1.90 m FY = 0.47 m	LI-A.2500 / LI-C.3200 LI-A.5000 / LI-C.6300	

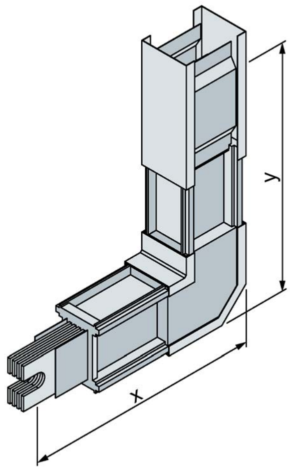


Figure 5-13 Knee LI-......-LV(H)-...

Length	System	Type
X = 0.44 … 1.90 m	LI-A.0800 / LI-C.1000	LI-......-LV(H)-FX(FY)-...
Y = 0.44 … 1.90 m		
X = 0.46 … 1.90 m	LI-A.1000 / LI-C.1250	
Y = 0.46 … 1.90 m		
X = 0.47 … 1.90 m	LI-A.1250 / LI-C.1600	
Y = 0.47 … 1.90 m		
X = 0.51 … 1.90 m	LI-A.1600 / LI-C.2000	
Y = 0.51 … 1.90 m	LI-A.3200 / LI-C.4000	
X = 0.56 … 1.90 m	LI-A.2000 / LI-C.2500	
Y = 0.56 … 1.90 m	LI-A.4000 / LI-C.5000	
X = 0.62 … 1.90 m	LI-A.2500 / LI-C.3200	
Y = 0.62 … 1.90 m	LI-A.5000 / LI-C.6300	
Max. X, Y = 3000 mm		

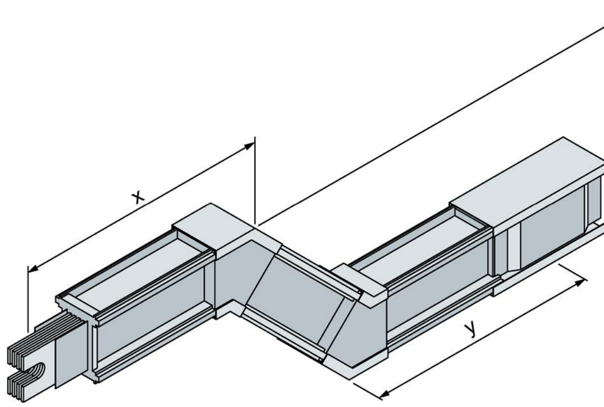


Figure 5-14 Z units LI. ....-ZV(H)45-.....

Length	System	Type
X / Y min = 0.40 m Z min. = 0.37 m	LI-A.0800 / LI-C.1000	LI.....-ZV(H)45-.....
X / Y min = 0.42 m Z min. = 0.38 m	LI-A.1000 / LI-C.1250	
X / Y min = 0.42 m Z min. = 0.40 m	LI-A.1250 / LI-C.1600	
X / Y min = 0.42 m Z min. = 0.43 m	LI-A.2000 / LI-C.2500 LI-A.2500 / LI-C.3200	
X / Y min = 0.44 m Z min. = 0.48 m	LI-A.1600 / LI-C.2000 LI-A.3200 / LI-C.4000	
X / Y min = 0.45 m Z min. = 0.55 m	LI-A.4000 / LI-C.5000 LI-A.5000 / LI-C.6300	
Max. X + Y + Z = 2800 mm Max. X / Y = 1500 mm Max. Z = 1200 mm		

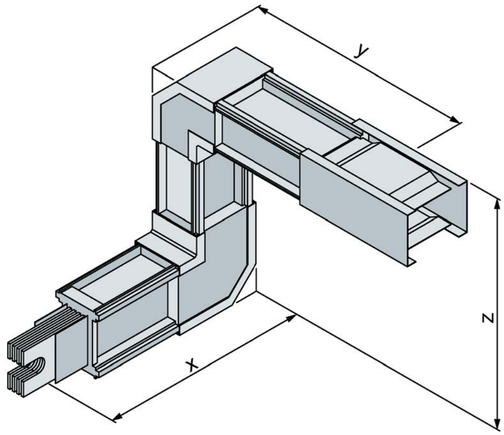


Figure 5-15 Elbow offset LI-......-LR(L)V(H)_...

Length	System	Type
X = 0.44 … 1.20 m / Y = 0.48 … 1.20 m Z = 0.51 … 1.20 m	LI-A.0800 / LI-C.1000	LI-......-LR(L)V(H)-...
X = 0.46 … 1.20 m / Y = 0.48 … 1.20 m Z = 0.54 … 1.20 m	LI-A.1000 / LI-C.1250	
X = 0.47 … 1.20 m / Y = 0.48 … 1.20 m Z = 0.55 … 1.20 m	LI-A.1250 / LI-C.1600	
X = 0.51 … 1.20 m / Y = 0.48 … 1.20 m Z = 0.58 … 1.20 m	LI-A.1600 / LI-C.2000	
X = 0.56 … 1.20 m / Y = 0.48 … 1.20 m Z = 0.63 … 1.20 m	LI-A.2000 / LI.C.2500	
X = 0.62 … 1.20 m / Y = 0.48 … 1.20 m Z = 0.70 … 1.20 m	LI-A.2500 / LI-C3200	
X = 0.51 … 1.20 m / Y = 0.74 … 1.20 m Z = 0.84 … 1.20 m	LI-A.3200 / LI-C.4000	
X = 0.56 … 1.20 m / Y = 0.74 … 1.20 m Z = 0.89 … 1.20 m	LI-A.4000 / LI-C.5000	
X = 0.62 … 1.20 m / Y = 0.74 … 1.20 m Z = 0.95 … 1.20 m	LI-A.5000 / LI-C.6300	
Max. X + Y + Z = 3000 mm		

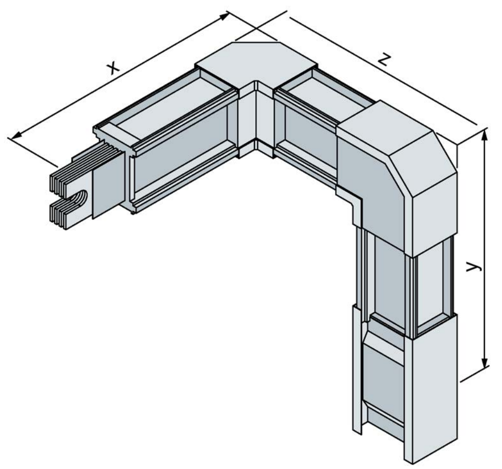


Figure 5-16 Knee offset LI-......-LV(H)R(L)

Length	System	Type
X = 0.48 … 1.20 m / Y = 0.44 … 1.20 m Z = 0.51 … 1.20 m	LI-A.0800 / LI-C.1000	LI-......-LV(H)R(L)-…
X = 0.48 … 1.20 m / Y = 0.46 … 1.20 m Z = 0.54 … 1.20 m	LI-A.1000 / LI-C.1250	
X = 0.48 … 1.20 m / Y = 0.47 … 1.20 m Z = 0.55 … 1.20 m	LI-A.1250 / LI-C.1600	
X = 0.48 … 1.20 m / Y = 0.51 … 1.20 m Z = 0.58 … 1.20 m	LI-A.1600 / LI-C.2000	
X = 0.48 … 1.20 m / Y = 0.56 … 1.20 m Z = 0.63 … 1.20 m	LI-A.2000 / LI-C.2500	
X = 0.48 … 1.20 m / Y = 0.62 … 1.20 m Z = 0.70 … 1.20 m	LI-A.2500 / LI-C.3200	
X = 0.74 … 1.20 m / Y = 0.51 … 1.20 m Z = 0.84 … 1.20 m	LI-A.3200 / LI-C.4000	
X = 0.74 … 1.20 m / Y = 0.56 … 1.20 m Z = 0.89 … 1.20 m	LI-A.4000 / LI-C.5000	
X = 0.74 … 1.20 m / Y = 0.62 … 1.20 m Z = 0.95 … 1.20 m	LI-A.5000 / LI-C.6300	
Max. X + Y + Z = 3000 mm		

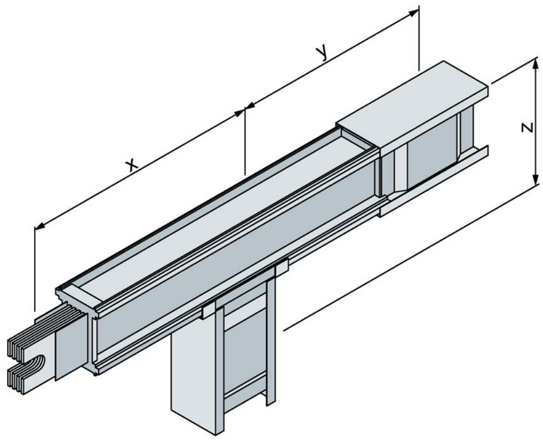


Figure 5-17 T unit LI......-T-X* /Y* /Z*

Length		System	Type
X / Y min = 0.45 m	Z = 0.311 m	LI-A.0800 / LI-C.1000	LI-......-T.-...
	Z = 0.332 m	LI-A.1000	
	Z = 0.317 m	LI-C.1250	
X / Y min = 0.50 m	Z = 0.346 m	LI-A.1250 / LI-C.1600	
	Z = 0.382 m	LI-A.1600	
	Z = 0.430 m	LI-A.2000	
	Z = 0.374 m	LI-C.2000	
	Z = 0.413 m	LI-C.2500	
X / Y min = 0.55 m	Z = 0.497 m	LI-A.2500	
	Z = 0.382 m	LI-A.3200	
	Z = 0.480 m	LI-C.3200	
	Z = 0.374 m	LI-C.4000	
X / Y min = 0.60 m	Z = 0.430 m	LI-A.4000	
	Z = 0.413 m	LI-C.5000	
X / Y min = 0.70 m	Z = 0.497 m	LI-A.5000	
	Z = 0.480 m	LI-C.6300	
Max. X, Y = 1500 mm			
Max. X + Y + Z = 2500 mm			

5.4.3 Distribution board connection for Siemens power distribution boards

Connection to power distribution systems as type-tested low-voltage switchgear assemblies compliant with DIN EN 61439-1 and DIN EN 61439-6

The distribution board and LI busbar trunking system are connected using an integrated busbar trunking connection unit for rated currents up to 6300 A (I_e = 6300 A on request). The busbars can be connected:

- From above
- From below (on request)

This enables a flexible arrangement. The link between the busbar trunking system and the SIVACON S8 distribution systems ensures high short-circuit strength backed up by type testing and a high level of reliability as regards power transmission.

Figure 5-18 Distribution board link

5.4.4 Busbar connection unit for non-Siemens distribution boards

If you wish to connect the busbar trunking system to a non-Siemens distribution board, you can establish this connection using a busbar connection unit LI. .... - FA for non-Siemens distribution boards. The connection unit is built into the distribution board and serves as an interface to the copper connections of the distribution system.

Versions

Depending on system type, a total of eight different conductor configurations are available for selection. The rated currents up to a maximum of 6300 A correspond to the specifications in the chapter "Technical specifications (Page 197)". In accordance with DIN EN 61439-1 and DIN EN 61439-6, the temperature limit in distribution systems in the event of heat rise must not be exceeded by the current heat. The temperature limit of busbars sheathed with insulating materials is 135 °C. You can find the required conductor cross-sections for the copper connections in the chapter "Technical specifications (Page 197)".

Installation of the busbar connection unit

The busbar connection unit in the distribution board must be copper-plated by the board manufacturer or in compliance with that manufacturer's specifications. The board manufacturer must ensure that the required short-circuit strength is achieved and the permissible temperature limit of the busbar connection unit for non-Siemens distribution boards is not exceeded.

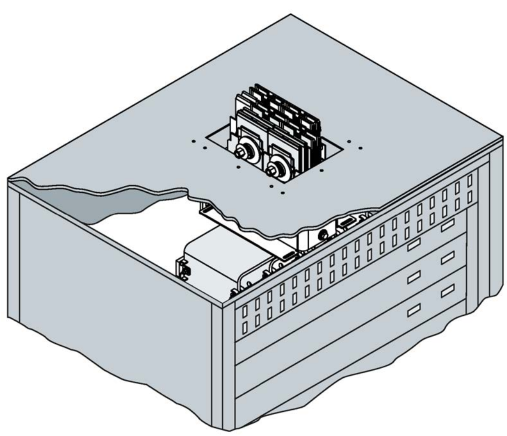


Figure 5-19 Busbar connection unit for non-Siemens distribution boards

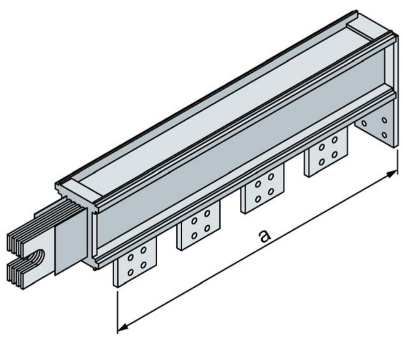
5.4.5 Connection unit for transformers and distribution boards

The wide variety of transformer types reflects the variety of rated currents and the different phase sequences and clearances.

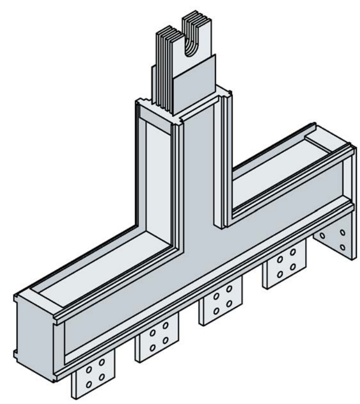
This type variety requires high flexibility as regards transformer connection in busbar trunking systems.

You can also use the universal connection unit for connecting distribution boards.

For LI busbar trunking systems up to 6300 A, transformer connection units are available with busbar connection on the side (LI.....-TCE.) and on the top (LI.....-TCET.).



Busbar connection on the side



Busbar connection on the top

The total length is calculated from the phase clearances of the connection units to be planned (approx. 3 x phase clearance + 300 mm).

Connection unit type	Selectable phase clearance
LI......-TCEL	135 … 800 mm
LI......-TCER	135 … 800 mm
LI......-TCETL	135 … 800 mm
LI......-TCETR	135 … 800 mm

Phase sequence

Different phase sequences are available for selecting and for adapting to the transformer. TCE unit is available as standard with the conductor configurations 3B, 4B and 5B. Other conductor configurations can be requested as SOND if required.

Table 5- 5 Table for 3-, 4- and 5-conductor systems

P1	P2	P3	P4	P5
L1	L2	L3	PEN(N)	(PE)
PEN(N)	L3	L2	L1	(PE)
L3	L2	L1	PEN(N)	(PE)
PEN(N)	L1	L2	L3	(PE)
L1	L2	PEN(N)	L3	(PE)
L3	PEN(N)	L2	L1	(PE)
L3	L2	PEN(N)	L1	(PE)
L1	PEN(N)	L2	L3	(PE)
L1	L2	L3	-	PE
L3	L2	L1	-	PE

The values in brackets in the table apply for the 5-conductor system

Phase clearances

For configuring, you can select any distances (a, b, c) between the phases (P1, P2, P3 and P4) within min. and max. values. The distance between c and phase P4 can be omitted for 3B-. Solution:

With the TCET version, there is only the dimension Fix2. Instead of Fix1 and Fix2, there is 2xFix2.

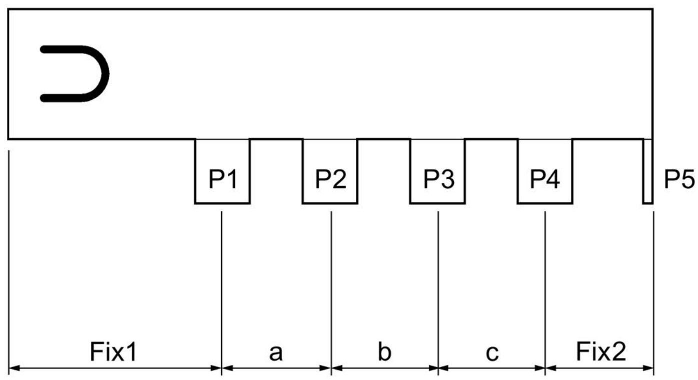


Figure 5-20 Phase clearances

System	Fix1	Fix2	a /b (/c) min.	a /b (/c) max.
			4B, 5B (3B)	4B, 5B (3B)
LIA800, LIC1000	266	120	135	800 (1200)
LIA1000	278	132	160	800 (1200)
LIA1250, LIC1600	286	140	175	800 (1200)
LIA1600, LIA3200	306	160	215	800 (1200)
LIA2000, LIA4000	333	187	270	800 (1200)
LIA2500, LIA5000	368	222	340	800 (1200)
LIC1250	271	125	145	800 (1200)
LIC2000, LIC4000	301	155	205	800 (1200)
LIC2500, LIC5000	323	177	250	800 (1200)
LIC3200, LIC6300	361	215	325	800 (1200)

Maximum possible total length TCE version: L = a + b (+ c) + Fix1 + Fix2 = 3000 mm
Maximum possible total length TCET version: L = a + b (+ c) + 2 x Fix2 = 3000 mm

Incoming transformer connections are only available on request for the following systems:

- System with conductor configurations of the code numbers 5C, 5G, 5H, 6B, 6C

If equipped with an adapter frame, the connection unit can be flange-mounted on a distribution board enclosure / transformer enclosure.

5.4.6 Incoming cable connection unit

If power needs to be supplied to the busbar trunking system via cables, you should use an incoming cable connection unit LI-....-CFE.

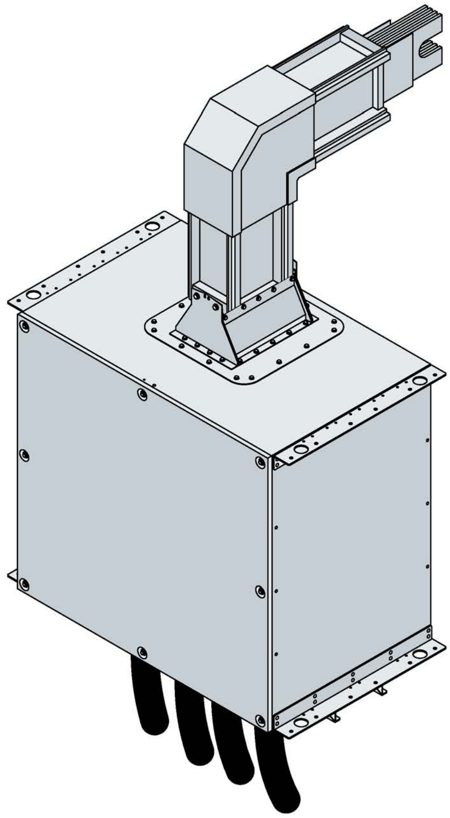


Figure 5-21 Incoming cable connection unit

The incoming cable connection unit is designed for rated currents from 800 to 3200 A.

Enclosure sizes

Depending on the system, two sizes can be selected:

Size 1: LI-A.0800...-CFE.-..-H to LI-A.1600...-CFE.-..-H
LI-C.1000...-CFE.-..-H to LI-C.1600...-CFE.-..-H
Size 2: LI-A.2000...-CFE.-..-H to LI-A.2500...-CFE.-..-H
LI-C.2000...-CFE.-..-H to LI-C.3200...-CFE.-..-H

The maximum dimensions are 1000 mm x 950 mm x 655 mm (W x H x D).

You can connect single-core or multi-core cables. You can connect cross-sections up to 300 mm² (bolted connection) directly to the connection bars of the incoming cable connection unit.

Cable entries

You can order the incoming cable connection either as a multi-core version or a single-core version:

- Type LI-...-CFE.MD-H with flange plate for multi-core cable (sheet steel plate with sleeves, including strain-relief bar)
- Type LI-...-CFE.-BD-H with flange plate for single-core cable (aluminium blank plate without drill holes)

5.4.7 Tap-off units

5.4.7.1 General information

Table 5- 6 Sizes / protection and switching devices

Size S	Tap-off unit with circuit breaker	Tap-off unit with fuse switch disconnector	Tap-off unit with fuse base	Tap-off unit with switch disconnector + fuse
	3VL	**3NP**	**3NH**	**FSF**
1	50 … 160 A[1)]	-	160 A	-
2	200 … 250 A	160 A	250 A	160 A
3	315 … 400 A	250 A	400 A	250 A
4	500 … 630 A (3VL5)	400 A	630 A	400 A
5	630 A (3VL6)	630 A	-	630 A
6	On request: 4 x 160	-	-	-
7	800 … 1250 A	-	-	-

1) Size 2 with transformer use and with or without motorised operating mechanism

Transformer use is available for sizes 1 to 7, and a motorised operating mechanism for size 2.

Table 5- 7 Permissible combination of tap-off unit / busbar

Conductor configuration Busbar		Tap-off unit LI-.T....-XX-...	Remarks
L1-L2-L3-PE_h	3B	3B	-
PEN-L1-L2-L3	4B	3B, 5H	A PEN jumper is additionally required for the TN-C-S system.
N1-L1-L2-L3-PE_h	5B	3B, 5H	-
N2-N1-L1-L2-L3-PE_h	5C	3B, 5C, 5H	-
N1-L1-L2-L3-0.5 PE	5G	3B, 5H	-
N1-L1-L2-L3-PE	5H	3B, 5H	-
N1-L1-L2-L3-CPE-PE_h	6B	3B, 5H, 6B	-
N2-N1-L1-L2-L3-CPE-PE_h	6C	3B, 5H, 5C, 6B, 6C	-

h = housing / enclosure

Characteristics of tap-off units

For a comprehensive power distribution structure, tap-off units are available in seven sizes:

- Tap-off units up to 160 A
- Tap-off units for 250 A
- Tap-off units for 400 A
- Tap-off units for 630 A
- Tap-off units for 800 to 1250 A (on request)

The rated operating voltage U_e is 400 V. Regardless of the mounting position, the closed enclosures ensure degree of protection IP55. As a general rule, they are equipped with:

- Fuse bases, fuse switch disconnectors, switch disconnectors with fuses or circuit breakers with handle or motorised operating mechanism
- Bolts for cable connection

Conductor configurations in acc. with type LI...-6.:

For conductor systems with insulated PE conductor, the tap-off units are supplied with the addition of a separate PE connection.

Tap-off units

- Tap-off via tap-off point
- Anti-rotation feature prevents incorrect mounting
- IP20 touch protection whilst the unit is being connected to the tap-off point

---

Note

Hot plugging

In accordance with DIN EN 50110-1 (VDE 0105-1), national regulations must be observed. Country-specific regulations may prohibit plugging when the busbar run is not switched off and energized with electrical power.

Cable entry

You can insert the cables optionally from the side or the front. Integrated flange with cable grommets facilitates multi-core cable entry. Aluminium plates are used for single-core cable entry; you have to fit these with cable glands locally. Blanking plates are attached at the side for delivery.

Safety during operation

To open the tap-off units, you must switch the breaker off either by actuation of the handle or at the motorised operating mechanism of the breaker. Once this is done, the cable connection area is no longer energized. The part of the contact device in the front of the tap-off unit is “finger-safe".

Implementing the tap-offs

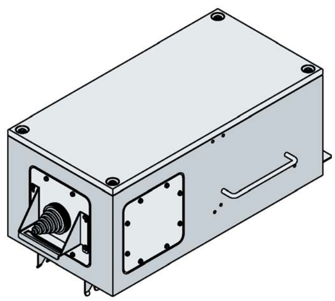
Tap-offs are required for different amperages depending on the size and type of loads involved. These are implemented by means of plug-in tap-off units up to 1250 A.

5.4.7.2 Tap-off units with fuse base up to 630 A

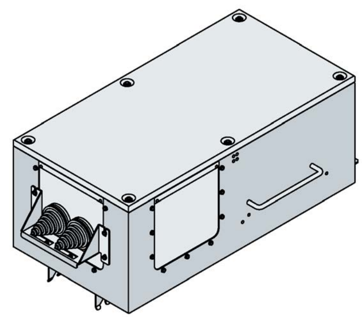
Rated currents

Plug-in tap-off units in four sizes are available for selection:

- For 160 A
- For 250 A
- For 400 A
- For 630 A



Tap-off unit with fuse base up to 400 A



Tap-off unit with fuse base up to 630 A

Short-circuit rating

If you are using IEC-standard-compliant fuse links, the conditional rated short-circuit current of the tap-off units is 120 kA.

Installed equipment

The fuse bases are available for fuses in accordance with the IEC standard. They are set up with 3 poles

Cable connections

Bolts are used to connect cables with pre-fabricated cable lug. For the small size, the maximum compatible cross section per phase is up to 150 mm², for the other sizes, it is 2 x 120 mm² up to a maximum of 1 x 240 mm².

IEC type designation

The type designation of the tap-off unit with fuse base up to 630 A is:

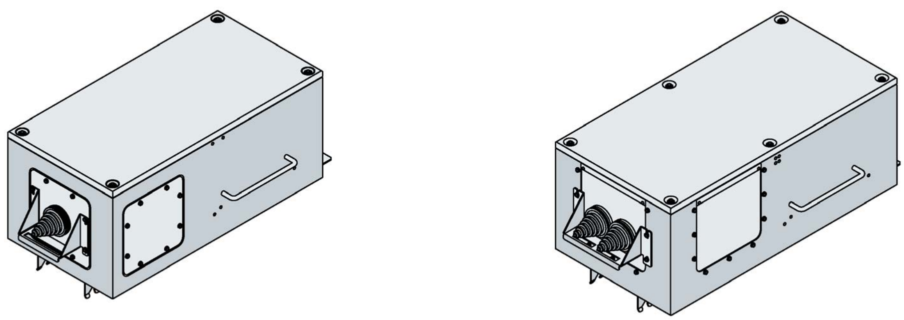
LI-T-....-..-NH..

5.4.7.3 Tap-off units with fuse switch disconnector up to 630 A

Rated currents

Plug-in tap-off units in four sizes are available for selection:

- For 160 A
- For 250 A
- For 400 A
- For 630 A



Tap-off units with fuse switch disconnector up to 250 A and 400 to 630 A

Short-circuit rating

If using IEC-standard-compliant fuse links, the conditional rated short-circuit current of the tap-off units is 100 kA, and for BS-standard-compliant fuse links it is 80 kA.

Installed equipment

The fuse switch disconnectors are available for fuses in accordance with the IEC or BS standard. They can be set up with 3 or 4 poles.

Cable connections

Bolts are used to connect cables with pre-fabricated cable lug. For the small size, the maximum compatible cross section per phase is up to 150 mm^2, for the other sizes, it is 2 x 120 mm^2 up to a maximum of 1 x 240 mm^2.

IEC / BS type designation

The type designation of the tap-off unit with fuse switch disconnector up to 630 A is:

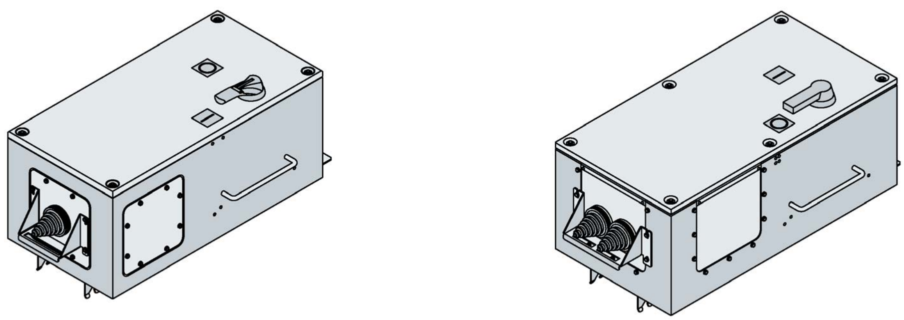
LI-T-....-..-3NP..

5.4.7.4 Tap-off unit with switch disconnector with fuses up to 630 A

Rated currents

Plug-in tap-off units in four sizes are available for selection:

- For 160 A
- For 250 A
- For 400 A
- For 630 A



Tap-off unit with switch disconnector with fuses up to 250 A and 400 A to 630 A

Short-circuit rating

If using IEC-standard-compliant fuse links, the conditional rated short-circuit current of the tap-off units is 100 kA, and for BS-standard-compliant fuse links it is 80 kA.

Installed equipment

The switch disconnectors with fuses are available for fuses in accordance with the IEC or BS standard. They can be set up with 3 or 4 poles.

Cable connections

Bolts are used to connect cables with pre-fabricated cable lug. For the small size, the maximum compatible cross section per phase is up to 150 mm^2, for the other sizes, it is 2 x 120 mm^2 up to a maximum of 1 x 240 mm^2.

IEC / BS type designation

The type designation of the tap-off unit with switch disconnector with fuses up to 630 A is:

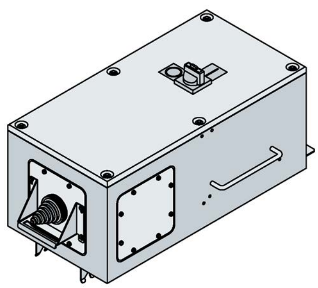
LI-T-....-..-FSF..

5.4.7.5 Tap-off units with circuit-breaker up to 1250 A

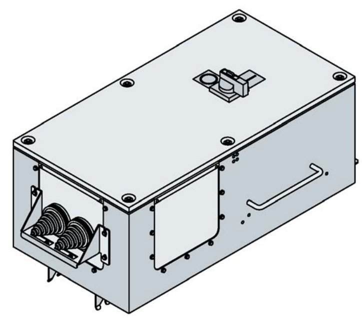
Rated currents

Tap-off units up to 630 A in six sizes are available for selection:

- For 160 A
- For 250 A
- For 400 A
- For 630 A
- For 800 A
- For 1250 A



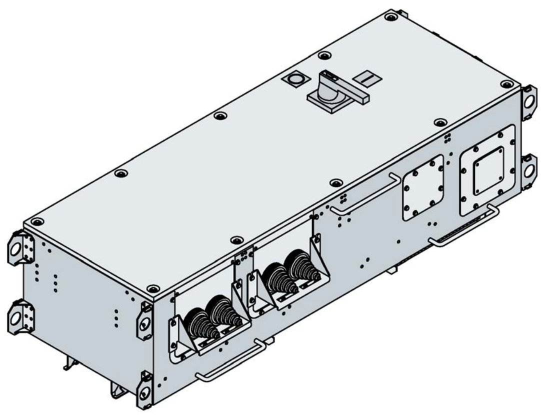
Tap-off unit with circuit breaker up to 400 A



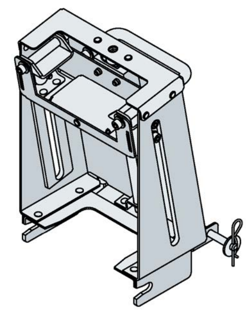
Tap-off unit with circuit breaker up to 630 A

Tap-off units with circuit-breaker from 800 A to 1250 A

The tap-off units are supplied in a standard size for 800 A, 1000 A and 1250 A. They are mounted on special busbar units LI-......-LTB and bolted at the tap-off point. There is a mounting aid for these tap-off units.



Tap-off unit from 800 A to 1250 A



Mounting aid

Short-circuit rating

If you use circuit breakers, the conditional rated short-circuit current of the tap-off units with switching capacity N is 55 kA, with switching capacity H 77 kA, and with switching capacity L 110 kA.

Installed equipment

The circuit breakers have the switching capacity N, H and L. They can come optionally with 3 or 4 poles.

Cable connection

Bolts are used to connect cables with pre-fabricated cable lug. For the small size the maximum compatible cross section per phase is up to 150 mm^2, for the medium size up to 240 mm^2, and for the large size up to 4 x 240 mm^2.

Type designation

The type designation for tap-off units with circuit breaker is:

LI-T....-..-3VL...

5.4.7.6 Empty tap-off units up to 630 A

Empty tap-off units are available in addition to the equipped tap-off units. Purchasers can configure and finally equip these empty tap-off units (including selection of the built-in devices) under their own responsibility. Observe the notes and instructions of Siemens as the manufacturer of the empty tap-off unit.

Note

Availability

Empty tap-off units are only available for certain countries. You can obtain further information on request.

Versions

The following versions are available:

- Prepared for installation of SENTRON 3VL moulded case circuit breakers
- For free equipping

You will find important information on the tap-off units, prepared for installation of SENTRON 3VL moulded case circuit breakers, in "Notes on empty tap-off units up to 630 A (Page 274)".

5.4.8 Additional equipment

End cap

If a busbar run is not to continue to another distribution board, you will need to fit an end cap.

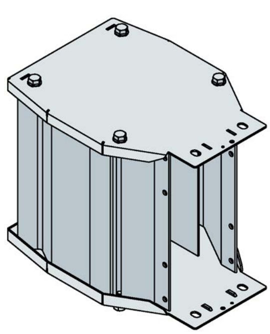


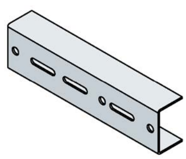
Figure 5-22 End cap

Fixing brackets for horizontal installation

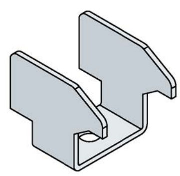
Different U profiles and terminal clamps are available.

- Type LI-Z-BH. U profiles
- Type LI-Z-BKK. Terminal clamp flexible
- Type LI-Z-BKF. Terminal clamp fixed point

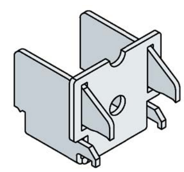
Two LI-Z-BK... type terminal clamps guide the busbar trunking system on the LI-Z-BH carriers.



U profile LI-Z-BH.



Terminal clamp flexible LI-Z-BKK.



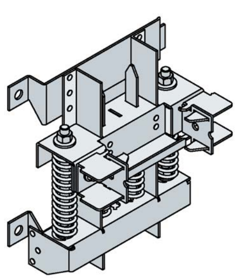
Terminal clamp fixed point LI-Z-BKF.

Fixing brackets for vertical installation

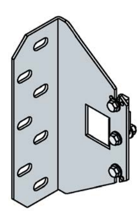
Special spring brackets and fixed-point brackets have to be used to install vertical busbar runs.

Type LI-Z-BV-.. Spring clamp
Type LI-Z-BVFB-.. Fixed point bracket

Type selection is weight-dependent and distance-dependent.



Spring bracket LI-Z-BV-..



Wall fixing, fixed-point bracket LI-Z-BVFP-..

5.5 Technical specifications

5.5.1 LI in general

		LI...
Standards and regulations		IEC 61439-1 and -6, DIN EN 61439-1 and -6
Resistance to extreme climates		
Damp heat, constant, acc. to IEC 60068-2-78		40 °C / 93 % RH / 56d
Damp heat, cyclic, acc. to IEC 60068-2-30		56 x (25 … 40 °C / 3 h; 40 °C / 9 h; 40 … 25 °C / 3 … 6 h; 25 °C / 6 h) / 95 % RH
Cold according to IEC 60068-2-1		-45 °C, 16 h
Temperature change in accordance with IEC 60068-2-14		-45 °C … 55 °C; 5 cycles (1 °C / min); holding time min. 30 min
Salt spray test in accordance with IEC 60068-2-52		Degree of severity 3
Ice formation acc. to IEC 60068-2-61		Testing based on a combination of moist heat, cyclic + low temperature
Environmental classes in accordance with IEC 60721 as derived from climatic proofing tests		
Climatic		1K5 (storage) = 3K7L (operation without direct sunlight); 2K2 (transport)
Chemically active		Salt spray, other contaminants optional, 1C2 (storage) = 3C2 (operation) = 2C2 (transport)
Biological		Covered by IP degrees of protection and packaging method 1B2 (storage) = 3B2 (operation) = 2B2 (transport)
Mechanically active		Covered by IP degrees of protection and packaging method 1S2 (storage) = 3S2 (operation); 2S2 (transport)
Ambient temperature*		
All positions		-5 / +40 / +35 (min. / max. / 24-h average)
Degree of protection		IP55
Torque for joint block (For re-use)	Nm	50 ± 5
Busbar surface treatment		Insulated along entire length Aluminium nickel-plated and tinned at the current transitions Copper tinned at the current transitions Current transitions at the tap-off points silver-coated
Trunking unit material		Painted aluminium casing
Colour of trunking units		RAL 7035 (light grey)
Dimensions		Chapter "Dimension drawings (Page 216)"
Rated insulation voltage U_i Trunking units in acc. with IEC 61439-1	AC V	1000
Overvoltage category / pollution degree		III/3 acc. to EN 60947

			LI...
Rated voltage U_e			
For power transmission	AC	V	1000
For power distribution	AC	V	690
Rated frequency		Hz	50 / 60

* Observe the derating factors at high ambient temperatures.

Thermal characteristics

Ambient temperature (24-hour average)	20 °C	25 °C	30 °C	35 °C	40 °C	45 °C	50 °C
Conversion factor, all mounting positions [1)]	1.075	1.05	1.025	1	0.95	0.9	0.85

1) Frequency 50 Hz; in accordance with IEC 61439, at 60 Hz, a reduction to 95 % must be taken into account for currents > 800 A.

5.5.2 Trunking units LI-A.. (4-pole, aluminium)

System-specific data			**LI-A.**	**0800**	**1000**	**1250**	**1600**	**2000**
Rated current		I_{nA}	A	800	1000	1250	1600	2000
Conductor impedance								
At 50 Hz and +20°C Busbar temperature	Resistance	R_{20}	mΩ/m	0.090	0.063	0.053	0.037	0.027
At 50 Hz and final heating of busbars	Resistance	R_1	mΩ/m	0.125	0.088	0.074	0.052	0.038
	Reactance	X_1	mΩ/m	0.021	0.016	0.014	0.010	0.008
	Impedance	Z_1	mΩ/m	0.127	0.089	0.075	0.053	0.038
At 50 Hz and +20°C	Resistance	R_{b20}	mΩ/m	0.127	0.096	0.083	0.062	0.047
Busbar temperature	Reactance	X_{b20}	mΩ/m	0.045	0.035	0.030	0.023	0.016
for 4-pole systems under fault conditions acc. to EN 61439-6	Impedance	Z_{b20}	mΩ/m	0.134	0.102	0.088	0.066	0.050
Impedance of PE path as pure return conductor								
At 50 Hz and +20°C Busbar temperature	Resistance	R_{20}	mΩ/m	0.045	0.042	0.041	0.039	0.034
Zero impedance								
At 50 Hz and +20°C	Resistance	R_{0_b20}	mΩ/m	0.202	0.163	0.143	0.112	0.088
Busbar temperature	Reactance	X_{0_b20}	mΩ/m	0.102	0.078	0.069	0.051	0.039
for 4-pole systems acc. to DIN EN 60909-0 / VDE 0102	Impedance	Z_{0_b20}	mΩ/m	0.226	0.181	0.158	0.123	0.096
Short-circuit rating								
Rated short-time withstand current	rms value t = 1 s	I_{cw}	kA	35	50	60	65	80
Rated impulse withstand current	Peak value	I_{pk}	kA	74	105	132	143	176

Conductor material			Aluminium					
No. of busbars	-	-	-	4	4	4	4	4
Conductor cross-section	L1, L2, L3, PEN	A	mm²	350	499	599	849	1185
Weights	-	-	kg/m	12.2	14.1	15.4	18.5	22.8

System-specific data			**LI-A.**	**2500**	**3200**	**4000**	**5000**
Rated current	-	I_{nA}	A	2500	3200	4000	5000
Conductor impedance							
At 50 Hz and +20°C Busbar temperature	Resistance	R_{20}	mΩ/m	0.020	0.019	0.013	0.010
At 50 Hz and final heating of busbars	Resistance	R_1	mΩ/m	0.027	0.026	0.018	0.013
	Reactance	X_1	mΩ/m	0.006	0.005	0.004	0.003
	Impedance	Z_1	mΩ/m	0.028	0.027	0.018	0.014
At 50 Hz and +20°C	Resistance	R_{b20}	mΩ/m	0.035	0.032	0.024	0.018
Busbar temperature	Reactance	X_{b20}	mΩ/m	0.012	0.012	0.009	0.006
for 4-pole systems under fault conditions acc. to EN 61439-6	Impedance	Z_{b20}	mΩ/m	0.037	0.034	0.026	0.019
Impedance of PE path as pure return conductor							
At 50 Hz and +20°C Busbar temperature	Resistance	R_{20}	mΩ/m	0.032	0.021	0.019	0.015
Zero impedance							
At 50 Hz and +20°C	Resistance	R_{0_b20}	mΩ/m	0.067	0.058	0.046	0.035
Busbar temperature	Reactance	X_{0_b20}	mΩ/m	0.030	0.039	0.018	0.015
for 4-pole systems acc. to DIN EN 60909-0 / VDE 0102	Impedance	Z_{0_b20}	mΩ/m	0.074	0.070	0.049	0.038
Short-circuit rating							
Rated short-time withstand current	rms value t = 1 s	I_{cw}	kA	100	120	150	150
Rated impulse withstand current	Peak value	I_{pk}	kA	220	264	330	330

Conductor material			Aluminium				
Number of busbars	-	-	-	4	8	8	8
Conductor cross-section	L1, L2, L3, PEN	A	mm²	1652	1699	2370	3304
Weights	-	-	kg/m	28.8	37.1	45.7	57.5

5.5.3 Trunking units LI-A.. (5-pole, aluminium)

System-specific data			LI-A.	0800	1000	1250	1600	2000
Rated current	-	I_{nA}	A	800	1000	1250	1600	2000
Conductor impedance								
At 50 Hz and +20°C Busbar temperature	Resistance	R_{20}	mΩ/m	0.090	0.063	0.053	0.037	0.027
At 50 Hz and final heating of busbars	Resistance	R_1	mΩ/m	0.125	0.088	0.074	0.052	0.038
	Reactance	X_1	mΩ/m	0.021	0.016	0.014	0.010	0.008
	Impedance	Z_1	mΩ/m	0.127	0.089	0.075	0.053	0.038
At 50 Hz and +20°C	Resistance	R_{b20}	mΩ/m	0.136	0.106	0.095	0.076	0.061
Busbar temperature	Reactance	X_{b20}	mΩ/m	0.053	0.044	0.039	0.031	0.024
for 5-pole systems (PE) under fault conditions acc. to EN 61439-6	Impedance	Z_{b20}	mΩ/m	0.146	0.115	0.102	0.082	0.066
At 50 Hz and +20°C	Resistance	R_{b20}	mΩ/m	0.190	0.134	0.113	0.081	0.058
Busbar temperature	Reactance	X_{b20}	mΩ/m	0.052	0.043	0.033	0.025	0.019
for 5-pole systems (N) under fault conditions acc. to EN 61439-6	Impedance	Z_{b20}	mΩ/m	0.197	0.141	0.117	0.084	0.061
Impedance of PE path as pure return conductor								
At 50 Hz and +20 °C busbar temperature	Resistance	R_{20}	mΩ/m	0.045	0.042	0.041	0.039	0.034
Zero impedance								
At 50 Hz and +20°C	Resistance	R_{0_b20}	mΩ/m	0.229	0.192	0.179	0.154	0.129
Busbar temperature	Reactance	X_{0_b20}	mΩ/m	0.126	0.108	0.096	0.078	0.060
for 5-pole systems (PE) acc. to DIN EN 60909-0/VDE 0102	Impedance	Z_{0_b20}	mΩ/m	0.262	0.220	0.203	0.173	0.142
At 50 Hz and +20°C	Resistance	R_{0_b20}	mΩ/m	0.387	0.273	0.231	0.165	0.120
Busbar temperature	Reactance	X_{0_b20}	mΩ/m	0.117	0.096	0.075	0.054	0.048
for 5-pole systems (N) acc. to DIN EN 60909-0 / VDE 0102	Impedance	Z_{0_b20}	mΩ/m	0.404	0.289	0.243	0.174	0.129
Short-circuit rating								
Rated short-time withstand current	rms value t = 1 s	I_{cw}	kA	35	50	60	65	80
Rated withstand current	Peak value	I_{pk}	kA	74	105	132	143	176

Conductor material			Aluminium					
No. of busbars	-	-	-	4	4	4	4	4
Conductor cross-section	L1, L2, L3, N	A	mm²	350	499	599	849	1185
Weights	-	-	kg/m	12.2	14.1	15.4	18.5	22.8

System-specific data			LI-A.	2500	3200	4000	5000
Rated current	-	I_{nA}	A	2500	3200	4000	5000
Conductor impedance							
At 50 Hz and +20°C Busbar temperature	Resistance	R_{20}	mΩ/m	0.020	0.019	0.013	0.010
At 50 Hz and final heating of the busbars	Resistance	R_1	mΩ/m	0.027	0.026	0.018	0.013
	Reactance	X_1	mΩ/m	0.006	0.005	0.004	0.003
	Impedance	Z_1	mΩ/m	0.028	0.027	0.018	0.014
At 50 Hz and +20°C Busbar temperature for 5-pole systems (PE) under fault conditions acc. to EN 61439-6	Resistance	R_{b20}	mΩ/m	0.052	0.039	0.033	0.025
	Reactance	X_{b20}	mΩ/m	0.018	0.016	0.012	0.007
	Impedance	Z_{b20}	mΩ/m	0.055	0.042	0.035	0.026
At 50 Hz and +20°C Busbar temperature for 5-pole systems (N) under fault conditions acc. to EN 61439-6	Resistance	R_{b20}	mΩ/m	0.042	0.040	0.029	0.021
	Reactance	X_{b20}	mΩ/m	0.013	0.014	0.009	0.008
	Impedance	Z_{b20}	mΩ/m	0.044	0.042	0.030	0.022
Impedance of PE path as pure return conductor							
At 50 Hz and +20°C Busbar temperature	Resistance	R_{20}	mΩ/m	0.032	0.021	0.019	0.015
Zero impedance							
At 50 Hz and +20°C Busbar temperature for 5-pole systems (PE) acc. to DIN EN 60909-0/VDE 0102	Resistance	R_{0_b20}	mΩ/m	0.116	0.080	0.073	0.055
	Reactance	X_{0_b20}	mΩ/m	0.045	0.039	0.030	0.033
	Impedance	Z_{0_b20}	mΩ/m	0.124	0.089	0.079	0.064
At 50 Hz and +20°C Busbar temperature for 5-pole systems (N) acc. to DIN EN 60909-0 / VDE 0102	Resistance	R_{0_b20}	mΩ/m	0.087	0.081	0.060	0.042
	Reactance	X_{0_b20}	mΩ/m	0.030	0.030	0.018	0.018
	Impedance	Z_{0_b20}	mΩ/m	0.092	0.086	0.063	0.046
Short-circuit rating							
Rated short-time withstand current	rms value t = 1 s	I_{cw}	kA	100	120	150	150
Rated withstand current	Peak value	I_{pk}	kA	220	264	330	330

Conductor material			Aluminium				
No. of busbars	-	-	-	4	8	8	8
Conductor cross-section	L1, L2, L3, N	A	mm²	1652	1699	2370	3304
Weights	-	-	kg/m	28.8	37.1	45.7	57.5

5.5.4 Trunking units LI-C.. (4-pole, copper)

System-specific data			**LI-C.**	**1000**	**1250**	**1600**	**2000**	**2500**
Rated current	-	I_{nA}	A	1000	1250	1600	2000	2500
Conductor impedance								
At 50 Hz and +20°C Busbar temperature	Resistance	R_{20}	mΩ/m	0.053	0.047	0.031	0.024	0.018
At 50 Hz and +20°C Busbar temperature	Resistance	R_1	mΩ/m	0.074	0.065	0.044	0.034	0.025
	Reactance	X_1	mΩ/m	0.021	0.019	0.012	0.010	0.008
	Impedance	Z_1	mΩ/m	0.077	0.068	0.045	0.035	0.026
At 50 Hz and +20°C Busbar temperature for 4-pole systems under fault conditions acc. to EN 61439-6	Resistance	R_{b20}	mΩ/m	0.086	0.079	0.056	0.045	0.035
	Reactance	X_{b20}	mΩ/m	0.041	0.037	0.028	0.022	0.017
	Impedance	Z_{b20}	mΩ/m	0.096	0.087	0.062	0.050	0.039
Impedance of PE path as pure return conductor								
At 50 Hz and +20°C Busbar temperature	Resistance	R_{20}	mΩ/m	0.047	0.046	0.041	0.039	0.036
Zero impedance								
At 50 Hz and +20°C Busbar temperature for 4-pole systems acc. to DIN EN 60909-0 / VDE 0102	Resistance	R_{0_b20}	mΩ/m	0.154	0.144	0.106	0.088	0.069
	Reactance	X_{0_b20}	mΩ/m	0.090	0.084	0.060	0.048	0.036
	Impedance	Z_{0_b20}	mΩ/m	0.179	0.167	0.122	0.100	0.078
Short-circuit rating								
Rated short-time withstand current	rms value t = 1 s	I_{cw}	kA	43	60	65	80	100
Rated impulse withstand current	Peak value	I_{pk}	kA	90	132	143	176	220

Conductor material			Copper					
No. of busbars	-	-	-	4	4	4	4	4
Conductor cross-section	L1, L2, L3, PEN	A	mm²	328	397	562	795	1068
Weights	-	-	kg/m	20.4	23.0	29.4	38.4	48.9

System-specific data			LI-C	3200	4000	5000	6300
Rated current	-	I_{nA}	A	3200	4000	5000	6300
Conductor impedance							
At 50 Hz and +20°C Busbar temperature	Resistance	R_{20}	mΩ/m	0.012	0.012	0.009	0.006
At 50 Hz and +20°C Busbar temperature	Resistance	R_1	mΩ/m	0.017	0.017	0.012	0.009
	Reactance	X_1	mΩ/m	0.006	0.005	0.004	0.003
	Impedance	Z_1	mΩ/m	0.018	0.017	0.013	0.009
At 50 Hz and +20°C Busbar temperature for 4-pole systems under fault conditions acc. to EN 61439-6	Resistance	R_{b20}	mΩ/m	0.025	0.023	0.018	0.014
	Reactance	X_{b20}	mΩ/m	0.012	0.011	0.008	0.006
	Impedance	Z_{b20}	mΩ/m	0.028	0.025	0.020	0.015
Impedance of PE path as pure return conductor							
At 50 Hz and +20°C Busbar temperature	Resistance	R_{20}	mΩ/m	0.033	0.020	0.019	0.017
Zero impedance							
At 50 Hz and +20°C Busbar temperature for 4-pole systems acc. to DIN EN 60909-0 / VDE 0102	Resistance	R_{0_b20}	mΩ/m	0.051	0.045	0.036	0.029
	Reactance	X_{0_b20}	mΩ/m	0.027	0.024	0.021	0.012
	Impedance	Z_{0_b20}	mΩ/m	0.058	0.051	0.042	0.031
Short-circuit rating							
Rated short-time withstand current	rms value t = 1 s	I_{cw}	kA	100	150	150	150
Rated impulse withstand current	Peak value	I_{pk}	kA	220	330	330	330

Conductor material			Copper				
No. of busbars	-	-	-	4	8	8	8
Conductor cross-section	L1, L2, L3, PEN	A	mm²	1537	1589	2135	3073
Weights	-	-	kg/m	67.0	76.2	97.3	133.4

5.5.5 Trunking units LI-C.. (5-pole, copper)

System-specific data			LI-C.	1000	1250	1600	2000	2500
Rated current	-	I_{nA}	A	1000	1250	1600	2000	2500
Conductor impedance								
At 50 Hz and +20°C Busbar temperature	Resistance	R_{20}	mΩ/m	0.053	0.047	0.031	0.024	0.018
At 50 Hz and final heating of busbars	Resistance	R_1	mΩ/m	0.074	0.065	0.044	0.034	0.025
	Reactance	X_1	mΩ/m	0.021	0.019	0.012	0.010	0.008
	Impedance	Z_1	mΩ/m	0.077	0.068	0.045	0.035	0.026
At 50 Hz and +20°C	Resistance	R_{b20}	mΩ/m	0.101	0.093	0.073	0.063	0.054
Busbar temperature	Reactance	X_{b20}	mΩ/m	0.050	0.047	0.038	0.030	0.024
for 5-pole systems (PE) under fault conditions acc. to EN 61439-6	Impedance	Z_{b20}	mΩ/m	0.112	0.104	0.082	0.070	0.059
At 50 Hz and +20°C	Resistance	R_{b20}	mΩ/m	0.116	0.103	0.069	0.053	0.040
Busbar temperature	Reactance	X_{b20}	mΩ/m	0.047	0.047	0.030	0.024	0.021
for 5-pole systems (N) under fault conditions acc. to EN 61439-6	Impedance	Z_{b20}	mΩ/m	0.126	0.114	0.076	0.058	0.045
Impedance of PE path as pure return conductor								
At 50 Hz and +20°C Busbar temperature	Resistance	R_{20}	mΩ/m	0.047	0.046	0.041	0.039	0.036
Zero impedance								
At 50 Hz and +20°C	Resistance	R_{0_b20}	mΩ/m	0.196	0.185	0.156	0.140	0.127
Busbar temperature	Reactance	X_{0_b20}	mΩ/m	0.123	0.120	0.093	0.078	0.063
for 5-pole systems (PE) acc. to DIN EN 60909-0/VDE 0102	Impedance	Z_{0_b20}	mΩ/m	0.231	0.221	0.181	0.160	0.142
At 50 Hz and +20°C	Resistance	R_{0_b20}	mΩ/m	0.240	0.213	0.144	0.111	0.084
Busbar temperature	Reactance	X_{0_b20}	mΩ/m	0.108	0.105	0.066	0.051	0.045
for 5-pole systems (N) acc. to DIN EN 60909-0 / VDE 0102	Impedance	Z_{0_b20}	mΩ/m	0.263	0.237	0.158	0.122	0.095

Short-circuit rating								
Rated short-time withstand current	rms value t = 1 s	I_{CW}	kA	43	60	65	80	100
Rated impulse withstand current	Peak value	I_{pk}	kA	90	132	143	176	220

Conductor material			Copper					
No. of busbars	-	-	-	4	4	4	4	4
Conductor cross-section	L1, L2, L3, N	A	mm^2	328	397	562	795	1068
Weights	-	-	kg/m	20.4	23.0	29.4	38.4	48.9

System-specific data			LI-C.	3200	4000	5000	6300
Rated current	-	-	I_{nA}	3200	400	5000	6300
Conductor impedance							
At 50 Hz and +20°C Busbar temperature	Resistance	R_{20}	mΩ/m	0.012	0.012	0.009	0.006
At 50 Hz and final heating of the busbars	Resistance	R_1	mΩ/m	0.017	0.017	0.012	0.009
	Reactance	X_1	mΩ/m	0.006	0.005	0.004	0.003
	Impedance	Z_1	mΩ/m	0.018	0.017	0.013	0.009
At 50 Hz and +20°C Busbar temperature for 5-pole systems (PE) under fault conditions acc. to EN 61439-6	Resistance	R_{b20}	mΩ/m	0.045	0.032	0.028	0.023
	Reactance	X_{b20}	mΩ/m	0.017	0.016	0.012	0.009
	Impedance	Z_{b20}	mΩ/m	0.049	0.036	0.030	0.025
At 50 Hz and +20°C Busbar temperature for 5-pole systems (N) under fault conditions acc. to EN 61439-6	Resistance	R_{b20}	mΩ/m	0.028	0.027	0.021	0.014
	Reactance	X_{b20}	mΩ/m	0.014	0.014	0.011	0.008
	Impedance	Z_{b20}	mΩ/m	0.031	0.030	0.023	0.016
Impedance of PE path as pure return conductor							
At 50 Hz and +20°C Busbar temperature	Resistance	R_{20}	mΩ/m	0.033	0.020	0.019	0.017
Zero impedance							
At 50 Hz and +20°C Busbar temperature for 5-pole systems (PE) acc. to DIN EN 60909-0/VDE 0102	Resistance	R_{0_b20}	mΩ/m	0.111	0.072	0.066	0.056
	Reactance	X_{0_b20}	mΩ/m	0.045	0.042	0.033	0.024
	Impedance	Z_{0_b20}	mΩ/m	0.120	0.083	0.073	0.061
At 50 Hz and +20°C Busbar temperature for 5-pole systems (N) acc. to DIN EN 60909-0 / VDE 0102	Resistance	R_{0_b20}	mΩ/m	0.060	0.054	0.042	0.030
	Reactance	X_{0_b20}	mΩ/m	0.033	0.030	0.024	0.015
	Impedance	Z_{0_b20}	mΩ/m	0.068	0.062	0.048	0.034
Short-circuit rating							
Rated short-time withstand current	rms value t = 1 s	I_{CW}	kA	100	150	150	150
Rated impulse withstand current	Peak value	I_{pk}	kA	220	330	330	330

Conductor material			Copper				
No. of busbars	-	-	-	4	8	8	8
Conductor cross-section	L1, L2, L3, N	A	mm^2	1537	1589	2135	3073
Weights	-	-	kg/m	67.0	76.2	97.3	133.4

5.5.6 Fire load for trunking units without tap-off points

System	Fire load [kWh / m]
LI-A.800..	2.37
LI-A.1000...	2.80
LI-C.1000..	2.37
LI-A.1250...	3.12
LI-C.1250...	2.56
LI-A.1600...	3.73
LI-C.1600...	3.06
LI-A.2000..	4.81
LI-C.2000..	3.57
LI-A.2500...	6.03
LI-C.2500...	4.43
LI-A.3200...	7.46
LI-C.3200...	5.76
LI-A.4000...	9.62
LI-C.4000	7.40
LI-A.5000...	12.06
LI-C.5000	8.85
LI-C.6300	11.07

Note

Trunking units with tap-off points

Regardless of system size, a fire load of 0.98 kWh must be taken into account for each tap-off point.

You can obtain fire load values for other conductor configurations on request.

5.5.7 Fixing distances

Table 5- 8 Fixing distances [m] for conventional mechanical load with horizontal installation

System	Edgewise busbars	Flat busbars
LI-A.800..	3	2
LI-A.1000... LI-C.1000..	3	2
LI-A.1250... LI-C.1250...	3	2
LI-A.1600... LI-C.1600...	3	2
LI-A.2000.. LI-C.2000..	3	2
LI-A.2500... LI-C.2500...	3	2
LI-A.3200... LI-C.3200...	3	2
LI-A.4000... LI-C.4000	3	2
LI-A.5000... LI-C.5000	3	2
LI-C.6300	3	2

5.5.8 Connection units for non-Siemens distribution boards

Table 5- 9 Required conductor cross sections for bare copper bars for connection to non-Siemens distribution boards.

System[1)]	I_{nA} [A]	Number of copper busbars Width x thickness				Suitable LI-A / LI-C system
		1	2	3	4	
LI-A.0800	800	60 x 10	30 x 10	20 x 10	-	LI-A.0800
LI-C.1000	1000	60 x 10	30 x 10	20 x 10	-	LI-C.1000
LI-A.1000	1000	80 x 10	40 x 10	30 x 10	-	LI-A.1000
LI-C.1250	1250	80 x 10	40 x 10	30 x 10	-	LI-C.1250
LI-A.1250	1250	100 x 10	60 x 10	30 x 10	-	LI-A.1250
LI-C.1600	1600	100 x 10	60 x 10	30 x 10	-	LI-C.1600
LI-A.1600	1600	100 x 10	60 x 10	30 x 10	-	LI-A.1600
LI-C.2000	2000	160 x 10	80 x 10	50 x 10	-	LI-C.2000
LI-A.2000	2000	200 x 10	100 x 10	60 x 10	50 x 10	LI-A.2000
LI-C.2500	2500	200 x 10	100 x 10	60 x 10	50 x 10	LI-C.2500
LI-A.2500	2500	-	160 x 10	100 x 10	80 x 10	LI-A.2500
LI-C.3200	3200	-	160 x 10	100 x 10	80 x 10	LI-C.3200
LI-A.3200	3200	-	200 x 10	120 x 10	100 x 10[1)]	LI-A.3200
LI-C.4000	4000	-	200 x 10	120 x 10	100 x 10[1)]	LI-C.4000
LI-A.4000	4000	-	-	200 x 10	160 x 10	LI-A.4000
LI-C.5000	5000	-	-	200 x 10	160 x 10	LI-C.5000
LI-A.5000	5000	-	-	200 x 10	160 x 10	LI-A.5000
LI-C.6300	6300	-	-	200 x 10	160 x 10	LI-C.6300

1) In accordance with DIN 43671, Table 1, the maximum continuous current for for this conductor cross-section for bare copper busbars is 3980 A.

5.5.9 Tap-off units

			LI...
Standards and regulations			IEC 61439-1 / DIN EN 61439-1
			IEC 61439-1 / DIN EN 61439-6
Resistance to extreme climates			Damp heat, constant, acc. to IEC 60068-2-78
			Damp heat, cyclic, acc. to IEC 60068-2-30
Ambient temperature		°C	-5 / +40 / +35 (min. / max. 24-h average)
Degree of protection			IP55
Trunking unit material			Sheet steel, painted
Colour of tap-off units			RAL 7035 (light grey)
Dimensions			Chapter "Tap-off units (Page 222)"
Rated insulation voltage U_i	AC	V	690
Overvoltage category / pollution degree			III/3 acc. to DIN EN 60947-1 / VDE 0660-100
Rated operating voltage U_e	AC	V	400
Rated frequency		Hz	50

Tap-off units with circuit breaker

System-specific data		3VL1	3VL2	3VL3
Rated current I_{nc}	A	50, 63, 80, 100, 125, 160	50, 63, 80, 100, 125, 160	200, 250
Max. permissible operating current I_{nc}	A	40, 50, 63, 80, 100, 130	50, 63, 80, 100, 125, 160[1)]	185, 230
Conditional rated short-circuit current I_{cc} Switching capacity N	kA	55	55	55
Conditional rated short-circuit current I_{cc} Switching capacity H	kA	70	70	70
Conditional rated short-circuit current I_{cc} Switching capacity L	kA	-	100	100
Suitable cross-sections (copper)				
L1, L2, L3	mm²	1 x 50 … 150 2 x 50 … 120	1 x 50 … 150 2 x 50 … 120	1 x 95 … 240 2 x 95 … 120
N, PE, ISO-PE	mm²	1 x 50 … 150 2 x 50 … 120	1 x 50 … 150 2 x 50 … 120	1 x 95 … 240 2 x 95 … 120
Bolted connection		M8	M8	M8
Cable entry				
From front		Yes	Yes	Yes
From side		Yes	Yes	Yes
Multi-core cable				
Cable grommets		KT4	KT4	KT4
Cable diameters	mm	14 … 68	14 … 68	14 … 68
Single-core cable [2)]				
Aluminium plate, undrilled		7 x M32	7 x M40	7 x M40
Weights	kg	20	20	40

1) Max. permissible operating current I_{nc} for system mounting position horizontal, tap-off unit at top, all other lengths 155 A

2) Cable glands with strain relief are required (not included in the scope of supply).

System-specific data		3VL4	3VL5	3VL6	3VL7	3VL8
Rated current I_{nc}	A	315, 400	500, 630	630	800	1250
Max. permissible operating current I_{nc}	A	285, 365	375, 475	600	800	1130
Conditional rated short-circuit current I_{cc} Switching capacity N	kA	55	55	55	55	55
Conditional rated short-circuit current I_{cc} Switching capacity H	kA	70	70	70	70	70
Conditional rated short-circuit current I_{cc} Switching capacity L	kA	100	100	100	100	100
Suitable cross-sections (copper)						
L1, L2, L3	mm^2	1 x 95 … 240 2 x 95 … 120	1 x 95 … 240 2 x 95 … 120	1 x 95 … 240 2 x 95 … 120	1 x 95 … 300 4 x 95 … 300	1 x 95 … 300 4 x 95 … 300
N, PE, ISO-PE	mm^2	1 x 95 … 240 2 x 95 … 120	1 x 95 … 240 2 x 95 … 120	1 x 95 … 240 2 x 95 … 120	1 x 95 … 300 4 x 95 … 300	1 x 95 … 300 4 x 95 … 300
Bolted connection		M10	M10	M10	M12	M12
Cable entry						
From front		Yes	Yes	Yes	Yes	Yes
From side		Yes	Yes	Yes	Yes	Yes
Multi-core cable						
Cable grommets		2 x KT4	2 x KT4	2 x KT4	4 x KT4	4 x KT4
Cable diameters	mm	14 … 68	14 … 68	14 … 68	14 … 68	14 … 68
Single-core cable [1)]						
Aluminium plate, undrilled		7 x M50	14 x M50	14 x M50	2x14 x M50	2x14 x M50
Weights	kg	60	80	90	150	150

1) Cable glands with strain relief are required (not included in the scope of supply).

Tap-off units with fuse bases

System-specific data		NH00	NH1	NH2	NH3
Rated current I_{nc}	A	160	250	400	630
Max. rated current I_{max} of the fuse	A	160	250	400	630
Max. permissible operating current I_{nc}	A	160	250	385	520[1)]
Conditional rated short-circuit current with fuse protection[2)]	kA	120	120	120	120
Suitable cross-sections (copper)					
L1, L2, L3	mm^2	1 x 50 … 150 2 x 50 … 120	1 x 50 … 150 2 x 50 … 120	1 x 95 … 240 2 x 95 … 120	1 x 95 … 240 2 x 95 … 120
N, PE, ISO-PE	mm^2	1 x 50 … 150 2 x 50 … 120	1 x 50 … 150 2 x 50 … 120	1 x 95 … 240 2 x 95 … 120	1 x 95 … 240 2 x 95 … 120
Bolted connection		M8	M10	M10	M10
Cable entry					
From front		Yes	Yes	Yes	Yes
From side		Yes	Yes	Yes	Yes
Multi-core cable					
Cable grommets		KT4	KT4	2 x KT4	2 x KT4
Cable diameters	mm	14 … 68	14 … 68	14 … 68	14 … 68
Single-core cable [3)]					
Aluminium plate, undrilled		10 x M50	10 x M50	10 x M50	10 x M50
Weights	kg	20	40	60	80

1) Max. permissible operating current I_{nc} for system mounting position vertical 475 A

2) Fuses: IEC 269-1-2, NF EN 60269, NFC 63210, VDE 0636-1, DIN 4360

3) Cable glands with strain relief are required (not included in the scope of supply).

Tap-off units with fuse switch disconnector

System-specific data		FSF160	FSF250	FSF400	FSF630
LV HRC fuse link		NH00	NH1	NH2	NH3
Rated current I_{nc}	A	160	250	400	630
Max. rated current I_{max} of the fuses	A	160	250	400	630
Max. permissible operating current I_{nc}	A	130[1)]	250	320	485[2)]
Conditional rated short-circuit current with fuse protection[3)]	kA	100 (80)	100 (80)	100 (80)	100 (80)
Suitable cross-sections (copper)					
L1, L2, L3	mm²	1 x 50 … 150 2 x 50 … 120	1 x 50 … 150 2 x 50 … 120	1 x 95 … 240 2 x 95 … 120	1 x 95 … 240 2 x 95 … 120
N, PE, ISO-PE	mm²	1 x 50 … 150 2 x 50 … 120	1 x 50 … 150 2 x 50 … 120	1 x 95 … 240 2 x 95 … 120	1 x 95 … 240 2 x 95 … 120
Bolted connection		M8	M10	M10	M10
Cable entry					
From front		Yes	Yes	Yes	Yes
From side		Yes	Yes	Yes	Yes
Multi-core cable					
Cable grommets		KT4	KT4	2 x KT4	2 x KT4
Cable diameters	mm	14 … 68	14 … 68	14 … 68	14 … 68
Single-core cable [4)]					
Aluminium plate, undrilled		10 x M50	10 x M50	10 x M50	10 x M50
Weights[5)]	kg	40 (60)	60 (80)	80 (90)	90

1) Max. permissible operating current I_{nc} for system mounting position horizontal, tap-off unit at top, all other lengths 125 A

2) Max. permissible operating current I_{nc} for system mounting position horizontal, tap-off unit at top, all other lengths 465 A

3) Fuses IEC 269-1-2, NF EN 60269-1, NFC 63211, NFC 63210, VDE 0636-1, DIN 43620; the values in brackets apply when using fuses in accordance with BS standard.

4) Cable glands with strain relief are required (not included in the scope of supply).

5) The values in brackets apply when using fuses in accordance with BS standard.

Tap-off units, switch disconnectors with fuse bases

		3NP1133	3NP1143	3NP1153	3NP1163
LV HRC fuse link		NH00	NH1	NH2	NH3
Rated current I_{nc}	A	160	250	400	630
Max. rated current I_{max} of the fuses	A	160	250	400	630
Max. permissible operating current I_{nc}	A	160	225	340	460
Conditional rated short-circuit current with fuse protection[1)]	kA	100	100	100	100
Suitable cross-sections (copper)					
L1, L2, L3	mm^2	1 x 50 … 150 2 x 50 … 120	1 x 50 … 150 2 x 50 … 120	1 x 95 … 240 2 x 95 … 120	1 x 95 … 240 2 x 95 … 120
N, PE, ISO-PE	mm^2	1 x 50 … 150 2 x 50 … 120	1 x 50 … 150 2 x 50 … 120	1 x 95 … 240 2 x 95 … 120	1 x 95 … 240 2 x 95 … 120
Bolted connection		M8	M10	M10	M10
Cable entry					
From front		Yes	Yes	Yes	Yes
From side		Yes	Yes	Yes	Yes
Multi-core cable					
Cable grommets		KT4	KT4	2 x KT4	2 x KT4
Cable diameters	mm	14 … 68	14 … 68	14 … 68	14 … 68
Single-core cable [2)]					
Aluminium plate, undrilled		10 x M50	10 x M50	10 x M50	10 x M50
Weights	kg	40	60	80	90

1) Fuses IEC 269-1-2, NF EN 60269-1, NFC 63211, NFC 63210, VDE 0636-1, DIN 43620.

2) Cable glands with strain relief are required (not included in the scope of supply).

5.6 Dimension drawings

Unless otherwise specified, all dimensions are in mm.

5.6.1 Trunking units

Sizes, single system

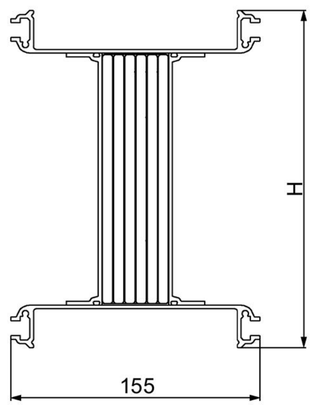


Figure 5-23 Sizes H x W, single system

Table 5- 10 AL system

Height H [mm]	System
111	LI-A.0800
132	LI-A.1000
146	LI-A.1250
182	LI-A.1600
230	LI-A.2000
297	LI-A.2500

Table 5- 11 CU system

Height H [mm]	System
111	LI-C.1000
117	LI-C.1250
146	LI-C.1600
174	LI-C.2000
213	LI-C.2500
280	LI-C.3200

Sizes, double system

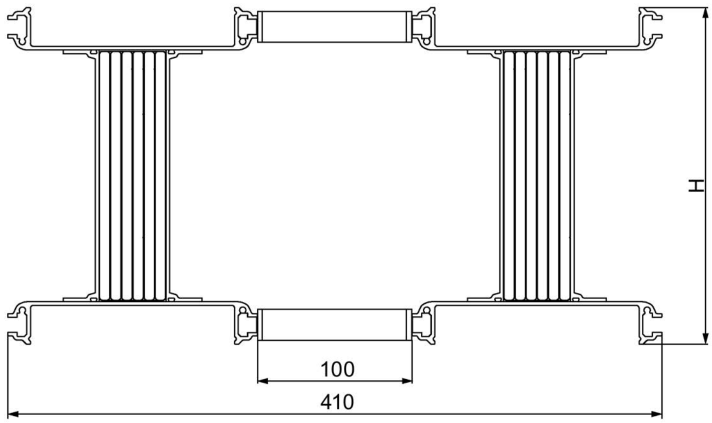


Figure 5-24 Sizes (H x W), double system

Table 5- 12 AL system

Height H [mm]	System
182	LI-A.3200
230	LI-A.4000
297	LI-A.5000

Table 5- 13 CU system

Height H [mm]	System
174	LI-C.4000
213	LI-C.5000
280	LI-C.6300

Straight length

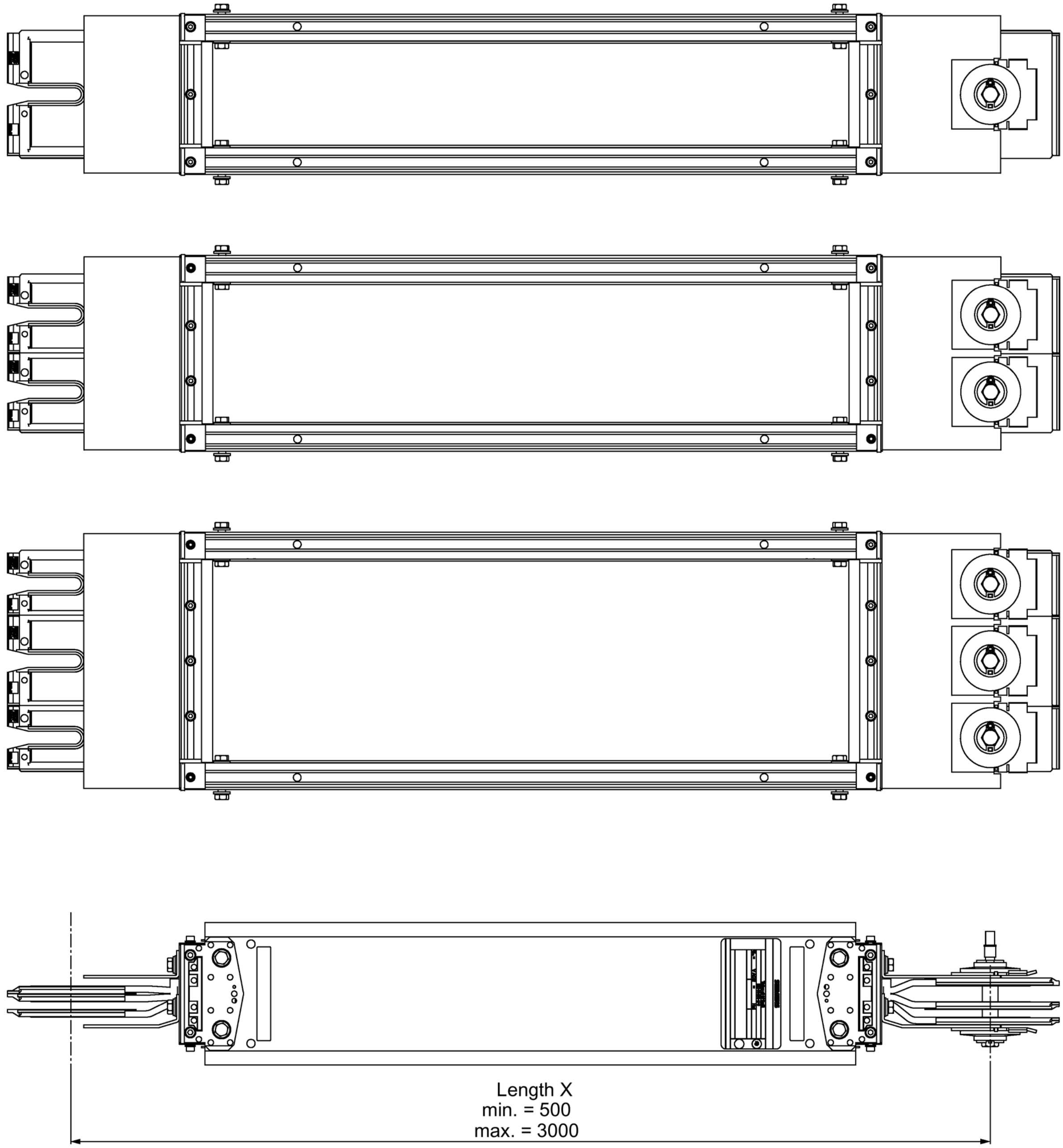


Figure 5-25 Straight length

Double system

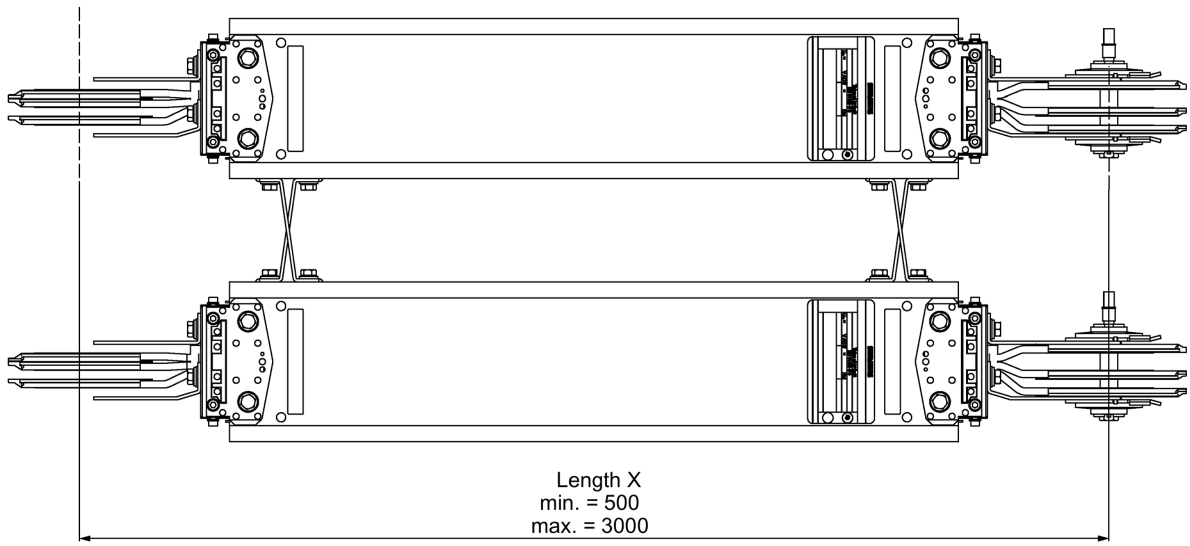


Figure 5-26 Double system

Incoming cable connection unit

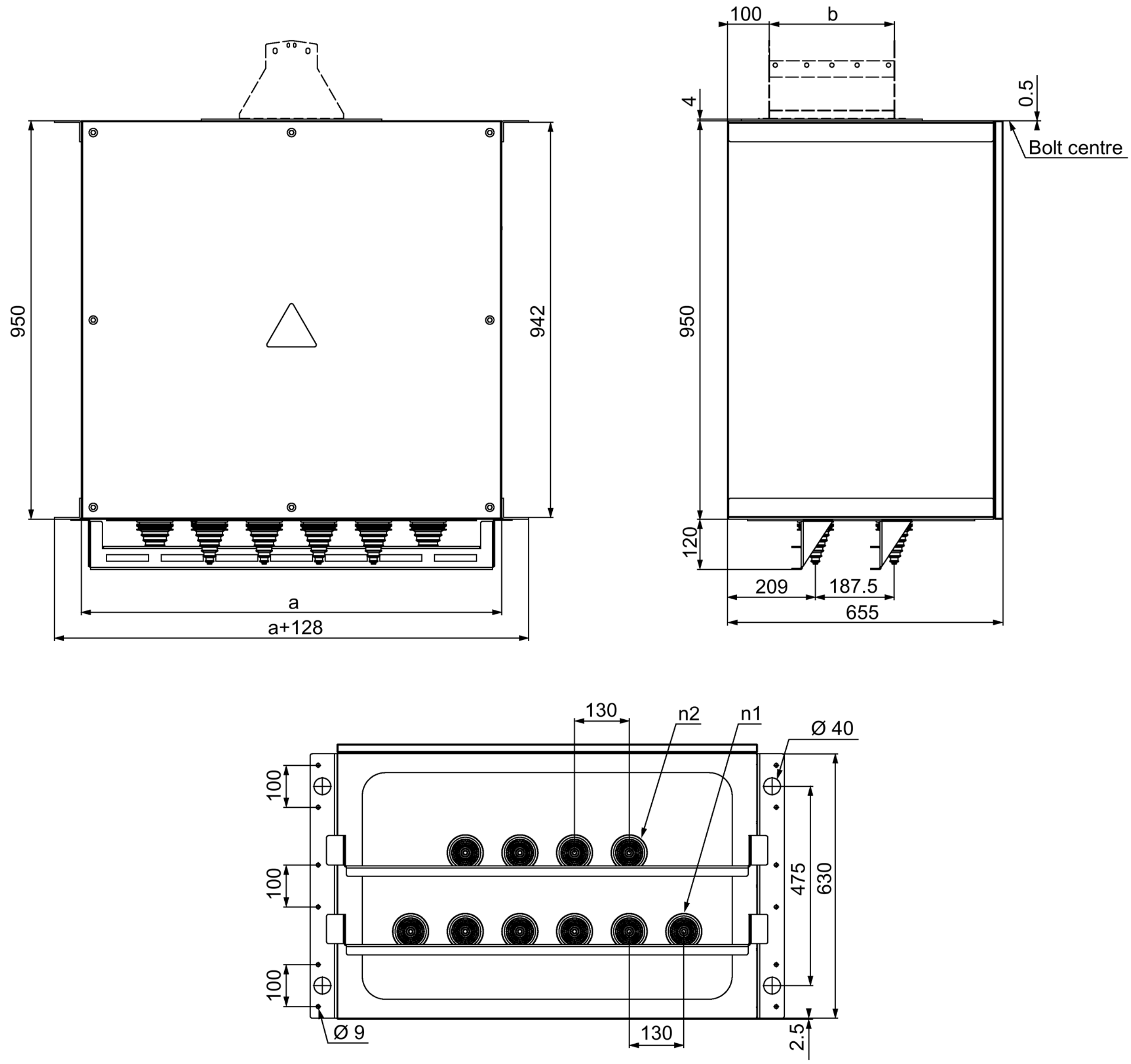


Figure 5-27 Incoming cable connection unit

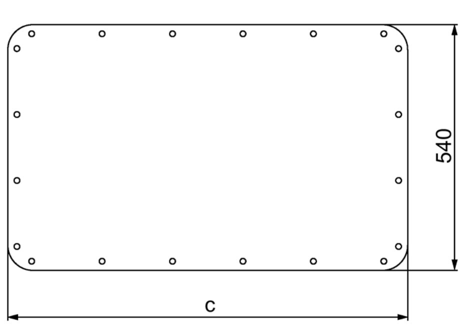


Figure 5-28 Single-core cable entry plate

Type	Enclosure dimensions			Cable entry			Cable connections	
	a	b	c	n1	n2	n3	Bolt	Max. cross-section
LI-AM0800-..-CFE...	670	110.5	540	3	0	3	3 x M16	300 mm^2
LI-AM1000-..-CFE...	670	131.8	540	3	1	4	4 x M16	300 mm^2
LI-AM1250-..-CFE...	670	146.1	540	3	2	5	5 x M16	300 mm^2
LI-AM1600-..-CFE...	670	181.8	540	3	3	6	6 x M16	300 mm^2
LI-AM2000-..-CFE...	1000	229.8	880	6	2	8	8 x M16	300 mm^2
LI-AM2500-..-CFE...	1000	296.5	880	6	4	10	10 x M16	300 mm^2
LI-CM1000-..-CFE...	670	110.5	540	3	1	4	4 x M16	300 mm^2
LI-CM1250-..-CFE...	670	117.2	540	3	2	5	5 x M16	300 mm^2
LI-CM1600-..-CFE...	670	146.1	540	3	3	6	6 x M16	300 mm^2
LI-CM2000-..-CFE...	1000	174	880	6	2	8	8 x M16	300 mm^2
LI-CM2500-..-CFE...	1000	213	880	6	4	10	10 x M16	300 mm^2
LI-CM3200-..-CFE...	1000	280	880	6	5	11	11 x M16	300 mm^2

5.6.2 Tap-off units

Tap-off units up to 630 A

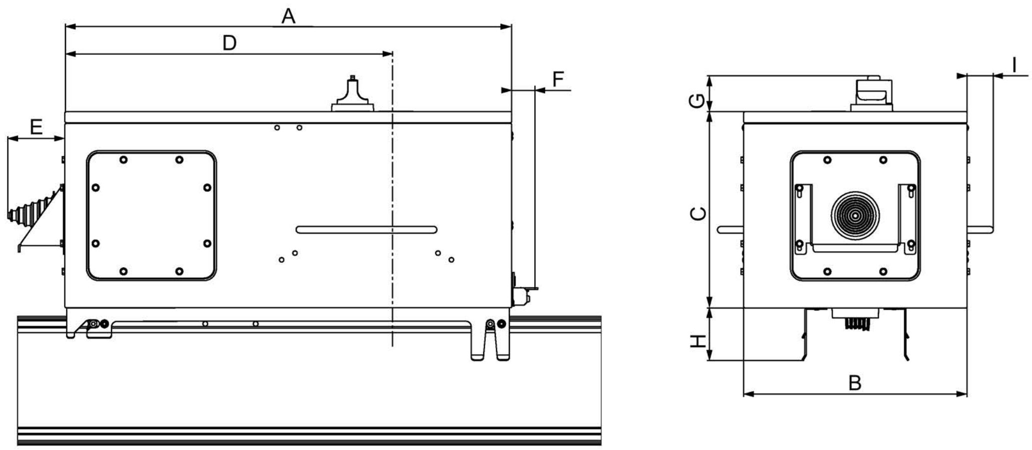
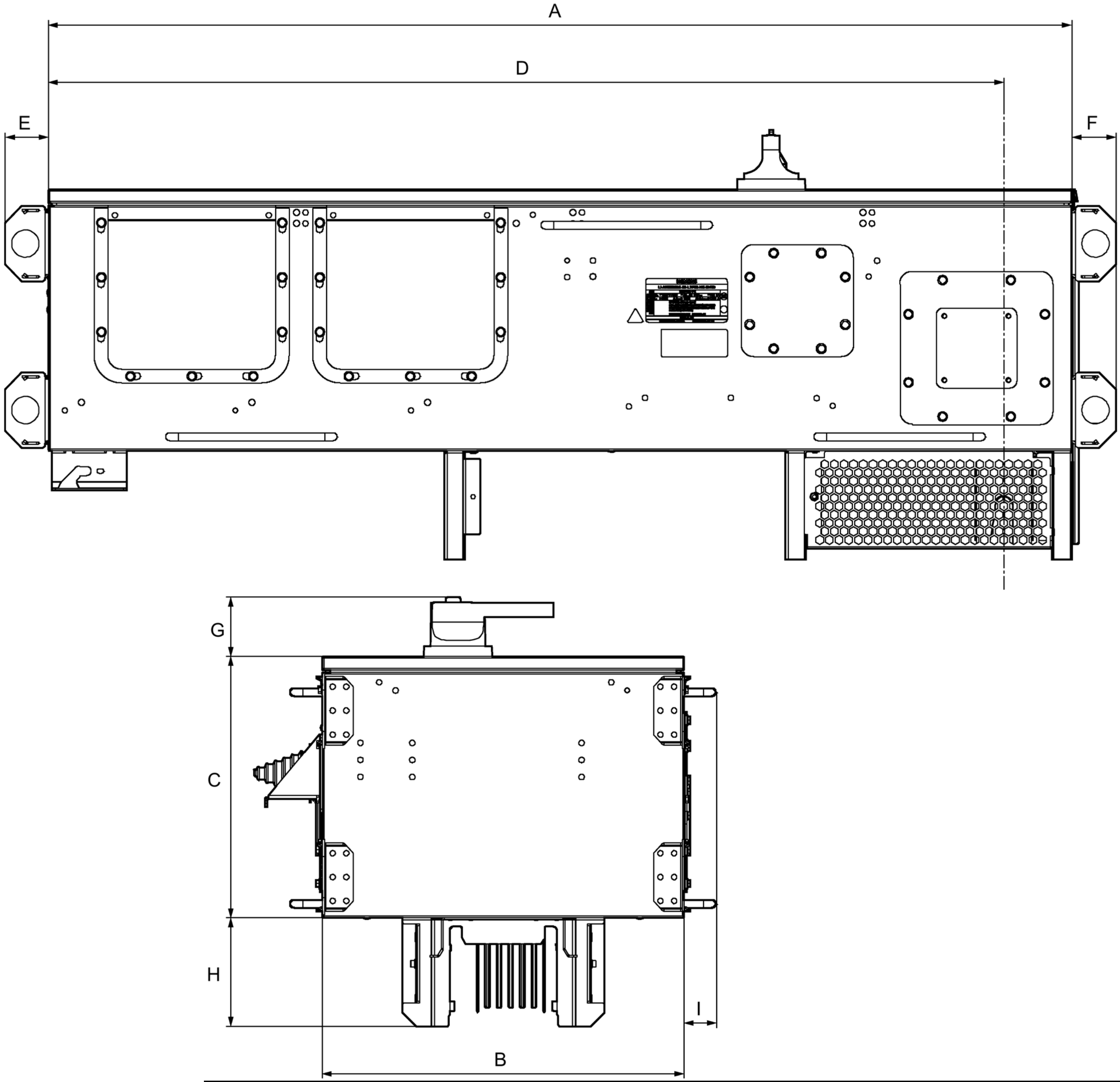


Figure 5-29 Tap-off units up to 630 A

	Size 1	Size 2	Size 3	Size 4	Size 5
A	510 mm	600 mm	800 mm	860 mm	860 mm
B	250 mm	320 mm	400 mm	440 mm	530 mm
C	250 mm	280 mm	352 mm	352 mm	382 mm
D	345 mm	435 mm	635 mm	695 mm	695 mm
E	85 mm	85 mm	85 mm	85 mm	85 mm
F	50 mm	50 mm	50 mm	50 mm	50 mm
G	57 mm	57 mm	57 mm	57 mm	57 mm
H	95 mm	95 mm	95 mm	95 mm	95 mm
I	No handles	47 mm	47 mm	47 mm	47 mm

Tap-off units up to 800 A, 1250 A



	BG7 [mm]
A	1 500
B	530
C	382
D	1 400
E	64
F	64
G	87
H	159
I	47

5.6.3 Additional equipment

5.6.3.1 Fixing for horizontal busbar run

U profiles

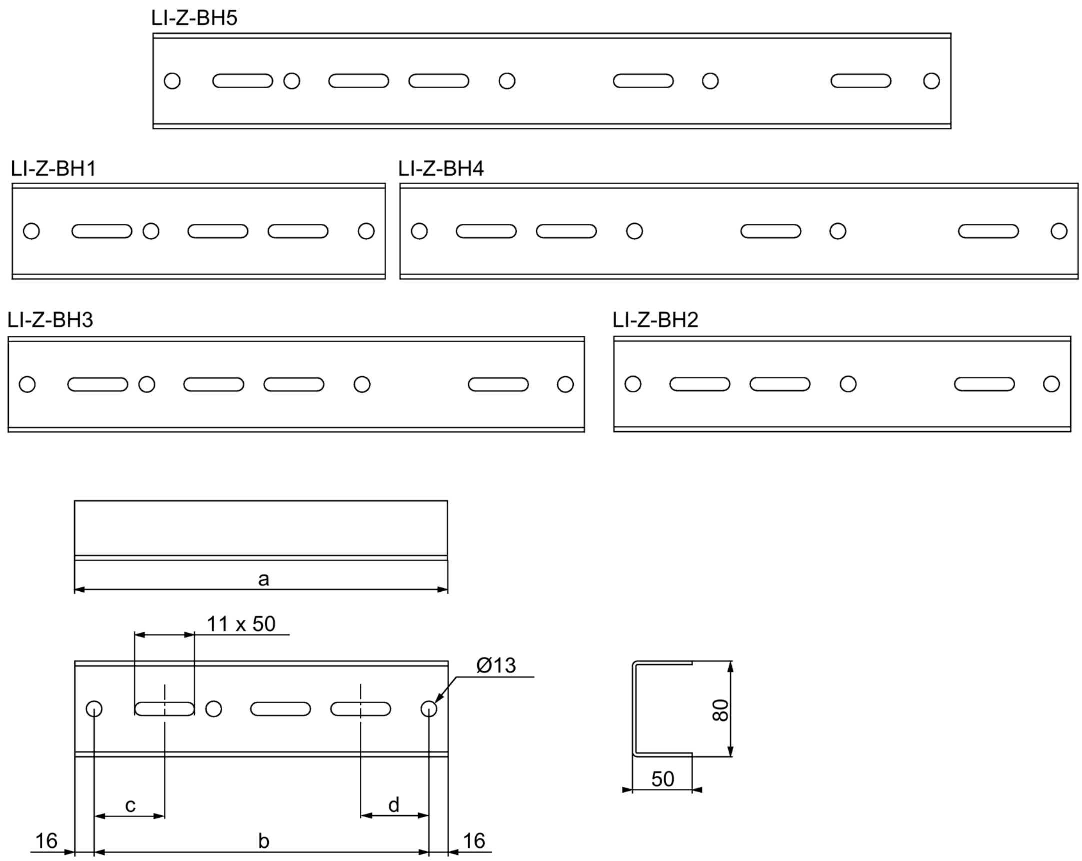
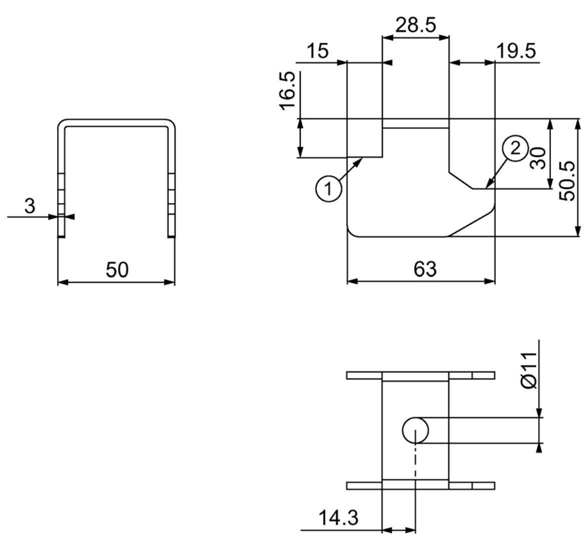


Figure 5-30 U profiles

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

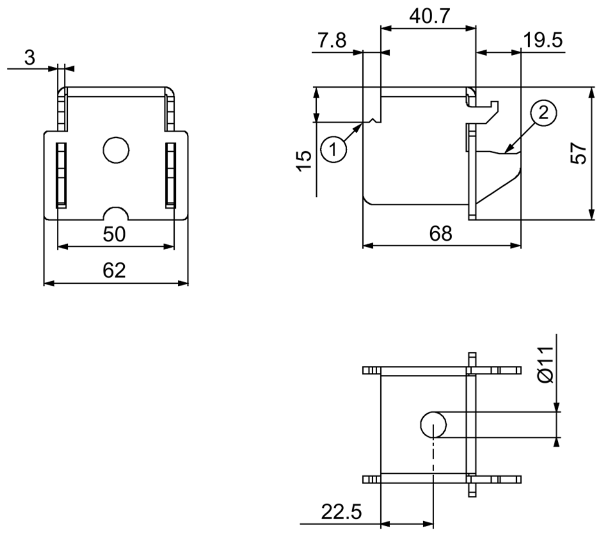
Straight trunking unit	Mounting position flat	Mounting position edgewise
LI-A.0800...	LI-Z-BH1	LI-Z-BH1
LI-A.1000...	LI-Z-BH1	LI-Z-BH1
LI-A.1250...	LI-Z-BH1	LI-Z-BH1
LI-A.1600...	LI-Z-BH2	LI-Z-BH1
LI-A.2000...	LI-Z-BH2	LI-Z-BH1
LI-A.2500...	LI-Z-BH3	LI-Z-BH1
LI-A.3200...	LI-Z-BH2	LI-Z-BH4
LI-A.4000...	LI-Z-BH2	LI-Z-BH4
LI-A.5000...	LI-Z-BH3	LI-Z-BH4
LI-C.1000...	LI-Z-BH1	LI-Z-BH1
LI-C.1250...	LI-Z-BH1	LI-Z-BH1
LI-C.1600...	LI-Z-BH1	LI-Z-BH1
LI-C.2000...	LI-Z-BH2	LI-Z-BH1
LI-C.2500...	LI-Z-BH2	LI-Z-BH1
LI-C.3200...	LI-Z-BH3	LI-Z-BH1
LI-C.4000...	LI-Z-BH2	LI-Z-BH4
LI-C.5000...	LI-Z-BH2	LI-Z-BH4
LI-C.6300...	LI-Z-BH3	LI-Z-BH4
LI-A.0800 … LI-C.6300	LI-Z-BH5	LI-Z-BH5

Terminal clamp flexible



① Fixing area, flat mounting position
② Fixing area, edgewise mounting position

Figure 5-31 Terminal clamp flexible LI-Z-BKK8



① Fixing area, flat mounting position

② Fixing area, edgewise mounting position

Figure 5-32 Terminal clamp, fixed LI-Z-BKFK2

5.6.3.2 Fixing bracket for vertical busbar run

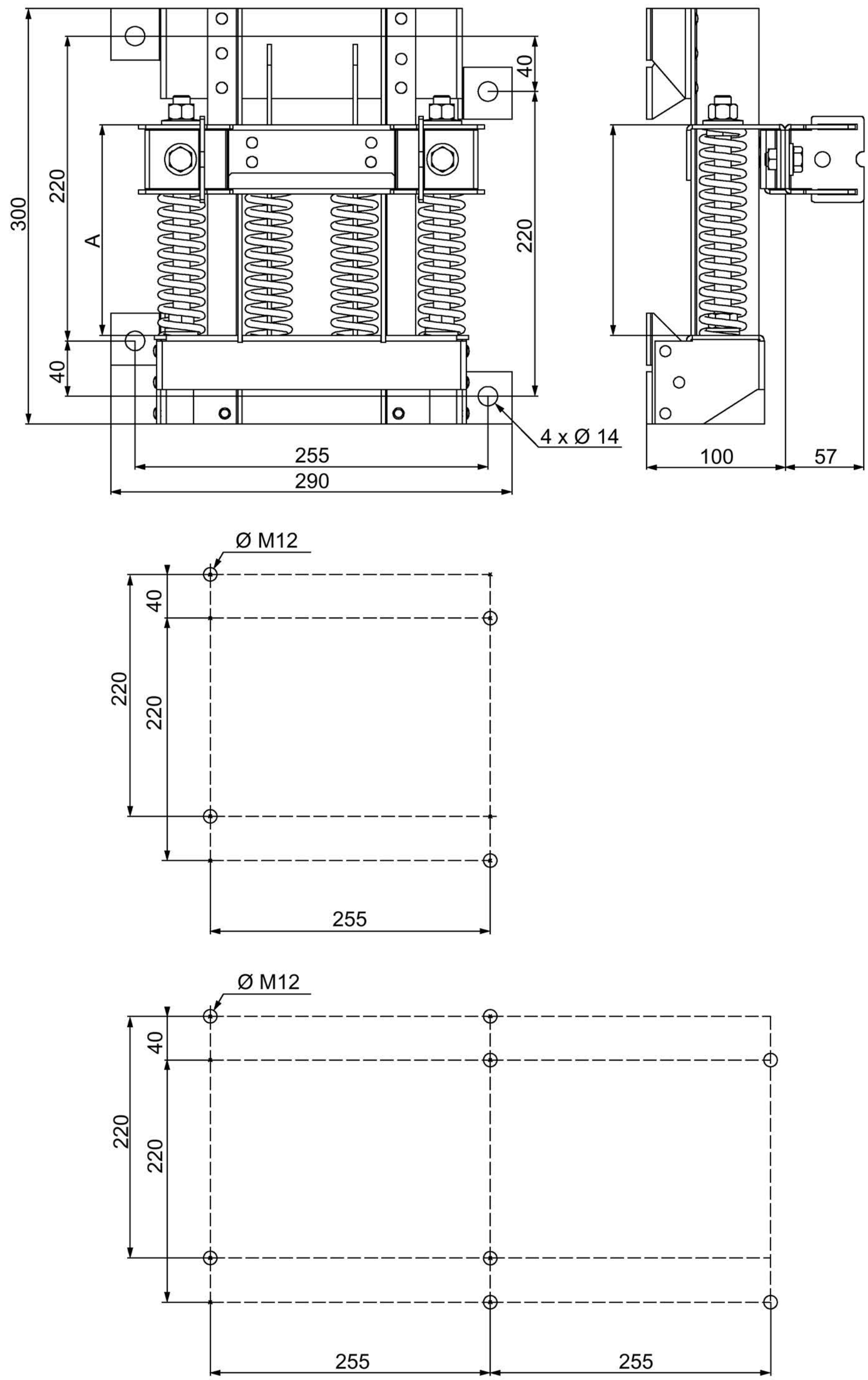


Figure 5-33 Fixing brackets for vertical run bracket

Article number	Type	Colour of the springs	Number of springs	Setting dimension A of the springs [mm]
8PS7073-0AA00-0AA3	LI-Z-BV-01	Yellow	3	106
8PS7073-0AA00-0AA4	LI-Z-BV-02	Red	3	101
8PS7073-0AA00-0AA1	LI-Z-BV-03	Red	4	99
8PS7073-0AA00-0AA2	LI-Z-BV-04	Blue	4	108
8PS7073-0AA00-0AA5	LI-Z-BV-05	Green	4	118
8PS7073-0AA00-0AA6	LI-Z-BV-06	Grey	4	127
8PS7073-0AA00-1AA0	LI-Z-BV-07	Dark grey	4	137
8PS7073-0AA00-1AA1	LI-Z-BV-08	Dark grey	4	134

LI-Z-BVFP-SB

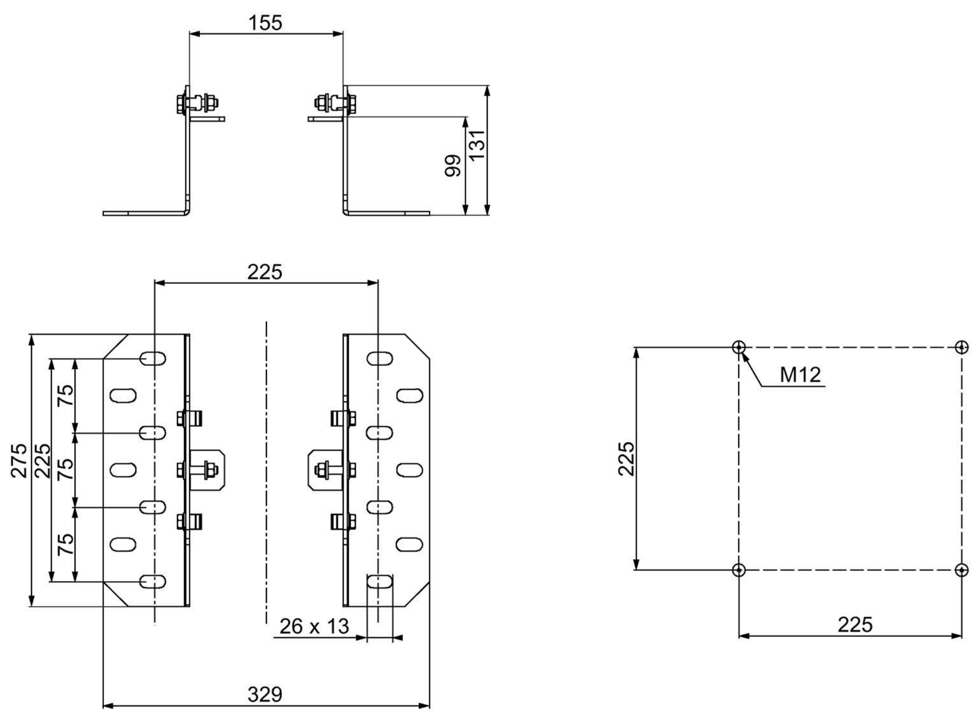


Figure 5-34 LI-Z-BVFP-SB

LI-Z-BVFP-DB

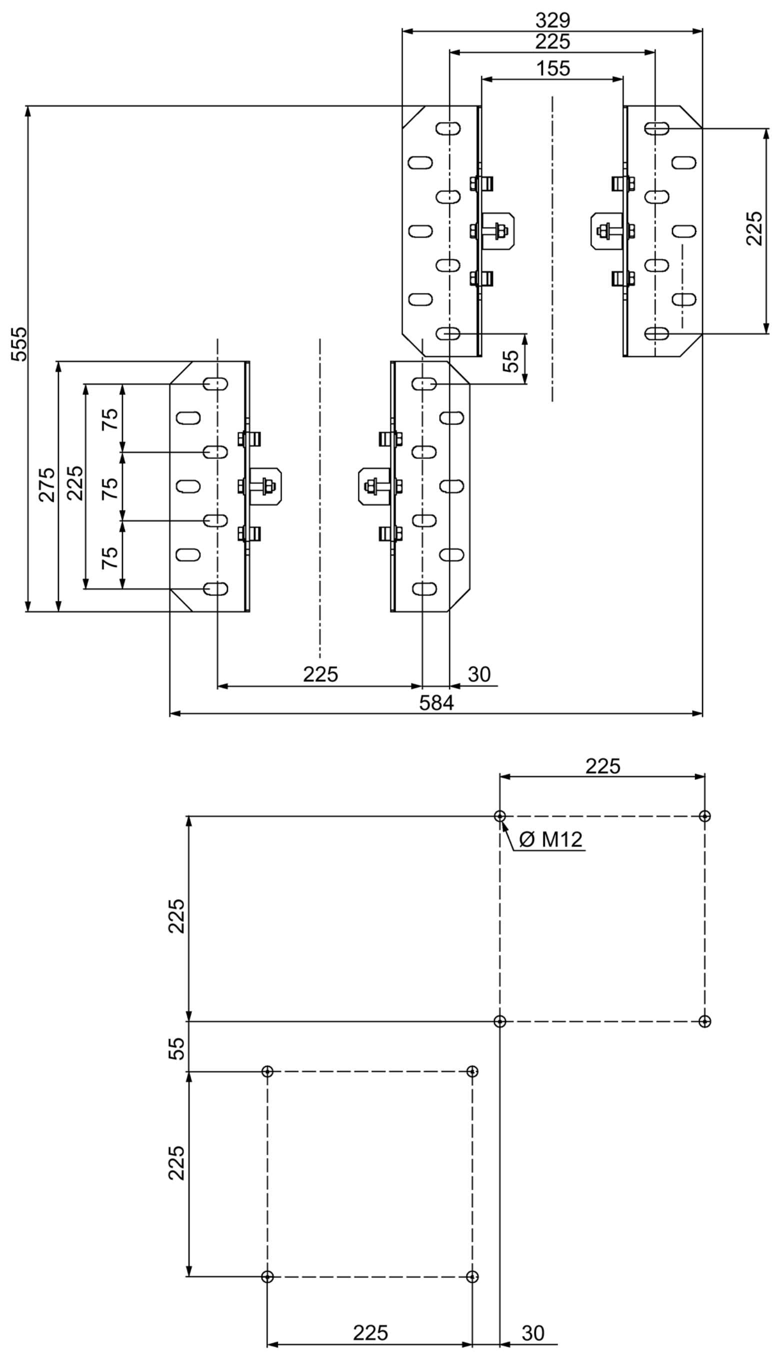


Figure 5-35 LI-Z-BVFP-DB

LI-Z-BVD-SB

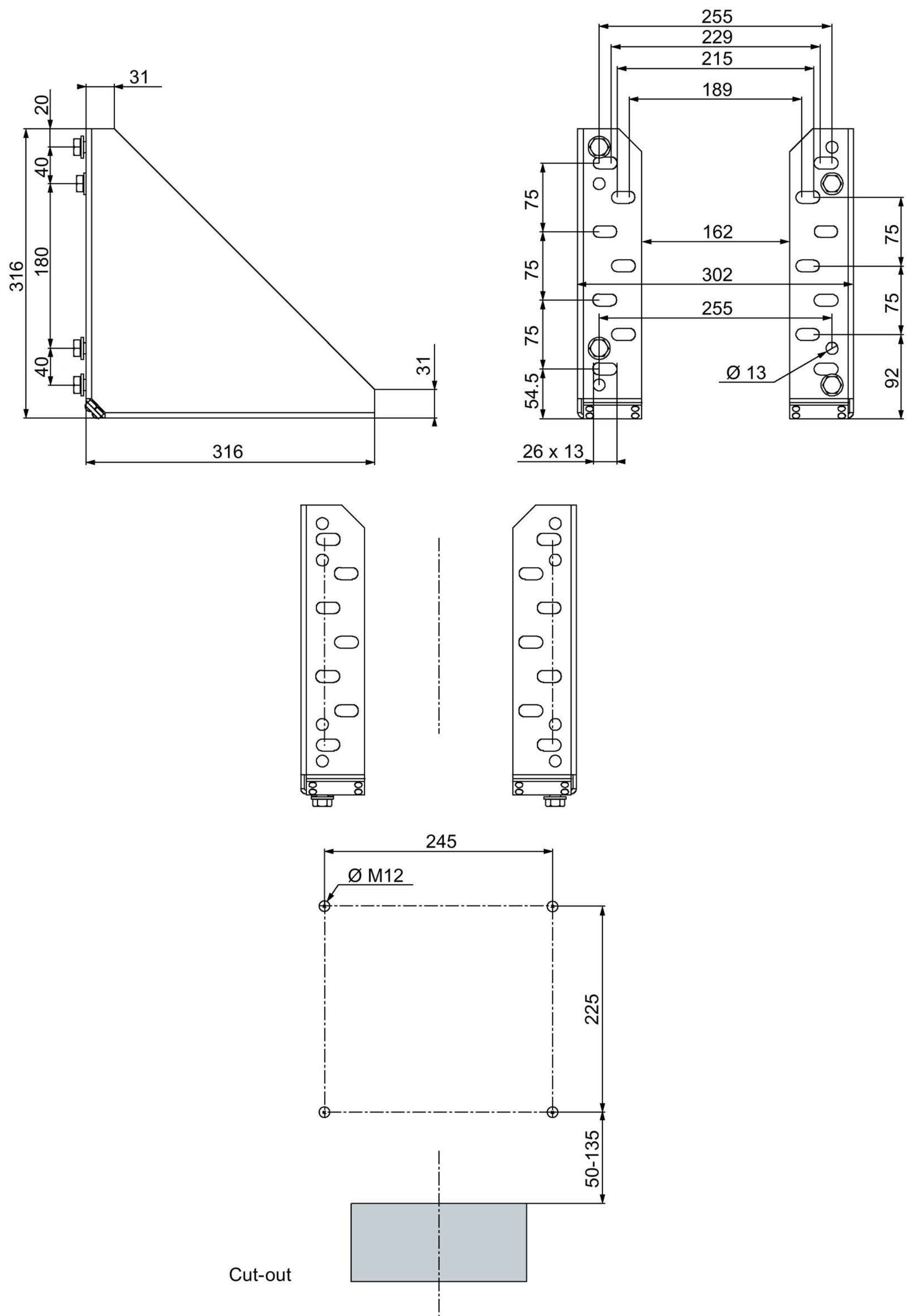


Figure 5-36 LI-Z-BVD-SB with drilling diagram

LI-Z-BVD-DB

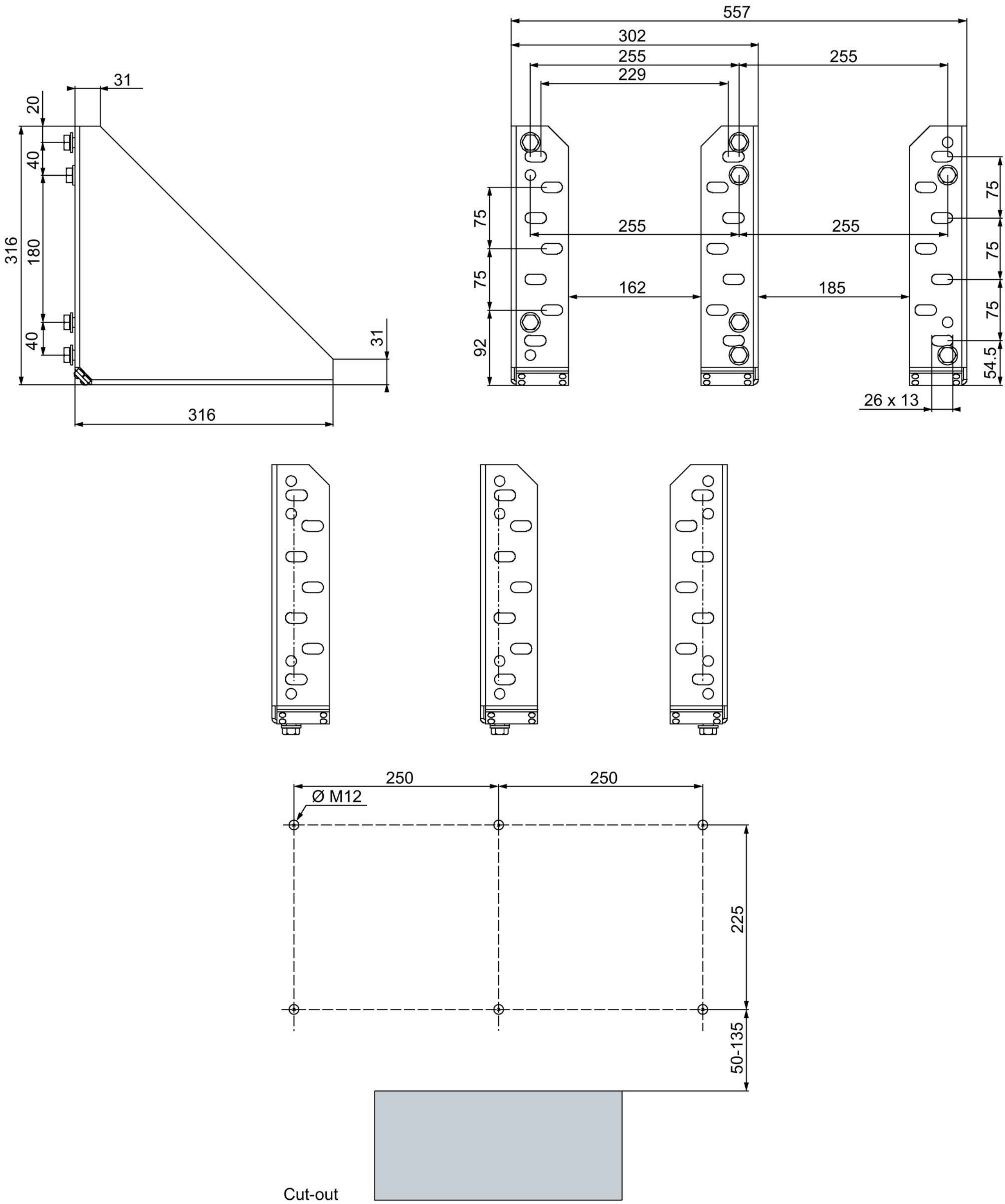


Figure 5-37 LI-Z-BVD-DB

LI-Z-BVF-SB, LI-Z-BVF-DB

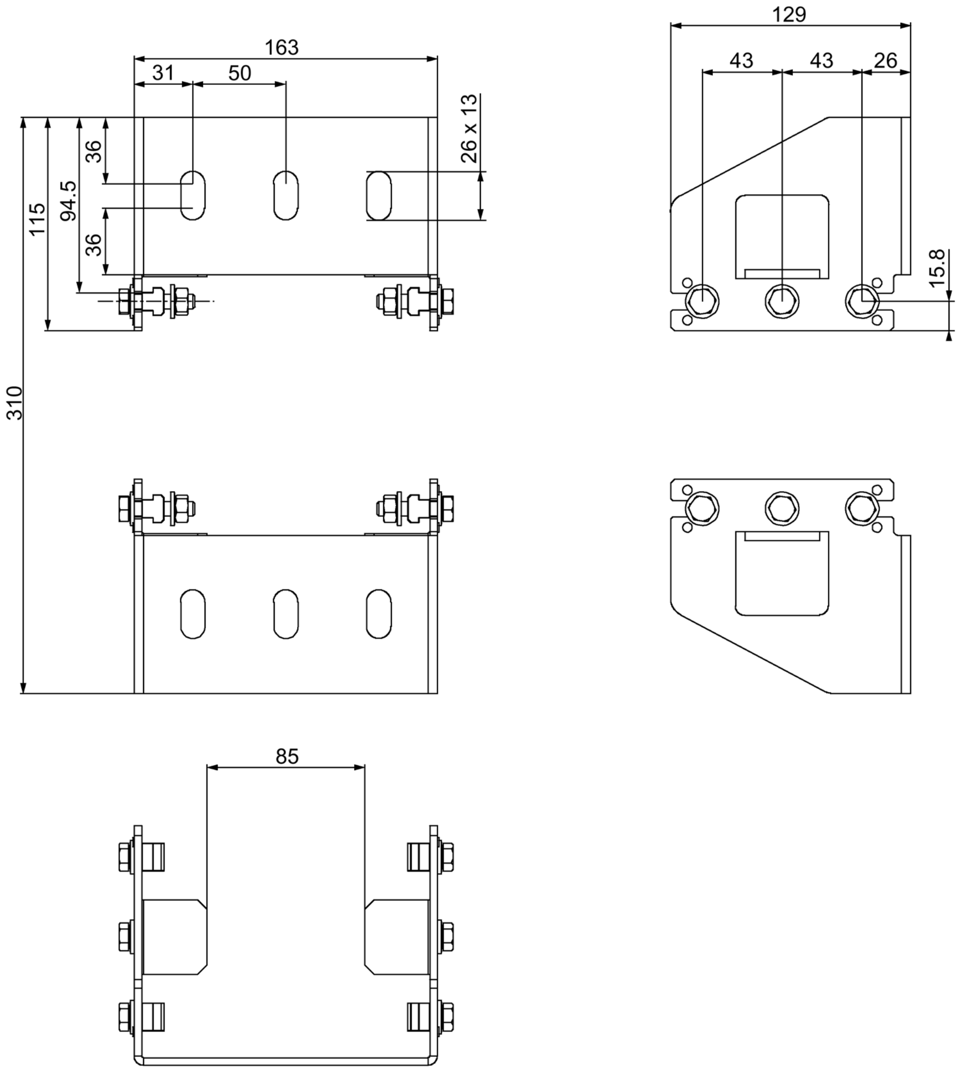


Figure 5-38 LI-Z-BVF-SB, LI-Z-BVF-DB

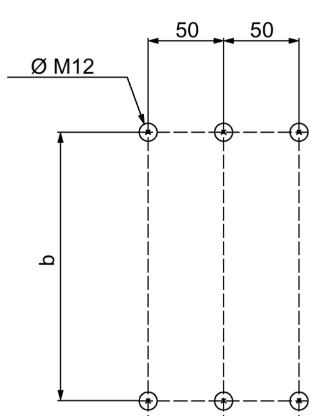


Figure 5-39 LI-Z-BVF-SB drilling diagram

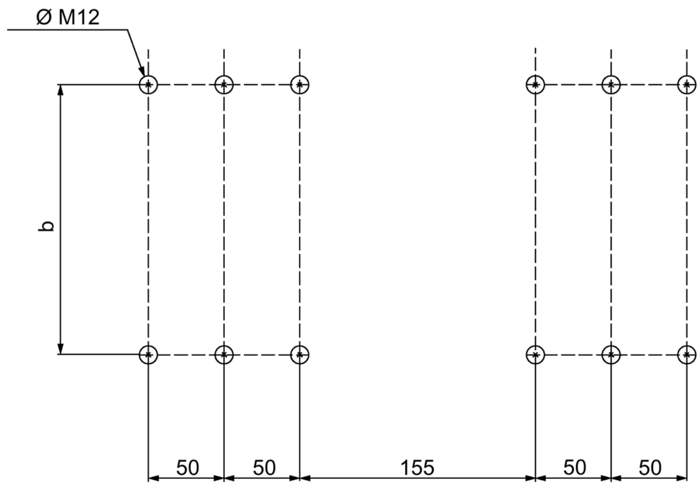


Figure 5-40 LI-Z-BVF-SB drilling diagram

System	b [mm]
LIA.0800...-L...	198
LIA.1000...-L...	219
LIA.1250...-L...	234
LIA.1600...-L...	269
LIA.2000...-L...	317
LIA.2500...-L...	384
LIA.3200...-L...	269
LIA.4000...-L...	317
LIA.5000...-L...	384
LIC.1000...-L...	198
LIC.1250...-L...	205
LIC.1600...-L...	234
LIC.2000...-L...	262
LIC.2500...-L...	300
LIC.3200...-L...	368
LIC.4000...-L...	262
LIC.5000...-L...	300
LIC.6300...-L...	368

End cap

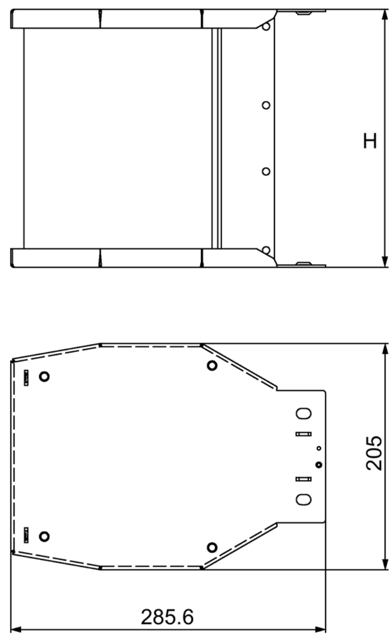


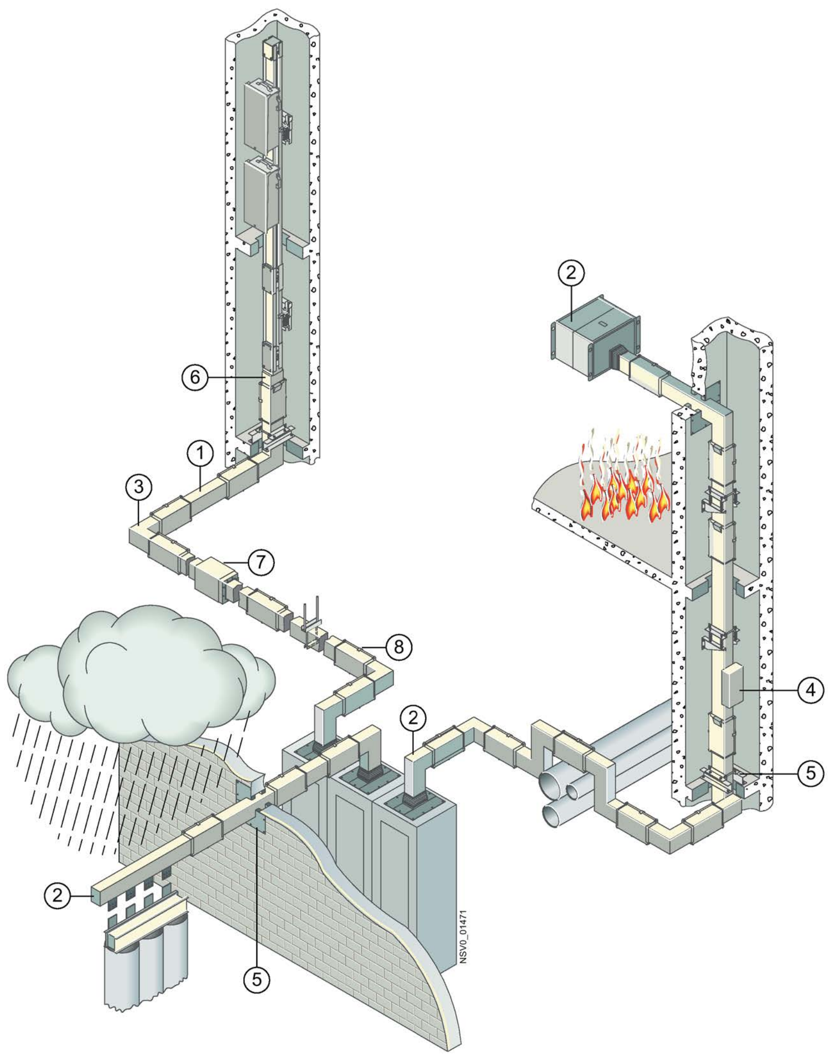
Figure 5-41 End cap

Type	H [mm]
LI-A.08..., LI-C.10...	114.5
LI-C.12...	121.2
LI-A.10...	135.8
LI-A.12..., LI-C.16...	150.1
LI.C.20..., LI-C.40...	178.0
LI-A.16..., LI-A.32...	185.8
LI-C.25..., LI-C.50	217.0
LI-A.20..., LI-A.40...	233.8
LI-C.32..., LI-C.63...	284.0
LI-A.25..., LI-A.50	300.5

Planning with LR

6

6.1 System description



① Straight trunking units
② Feeder units
③ Junction units
④ Tap-off units
⑤ Accessories
⑥ Adapter for the LI system
⑦ Expansion compensation
⑧ Encapsulated joint unit

Figure 6-1 LR system structure

Thanks to its cast epoxy enclosure with high IP68 degree of protection and high short-circuit rating, the LR system can provide an assurance of reliable power transmission even under the harshest ambient conditions. It is entirely resistant to environmental factors such as air humidity and corrosive or salty atmospheres.

The compact system is suitable for flat, edgewise, vertical or horizontal installation as per requirements in applications from 400 A to 6300 A. Bracket pieces, connectors and T pieces to create junction units facilitate optimisation in line with structural conditions within the most compact of dimensions. The LR system is even ideal for use outdoors.

6.2 System components

6.2.1 Preliminary remark for specifications

Basic description busbar trunking systems 400 A to 6300 A

Busbar trunking systems shall be supplied and installed as type-tested and ready-to-use low-voltage switchgear assemblies.

The following descriptions are part of the costing and contracts process. They must be considered when specifying individual systems and equipment, even if they are not subsequently referred to in more detail.

The busbar trunking system has to be suitable for power transmission, e.g. between transformer and low-voltage main distribution board, and power distribution in the form of a power supply, as well as for horizontal and vertical installation.

The busbar trunking system must comprise listed system components such as:

- Straight trunking units
- Feeder units for incoming transformer, distribution board and cable connection units
- Junction units with elbow, offset elbow, knee, offset knee, Z units and T units
- Joint units
- Accessories

The busbar trunking system must comprise standardised factory-built system components. It is not permitted to set up flexible junction units and junction units using cable connections. Expansion units and fixed points must be planned as per requirements.

Standard components are connected to the tap points on the trunking units as required. It must be possible to select the number and position of tap-off points. The bolt-on tap-off units can only be installed and removed when voltage-free.

If required, it must be possible to fit the busbar trunking system with an asbestos-free fireproof barrier for wall or ceiling mounting which is compliant with the fire resistance class S60, S90 or S120.

The enclosure is of epoxy resin and is corrosion-free. The cross section of the trunking units must not exceed the dimensions specified in the technical data.

The individual system components must be connected by screwing on a state-of-the-art bolted joint block.

The connection must be encapsulated in cast resin and closed following installation of the bolted joint block.

The busbars must be made of copper-coated aluminium or copper. The outer dimensions of the enclosure/casing must not exceed the values specified in the technical data.

The fire load must not exceed the value specified in the technical data.

Conformity and test certificates

The manufacturer of the busbar system must have in place and be able to prove compliance with a quality management system in accordance with EN ISO 9001.

Proof of compliance with the following requirements must be provided for the entire system in the form of certificates or declarations of conformity:

- Type test acc. to IEC / EN 61439-1 and -6
- Resistance to extreme climates acc. to IEC 60068-2-78 (constant) and IEC 60068-2-30 (cyclic)
- Fire protection acc. to DIN 4102--9

Reliable proof of special additional characteristics (e.g. functional endurance) of system components must be provided.

Technical data for busbar trunking systems

		LR...
Ambient temperature min./max./24-hour average		–5/+40/35°C
Degree of protection		IP68
Torque for joint block		LR.01 … LR03: 40 Nm [1)] LR.04 … LR29: 84 Nm [1)]
Trunking unit material		Epoxy resin
Colour of trunking units		Similar to RAL 7030 (stone grey)
Rated insulation voltage	AC	1000 V
Rated operating voltage	AC	1000 V
Rated frequency		50 … 60 Hz
Rated current		_______ [2)]
Rated short-time withstand current		
External conductor I_{cw} (1 s)		_______ [2)]
Neutral conductor I_{cw} (1 s)		_______ [2)]
5th conductor I_{cw} (1 s)		_______ [2)]
Rated peak withstand current I_{pk}		_______ [2)]
Conductor material		AL / Cu [1)]
No. of busbars		_______ [2)]
Conductor cross-section		
L1, L2, L3		_______ [2)]
N		_______ [2)]
PE		_______ [2)]
Fire loads		
Trunking unit		_______ [2)]
Max. fixing distances		
Horizontal edgewise		_______ [2)]
Horizontal flat		_______ [2)]
Vertical		_______ [2)]
Enclosure dimensions		_______ [2)]

1) Please delete as appropriate.

2) Enter data for selected systems.

You can find the values for the selected systems in the chapter "Technical specifications (Page 252)".

6.2.2 Type code

The components of the LR system are determined using a type code. The type is specified and selected on the basis of rated current, conductor material and system type or conductor configuration.

The resulting type code enables the product to be ordered to be precisely defined.

Ordering type

LR [ ] [ ] [ ] - [ ]

Conductor material	Aluminium	A
Conductor material	Copper	C

Size
Rated current I_{nA} [A]

Al	Cu			
400	630		**01**	**-6**
630	800		**02**	**-6**
800	1000		**03**	**-6**
1000	1350		**04**	**-8**
1200	1600		**05**	**-0**
1400	1700		**06**	**-2**
1600	2000		**07**	**-8**
2000	2500		**08**	**-0**
2500	3200		**09**	**-2**
3200	4000		**27**	**-8**
4000	5000		**28**	**-0**
5000	6300		**29**	**-2**

Version

4-conductor system	L1, L2, L3, PEN	**41**
5-conductor system	L1, L2, L3, N, PE	**51**

Component designation

Figure 6-2 Type codes LRA/LRC

Selection example:

A rated current of 2500 A is calculated for a project. A 5-pole system has to be used.

This results in type **LRC0851-0**.

6.2.3 System sizes and structure

Sizes

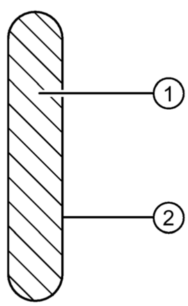
The sizes are dependent upon the rated current rating. In total, there are nine sizes. Six sizes are set up as single systems and three as double systems.

Single systems comprise one enclosure with 4 to 5 aluminium busbars for the LRA system and 4 to 5 copper bars for the LRC system. Double systems have between 8 and 10 bars in two enclosures.

The precise number of bars is determined by the required conductor configuration.

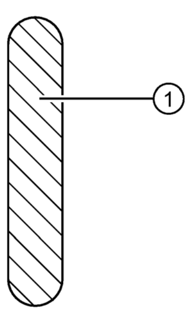
Structure of the busbars

The busbars of the LRA system are surface-treated (copper-coated), and the busbars of the LRC system are not.



① Aluminium bar
② Copper coating

Figure 6-3 LRA busbar trunking system

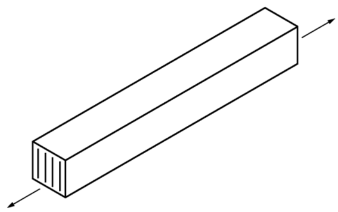


① Copper bar

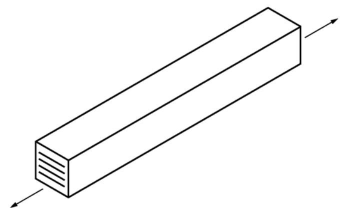
Figure 6-4 LRC busbar system

Mounting positions and rated current

The cast resin construction means that the current carrying capacity of the the LR busbar system is independent of the mounting position. This guarantees high flexibility for positioning the busbar runs. Current derating is not required for busbars in edgewise and flat positions on horizontal busbar runs or on rising main busbars (vertical busbar runs).



Horizontal busbar run, edgewise busbars

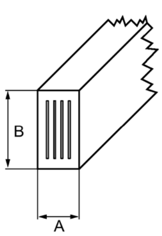
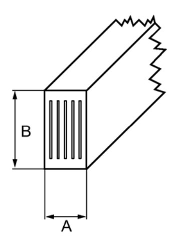
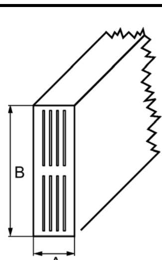
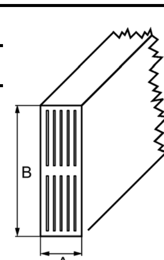


Horizontal busbar run, flat busbars

Vertical busbar run

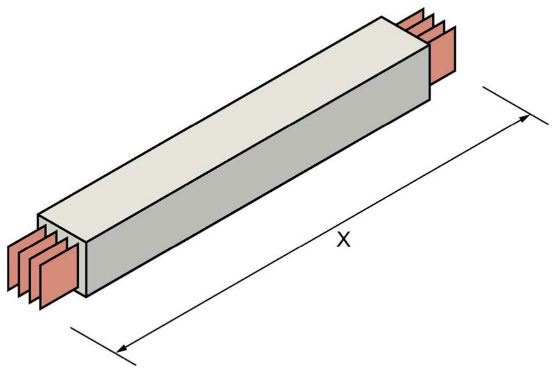
6.2.4 Conductor configuration and sizes

The LRA/LRC busbar system is available with two different conductor configurations dependent upon system type and the size of the N and PE cross sections.

I_{nA} [A]		4-conductor system				5-conductor system			
LRA	LRC		System	A	B		System	A	B
400	630		LR.0141	90	90		LR.0151	90	90
630	800		LR.0241				LR.0251		
800	1000		LR.0341				LR.0351		
1000	1350		LR.0441	100	110		LR.0451	120	110
1200	1600		LR.0541		130		LR.0551		130
1400	1700		LR.0641		150		LR.0651		150
1600	2000		LR.0741		190		LR.0751		190
2000	2500		LR.0841		230		LR.0851		230
2500	3200		LR.0941		270		LR.0951		270
3200	4000		LR.2741	100	380		LR.2751	120	380
4000	5000		LR.2841		460		LR.2851		460
5000	6300		LR.2941		540		LR.2951		540

6.2.5 Straight trunking units

Straight trunking units for horizontal and vertical installation without tap points and joint unit



Configurable lengths X from 0.30 m to 3.00 m in 0.01 m steps available

Straight trunking units for tap-off units on request

Straight trunking units to adapt to LI systems for indoor applications

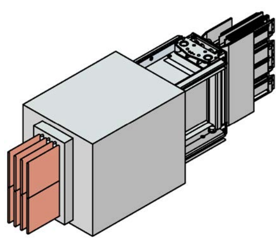


Figure 6-5 LR-LI adapter element (x = 0.8 m or 0.95 m)

Straight trunking units to adapt to LD systems for indoor applications

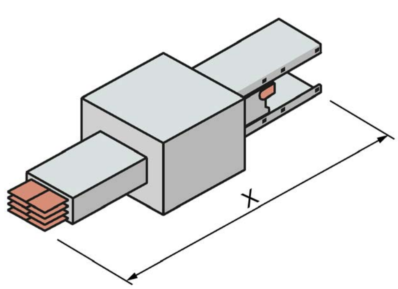
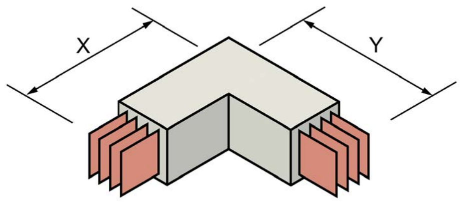


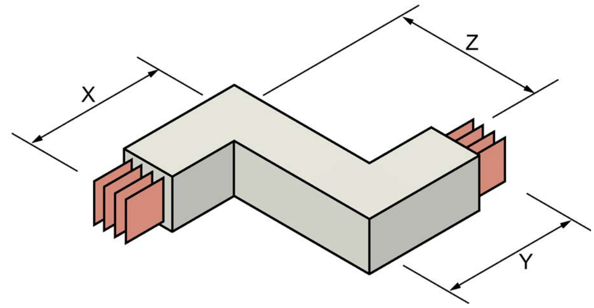
Figure 6-6 Adapter element (X = 1.0 m)

6.2.6 Junction units

Junction units for horizontal installation



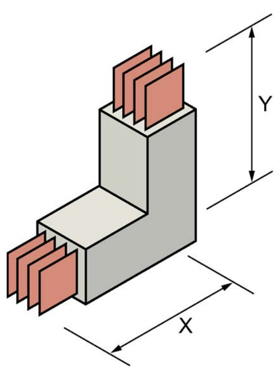
Elbow LR....-E(-1.0 / -1.5)



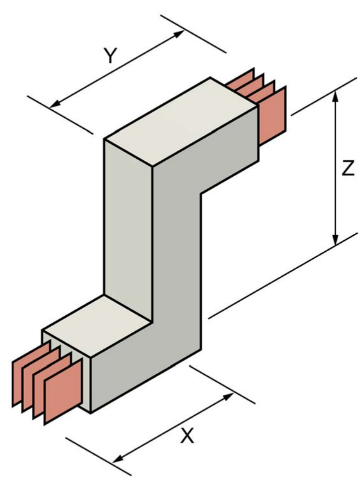
Z unit LR....-ZE

Length	System	Type
X = 0.30 … 1.20 m Y = 0.30 … 1.20 m	LR.01 … LR.29	LR....-E(-1.0 / -1.5)
X/Y = 0.35 m Z = 0.01 … 0.70 m	LR.01 … LR.29	Z unit LR....-ZE

Junction units for horizontal and vertical installation

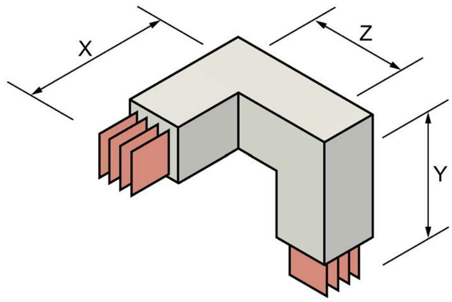


Knee LR....-K(-1.0 / -1.5)

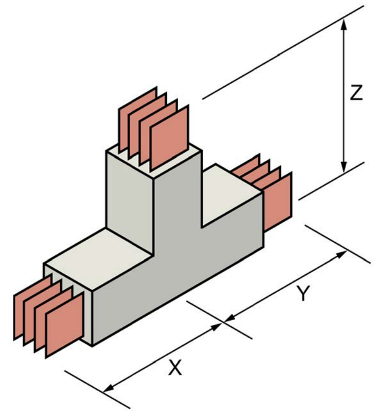


Z unit LR....-ZK

Length	System	Type
X/Y = 0.35 … 1.15 m	LR.01 … LR.09	LR....-K(-1.0 / -1.5)
X/Y = 0.50 … 1.00 m	LR.27 … LR.29	
X/Y = 0.35 m Z = 0.01 … 0.70 m	LR.01 … LR.09	LR....-ZK
X/Y = 0.50 m Z = 0.01 … 1.00 m	LR.27 … LR.29	



Offset knee LR...-XL



T unit LR....-TV(-2.0)

Length	System	Type
X/Y = 0.35 m Z = 0.09 … 0.70 m	LR.01 … LR.09	LR....-XL
X/Y = 0.50 m Z = 0.25 … 1.00 m	LR.27 … LR.29	
X/Y = 0.35 … 0.75 m Z = 0.35 … 0.50 m	LR.01 … LR.09	LR....-TV(-2.0)
X/Y = 0.50 … 0.75 m Z = 0.50 m	LR.27 … LR.29	

6.2.7 Distribution board connection for Siemens power distribution boards

For the LR system, an LI-connection unit in conjunction with an LR adapter element can be used to achieve a type-tested link to Siemens power distribution boards.

6.2.8 Busbar connection unit for non-Siemens distribution boards

If you wish to connect the busbar trunking system to a non-Siemens distribution board, you can establish this connection using a busbar connection unit LR....-T. for non-Siemens distribution boards. The connection unit is built into the distribution board and serves as an interface to the copper connections of the distribution system.

Versions

Aluminium or copper conductors are used for connection units for non-Siemens distribution boards. The rated currents up to a maximum of 6300 A correspond to the specifications in chapter "Technical specifications (Page 252)". The required conductor cross sections for copper connections are also listed in the chapter "Technical specifications (Page 252)".

Installation of the busbar connection unit

The busbar connection unit in the distribution board must be copper-plated by the board manufacturer or in compliance with that manufacturer's specifications. The board manufacturer must ensure that the required short-circuit strength is achieved and the permissible temperature limit of the busbar connection unit for non-Siemens distribution boards is not exceeded.

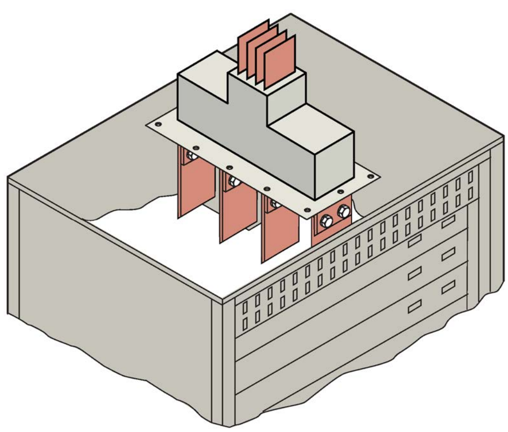


Figure 6-7 Busbar connection unit for non-Siemens distribution boards

The dimensions correspond to those of the incoming cable connection units.

6.2.9 Connection unit for transformers and distribution boards

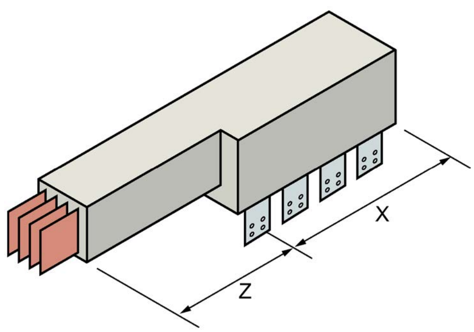
The wide variety of transformer types reflects the variety of rated currents and the different phase sequences and clearances.

This type variety requires high flexibility as regards transformer connection in busbar trunking systems.

The universal connection unit can also be used to connect distribution boards.

For LR busbar trunking systems up to 6300 A, transformer connection units are available with busbar connection on the side (LR....-TC, -TD or -TE) and on the top (LR....-TJ, -TG, -TM, -TK or -TX).

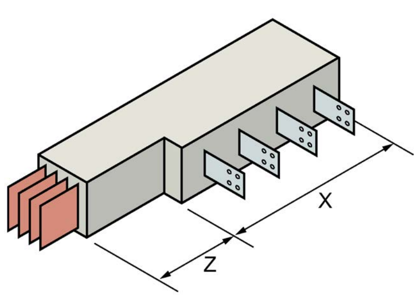
Busbar connection on the side and customer connection on the bottom



LR.....-TE(-F)

Length	System
X ≤ 0.70 m Z = 0.30 … 0.50 m	LR.01 … LR.09
X ≤ 1.00 m Z = 0.30 … 0.50 m	LR.27 … LR.29

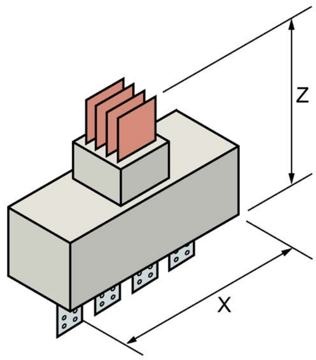
Busbar connection on the side and customer connection on the side



LR.....-TC(-F)

Length	System
X ≤ 0.40 … 0.70 m (4L), 0.50 … 0.70 m (5L) Z = 0.30 … 0.50 m	LR.01 … LR.29

Busbar connection on the top and customer connection on the bottom



LR.....-TX(-F)

Length	System
X ≤ 0.70 m Z = 0.50 m	LR.01 … LR.09
X ≤ 1.00 m Z = 0.70 m	LR.27 … LR.29

The phase clearances can be selected up to 750 mm.

Minimum phase clearance: Tag width + 25 mm

The sequence of the connection tags from conductors L1, L2, L3, N (PEN) and PE can be freely selected.

6.2.10 Incoming cable connection unit

If power needs to be supplied to the busbar trunking system via cables, you should use an LR....-KE incoming cable connection unit.

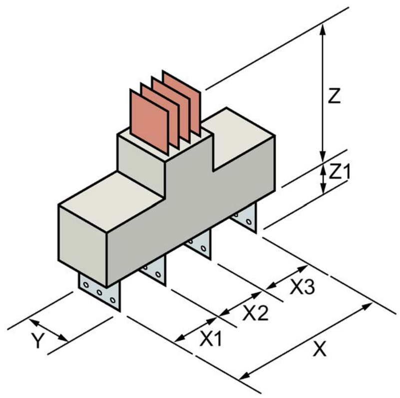


Figure 6-8 Incoming cable connection unit

Design	Size
4-conductor	X = 0.40 m Z = 0.30 m Z_1 = 0.06 m
5-conductor	X = 0.50 m Z = 0.30 m Z_1 = 0.06 m

Tags

Clearance	Width	Type
$X_1 = X_2 = X_3$ = 0.10 m	Y = 0.06 m	LR.01 … LR.03
	Y = 0.09 m	LR.04
	Y = 0.11 m	LR.05
	Y = 0.12 m	LR.06
	Y = 0.16 m	LR.07
	Y = 0.19 m	LR.08
	Y = 0.21 m	LR.09 … LR.29

You can connect single-core or multi-core cables. You can connect cross-sections up to 300 mm^2 (bolted connection) directly to the connection bars of the incoming cable connection unit.

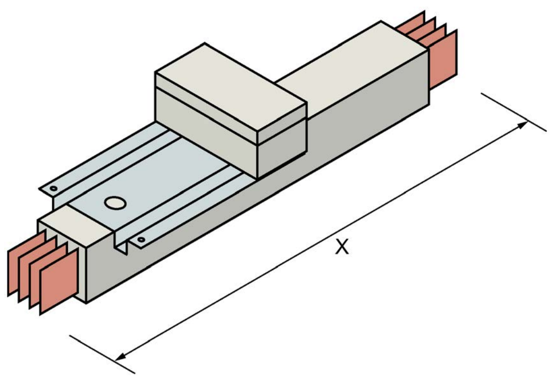
The cable connections are moulded to the tags on site once the cables have been connected. A moulding cast and cast resin mix are included in the scope of supply for this purpose.

6.2.11 Tap-offs for power distribution

The LR system has been designed purely for power transmission. However, power tap-offs for loads can be created by adding straight trunking units with junction points and corresponding junction boxes to the LR run.

Note

Junction boxes are available on request.



x = X = 0.50 … 3.00 m

Figure 6-9 Straight trunking unit with junction box

The tap-off unit permits rated currents of up to 630 A. An equipment compartment is built onto the tap-off unit. Project-specific switchgear (e.g. circuit breakers) is installed in the compartment and connected - both electrically and mechanically - to the tap-off unit.

Tap-off units are not designed for connection whilst the LRC system is live.

All other characteristics and technical data can only be provided on request for specific projects.

6.2.12 Additional equipment

Joint block

The joint block is used for the trunking units' electrical and mechanical connections. LR trunking units are usually supplied without joint units (junction blocks or monoblocks, as they are also known). Accordingly, you need to make provision to plan and order joint blocks separately as appropriate for the number of trunking unit connections.

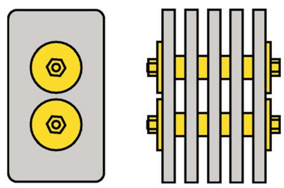
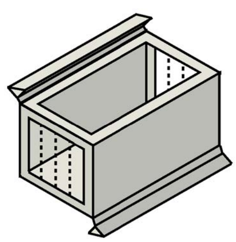


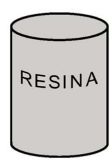
Figure 6-10 Joint unit

Accessories for busbar connections with joint blocks

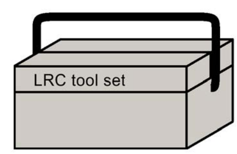
Once the electrical link with the joint block has been established, it needs to be cast with epoxy resin. For this purpose, moulding casts, cast resin mix, separators and various tools are provided as accessories.



Casting mould



Cast resin mix



Tool set

Fixing brackets for horizontal installation

Various types of fixing bracket are available:

- Mounting position: edgewise or flat
- Mounting characteristic: run supported or fixed.

The standard supporting brackets are:

- LR..-BHF type for edgewise mounting
- LR..-BHH type for flat mounting

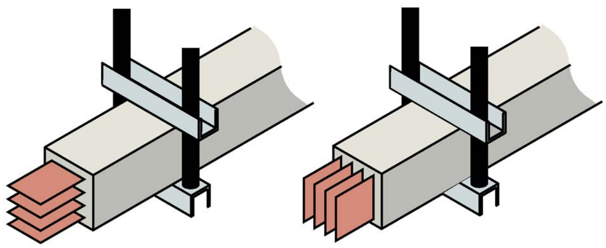


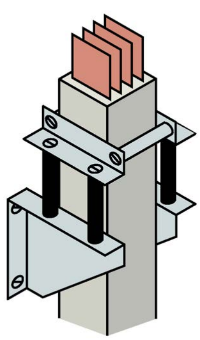
Figure 6-11 Flat (left) and edgewise (right) mounting position

The fixed points, as they are called, are created using long run lengths in conjunction with expansion compensation units.

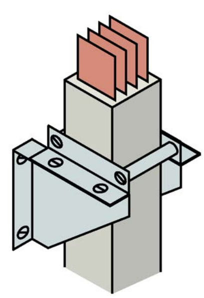
Fixing brackets for vertical installation

Various types of bracket have to be used to install vertical busbar runs:

- Spring clamp to carry the weight of the run, type LR..-BV.
- Sliding bracket to guide the run in the prescribed position, type LR..-BG.
- Fixed points to fix the run to the building structure, type LR..-BF.



LR..-BVW (wall mounting)



LR..-BF

6.3 Technical specifications

6.3.1 LR general data

			LR...
Standards and regulations			IEC / EN 61439-1 and -6
Rated insulation voltage[1] U_i	AC	V	1000
Overvoltage category / pollution degree			III/3
Rated operating voltage[1] U_e	AC	V	1000
Frequency		Hz	50 … 60
Rated current I_{nA}		A	400 … 5000 (LRA) 630 … 6300 (LRC)
Resistance to extreme climates			Damp heat (constant) acc. to IEC 60068-2-78
			Damp heat (cyclic) acc. to IEC 60068-2-30
Ambient temperature*		°C	-5 … +40
Degree of protection acc. to IEC/EN 60529 (type 2)			
Busbar elements			IP68
Connection elements/tap-off units			IP68
Material			
Enclosure for busbar elements, connection elements Busbars			Epoxy resin Aluminium with copper coating (LRA) Copper (LRC)
Mounting positions			Horizontal edgewise, horizontal flat, vertical
Colour			Stone grey, similar to RAL 7030

* Observe the derating factor for the rated current at high ambient temperatures

1) For power distribution when using junction boxes on request

Thermal characteristics

Parameter	Values								
Ambient temperature [°C]	20	25	30	35	40	45	50	55	60
Conversion factor	1.15	1.10	1.05	1.00	0.96	0.89	0.84	0.78	0.72

6.3.2 Trunking units LRA..41 (4-pole, aluminium)

LRA0141 to LRA0341

LRA				0141	0241	0341
Rated current		I_{nA}	A	400	630	800
Degree of protection				IP68		
At 50 Hz and +20 °C busbar temperature	Resistance	R_{20}	mΩ/m	0.161	0.121	0.081
	Reactance	X_{20}	mΩ/m	0.050	0.042	0.026
	Impedance	Z_{20}	mΩ/m	0.169	0.128	0.085
At 50 Hz and final heating of busbars	Resistance	R_{warm}	mΩ/m	0.176	0.142	0.096
	Reactance	X_{warm}	mΩ/m	0.050	0.042	0.026
	Impedance	Z_{warm}	mΩ/m	0.178	0.151	0.102
For 4-pole systems under fault conditions acc. to EN 61439-6 Annex N	Resistance	R_F	mΩ/m	0.353	0.284	0.193
	Reactance	X_F	mΩ/m	0.175	0.100	0.155
	Impedance	Z_F	mΩ/m	0.394	0.301	0.247
Zero impedance for 4-pole systems to DIN VDE 0102, IEC 909	Resistance PEN	R_0	mΩ/m	0.470	0.379	0.257
	Reactance PEN	X_0	mΩ/m	0.609	0.509	0.529
	Impedance PEN	Z_0	mΩ/m	0.769	0.634	0.588
Short-circuit rating						
Rated impulse withstand current		I_{pk}	kA	24	24	55.7
Rated short-time withstand current	t = 1 s	I_{cw}	kA	12	12	26.5
Conductor material				Aluminium		
Conductor cross-section	PEN		mm²	176	236	354
Cross-section of active conductors			mm²	176	236	354
Fire load			kWh/m	13.01	12.59	11.76
Fixing distances			m	1.5	1.5	1.5
Weight (2 m length with clamped connection)			kg/m	21.89	22.08	22.46

LRA0441 to LRA0941

LRA				0441	0541	0641	0741	0841	0941
Rated current		I_{nA}	A	1000	1200	1400	1600	2000	2500
Degree of protection				IP68					
At 50 Hz and +20 °C busbar temperature	Resistance	R_{20}	mΩ/m	0.060	0.048	0.040	0.030	0.024	0.020
	Reactance	X_{20}	mΩ/m	0.055	0.050	0.042	0.046	0.031	0.029
	Impedance	Z_{20}	mΩ/m	0.081	0.070	0.058	0.055	0.040	0.035
At 50 Hz and final heating of busbars	Resistance	R_{warm}	mΩ/m	0.074	0.059	0.050	0.036	0.029	0.026
	Reactance	X_{warm}	mΩ/m	0.055	0.050	0.042	0.046	0.031	0.029
	Impedance	Z_{warm}	mΩ/m	0.094	0.079	0.066	0.059	0.043	0.038
For 4-pole systems under fault conditions acc. to EN 61439-6 Annex N	Resistance	R_F	mΩ/m	0.149	0.119	0.099	0.073	0.060	0.051
	Reactance	X_F	mΩ/m	0.147	0.118	0.098	0.091	0.116	0.118
	Impedance	Z_F	mΩ/m	0.209	0.167	0.139	0.117	0.131	0.129
Zero impedance for 4-pole systems to DIN VDE 0102, IEC 909	Resistance PEN	R_0	mΩ/m	0.198	0.159	0.132	0.097	0.080	0.068
	Reactance PEN	X_0	mΩ/m	0.355	0.284	0.237	0.220	0.212	0.204
	Impedance PEN	Z_0	mΩ/m	0.407	0.325	0.271	0.240	0.227	0.215
Short-circuit rating									
Rated impulse withstand current		I_{pk}	kA	55.7	117	117	143	143	143
Rated short-time with-stand current	t = 1 s	I_{cw}	kA	26.5	53	53	65	65	65
Conductor material				Aluminium					
Conductor cross-section	PEN		mm²	472	592	712	944	1184	1424
Cross-section of active conductors			mm²	472	592	712	944	1184	1424
Fire load			kWh/m	15.72	19.19	21.32	27.51	32.05	36.68
Fixing distances			m	1.5	1.5	1.5	1.5	1.5	1.5
Weight (2 m length with clamped connection)			kg/m	29.74	34.66	38.81	48.87	58.17	67.97

LRA2741 to LRA2941

LRA				2741	2841	2941
Rated current		I_{nA}	A	3200	4000	5000
Degree of protection				IP68		
At 50 Hz and +20 °C busbar temperature	Resistance	R_{20}	mΩ/m	0.015	0.012	0.010
	Reactance	X_{20}	mΩ/m	0.024	0.026	0.023
	Impedance	Z_{20}	mΩ/m	0.028	0.029	0.025
At 50 Hz and final heating of busbars	Resistance	R_{warm}	mΩ/m	0.019	0.015	0.013
	Reactance	X_{warm}	mΩ/m	0.024	0.026	0.023
	Impedance	Z_{warm}	mΩ/m	0.031	0.030	0.026
For 4-pole systems under fault conditions acc. to EN 61439-6 Annex N	Resistance	RF	mΩ/m	0.038	0.030	0.025
	Reactance	X_F	mΩ/m	0.093	0.084	0.068
	Impedance	Z_F	mΩ/m	0.100	0.089	0.073
Zero impedance for 4-pole systems to DIN VDE 0102, IEC 909	Resistance PEN	R_0	mΩ/m	0.051	0.041	0.034
	Reactance PEN	X_0	mΩ/m	0.197	0.192	0.167
	Impedance PEN	Z_0	mΩ/m	0.204	0.196	0.170
Short-circuit rating						
Rated impulse withstand current		I_{pk}	kA	220	220	220
Rated short-time withstand current	t = 1 s	I_{cw}	kA	100	100	100
Conductor material				Aluminium		
Conductor cross-section	PEN		mm²	1889	2368	2849
Cross-section of active conductors			mm²	1889	2368	2849
Fire load			kWh/m	55.01	64.11	73.36
Fixing distances			m	1.5	1.5	1.5
Weight (2 m length with clamped connection)			kg/m	97.74	116.34	135.95

Resistance per unit length from measurements / derivations

6.3.3 Trunking units LRA..51 (5-pole, aluminium)

LRA0151 to LRA0351

LRA				0151	0251	0351
Rated current		I_{nA}	A	400	630	800
Degree of protection				IP68		
At 50 Hz and +20 °C busbar temperature	Resistance	R_{20}	mΩ/m	0.161	0.121	0.081
	Reactance	X_{20}	mΩ/m	0.050	0.042	0.026
	Impedance	Z_{20}	mΩ/m	0.169	0.128	0.085
At 50 Hz and final heating of busbars	Resistance	R_{warm}	mΩ/m	0.176	0.142	0.096
	Reactance	X_{warm}	mΩ/m	0.050	0.042	0.026
	Impedance	Z_{warm}	mΩ/m	0.178	0.151	0.102
For 5-pole systems (PE) under fault conditions acc. to EN 61439-6 Annex N	AC resistance per unit length PE	R_F	mΩ/m	0.353	0.284	0.193
	Reactance PE	X_F	mΩ/m	0.157	0.090	0.140
	Impedance PE	Z_F	mΩ/m	0.386	0.298	0.238
For 5-pole systems (N) under fault conditions acc. to EN 61439-6 Annex N	Resistance N	R_F	mΩ/m	0.353	0.284	0.193
	Reactance N	X_F	mΩ/m	0.175	0.100	0.155
	Impedance N	Z_F	mΩ/m	0.394	0.301	0.209
Zero impedance for 5-pole systems (PE) to DIN VDE 0102, IEC 909	Resistance 1 N	R_0	mΩ/m	0.447	0.360	0.244
	Reactance 1 N	X_0	mΩ/m	0.974	0.814	0.846
	Impedance 1 N	Z_0	mΩ/m	1.071	0.890	0.880
Zero impedance for 5-pole systems (PE) to DIN VDE 0102, IEC 909	Resistance 2 PE	R_0	mΩ/m	0.470	0.379	0.257
	Reactance 2 PE	X_0	mΩ/m	0.609	0.509	0.529
	Impedance 2 PE	Z_0	mΩ/m	0.769	0.634	0.588
Short-circuit rating						
Rated impulse withstand current		I_{pk}	kA	24	24	55.7
Rated short-time withstand current	t = 1 s	I_{cw}	kA	12	12	26.5
Conductor material				Aluminium		
Conductor cross-section	N		mm²	176	236	354
Cross-section of active conductors			mm²	176	236	354
Conductor cross-section	PE		mm²	176	236	354
Fire load			kWh/m	12.70	12.17	11.13
Fixing distances			m	1.5	1.5	1.5
Weight (2 m length with clamped connection)			kg/m	22.03	22.27	22.75

LRA0451 to LRA0951

LRA				0451	0551	0651	0751	0851	0951
Rated current		I_{nA}	A	1000	1200	1400	1600	2000	2500
Degree of protection				IP68					
At 50 Hz and +20° C busbar temperature	Resistance	R_{20}	mΩ/m	0.060	0.048	0.040	0.030	0.024	0.020
	Reactance	X_{20}	mΩ/m	0.055	0.050	0.042	0.046	0.031	0.029
	Impedance	Z_{20}	mΩ/m	0.081	0.070	0.058	0.055	0.040	0.035
At 50 Hz and final heating of busbar	Resistance	R_{warm}	mΩ/m	0.074	0.059	0.050	0.036	0.029	0.026
	Reactance	X_{warm}	mΩ/m	0.055	0.050	0.042	0.046	0.031	0.029
	Impedance	Z_{warm}	mΩ/m	0.094	0.079	0.066	0.059	0.043	0.038
For 5-pole (PE) systems under fault conditions acc. to EN 61439-6 Annex N	AC resistance per unit length PE	R_F	mΩ/m	0.149	0.119	0.099	0.073	0.060	0.051
	Reactance PE	X_F	mΩ/m	0.132	0.106	0.088	0.082	0.105	0.106
	Impedance PE	Z_F	mΩ/m	0.199	0.159	0.133	0.110	0.121	0.118
For 5-pole (N) systems under fault conditions acc. to EN 61439-6 Annex N	AC resistance per unit length N	R_F	mΩ/m	0.149	0.119	0.099	0.073	0.060	0.051
	Reactance N	X_F	mΩ/m	0.147	0.118	0.098	0.091	0.116	0.118
	Impedance N	Z_F	mΩ/m	0.167	0.167	0.139	0.117	0.131	0.129
Zero impedance for 5-pole systems (N) to DIN VDE 0102, IEC 909	Resistance 1 N	R_0	mΩ/m	0.188	0.151	0.126	0.092	0.076	0.065
	Reactance 1 N	X_0	mΩ/m	0.568	0.454	0.379	0.352	0.339	0.326
	Impedance N	Z_0	mΩ/m	0.598	0.479	0.399	0.364	0.348	0.333
Zero impedance for 5-pole systems (PE) to DIN VDE 0102, IEC 909	Resistance 2 PE	R_0	mΩ/m	0.198	0.159	0.132	0.097	0.080	0.068
	Impedance 2 PE	X_0	mΩ/m	0.355	0.284	0.237	0.220	0.212	0.204
	Impedance 2 PE	Z_0	mΩ/m	0.407	0.325	0.271	0.240	0.227	0.215
Short-circuit rating									
Rated short-time withstand current		I_{pk}	kA	55.7	117	117	143	143	143
Rated short-time withstand current	t = 1 s	I_{cw}	kA	26.5	53	53	65	65	65
Conductor material				Aluminium					
Conductor cross-section	N		mm2	472	592	712	944	1184	1424
Cross-section of active conductors			mm2	472	592	712	944	1184	1424
Conductor cross-section	PE		mm2	472	592	712	944	1184	1424
Fire load			kWh/m	18.69	22.84	25.33	32.71	38.04	43.48
Fixing distances			m	1.5	1.5	1.5	1.5	1.5	1.5
Weight (2 m length with clamped connection)			kg/m	34.26	40.04	45.04	56.79	67.80	79.30

LRA2751 to LRA2951

LRA				2751	2851	2951
Rated current		I_{nA}	A	3200	4000	5000
Degree of protection				IP68		
At 50 Hz and +20 °C busbar temperature	Resistance	R_{20}	mΩ/m	0.015	0.012	0.010
	Reactance	X_{20}	mΩ/m	0.024	0.026	0.023
	Impedance	Z_{20}	mΩ/m	0.028	0.029	0.025
At 50 Hz and final heating of busbars	Resistance	R_{warm}	mΩ/m	0.019	0.015	0.013
	Reactance	X_{warm}	mΩ/m	0.024	0.026	0.023
	Impedance	Z_{warm}	mΩ/m	0.031	0.030	0.026
For 5-pole systems (PE) under fault conditions acc. to EN 61439-6 Annex N	AC resistance per unit length PE	R_F	mΩ/m	0.038	0.030	0.025
	Reactance PE	X_F	mΩ/m	0.084	0.076	0.061
	Impedance PE	Z_F	mΩ/m	0.092	0.082	0.066
For 5-pole systems (N) under fault conditions acc. to EN 61439-6 Annex N	Resistance N	R_F	mΩ/m	0.038	0.030	0.025
	Reactance N	X_F	mΩ/m	0.093	0.084	0.068
	Impedance N	Z_F	mΩ/m	0.100	0.089	0.073
Zero impedance for 5-pole systems (PE) to DIN VDE 0102, IEC 909	Resistance 1 N	R_0	mΩ/m	0.048	0.039	0.032
	Reactance 1 N	X_0	mΩ/m	0.316	0.307	0.267
	Impedance 1 N	Z_0	mΩ/m	0.319	0.310	0.269
Zero impedance for 5-pole systems (PE) to DIN VDE 0102, IEC 909	Resistance 2 PE	R_0	mΩ/m	0.051	0.041	0.034
	Reactance 2 PE	X_0	mΩ/m	0.197	0.192	0.167
	Impedance 2 PE	Z_0	mΩ/m	0.204	0.196	0.170
Short-circuit rating						
Rated impulse withstand current		I_{pk}	kA	220	220	220
Rated short-time withstand current	t = 1 s	I_{cw}	kA	100	100	100
Conductor material				Aluminium		
Conductor cross-section	N		mm2	1889	2368	2849
Cross-section of active conductors			mm2	1889	2368	2849
Conductor cross-section	PE		mm2	1889	2368	2849
Fire load			kWh/m	65.43	76.08	86.96
Fixing distances			m	1.5	1.5	1.5
Weight (2 m length with clamped connection)			kg/m	113.59	135.59	158.59

Resistance per unit length from measurements / derivations

6.3.4 Trunking units LRC..41 (4-pole, copper)

LRC0141 to LRC0341

LRC				0141	0241	0341
Rated current		I_{nA}	A	630	800	1000
Degree of protection				IP68		
At 50 Hz and +20 °C busbar temperature	Resistance	R_{20}	mΩ/m	0.099	0.074	0.049
	Reactance	X_{20}	mΩ/m	0.068	0.058	0.057
	Impedance	Z_{20}	mΩ/m	0.120	0.094	0.075
At 50 Hz and final heating of busbars	Resistance	R_{warm}	mΩ/m	0.119	0.093	0.062
	Reactance	X_{warm}	mΩ/m	0.106	0.085	0.069
	Impedance	Z_{warm}	mΩ/m	0.159	0.126	0.092
For 4-pole systems under fault conditions acc. to EN 61439-6 Annex N	Resistance	R_F	mΩ/m	0.197	0.15	0.117
	Reactance	X_F	mΩ/m	0.231	0.191	0.16
	Impedance	Z_F	mΩ/m	0.304	0.243	0.198
Zero impedance for 4-pole systems to DIN VDE 0102, IEC 909	Resistance	R_0	mΩ/m	0.275	0.217	0.173
	Reactance	X_0	mΩ/m	0.269	0.227	0.193
	Impedance	Z_0	mΩ/m	0.385	0.313	0.259
Short-circuit rating						
Rated impulse withstand current		I_{pk}	kA	48	48	80
Rated short-time withstand current	t = 1 s	I_{cw}	kA	23	23	38
Conductor material				Copper		
Conductor cross-section	PEN		mm²	176	236	354
Cross-section of active conductors			mm²	176	236	354
Fire load			kWh/m	13.01	12.59	11.76
Fixing distances			m	1.5	1.5	1.5
Weight (2 m length with clamped connection)			kg/m	25.24	26.93	30.31

LRC0441 to LRC0941

LRC				0441	0541	0641	0741	0841	0941
Rated current		I_{nA}	A	1350	1600	1700	2000	2500	3200
Degree of protection				IP68					
At 50 Hz and +20 °C busbar temperature	Resistance	R_{20}	mΩ/m	0.039	0.031	0.026	0.021	0.017	0.015
	Reactance	X_{20}	mΩ/m	0.051	0.046	0.038	0.034	0.031	0.029
	Impedance	Z_{20}	mΩ/m	0.065	0.056	0.046	0.040	0.035	0.033
At 50 Hz and final heating of busbars	Resistance	R_{warm}	mΩ/m	0.050	0.040	0.031	0.025	0.020	0.018
	Reactance	X_{warm}	mΩ/m	0.051	0.046	0.038	0.034	0.031	0.029
	Impedance	Z_{warm}	mΩ/m	0.071	0.061	0.049	0.042	0.037	0.034
For 4-pole systems under fault conditions acc. to EN 61439-6 Annex N	Resistance	R_F	mΩ/m	0.094	0.075	0.060	0.048	0.038	0.031
	Reactance	X_F	mΩ/m	0.136	0.116	0.098	0.084	0.071	0.060
	Impedance	Z_F	mΩ/m	0.165	0.138	0.115	0.096	0.081	0.068
Zero impedance for 4-pole systems to DIN VDE 0102, IEC 909	Resistance PEN	R_0	mΩ/m	0.142	0.116	0.095	0.078	0.064	0.053
	Reactance PEN	X_0	mΩ/m	0.164	0.139	0.119	0.101	0.086	0.073
	Impedance PEN	Z_0	mΩ/m	0.217	0.182	0.152	0.128	0.107	0.090
Short-circuit rating									
Rated impulse withstand current		I_{pk}	kA	80	140	140	140	176	176
Rated short-time withstand current	t = 1 s	I_{cw}	kA	38	65	65	65	80	80
Conductor material				Copper					
Conductor cross-section	PEN		mm²	472	592	712	944	1184	1424
Cross-section of active conductors			mm²	472	592	712	944	1184	1424
Fire load			kWh/m	15.72	19.19	21.32	27.51	32.05	36.68
Fixing distances			m	1.5	1.5	1.5	1.5	1.5	1.5
Weight (2 m length with clamped connection)			kg/m	40.56	47.39	55.69	71.72	86.59	102.34

LRC2741 to LRC2941

LRC				2741	2841	2941
Rated current		I_{nA}	A	4000	5000	6300
Degree of protection				IP68		
At 50 Hz and +20 °C busbar temperature	Resistance	R_{20}	mΩ/m	0.010	0.008	0.006
	Reactance	X_{20}	mΩ/m	0.014	0.013	0.011
	Impedance	Z_{20}	mΩ/m	0.017	0.015	0.013
At 50 Hz and final heating of busbars	Resistance	R_{warm}	mΩ/m	0.013	0.010	0.008
	Reactance	X_{warm}	mΩ/m	0.014	0.013	0.011
	Impedance	Z_{warm}	mΩ/m	0.019	0.016	0.014
For 4-pole systems under fault conditions acc. to EN 61439-6 Annex N	Resistance	R_F	mΩ/m	0.022	0.018	0.014
	Reactance	X_F	mΩ/m	0.054	0.046	0.039
	Impedance	Z_F	mΩ/m	0.059	0.049	0.041
Zero impedance for 4-pole systems to DIN VDE 0102, IEC 909	Resistance PEN	R_0	mΩ/m	0.046	0.038	0.031
	Reactance PEN	X_0	mΩ/m	0.067	0.057	0.048
	Impedance PEN	Z_0	mΩ/m	0.082	0.068	0.057
Short-circuit rating						
Rated impulse withstand current		I_{pk}	kA	220	220	220
Rated short-time withstand current	t = 1 s	I_{cw}		100	100	100
Conductor material				Copper		
Conductor cross-section	PEN		mm²	1889	2368	2849
Cross-section of active conductors			mm²	1889	2368	2849
Fire load			kWh/m	55.01	64.11	73.36
Fixing distances			m	1.5	1.5	1.5
Weight (2 m length with clamped connection)			kg/m	140.49	171.99	186.69

Resistance per unit length from measurements / derivations

6.3.5 Trunking units LRC..51 (5-pole, copper)

LRC0151 to 0351

LRC				0151	0251	0351
Rated current		I_{nA}	A	630	800	1000
Degree of protection				IP68		
At 50 Hz and +20 °C busbar temperature	Resistance	R_{20}	mΩ/m	0.099	0.074	0.049
	Reactance	X_{20}	mΩ/m	0.068	0.058	0.057
	Impedance	Z_{20}	mΩ/m	0.120	0.094	0.075
At 50 Hz and final heating of busbars	Resistance	R_{warm}	mΩ/m	0.119	0.093	0.062
	Reactance	X_{warm}	mΩ/m	0.106	0.085	0.069
	Impedance	Z_{warm}	mΩ/m	0.159	0.126	0.092
For 5-pole systems (PE) under fault conditions acc. to EN 61439-6 Annex N	AC resistance per unit length PE	R_F	mΩ/m	0.197	0.150	0.117
	Reactance PE	X_F	mΩ/m	0.231	0.191	0.16
	Impedance PE	Z_F	mΩ/m	0.304	0.243	0.198
For 5-pole systems (N) under fault conditions acc. to EN 61439-6 Annex N	Resistance N	R_F	mΩ/m	0.197	0.150	0.117
	Reactance N	X_F	mΩ/m	0.231	0.191	0.16
	Impedance N	Z_F	mΩ/m	0.304	0.243	0.198
Zero impedance for 5-pole systems (PE) to DIN VDE 0102, IEC 909	Resistance 1 N	R_0	mΩ/m	0.275	0.217	0.173
	Reactance 1 N	X_0	mΩ/m	0.269	0.227	0.193
	Impedance 1 N	Z_0	mΩ/m	0.385	0.313	0.259
Zero impedance for 5-pole systems (PE) to DIN VDE 0102, IEC 909	Resistance 2 PE	R_0	mΩ/m	0.275	0.217	0.173
	Reactance 2 PE	X_0	mΩ/m	0.269	0.227	0.193
	Impedance 2 PE	Z_0	mΩ/m	0.385	0.313	0.259
Short-circuit rating						
Rated impulse withstand current		I_{pk}	kA	48	48	80
Rated short-time withstand current	t = 1 s	I_{cw}	kA	23	23	38
Conductor material				Copper		
Conductor cross-section	N	-	mm²	176	236	354
Cross-section of active conductors			mm²	176	236	354
Conductor cross-section	PE	-	mm²	176	236	354
Fire load			kWh/m	12.70	12.17	11.13
Fixing distances			m	1.5	1.5	1.5
Weight (2 m length with clamped connection)			kg/m	26.70	28.82	33.04

LRC0451 to LRC0951

LRC				0451	0551	0651	0751	0851	0951
Rated current		I_{nA}	A	1350	1600	1700	2000	2500	3200
Degree of protection				IP68					
At 50 Hz and +20 °C busbar temperature	Resistance	R_{20}	mΩ/m	0.039	0.031	0.026	0.021	0.017	0.015
	Reactance	X_{20}	mΩ/m	0.051	0.046	0.038	0.034	0.031	0.029
	Impedance	Z_{20}	mΩ/m	0.065	0.056	0.046	0.040	0.035	0.033
At 50 Hz and final heating of busbar	Resistance	R_{warm}	mΩ/m	0.050	0.040	0.031	0.025	0.020	0.018
	Reactance	X_{warm}	mΩ/m	0.051	0.046	0.038	0.034	0.031	0.029
	Impedance	Z_{warm}	mΩ/m	0.071	0.061	0.049	0.042	0.037	0.034
For 5-pole (PE) systems under fault conditions acc. to EN 61439-6 Annex N	AC resistance per unit length PE	R_F	mΩ/m	0.094	0.075	0.060	0.048	0.038	0.031
	Reactance PE	X_F	mΩ/m	0.150	0.127	0.108	0.092	0.078	0.066
	Impedance PE	Z_F	mΩ/m	0.176	0.148	0.124	0.104	0.087	0.073
For 5-pole (N) systems under fault conditions acc. to EN 61439-6 Annex N	AC resistance per unit length N	R_F	mΩ/m	0.094	0.075	0.060	0.048	0.038	0.031
	Reactance N	X_F	mΩ/m	0.136	0.116	0.098	0.084	0.071	0.060
	Impedance N	Z_F	mΩ/m	0.165	0.138	0.115	0.096	0.081	0.068
Zero impedance for 5-pole systems (N) to DIN VDE 0102, IEC 909	Resistance 1 N	R_0	mΩ/m	0.163	0.134	0.110	0.090	0.074	0.060
	Reactance 1 N	X_0	mΩ/m	0.328	0.279	0.237	0.201	0.171	0.146
	Impedance N	Z_0	mΩ/m	0.366	0.309	0.261	0.221	0.186	0.158
Zero impedance for 5-pole systems (PE) to DIN VDE 0102, IEC 909	Resistance 2 PE	R_0	mΩ/m	0.142	0.116	0.095	0.078	0.064	0.053
	Impedance 2 PE	X_0	mΩ/m	0.164	0.139	0.119	0.101	0.086	0.073
	Impedance 2 PE	Z_0	mΩ/m	0.217	0.182	0.152	0.128	0.107	0.090
Short-circuit rating									
Rated short-time withstand current		I_{pk}	kA	80	140	140	140	176	176
Rated short-time withstand current	t = 1 s	I_{cw}	kA	38	65	65	65	80	80
Conductor material				Copper					
Conductor cross-section	N	-	mm²	472	592	712	944	1184	1424
Cross-section of active conductors			mm²	472	592	712	944	1184	1424
Conductor cross-section PE			mm²	472	592	712	944	1184	1424
Fire load			kWh/m	18.69	22.84	25.33	32.71	38.04	43.48
Fixing distances			m	1.5	1.5	1.5	1.5	1.5	1.5
Weight (2 m length with clamped connection)			kg/m	48.77	58.09	67.03	86.77	104.94	123.99

LRC2751 to LRC2951

LRC				2751	2851	2951
Rated current		I_{nA}	A	4000	5000	6300
Degree of protection				IP68		
At 50 Hz and +20 °C busbar temperature	Resistance	R_{20}	mΩ/m	0.010	0.008	0.006
	Reactance	X_{20}	mΩ/m	0.014	0.013	0.011
	Impedance	Z_{20}	mΩ/m	0.017	0.015	0.013
At 50 Hz and final heating of busbars	Resistance	R_{warm}	mΩ/m	0.013	0.010	0.008
	Reactance	X_{warm}	mΩ/m	0.014	0.013	0.011
	Impedance	Z_{warm}	mΩ/m	0.019	0.016	0.014
For 5-pole systems (PE) under fault conditions acc. to EN 61439-6 Annex N	AC resistance per unit length PE	R_F	mΩ/m	0.022	0.018	0.014
	Reactance PE	X_F	mΩ/m	0.059	0.050	0.043
	Impedance PE	Z_F	mΩ/m	0.063	0.053	0.045
For 5-pole systems (N) under fault conditions acc. to EN 61439-6 Annex N	Resistance N	R_F	mΩ/m	0.022	0.018	0.014
	Reactance N	X_F	mΩ/m	0.054	0.046	0.039
	Impedance N	Z_F	mΩ/m	0.059	0.049	0.041
Zero impedance for 5-pole systems (PE) to DIN VDE 0102, IEC 909	Resistance 1 N	R_0	mΩ/m	0.053	0.043	0.036
	Reactance 1 N	X_0	mΩ/m	0.134	0.114	0.097
	Impedance 1 N	Z_0	mΩ/m	0.144	0.122	0.103
Zero impedance for 5-pole systems (PE) to DIN VDE 0102, IEC 909	Resistance 2 PE	R_0	mΩ/m	0.046	0.038	0.031
	Reactance 2 PE	X_0	mΩ/m	0.067	0.057	0.048
	Impedance 2 PE	Z_0	mΩ/m	0.082	0.068	0.057
Short-circuit rating						
Rated impulse withstand current		I_{pk}	kA	220	220	220
Rated short-time withstand current	t = 1 s	I_{cw}	kA	100	100	100
Conductor material				Copper		
Conductor cross-section	N	-	mm²	1889	2368	2849
Cross-section of active conductors			mm²	1889	2368	2849
Conductor cross-section	PE	-	mm²	1889	2368	2849
Fire load			kWh/m	65.43	76.08	86.96
Fixing distances			m	1.5	1.5	1.5
Weight (2 m length with clamped connection)			kg/m	170.30	208.77	264.47

Resistance per unit length from measurements / derivations

6.4 Dimension drawings

Unless otherwise specified, all dimensions are in mm.

6.4.1 Straight busbar elements LR

4-conductor system

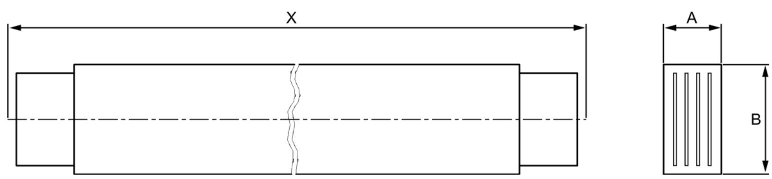


Figure 6-12 LR.0141 to LR.0941

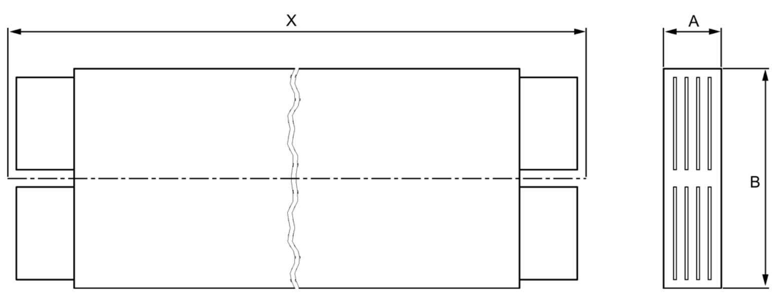


Figure 6-13 LR.2741 to LR.2941

System	A [mm]	B [mm]	x [mm]
LR.0141	90	90	300 … 3000
LR.0241			
LR.0341			
LRC.441	100	110	
LR.0541		130	
LR.0641		150	
LR.0741		190	
LR.0841		230	
LR.0941		270	
LR.2741		380	
LR.2841		460	
LR.2941		540	

5-conductor system

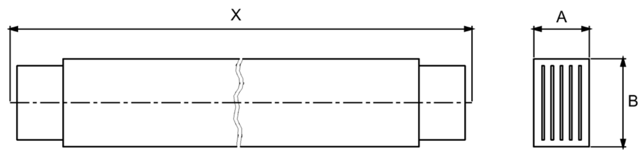


Figure 6-14 LR.0151 to LR.0951

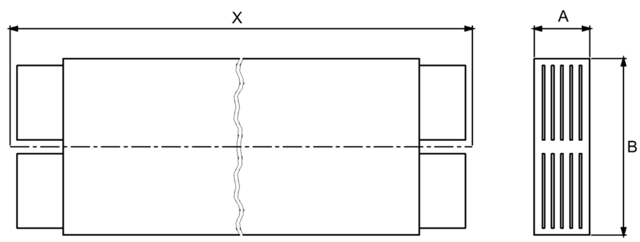


Figure 6-15 LR.2751 to LR.2951

System	A [mm]	B [mm]	x [mm]
LR.0151	90	90	300 … 3000
LR.0251			
LR.0351			
LR.0451	120	110	
LR.0551		130	
LR.0651		150	
LR.0751		190	
LR.0851		230	
LR.0951		270	
LR.2751		380	
LR.2851		460	
LR.2951		540	

Further information about planning 7

7.1 Dimensioning and selection

7.1.1 Determining the voltage drop

Formula for voltage drop

With long trunking runs it may be necessary to calculate the voltage drop:

$$\Delta U = k \cdot \sqrt{3} \cdot I_B \cdot l \cdot \left(R_1 \cdot \cos\varphi + X_1 \cdot \sin\varphi\right) \cdot 10^{-3}$$

ΔU	= voltage drop (V)
I_B	= rated current (A)
l	= total length of system (m)
k	= load distribution factor
R_1	= ohmic resistance (mΩ/m) with busbar final heating
X_1	= inductive resistance (mΩ/m) with busbar final heating
cos φ	= power factor

The load distribution factor k for calculating the voltage drop at the end of the busbar trunking system is defined as follows:

- k = 1, if the load is concentrated at the end of the busbar trunking system (power transmission).
- k = (n +1)/(2 x n), if the load is distributed across n taps.

To calculate the voltage drop in the distance d between the start of a tap and the start of the busbar system, proceed as follows:

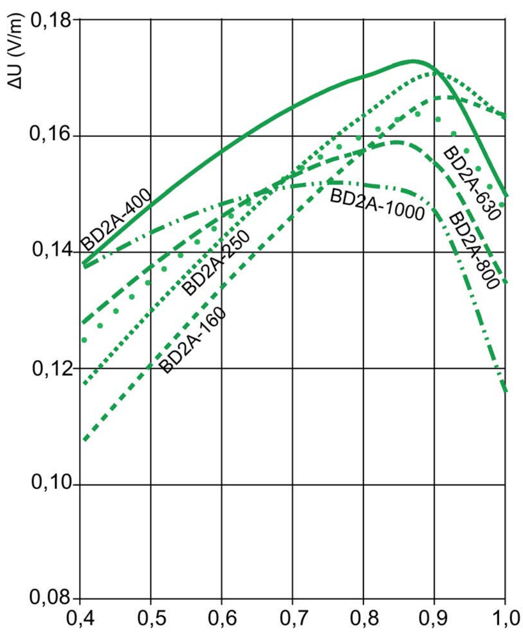
- k = (2 x n + 1 – n x d/L)/(2 x n)

Voltage drop diagrams

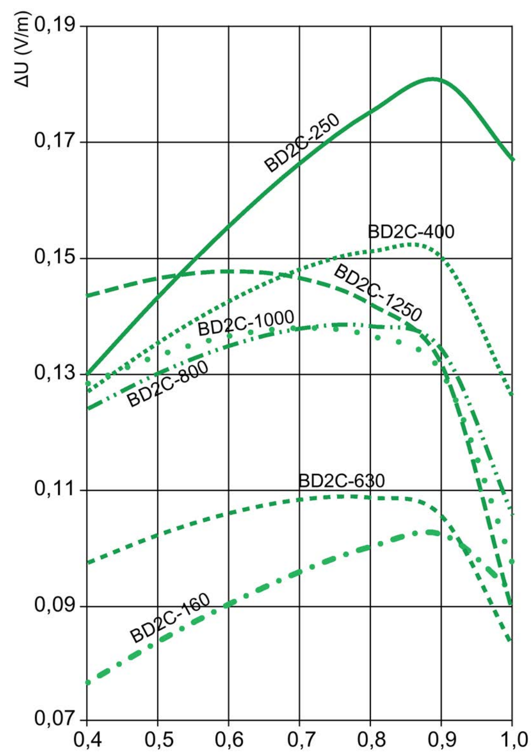
The following diagrams illustrate the voltage drop on the BD2, LD, LI and LR systems

- taking into account the final heating resistances (in accordance with 61439-6)
- with a load distribution factor
  - k = 1 for LD and LR
  - k = 0.5 for BD2 and LI
- at rated current load. (In the case of a different current diversity factor, the value of the curve must be multiplied by the appropriate distribution factor).

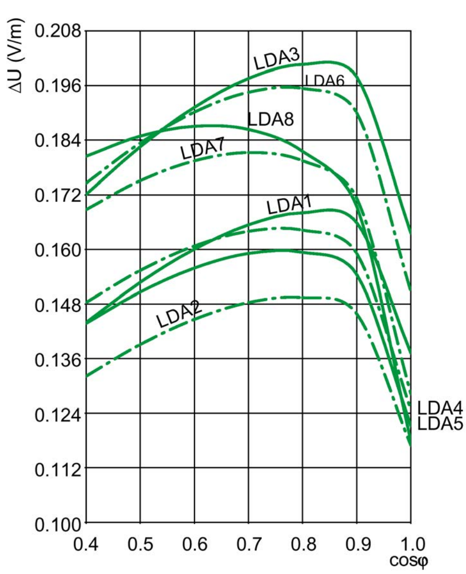
For systems with unevenly distributed loads, we recommend the SIMARIS design program for calculating short circuits and load flows (see the chapter "Tools and services (Page 307)").



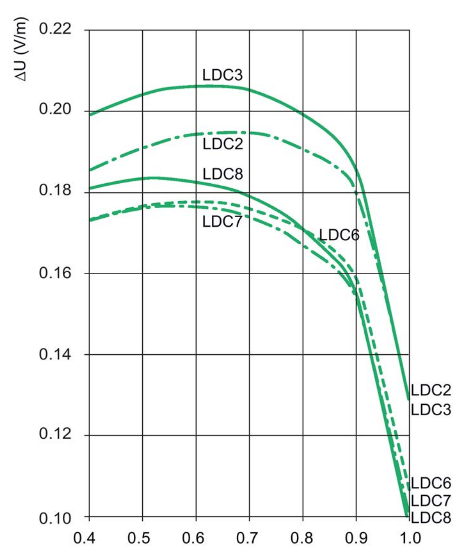
Voltage drop BD2A



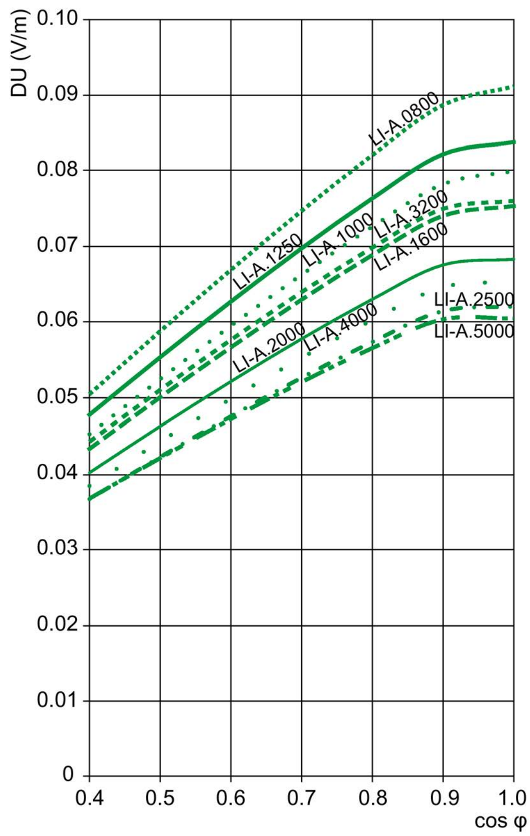
Voltage drop BD2C



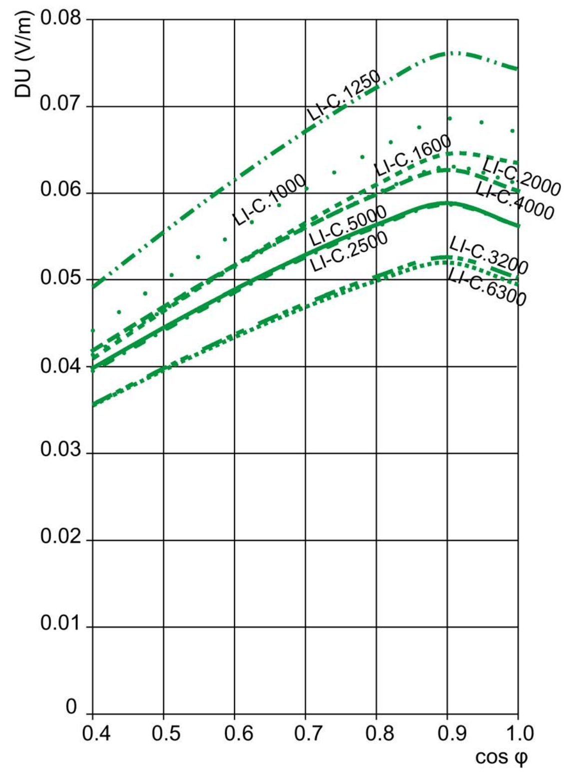
Voltage drop LDA



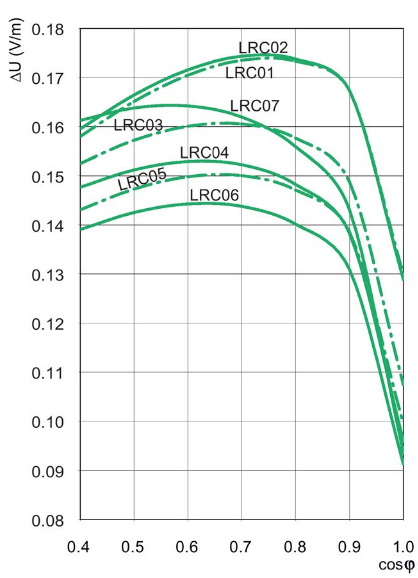
Voltage drop LDC



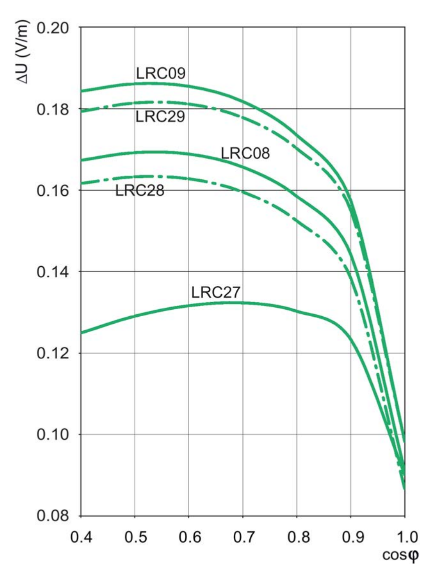
Voltage drop LI-A



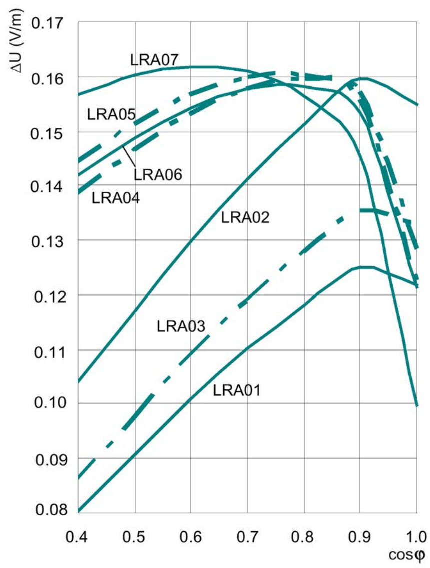
Voltage drop LI-C



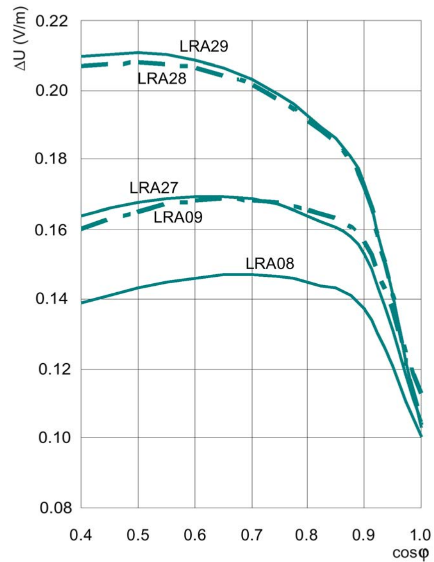
Voltage drop LRC01 to LRC07



Voltage drop LRC08 to LRC29



Voltage drop LRA01 to LRA07



Voltage drop LRA08 to LRA29

7.1.2 Overload protection and short-circuit protection

Busbar trunking systems need to be protected against short circuits and overloads. Fuses and circuit breakers are available for use as protective devices. When selecting protective devices, the level of the expected short-circuit currents, selectivity requirements or operating and signalling functions are also factors for consideration.

When deciding to provide short-circuit protection using fuses and circuit breakers, you must not exceed the specified short-circuit ratings of the busbar trunking systems. Whether a current limiting protective device is required and what short-circuit breaking capacity the protective device must have depend on the level of expected short-circuit current.

The table below offers an overview of the circuit-breakers which are able to provide short-circuit and overload protection (400 V and 50 Hz) for the corresponding busbar system.

The following applies:

$I''_k \leq I_{cc} \leq I_{cu}$

I''_k = anticipated short-circuit current at installation location

I_{cc} = conditional rated short-circuit current of the trunking run

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

Table 7- 1 Circuit-breakers which are able to provide short-circuit and overload protection (400 V and 50 Hz) for the corresponding busbar system[1)]

Type	Rated current	Circuit breakers with normal switching capacity	Rated short-circuit current [1)]		Circuit breakers with strong switching capacity	Rated short-circuit current [2)]		Circuit breakers with high switching capacity	Rated short-circuit current [1)]	
	I_n		I_{cu}	I_{cc}		I_{cu}	I_{cc}		I_{cu}	I_{cc}
	A		kA	kA		kA	kA		kA	kA
BD2A(C)-160	160	3VL27 16-1...	40	20	3VL27 16-2...	70	20	3VL27 16-3...	100	20
BD2A(C)-250	250	3VL37 25-1...	40	40	3VL37 25-2...	70	50	3VL37 25-3...	100	50
BD2A(C)-400	400	3VL47 40-1...	45	45	3VL47 40-2...	70	45	3VL47 40-3...	100	45
BD2A(C)-630	630	3VL57 63-1DC36	45	45	3VL57 63-2DC36	70	70	3VL57 63-3DC36	100	100
BD2A(C)-800	800	3VL57 80-1SE36	-	50	3VL57 80-2SE36	70	70	3VL57 80-3SE36	100	100
BD2A(C)-1000	1000	3VL77 10-1SE36	-	50	3VL77 10-2SE36	70	60	3VL77 10-3SE36	100	60
BD2C-1250	1250	3VL77 12-1SE36	-	50	3VL77 12-2SE36	70	60	3VL77 12-3SE36	100	60

1) The tripping characteristic of the protective device must be selected as appropriate for the short-circuit rating of the busbar systems, the type of system, the type and number of loads, as well as in line with country-specific regulations and type series. This table contains only a brief overview of BD2 on the use of circuit breakers for protection against short-circuit and overload, and it is intended only as a recommendation. We always recommend that you carry out a calculation using the SIMARIS design network tool to determine the appropriate protection. Please contact our TIP specialists for this purpose.

2) The values for the conditional rated short-circuit current I_{cc} apply for the busbar trunking systems without taking account of the tap-off units.

7.1.3 Loop impedance

As the level of loop impedance is decisive as regards the magnitude of the 1-pole short-circuit current, DIN VDE 0100-600 prescribes that loop impedance must be determined between:

- Phasel conductor and protective conductor or
- Phase conductor and PEN conductor

The value can be determined by means of:

- Measurements taken using measuring instruments
- Calculation
- Simulating the network in the network model

The loop impedances of a busbar trunking system represent part of the total loop impedance. You can find the impedance values for calculating the loop impedances of a busbar trunking system in the following chapters:

- For the BD2 busbar trunking system in the chapter titled "Technical specifications (Page 62)"
- For the LD busbar trunking system in the chapter "Technical specifications (Page 128)"
- For the LI busbar trunking system in the chapter "Technical specifications (Page 197)"
- For the LR busbar trunking system in the chapter "Technical specifications (Page 252)"

Calculating the loop impedance of all contributory equipment in a system (incoming power supply, transformers, distribution boards, cable runs, etc.) takes a great deal of time and effort. In this regard, planning time and effort can be reduced significantly by using a dimensioning program such as SIMARIS design which stores the necessary data for most common electrical equipment in a database.

7.1.4 Degrees of protection for busbar trunking systems

Use in areas at risk of fire

In areas at risk of fire, in accordance with European standard HD 384.4.482 S1, increased requirements are placed on the degree of protection to be afforded for electrical equipment. In the event of a fire risk due to the nature of the materials being processed or stored, the minimum degree of protection must be equivalent to IP5X if there is a potential for dust accumulation. If dust is not to be expected, national regulations shall apply accordingly.

The risk prevention arm of the association of German insurers sets out the following requirements:

- In the event of a fire risk due to dust and/or fibres: IP5X degree of protection
- In the event of a fire risk due to other readily flammable solid foreign bodies with a diameter of 1 mm or more: IP4X degree of protection

SIVACON 8PS busbar trunking systems meet these requirements. They are therefore suitable for such applications.

7.1.5 Degrees of protection for electrical equipment in accordance with IEC / EN 60529

Degree of protection	1st code no.		2nd code no.
	Touch protection	**Protection against solid foreign bodies and dust**	**Protection against ingress of liquid**
IP00	No special protection	No special protection	No special protection
IP20	Against finger contact	Against solid particles ≥ 12.5 mm	No special protection
IP34	Against tools	Against solid particles ≥ 2.5 mm	No damage caused by splashwater
IP41	Against wire	Against solid particles ≥ 1 mm	No damage caused by dripping water (vertical drops)
IP43	Against wire	Against solid particles ≥ 1 mm	Protected against damage caused by water spray
IP54	Against wire	Against hazardous dust deposits inside (dust-tight)	No damage caused by splashwater
IP55	Against wire	Against hazardous dust deposits inside (dust-tight)	No damage caused by water jet
IP65	Against wire	Against penetration of dust (dust-tight)	No damage caused by water jet
IP66	Against wire	Against penetration of dust (dust-tight)	In the event of temporary immersion, ingress of water will have no harmful effects (water jet)
IP67	Against wire	Against penetration of dust (dust-tight)	Water may not ingress in harmful quantities during immersion (temporary immersion)
IP68	Against wire	Against penetration of dust (dust-tight)	Water may not ingress in harmful quantities during immersion for indefinite periods (continuous immersion)

Protection against direct contact according to DIN EN 50274

These regulations must be complied with when dimensioning and laying out electrical equipment in electrical systems with rated voltages up to 1000 V AC or 1500 V DC with regard to protection against direct contact, insofar as actuators (pushbuttons, rockers, etc.) are located in the vicinity of touch-hazardous parts.

“Finger-safe" touch protection only applies to the actuator in the actuating direction. Measured from the central point, a clearance with a radius of r = 30 mm must be maintained between the actuator and touch-hazardous parts. Degree of protection IP20 is more than “finger-safe" touch protection. It includes touch protection of electrical equipment from all directions. For devices with “finger-safe" touch protection and IP00 degree of protection, direct contact protection can be provided on request in the form of covers.

7.1.6 Notes on empty tap-off units up to 630 A

Important information on the tap-off units, prepared for installation of SENTRON 3VL moulded case circuit breakers and for free assembly

At the customer's request, the SIVACON 8PS … tap-off unit is supplied as an empty tap-off unit without installation of additional devices such as switching devices. As an empty tap-off unit, the tap-off unit was installed expertly by Siemens and tested in accordance with IEC 61439. Customers must configure the empty tap-off unit and finally equip it under their own responsibility. This includes selection of the switching devices.

Note

Observe the notes and instructions of Siemens as the manufacturer of the empty tap-off unit.

- Responsibility and risks for use of the empty tap-off unit lie solely with the purchaser.
- Purchasers must comply with all applicable regulations in their countries. In particular, it is the purchaser's own responsibility to comply with the product safety law.
- Purchasers are solely responsible for conclusive routine testing of a finally equipped tap-off unit and for its warranty.
- Purchasers accept the obligation to release Siemens from all third-party claims arising from the customer-equipped tap-off unit.
- For each tap-off unit, the scope of supply includes configuration instructions for installed devices and assembly instructions for plugging on to the busbar trunking system.

⚠ WARNING
Electrical Voltage. Improper working on the empty tap-off unit can lead to severe injury or death. Perform all modification and expansion work only after removing the empty tap-off unit, i.e. after it is no longer connected electrically to the busbar trunking system. Observe the five safety rules. Only appropriately trained and qualified specialists may perform modification and expansion work on the empty tap-off unit.

⚠ WARNING
Failure to observe the maximum permissible data can lead to severe injury or death. For safety reasons, the maximum permissible data specified in the configuration instructions must not be exceeded.

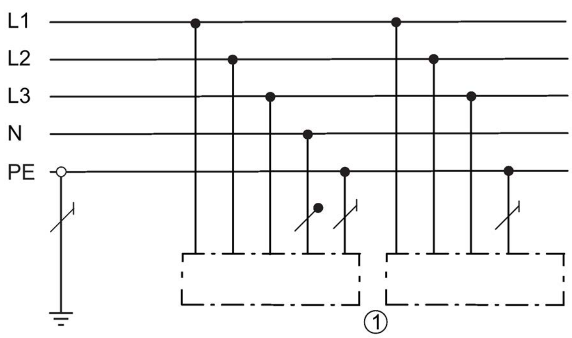
- The finally configured tap-off unit with 3VL moulded case circuit breaker corresponds to the type test of the comparable factory-equipped tap-off unit only if devices have been installed in compliance with the configuration instructions and conditions.
- Availability and sales of empty tap-off units are regionally limited. Permission and release must be coordinated and obtained separately for each region from the central sales departments at head office.

7.1.7 Distribution systems

Determining the protective measure and selecting the electrical equipment appropriate for your distribution system

TN systems

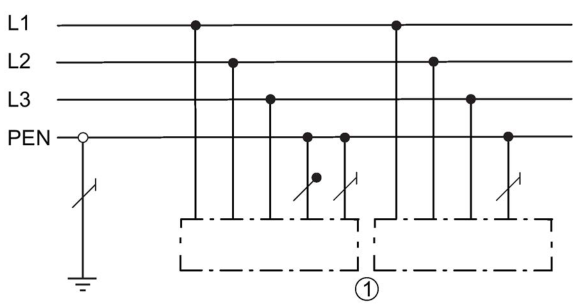
TN-S system: The neutral conductor and protective conductor function are separate throughout the system.



① Exposed part

Figure 7-1 TN-S system

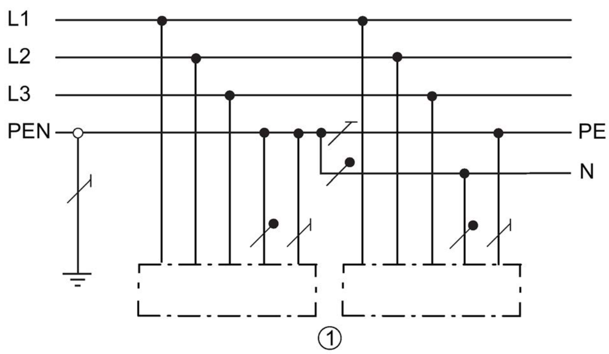
TN-C system: The neutral conductor and protective conductor function are combined throughout the system.



① Exposed part

Figure 7-2 TN-C system

TN-C-S system: Hybrid neutral conductor and protective conductor function. In one part of the system they are combined, in the other part they are separate.

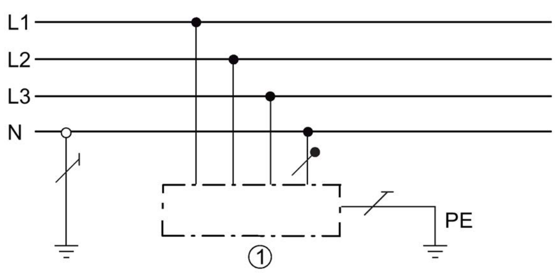


① Exposed part

Figure 7-3 TN-C-S system

TT system

In TT systems, one point is directly earthed; the exposed parts of the electrical installation are connected to earth electrodes which are isolated from the system earth electrode.



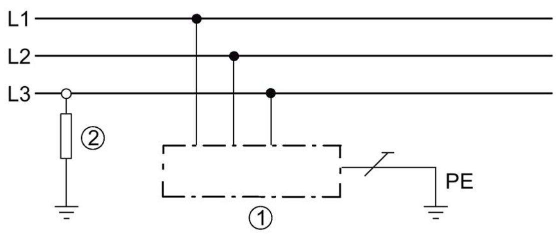
① Exposed part

Figure 7-4 TT system

IT system

The IT system has no direct link between active conductors and earthed parts; the exposed parts of the electrical installation are earthed.

Today's IT systems feature protective measures in the form of a protective-conductor system.



① Exposed part
② Impedance

Figure 7-5 IT system

First letter: Earthing condition of the incoming current source

T = Direct **earthing** of a point

I = Either **insulation** of all active parts from earth or connection between a point and earth via an impedance

Second letter: Earthing condition of the exposed parts of the electrical installation

T = Exposed part **directly earthed** regardless of whether or not a point in the power supply is earthed

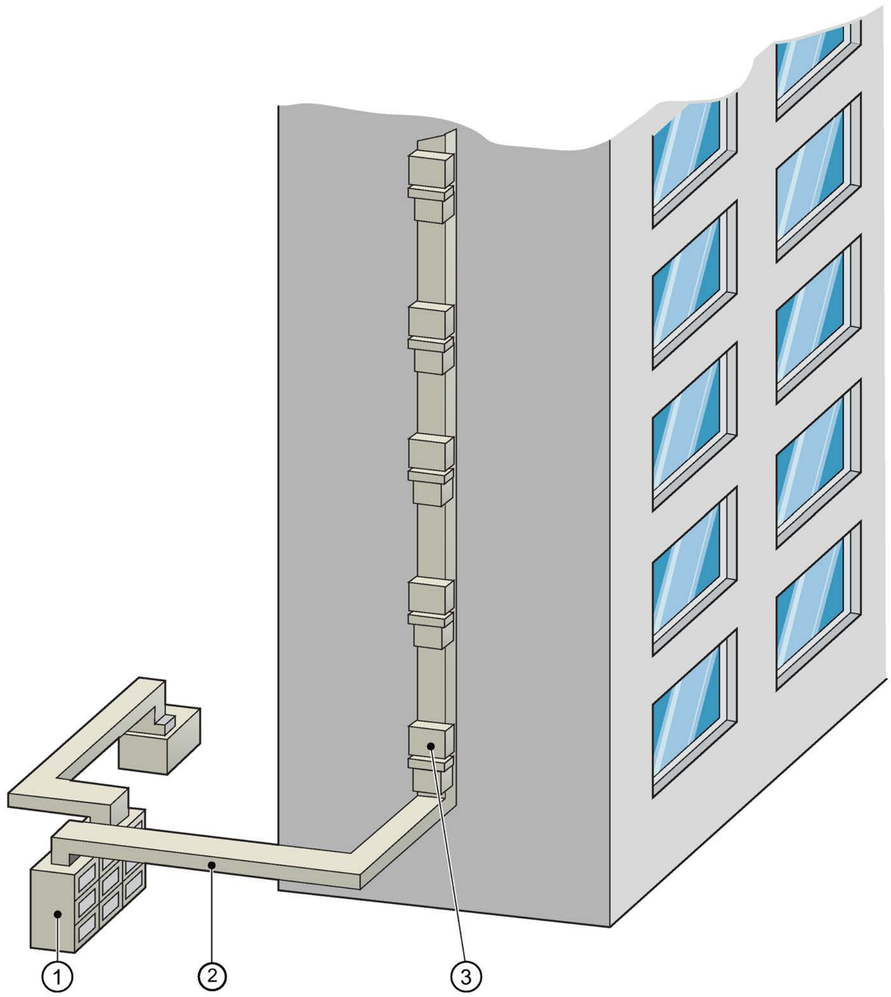
N = Exposed part linked directly to **system earth**, in alternating voltage systems, the earthed point is usually the star point.

Additional letters = Arrangement of the neutral conductor and the protective conductor

S = Neutral conductor and protective conductor functions via **separate** conductors

C = Neutral conductor and protective conductor functions **combined** in a single conductor (PEN)

7.2 Planning example



① Power distribution board
② Busbar trunking system
③ Tap-off point

Figure 7-6 Power supply for a high rise building

	Planned values
No. of floors	15 (of which 8 are residential units)
Effective installed loads per residential unit	26 kW
Rated operating voltage U_e	400 V
Power factor cos φ	0.9
Load factor α	0.6
Utilization factor β	0.5
Supply transformers	1 x 1250 kVA, U_k = 6 %
Degree of protection	IP30 / IP54
Line system configuration	TN-S

Determining the rated current per floor

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

I_{nS} = Rated current per storey (A)
U_e = Rated operating voltage (V)
cos φ = Power factor
P_{inst} = Installed power rating [kW]
α = Rated diversity factor

$$I_{BS} = \frac{8 \cdot 26 \cdot 0.6}{\sqrt{3} \cdot 400 \cdot 0.9} \cdot 10^3 = 200A$$

Determining the rated current of the trunking run

$I_n = N \cdot I_{nS} \cdot \beta$

$I_n = 15 \cdot 200 \cdot 0.5 = 1500$ A

$I_n \leq I_e$

The rated diversity factor in accordance with IEC / EN 61439-1 applies for the total number of loads and the demand factor for the type of load. In the absence of precise figures for the demand factor, reliable empirical values can be obtained from local utility companies. However, these vary from region to region. Average values are listed in the table below:

Type of load	β
Residential accommodation with electric ovens and water heaters	0.1 … 0.2
Off-peak storage heating	0.8 … 1
Lighting in office blocks and commercial buildings	0.7 … 0.9
Lifts and and general facilities	0.6 … 0.8
Conference rooms	0.6 … 0.8
Small offices	0.5 … 0.7
Large offices	0.4 … 0.8

In accordance with the system selection criteria based on technical data and areas of application in the chapter "Planning principles (Page 19)", the LI high-voltage system is used in the planning for this example (power distribution in multi-storey buildings with primarily vertical trunking layout).

Combining the assessment criteria and calculations results in an LI-A busbar system being selected with 5 conductors and full neutral conductor cross section, a current carrying capacity of 1600 A and a short-circuit rating of I_{cw} (t = 1 s) 65 kA.

Selected busbar system: **LI-A.1600**

Tap-off units with 3-pole 250 A fuse switch disconnectors (designed for use with NH1 fuse links) are used to supply power to the distribution boards on each floor.

Selected tap-off unit: **LI-T-0250-5H-55-FSF-IEC-3-RD-G-BD-00**

7.3 Functional endurance

7.3.1 Applicable regulations

"Fire prevention devices and fire prevention measures" for electrical installations are required in particular in buildings of special types and used for special purposes. Examples of these types of building include hospitals and public buildings. In this regard, DIN VDE 0100-560 relating to buildings and structures for public use and DIN VDE 0100-710 (previously DIN VDE 0107) relating to medical locations, and/or legal requirements specify that the electrical installations in such buildings must maintain functional endurance for specific lengths of time even in the event of a fire. This requirement affects the following equipment in particular:

- Fire alarm systems
- Systems for alerting and providing instructions to visitors and employees
- Emergency lighting
- Passenger lifts with evacuation circuits that assure functional performance for at least 30 minutes in the incoming cable area under full fire conditions
- Water pressure boosting systems for the supply of extinguishing water
- Ventilating systems of safety stairwells, fire department lifts and machine rooms where functioning must be guaranteed for at least 90 minutes.

To be able to offer the required functional endurance for busbar trunking systems, we have, for example (in some cases working together with Promat), had the BD2, LD, LI and LR busbar trunking systems tested successfully at the Materials Testing Institute in Braunschweig and Leipzig in Germany.

During fire testing the busbar trunking systems concerned (housed in Promatect plate casings of varying thicknesses) were subjected in this respect to an external fire load in compliance with the standard temperature curve (STC) to evaluate functional endurance to DIN 4102-12.

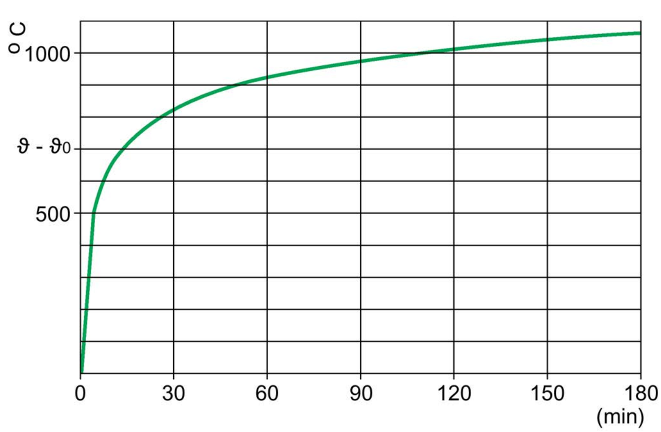


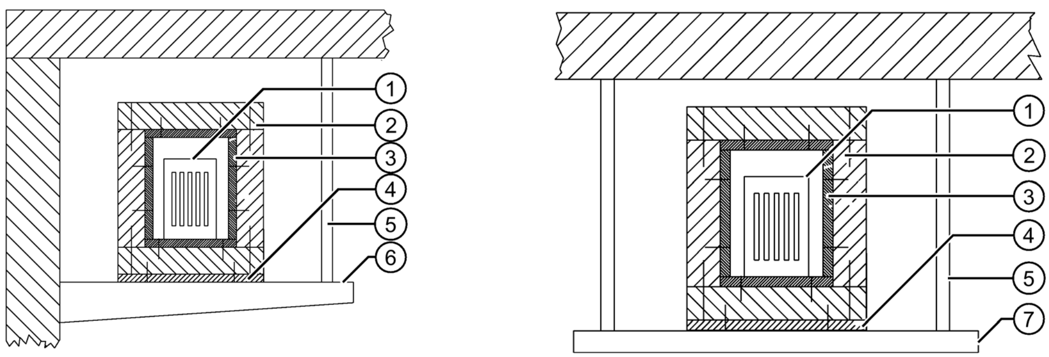
Figure 7-7 Standard temperature curve (STC) to evaluate functional endurance

7.3.2 Versions

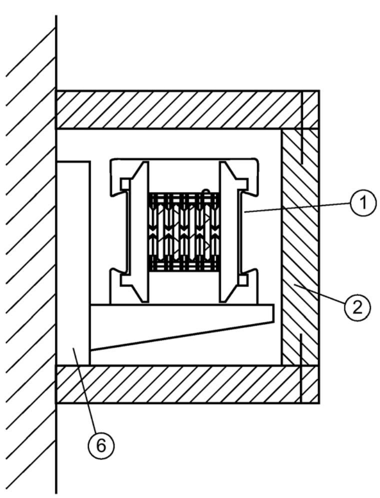
Special components for the functional endurance channel as well as the carrier construction for the channel and BD2, LD, LR and LI busbar trunking systems are vital to compliance with functional endurance requirements. The design of the channel (barriers on 4 and 3 sides) and the carrier construction (fixing with threaded rods or wall-mounted cable brackets) can vary depending on ambient conditions. Observance of/compliance with the specifications of test certification issued by planning authorities is mandatory:

- Observance of the maximum permissible clearances between the mounting points, and a maximum permissible tensile stress of 6 N / mm²
- Use only fixing accessories approved by planning authorities and barrier material incl. barrier accessories. This material must be provided by the customer and is not included in the scope of supply of the busbar trunking system.

The following versions can be considered:



Functional endurance with barrier on 4 sides



Functional endurance with barrier on 3 sides[1)]

① Busbar system

② Casing, functional endurance

③ Casing on external lateral connections (joint edges)

④ Load distribution plate

⑤ Threaded rod (M12/M16)

⑥ Cable bracket according to statics

⑦ Carrier according to statics

All the information you need about the nature and types of barrier and component, as well as a detailed description of carrier constructions, is contained in the planning authority test certificates. Prior to planning, these test certificates must be requested from the product manager.

Table 7- 2 Reduction factors for functional endurance for the BD2 and LD systems

System	Functional endurance class [5)]	Density d [mm]/PROMATECT plate type	External dimensions [2) 2a)] of the Promat duct (W [mm] x H [mm])	Reduction factor [3)] according to functional endurance class and mounting position		
				Horizontal		Vertical
				Edgewise[4)]	Flat	
BD2A-160 … 400	E60	40/L500	288 x 190	0.75	0.7	0.7
	E90	50 / LS	308 x 210	0.7	0.65	0.65
BD2A-630 … 1000	E90	40/L500	250 x 300	0.75	0.7	0.7
BD2C-160 … 400	E30 … E90	45 / LS	300 x 200	0.75	0.65	0.65
BD2C-630 … 1250	E30 … E90	45 / LS	300 x 260	0.75	0.65	0.65
Material Testing Institute, Braunschweig, Germany						
LDA1 … LDA3 / LDC2, LDC3 (IP34)	E30 E60	20/L500	260 x 260	0.57 (Al) 0.58 (Cu)	-	-
	E30 E60 E90	40/L500	300 x 300	0.5 (Al) 0.52 (Cu)	-	-
LDA4 … LDA8 / LDC6 … LDC8 (IP34)	E30 E60 E90	20/L500	320 x 260	0.57	-	-
Material Testing Institute, Leipzig, Germany						
LDA1 … LDA3 / LDC2, LDC3 (IP34)	E30 E60 E90	45 / LS	310 x 320	0.5 (Al) 0.52 (Cu)	-	0.5 (Al) 0.48 (Cu)
LDA4 … LDA8 / LDC6 … LDC8 (IP34)	E30 E60 E90	45 / LS	370 x 320	0.45	-	0.44 (Al) 0.48 (Cu)

1) Versions with 3 barriers available for Germany on request.

2) External dimensions are valid for versions with 4 barriers. Dimensions for versions with 3 barriers are available on request.

2a) LD system: The external dimensions apply for versions with 4 barriers without external lateral connection (bushing). Dimensions for versions with 3 and 2 barriers as well as for versions with ventilation flaps are available on request.

3) The reduction factors are based on the rated current and an ambient temperature of 35 °C (24-hour average), and in the case of the LD system, additionally on freely ventilated ducts. In the case of temperature deviations, take account additionally of the valid reduction factors.

4) Mounting position horizontal edgewise.

5) LD system: Functional endurance class E120 has been tested based on the testing standard DIN 4102-12. However, according to the standard, the maximum functional endurance class is only E90.

Table 7- 3 Reduction factors for functional endurance for the LI system

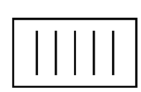
System	Functional endurance class	Density d [mm] Plate type PROMATECT	Dimensions[2) W [mm] x H [mm]	Reduction factor [3) for all positions Channel length functional endurance > 3.20	≤ 3.20 m
LI-A.0800…	E15 … E90	45 / LS	300 x 240	0.55	0.61
LI-C.1000…				0.57	0.62
LI-A.1000…	E15 … E90	45 / LS	300 x 260	0.56	0.62
LI-C.1250…				0.53	0.58
LI-A.1250…	E15 … E90	45 / LS	300 x 280	0.53	0.58
LI-C.1600…				0.52	0.57
LI-A.1600…	E15 … E90	45 / LS	300 x 310	0.52	0.58
LI-C.2000…				0.52	0.57
LI-A.2000…	E15 … E90	45 / LS	300 x 360	0.56	0.61
LI-C.2500…				0.48	0.53
LI-A.2500…	E15 … E90	45 / LS	300 x 430	0.55	0.61
LI-C.3200…				0.54	0.59
LI-A.3200…	E15 … E90	45 / LS	550 x 310	0.57	0.59
LI-C.4000…				0.50	0.53
LI-A.4000…	E15 … E90	45 / LS	550 x 360	0.55	0.58
LI-C.5000…				0.52	0.55
LI-A.5000…	E15 … E90	45 / LS	550 x 430	0.54	0.57
LI-C.6000…				0.58	0.61

1) Versions with 3 barriers available for Germany on request.

2) External dimensions are valid for versions with 4 barriers. Mounting position horizontal edgewise. Dimensions for versions with 3 barriers are available on request.

3) The reduction factors are based on the rated current and an ambient temperature of 35 °C (24-hour average). In the case of temperature deviations, take account additionally of the valid reduction factors.

BD2 (trunking unit)



LD, LI (trunking conductor)

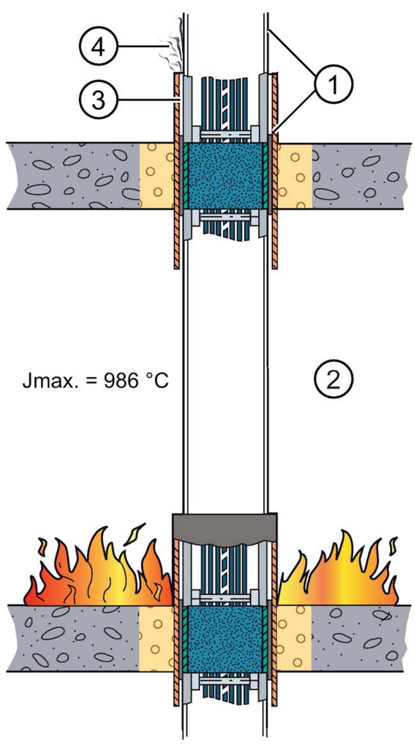
7.4 Fireproof barrier

7.4.1 Busbar trunking system with fireproof barrier

German building regulations (or other national regulations) 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". Accordingly, neither fire nor fumes are permitted to spread from one floor or fire area to another.

The BD01, BD2, LD, LI and LR busbar trunking systems can be equipped with fireproof barriers. Fireproof barriers are generally subject to the device standard IEC / EN 61439-6 and national regulations, and these can differ from each other. For this reason, we recommend that you contact your SIEMENS representative in the planning phase.

The systems meet the requirements for proving fire resistance duration as per the fire resistance class specifications in ISO 834-1 in accordance with IEC / EN 61439-6.



① Permissible surface temperature on components (on the opposite side to the fire) max. 180K above the starting temperature

② Area on fire: Fire in accordance with standard temperature curve DIN 4102, Sheet 2 or DIN EN 1363-1

③ Permissible temperature increase of escaping air max. 140°C

④ Flammable gases must not be allowed to escape. No fumes likely to impair rescue attempts must be allowed to escape

Figure 7-8 Conditions for busbar trunking systems

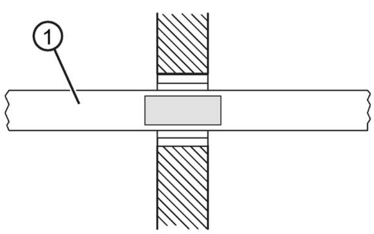
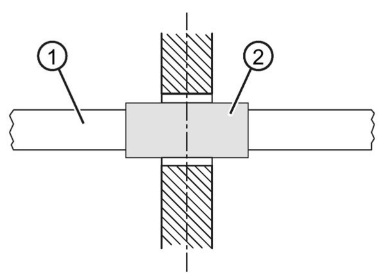
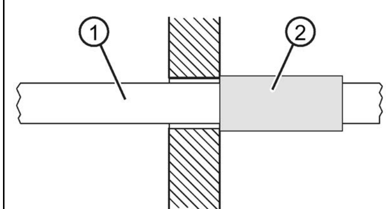
7.4.2 Versions

Unlike cable trunking, the busbar trunking systems are supplied ex-works with a fireproof barrier. The fireproofing consists of an inner and outer barrier or an outer barrier only depending on the busbar trunking system.

The fireproof barriers are compliant with fire resistance classes S60, S90 and S120 in accordance with DIN 4102-9 dependent upon version and type (EI60, EI90 and EI120 available soon).

The fireproof barrier can be installed in the busbar trunking system at the factory (BD2, LD), added on site (BD01, LI, LR), or omitted completely (LR). Please note the section "Special conditions for the German market" in this regard.

The type of installation is determined by the structure of the busbar trunking system and the required fire resistance class, as you can see from the overview below (the figures ignore the minimum clearances between the fireproof barrier and the wall, and the fireproof mortar):

Without external fireproof barrier, in the centre of the wall/ceiling	Without external fireproof barrier, in the centre of the wall/ceiling	With external fireproof barrier on the wall/ceiling
		
① Busbar system		
② Outer fire barrier		
Examples BD2A with inner fire protection S90 (Wall thickness ≥ 35 cm) BD2A with inner fire protection S120 (Wall thickness ≥ 35 cm)	BD2A / BD2C: S120 (Wall thickness < 35 cm) LR: S90[1)] LR: S120[1)] BD01: S90 LD: S120 LI: EI90; EI120	BD01: S90 (Fire protection installed on both sides)

1) Fire protection from the LR system is installed on-site after sealing the wall/ceiling with fillers. There is usually no outer fire protection in the wall/ceiling for the LR system.

Fire resistance classes

System	Fire resistance class		
	S60	S90	S120
BD01	1	1	-
BD2A / BD2C	2	2	3
LDA / LDC	3	3	3
LI-A / LI-C single systems	4	4	4
LI-A / LI-C double systems	4	4	4
LRA / LRC	5	6	7

1: Locally installable fire protection kit for S90 and S60 for installation in a solid wall/ceiling or stud wall.

2: Fire barrier installed in the system at the factory for S90 and S60 for installation in a solid wall/ceiling.

3: Fire barrier installed in the system at the factory for S120 for installation in a solid wall/ceiling.

4: Locally installable fire protection kit for EI90 and EI120 for installation in a solid wall/ceiling.

5: S60 without system-specific fire barrier for installation on solid wall/ceiling. Test certificates are available.

6 Protective coating to be applied locally for S90 for installation on solid wall/ceiling. Test certificates are available.

7: Protective coating to be applied locally and fire protection kit for S120 for installation on solid wall/ceiling.

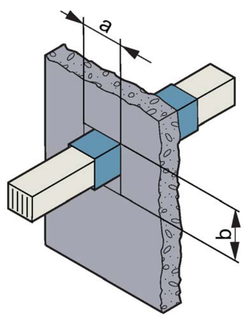
Special conditions for the German market:

The versions for fire barriers described here were created on the basis of tests passed in accordance with DIN 4102 Part 9 or EN 1366-3. In Germany, fireproof barriers must possess general planning authority approval or a European technical approval. These are issued by the German Institute for Civil Engineering in Berlin. All divergences from the approval must be clarified with the product manager for the purpose of applying to the respective regional building authority for agreement in individual cases if necessary.

Fire safety tests have been carried out successfully for the installation of fireproof barriers in stud walls for the BD01, BD2, LD and LI systems. Please contact the relevant product manager for more detailed information about designs and approvals.

7.4.3 Cut-outs

Recommended dimensions for solid wall and solid ceiling cut-outs



System		a [cm]	b [cm]
BD01		19	13
BD2A (160 … 400)	BD2C (160 … 400)	20	9
BD2A(630 … 1250)	BD2C (630 … 1250)	20	15
LDA1 … LDA3	LDC2 … LDC3	40	40
LDA4 … LDA8	LDC6 … LDC8	45	40
LI-A.0800...	LI-C.1000...	35	31
LI-A.1000...	LI-C.1250...	35	33
LI-A.1250...	LI-C.1600...	35	35
LI-A.1600...	LI-C.2000...	35	38
LI-A.2000...	LI-C.2500...	35	43
LI-A.2500...	LI-C.3200...	35	50
LI-A.3200...	LI-C.4000...	61	38
LI-A.4000...	LI-C.5000...	61	43
LI-A.5000...	LI-C.6300...	61	50
LRA01 … LRA03	LRC01 … LRC03	19	19
LRA04..	LRC04..	22	21
LRA05	LRC05	22	23
LRA06	LRC06	22	25
LRA07..	LRC07..	22	29
LRA08..	LRC08..	22	33
LRA09..	LRC09..	22	37
LRA27..	LRC27..	22	48
LRA28..	LRC28..	22	56
LRA29..	LRC29..	22	64

Note

Following installation, you must fill the space between the busbar trunking system or the fire protection block and the wall or ceiling cut-out with non-combustible material such as concrete or mortar to the thickness of the wall or ceiling. The concrete or mortar must comply with the applicable regulations to maintain the fire resistance class of the wall or ceiling, (e.g. EN 206-1 and EN 998-2).

Note

Minimum clearance

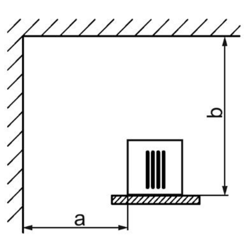
For the installation of SIVACON 8PS busbar systems with fire protection, a minimum clearance of 5 cm must be maintained between the system or system fire protection and the structure in the cut-out. This ensures that there is sufficient space to mount the run, the fixing brackets and for filling with mortar.

7.5 Planning runs

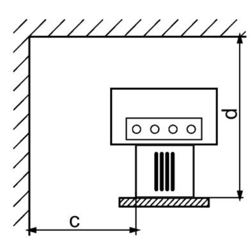
7.5.1 Space requirements for horizontal installation

To simplify the mounting of the trunking units and the tap-off units, minimum clearances must be observed between the runs and the building structure during planning.

Minimum dimensions for busbar trunking systems with and without tap-off units including system-compliant fixing brackets mounted horizontally on cable racks or wall-mounted cable brackets:



Busbar trunking systems without tap-off units (Horizontal installation)



Busbar trunking systems with tap-off units (Horizontal installation)

Space requirements

System		Clearances[1)]			
		a [cm]	b[2)] [cm]	c [cm]	d[3)] [cm]
BD2A (160 … 400)	BD2C (160 … 400)	10	16 (20)	30	62
BD2A(630 … 1000)	BD2C (630 … 1250)	10	28 (24)	30	68
LDA1 … LDA3	LDC2 … LDC3	10	36	35	100
LDA4 … LDA8	LDC6 … LDC8	10	36	38	100
LI-A.0800...		10	21 (26)	38	121
LI-A.1000...		10	23 (26)	38	123
LI-A.1250...		10	25 (26)	38	125
LI-A.1600...		10	28 (26)	38	128
LI-A.2000...		10	33 (26)	38	133
LI-A.2500...		10	40 (26)	38	140
LI-A.3200...		10	28 (51)	38	128
LI-A.4000...		10	33 (51)	38	133
LI-A.5000...		10	40 (51)	38	140
LI-C.1000...		10	21 (26)	38	121
LI-C.1250...		10	22 (26)	38	122
LI-C.1600...		10	25 (26)	38	125
LI-C.2000...		10	27 (26)	38	127
LI-C.2500...		10	31 (26)	38	131
LI-C.3200...		10	38 (26)	38	138
LI-C.4000...		10	27 (51)	38	127
LI-C.5000		10	31 (51)	38	131
LI-C.6300...		10	38 (51)	38	138
LRA01 … LRA03	LRC01 … LRC03	10	59 (62)	—[4)]	—[4)]
LRC04..		10	62 (62)	—[4)]	—[4)]
LRA05 … LRA06	LRC05 … LRC06	10	65 (62)	—[4)]	—[4)]
LRA07..	LRC07..	10	69 (62)	—[4)]	—[4)]
LRA08..	LRC08..	10	72 (62)	—[4)]	—[4)]
LRA09..	LRC09..	10	74 (62)	—[4)]	—[4)]
LRA27..	LRC27..	10	88 (62)	—[4)]	—[4)]
LRA28..	LRC28..	10	94 (62)	—[4)]	—[4)]
LRA29..	LRC29..	10	98 (62)	—[4)]	—[4)]

1) Clearances are valid for horizontal edgewise mounting of the busbar trunking systems without taking the enclosure dimensions of incoming cable connection units into account.

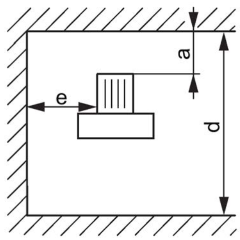
2) The dimensions in brackets are valid for horizontal flat mounting of the busbar trunking systems without taking the enclosure dimensions of incoming cable connection units into account.

3) The clearances are dependent upon the dimensions of the tap-off units. Dimensions are available on request for horizontal flat mounting of trunking units and suspended tap-off units.

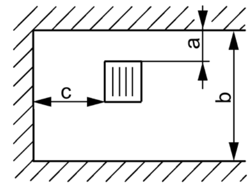
4) The clearances are dependent on the dimensions of the tap-off units. Specifications available on request.

7.5.2 Space requirements for vertical installation

Minimum dimensions are specified for busbar trunking systems with and without tap-off units. The system-specific fixing brackets (not illustrated) have been taken into account in the dimensions specified.



Busbar trunking systems with tap-off unit
(Vertical installation)



Busbar trunking systems without tap-off units
(Vertical installation)

Space requirements

System		Clearances [1)]				
		a [cm]	b[2)] [cm]	c [cm]	d[4)] [cm]	e [cm]
BD2A (160 … 400)	BD2C (160 … 400)	5[2)] (3)[3)]	19	10	116	30
BD2A (630 … 1250)	BD2C (630 … 1250)	5[2)] (3)[3)]	31	10	120	30
LDA1 … LDA3	LDC2 … LDC3	10[2)] (2)[3)]	46	10	146	35
LDA4 … LDA8	LDC6 … LDC8	10[2)] (2)[3)]	46	10	146	38
LI-A.0800...		10[2)] (6)[3)]	21	15	131	38
LI-A.1000...		10[2)] (6)[3)]	23	15	133	38
LI-A.1250...		10[2)] (6)[3)]	25	15	135	38
LI-A.1600...		10[2)] (6)[3)]	28	15	138	38
LI-A.2000...		10[2)] (6)[3)]	33	15	143	38
LI-A.2500...		10[2)] (6)[3)]	40	15	150	38
LI-A.3200...		10[2)] (6)[3)]	28	15	138	38
LI-A.4000...		10[2)] (6)[3)]	33	15	143	38
LI-A.5000...		10[2)] (6)[3)]	40	15	150	38
LI-C.1000...		10[2)] (6)[3)]	21	15	131	38
LI-C.1250...		10[2)] (6)[3)]	22	15	132	38
LI-C.1600...		10[2)] (6)[3)]	25	15	135	38
LI-C.2000...		10[2)] (6)[3)]	27	15	137	38
LI-C.2500...		10[2)] (6)[3)]	31	15	141	38
LI-C.3200...		10[2)] (6)[3)]	38	15	148	38
LI-C.4000...		10[2)] (6)[3)]	27	15	137	38
LI-C.5000...		10[2)] (6)[3)]	31	15	141	38
LI-C.6300...		10[2)] (6)[3)]	38	15	148	38
LRA01 … LRA03	LRC01 … LRC03	10[2)]	69	10	—[5)]	—[5)]

System		Clearances [1]				
		a [cm]	b[2] [cm]	c [cm]	d[4] [cm]	e [cm]
LRC04..		10[2]	72	10	—[5]	—[5]
LRA05 … LRA06	LRC05 … LRC06	10[2]	75	10	—[5]	—[5]
LRC07..		10[2]	79	10	—[5]	—[5]
LRC08..		10[2]	82	10	—[5]	—[5]
LRC09..		10[2]	84	10	—[5]	—[5]
LRC27..		10[2]	98	10	—[5]	—[5]
LRC28..		10[2]	104	10	—[5]	—[5]
LRC29..		10[2]	108	10	—[5]	—[5]

1) The enclosure dimensions of incoming cable connection units have not been taken into account.

2) Clearances apply as minimum dimensions taking into account the recommended cut-out dimensions for fireproof barriers in the ceiling and flush connection between the cut-out and the wall.

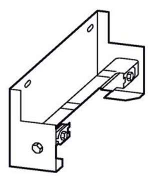
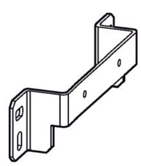
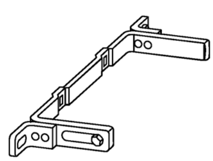
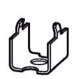
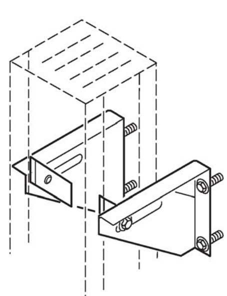
3) The reduced dimensions in brackets apply for trunking units without fireproof barriers and are based on space requirements for vertical fixing brackets. If local conditions vary, fillers will need to be used on site.

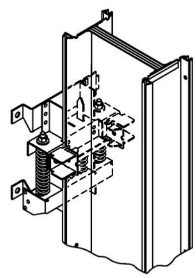
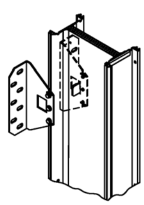
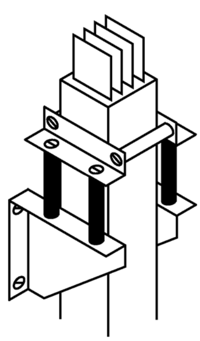
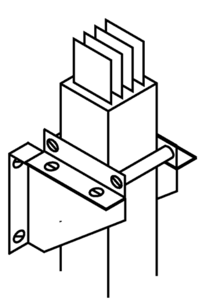
4) The clearances are dependent upon the dimensions of the tap-off units. The dimensions specified apply for the available tap-off units max. size. Specifications for the use of smaller sizes are available on request.

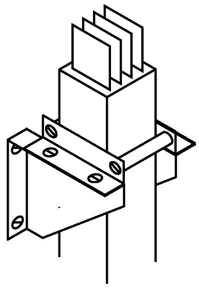
5) The clearances are dependent upon the dimensions of the junction boxes. Data on request.

7.5.3 Fixing brackets for vertical mounting

System-specific fixing brackets have to be used to mount the trunking units.

System	Type of bracket	Function	Fixing distances2)
BD2A / BD2C1)	 Fixing bracket with weight carrying capacity (-BVW)	• Support of weight of run • For wall mounting • For ceiling mounting (-BDV)	7.5 m: up to 400 A 5 m: 630 A 4 m: 800 A … 1000 A 3.25 m: 1250 A
	 Fixing bracket with weight carrying capacity (-BVF)	• Support of weight of run • For wall mounting	At every joint block connecting flange (max. 3.25 m)
	 Spacer brackets (-BD) for busbar runs and distance compensation  Spacer (-DSB)	• Fix clearance from building • For wall mounting	Dependent upon local conditions and planning
LDA / LDC1)	 Fixing bracket with weight carrying capacity (-BV)	• Support of weight of run • For wall mounting	At every trunking unit (max. 3.20 m)

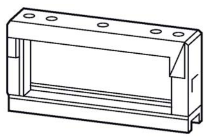
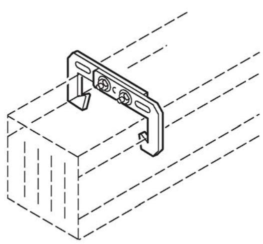
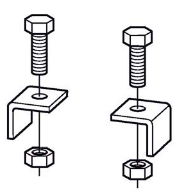
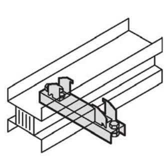
System	Type of bracket	Function	Fixing distances[2)]
LI-A / LI-C	 Fixing bracket with weight carrying capacity	• Support of weight of run • Permit proper movement • For wall mounting • For ceiling mounting	At an average storey height of 3.40 m to 3.90 m 1 bracket per storey
	 Fixed point bracket	• Fixing the run to the building • For wall mounting	Dependent upon local condi- tions and planning
LRA / LRC	 Fixing bracket with weight carrying capacity (-BVW)	• Support of weight of run • Permit proper movement • For wall mounting • For ceiling mounting (-BVD)	At an average storey height of 3.40 m to 3.90 m 1 bracket per storey
	 Fixed point bracket (-BF)	• Fixing the run to the building • For wall mounting • For ceiling mounting (-BVD)	Dependent upon local conditions and planning

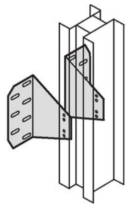
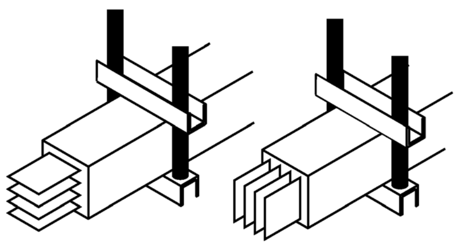
System	Type of bracket	Function	Fixing distances[2)]
	 Sliding bracket (-BGW)	• Fix clearance from building • Permit proper movement • For wall mounting	Dependent upon local conditions and planning

1) Fixed point brackets are not required due to the type of system.

2) These are recommendations for planning. Please refer to the planning guidelines for max. permissible fixing distances.

7.5.4 Fixing brackets for horizontal installation

System	Type of bracket	Function	Fixing distances[2)]
BD2A / BD2C[1)]	 Fixing bracket (-BB)	• Run supported or borne • For wall mounting • For ceiling mounting using U-supports or H-supports • For wall mounting using spacers • For fixing on walls and pipe cable brackets	3.25 m: up to 630 A (1 x mount per trunking unit) 2.5 m: up to 1000 A For BD2C and mounting using spacer brackets see Technical specifications (Page 62)
LDA / LDC[1)]	 Suspension bracket (-B.)	• Bearing the weight of the run • For mounting on U-supports or H-supports	1 x mount per trunking unit for LDA up to 4000 A and LDC up to 4400 A (IP34) 2 m for 5000 A (IP34)
	 Terminal clamp (supplied by the customer)	• For fixing on walls and pipe cable brackets	As suspension bracket
LI-A / LI-C	 Fixing bracket with weight carrying capacity (-BH and -BK)	• Support of weight of run • Permit proper movement • For mounting on ceilings using threaded rods • Mounting on wall using wall and pipe cable brackets	2 m for flat mounting position 3 m for edgewise mounting position

System	Type of bracket	Function	Fixing distances[2)]
	 Fixed point bracket (-BVF..)	• Fixing the run to the building • For wall and ceiling mounting • For mounting on fixed point consoles (-K)	Dependent upon local conditions and planning
LRA / LRC	 Fixing bracket with weight carrying capacity (-BVW)	• Support of weight of run • Permit proper movement • For wall mounting • For ceiling mounting (-BVD)	1.5 m
	Fixed point bracket	• Fixing the run to the building • For wall mounting • For ceiling mounting	Dependent upon local conditions and planning

1) Fixed point brackets are not required due to the type of system.

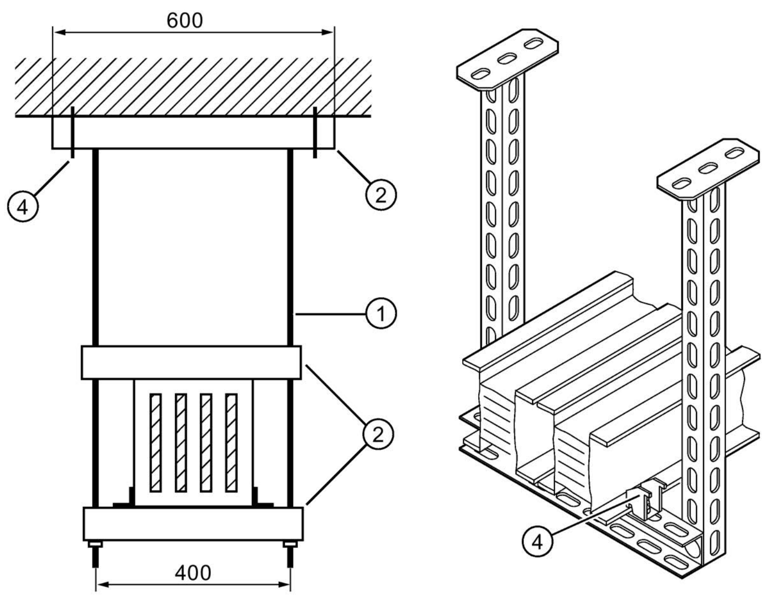
2) These are recommendations for planning. For the maximum permissible fixing distances, please refer to the technical data tables.

7.5.5 Carrier constructions

Mounting types

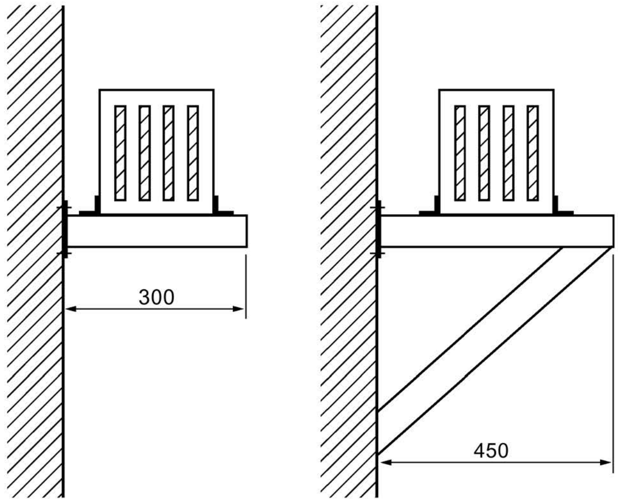
The variety of local structural conditions is reflected in the large number of different technical options for carrier constructions. The most common of these are listed below:

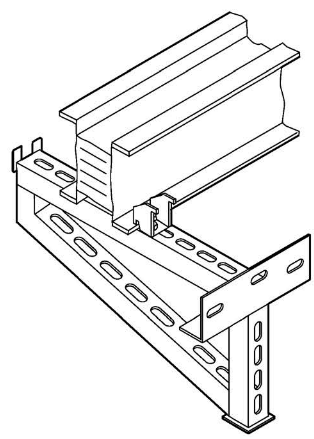
Ceiling: suspended installation



① Threaded rods or C profiles
② C profiles or top plates
③ Dowels
④ Terminal clamp

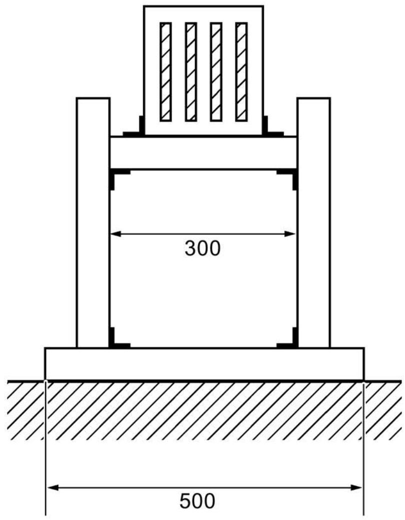
Wall: supported installation

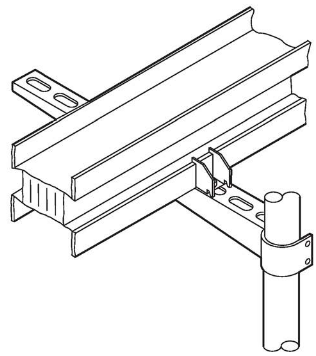




Various beams in accordance with static requirements

Floor: elevated installation





Most stands consist of C profiles with connectors or profiles and appropriate accessories.

For more information about system mounting, please refer to the relevant project planning and installation manuals.

7.6 Magnetic fields

General information

Due to their physical characteristics, busbars designed for power distribution and transmission generate pulsating electromagnetic fields in their vicinity with a fundamental frequency of 50 Hz. These magnetic fields can impair the ability of sensitive equipment such as computers or metering instruments to function in full working order.

Limits

EMC directives and the associated standards do not set out requirements or recommendations for the planning of busbar trunking systems. DIN VDE 0100-710 can be consulted in relation to busbar trunking systems used in hospitals.

DIN VDE 0100-710 defines limits for line frequency magnetic fields in hospitals. For example, at 50 Hz, the magnetic induction around a patient's bed must not exceed the following values:

B= 2 x 10^{-7} tesla for EEG

B = 4 x 10^{-7} tesla for ECG

The limit for inductive interference between multi-core cables and lines in a high voltage installation (conductor cross section > 185 mm^2) and the patient beds to be protected is safely undershot if the minimum clearance of 9 m recommended in DIN VDE 0100-710 is complied with.

When using busbars, this clearance can generally be reduced, since the busbar systems are designed to effectively reduce the magnetic interference fields in the local vicinity.

Magnetic field measurements

However, in order to facilitate evaluation of the busbars to be used in the planning phase, extensive magnetic field measurements have been taken in accordance with EN 61439-6. The magnetic field emissions of the busbar systems were measured on a straight trunking run that was 9.0 m long. With the busbars under a balanced rated current load, the magnetic fields were measures in eight directions at intervals of 0.1 m and up to a clearance of 1 m.

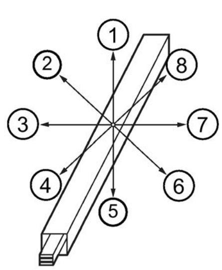


Figure 7-9 Coordinate system for magnetic field measurement

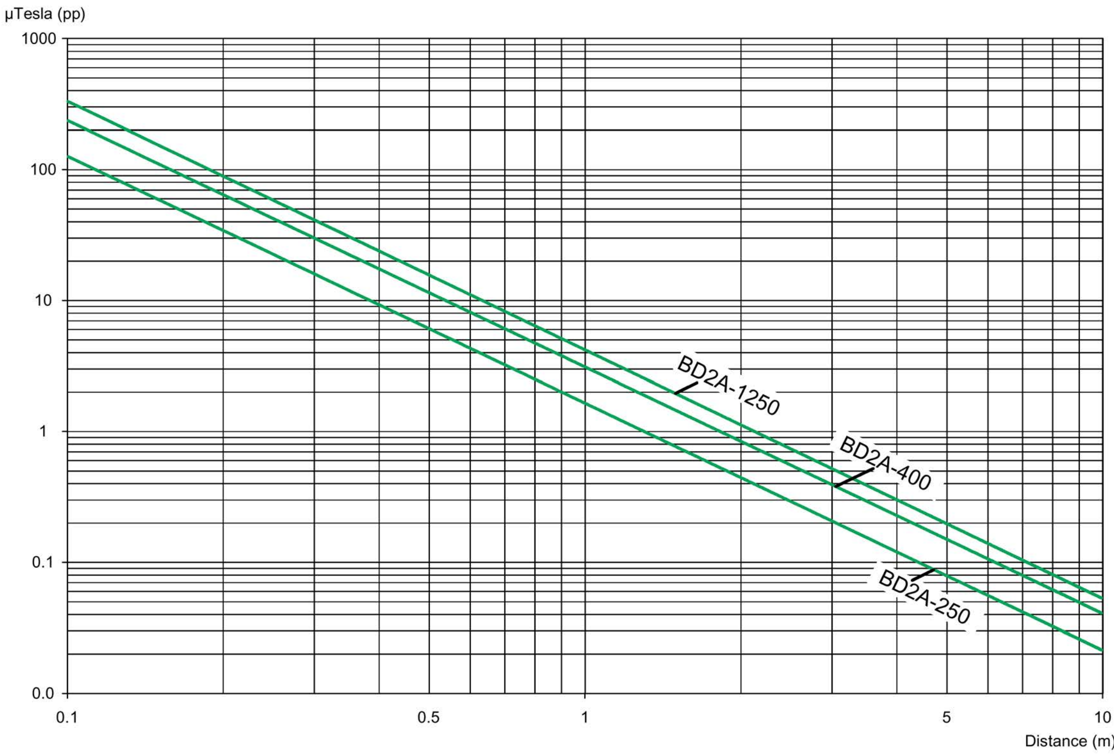


Figure 7-10 BD2 magnetic fields for systems Al 250 A, 400 A, Cu 1250 A

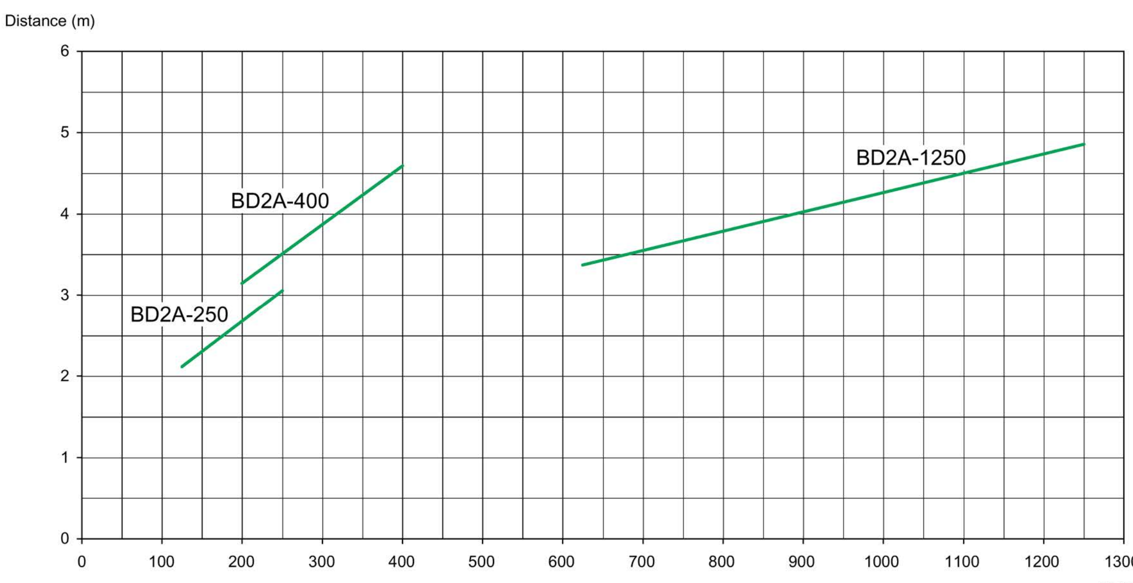


Figure 7-11 BD2 load distance profile for 0.2 µT of systems Al 250 A, 400 A, Cu 1250 A

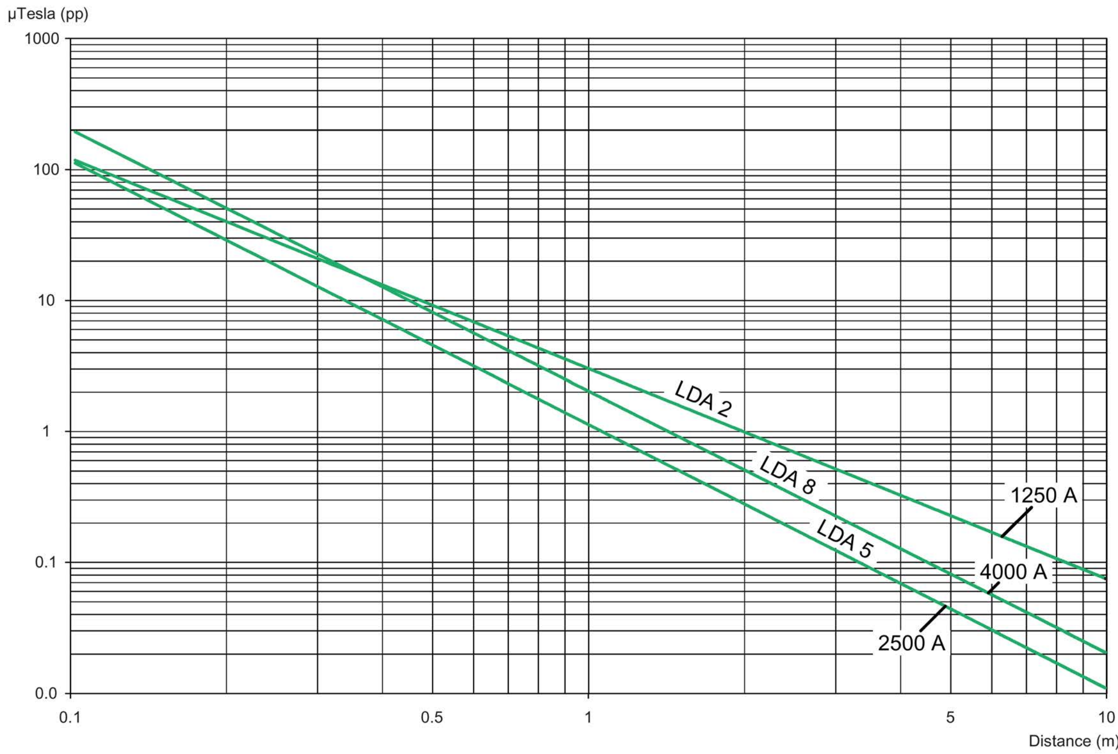


Figure 7-12 LDA magnetic fields for systems Al 1250 A, 2500 A and 4000 A

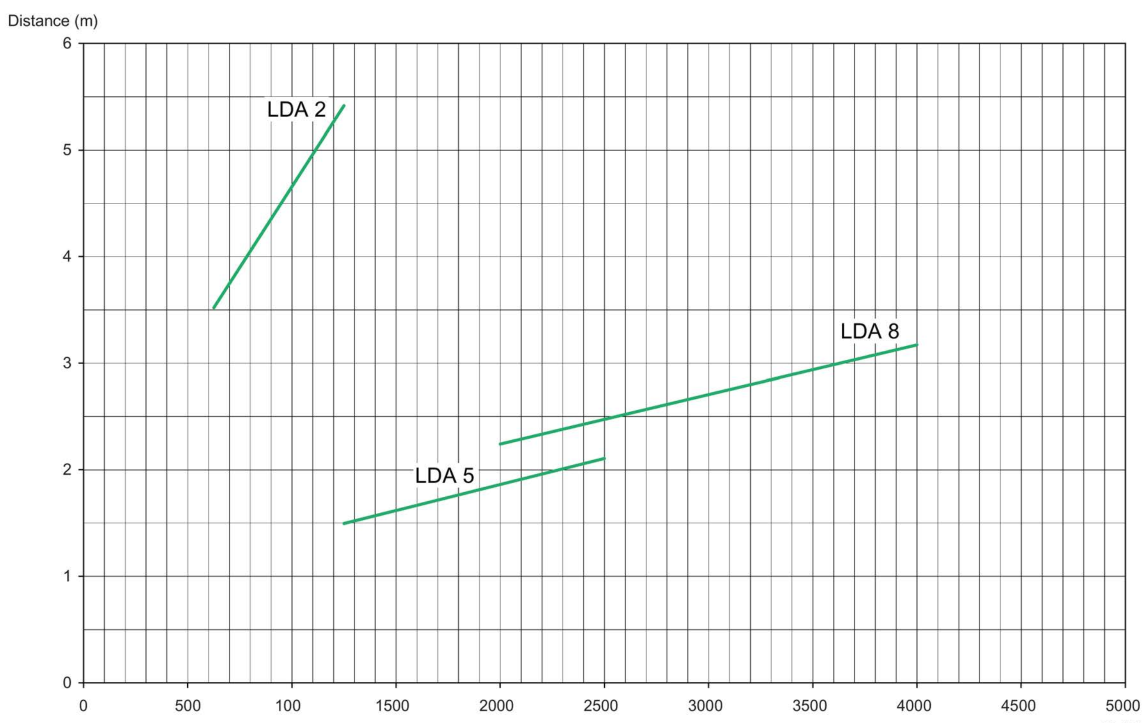


Figure 7-13 LDA magnetic fields for 0.2 μT of systems Al 1250 A, 2500 A and 4000 A

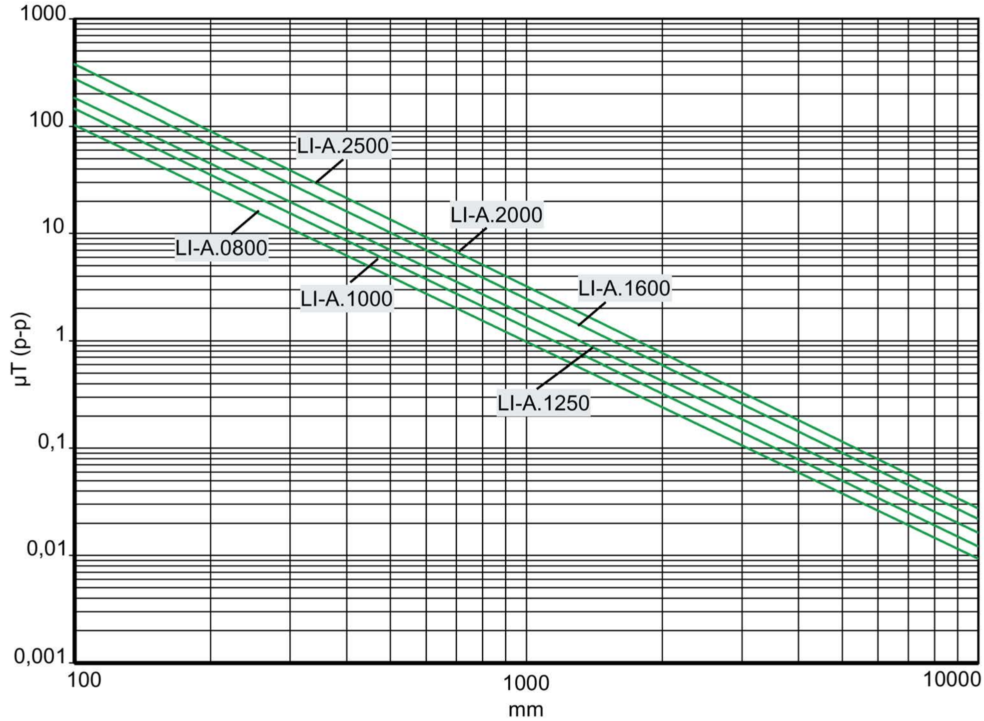


Figure 7-14 Interference field LI-A0800 to LI-A2500

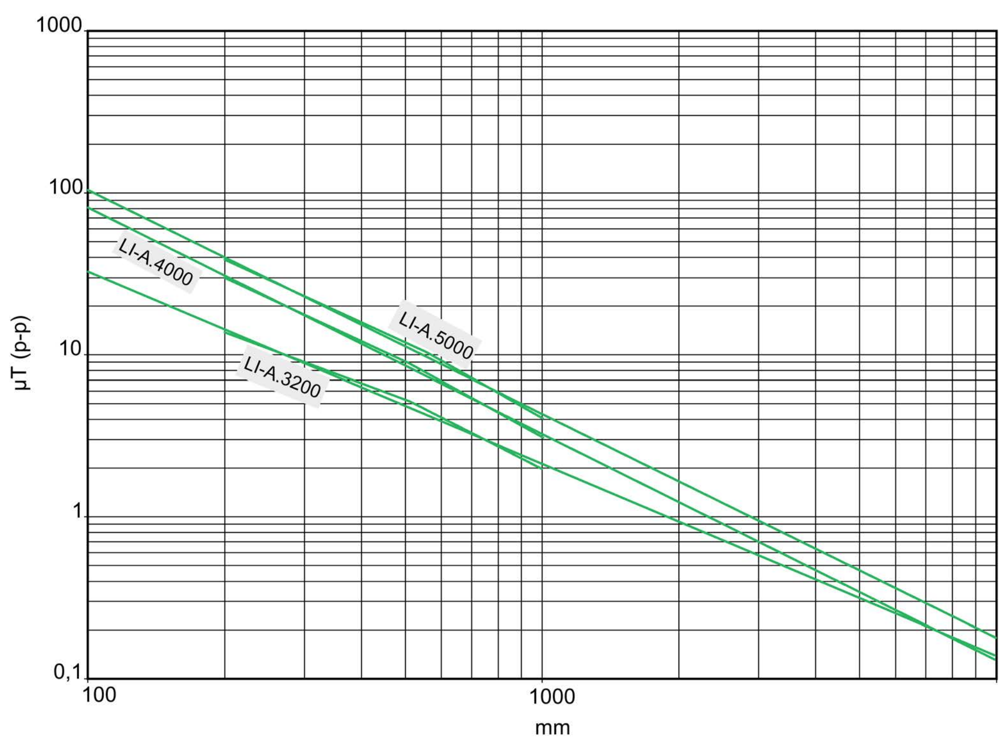


Figure 7-15 Interference field LI-A3200 to LI-A5000

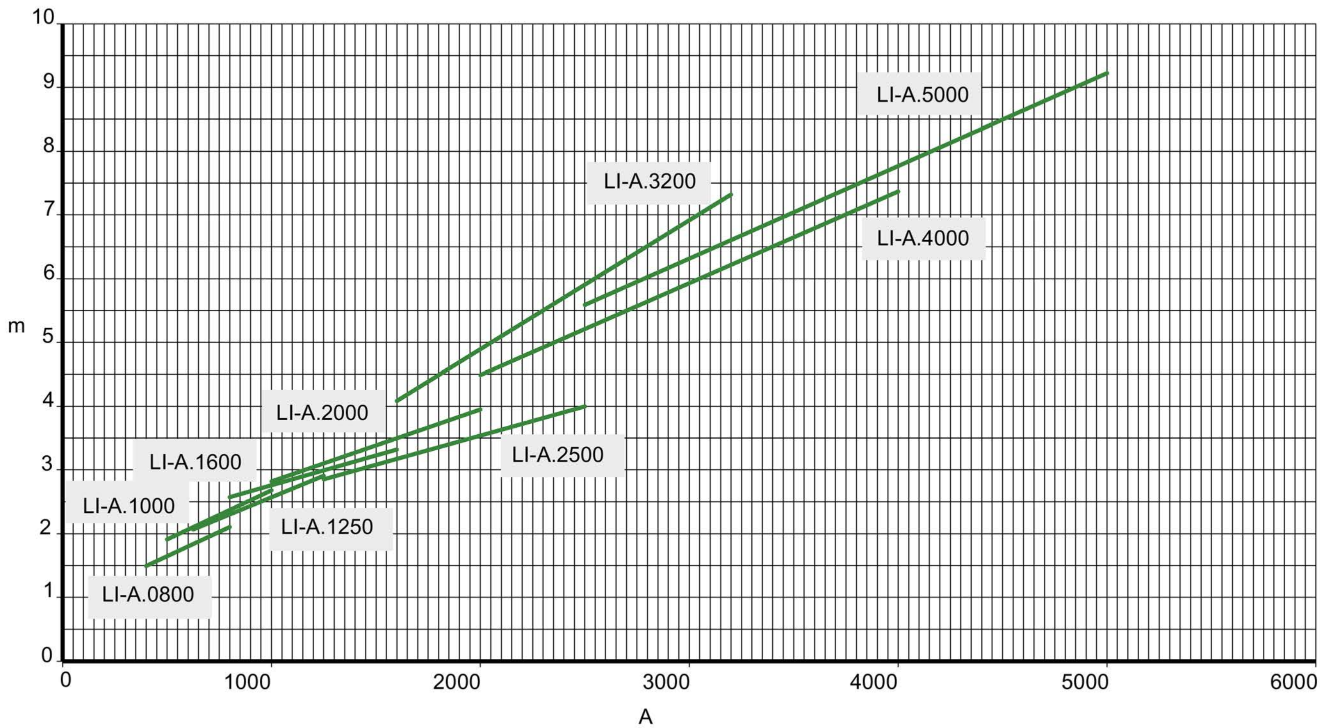


Figure 7-16 LI-A load distance profile for 0.2 µT - overview diagram

Diagrams for other sizes and for the LR system are available on request.

7.7 Sprinkler test

General information

Sprinkler systems are used for fire prevention and protection in buildings and industrial facilities. Sprinkler systems are automatic fire extinguishing systems. They are designed to detect the outbreak of fire at an early stage and extinguish it as quickly as possible. Once activated for the purpose of extinguishing fire, such systems usually run for at least 30 minutes.

The BD2, LD and LI busbar trunking systems have been subjected to a sprinkler test. In the absence of a binding standard, the tests were carried out based on a test structure reflecting practical application (see diagram).

Test results

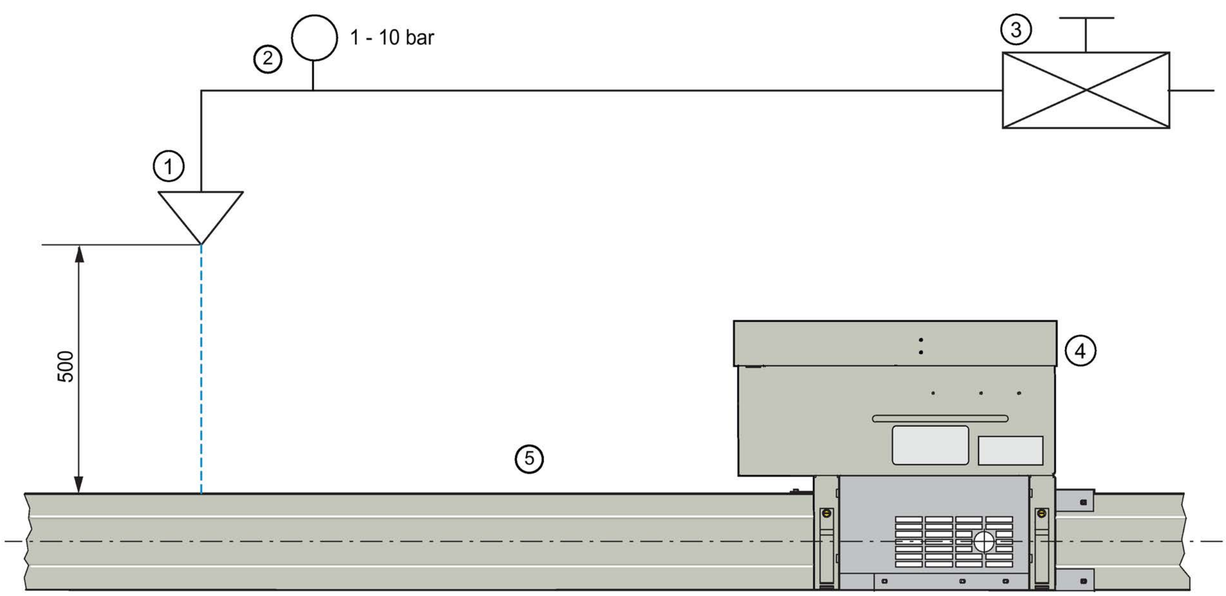
BD2 and LI

All mounting positions of the BD2 and LI busbar trunking systems were tested for water resistance in degree of protection IP54 on the basis of the national risk prevention guidelines for sprinkler systems issued in Germany. Insulation resistance measurements were taken before and after the 90-minute sprinkling period and a high-voltage test was carried out in accordance with IEC / EN 61439-6 . The equipment passed the test, proving that the busbar system can be put back into operation immediately and without delay once the sprinkler system has run its course.

LD

The LD busbar system with degree of protection IP34 and the associated tap-off units with degree of protection IP54 were sprinkled with both horizontal and vertical trunking runs with a 3/4" umbrella sprinkler and a 1/2" flat spray sprinkler at a water pressure of 6 bar. In order to be able to assess electrical performance during testing, insulation resistance measurements were taken during the course of the test. No operational failures occurred.

Even when subject to extreme water loads such as those associated with sprinkler systems, the LD busbar system is able to remain in full working order. This operational reliability is made possible on the one hand by the generous creepages and clearances and on the other by the fact that water can drain away unhindered.



① Sprinkler
② Pressure gauge
③ Shut-off valve
④ Tap-off unit
⑤ Trunking unit

Figure 7-17 Diagram of sprinkler test

7.8 Tools and services

7.8.1 Engineering Tools - SIMARIS design

SIMARIS design

Software tool for fast, effective network designing and dimensioning of electrical power distribution for utility and industrial buildings from the medium voltage supply to the load:

- Dimensioning of electrical systems on the basis of real products in accordance with the state of the art and applicable standards (VDE, IEC)
- Automatic selection of the appropriate components from the stored product database
- Option of saving frequently required modules in the Favourites library
- High level of planning reliability coupled with flexibility in the planning and implementation process
- Option of automatic selectivity assessment with the professional version: selectivity limits are automatically displayed in addition to the current-time curve and the relevant envelope curves

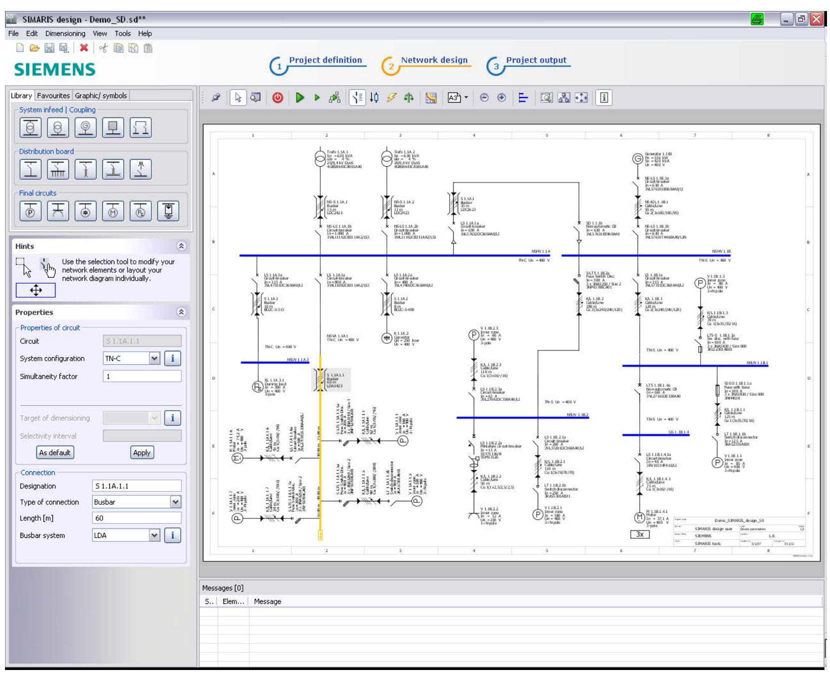


Figure 7-18 SIMARIS design

7.8.2 Engineering Tools - SIMARIS project

SIMARIS project

Software tool for fast calculation of space requirements and the electrical power distribution budget for utility and industrial buildings, as well as the drafting of tender specifications:

- Automatic selection and positioning of the suitable systems using the parameters entered
- Quick overview of space requirements and budget
- System-wide planning from the medium voltage supply to the distribution board
- Easy adaptation of project planning in specific cases, even with changes of use or expansions
- Saving of planned systems in the Favourites library for further use in similar projects
- Automatic generation of specifications for planned systems

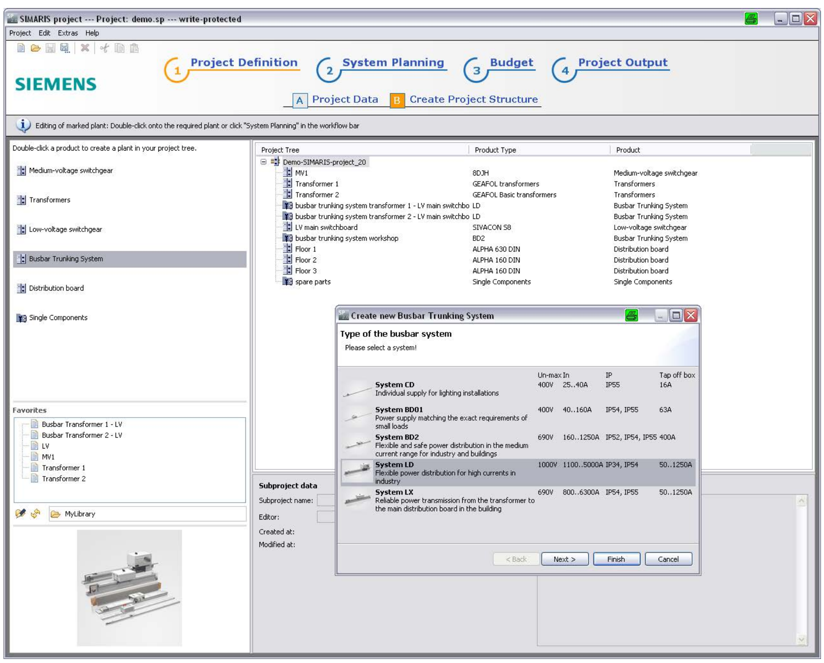


Figure 7-19 SIMARIS project

7.8.3 Engineering Tools - SIMARIS curves

SIMARIS curves

Software tool for visualizing and evaluating characteristic curves of low-voltage protective devices and fuses (IEC) including the option of simulating device settings:

- Visualisation of tripping characteristics, let-through current characteristics, and let-through energy characteristics
- Devices selected using order number or by entering known technical data via the selection aids
- Saving of frequently required devices as favourites
- Saving of several characteristic curves including selected settings as overall project

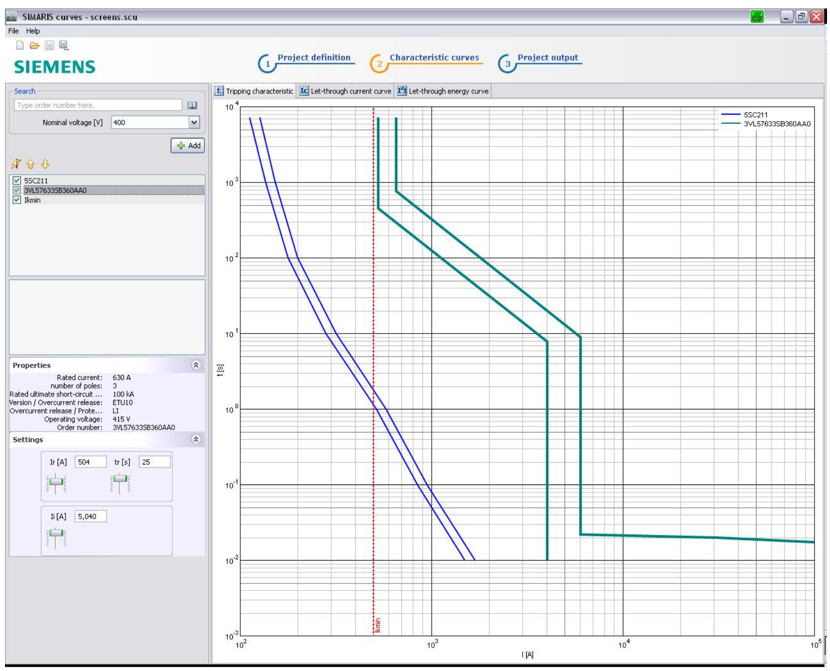


Figure 7-20 SIMARIS curves

7.8.4 Engineering Tools - Further information on SIMARIS

Further information for electrical power distribution

You can find additional information on the Internet under: Totally Integrated Power

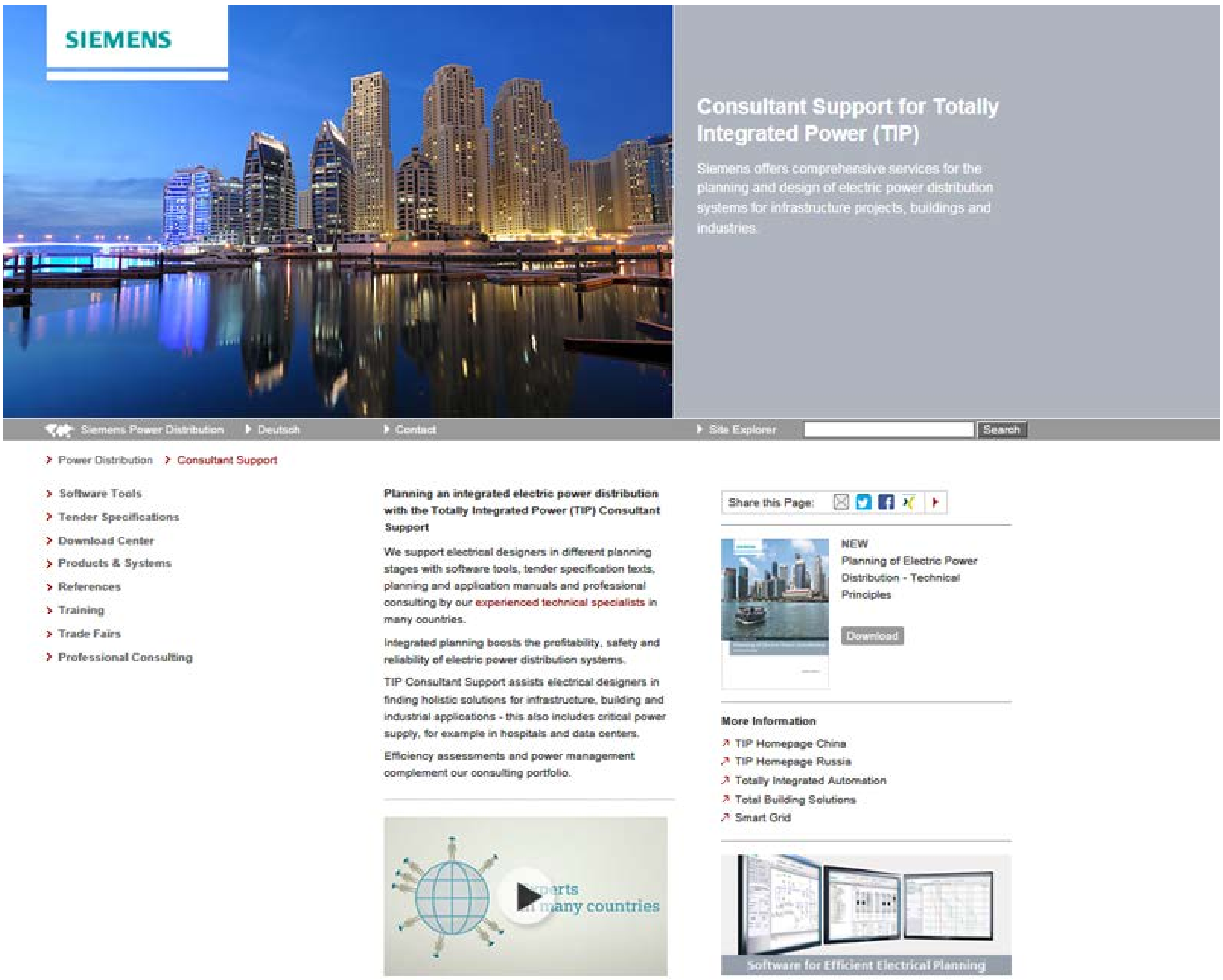


Figure 7-21 Start page "Consultant Support for Totally Integrated Power (TIP)"

The SIVACON 8PS busbar trunking systems are part of the comprehensive product portfolio of Totally Integrated Power, the Siemens solution for system-wide electrical power distribution in industrial applications, infrastructure, and buildings. With technical manuals and software tools for planning power distribution, as well as online tender specifications, we support you in the different planning phases.

You will find all these documents and information on our Homepage (http://www.siemens.com/tip-cs).

Glossary

Conditional rated short-circuit current (Icc) DIN EN 61439-1; 5.3.5, IEC / EN 61439-1

The conditional rated short-circuit current corresponds to the prospective short-circuit current that a circuit in a switchgear and controlgear assembly, protected by a short-circuit protective device, can carry without damage (for a certain time). The conditional rated short-circuit current is therefore specified for tap-off units and/or infeeds with circuit breakers, for example.

Rated control voltage (Uc) DIN EN 60947-1; 4.5.1

This is the voltage that is applied to the normally-open actuation contact in a control circuit. It may deviate from the rated control supply voltage due to transformers or resistors in the switching circuit.

Rated current (In) (of a circuit breaker) DIN EN 60947-2; 4.3.2.3

Current which, for circuit breakers, corresponds to the rated continuous current and the conventional thermal current.

➜ Rated uninterrupted current

Rated current (In) (of a circuit of a circuit breaker assembly) DIN EN 61439-1; 5.3.2

The rated current of a circuit of a switchgear and controlgear assembly is specified by the manufacturer and depends on the rated values of the individual items of electrical equipment in the circuit within the switchgear and controlgear assembly, their arrangement, and type of use. The circuit must be able to carry the rated current without the overtemperatures on the individual components exceeding the limit values defined in 9.2 (Table 6) when tested according to 10.10.2.

Rated frequency DIN EN 60947-1; 4.3.3

Frequency for which switching devices are dimensioned and to which the other characteristic data refer.

➜ Rated operating voltage; rated uninterrupted current

Rated impulse withstand voltage (Uimp) DIN EN 60947-1; 4.3.1.3

Parameter for the resistance of clearances inside switching devices to impulse overvoltages. Suitable switchgear can be used to ensure that deactivated parts of a system cannot transmit overvoltages from the line on which they are used.

Rated insulation voltage (Ui) DIN EN 60947-1; 4.3.1.2

Voltage to which insulation tests and creepage paths apply. The maximum rated operating voltage must, in no case, exceed the rated insulation voltage.

→ Rated operating voltage

Rated making capacity DIN EN 60947-1; 4.3.5.2

Current which can be switched on by a switching device with the respective rated operating voltage in accordance with the utilisation category.

→ Rated operating voltage

Rated operating current (Ie) DIN EN 60947-1; 4.3.2.3

Current which can be carried by a switching device in consideration of the rated operating voltage, the operating time, the utilisation category and the ambient temperature.

→ Rated operating voltage

Rated operating power DIN EN 60947-1; 4.3.2.3

The power that a switching device can switch at the assigned rated operating voltage in compliance with the utilisation category, e.g. circuit breaker utilisation category AC-3: 37 kW at 400 V.

Rated operating voltage (Ue) DIN EN 60947-1; 4.3.1.1

Voltage to which the characteristic values of a switching device apply. The maximum rated operating voltage must, in no case, exceed the rated insulation voltage.

➞ Rated insulation voltage

Rated peak withstand current (Ipk) DIN EN 61439-1; 5.3.3, IEC / EN 61439-1

As the peak value of the impulse current, the rated impulse withstand current characterises the dynamic strength of a circuit belonging to a switchgear and controlgear assembly. The rated short-time withstand current is usually specified for the trunking and/or main busbars of a switchgear and controlgear assembly.

Rated service short-circuit breaking capacity (Ics) DIN EN 60947-2; 4.3.5.2.2

The short-circuit current dependent on the rated operating voltage that a circuit breaker is capable of repeatedly breaking (test O - CO - CO, previously P - 2). After the short-circuit breaking, the circuit breaker is able to continue to carry the rated current in the case of increased self-heating and to trip in case of overload.

➞ Rated uninterrupted current; rated operating voltage

Rated short-circuit breaking capacity (Icn) DIN EN 60947-1; 4.3.6.3

The highest current that a switching device can break at rated operating voltage and frequency without damage. The value is stated as the rms value.

→ Rated operating voltage

Rated short-circuit current, conditional (Icc) DIN EN 60947-1; 2.5.29

➞ Conditional rated short-circuit current (I_{cc})

Rated short-circuit making capacity (Icm) DIN EN 60947-1; 4.3.6.2

The highest current that a switching device can make at a specific rated operating voltage and frequency without damage. Deviating from the other characteristic data, the value is stated as the peak value.

→ Rated operating voltage

Rated short-time withstand current (Icw) DIN EN 61439-1; 5.3.4, IEC / EN 61439-1

As the effective short-circuit current value, the rated short-time withstand current characterises the thermal strength of switchgear and controlgear assembly circuits during a short-time load. The rated short-time withstand current is normally determined for a duration of 1 s; divergent time values must be specified. The rated short-time withstand current is specified for the trunking and/or main busbars of a switchgear and controlgear assembly.

Rated ultimate short-circuit breaking capacity (Icu) DIN EN 60947-2; 4.3.5.2.1

The maximum short-circuit current that a circuit breaker is capable of breaking (test O - CO, previously P-1). After short-circuit breaking, the circuit breaker is capable of tripping under an overload, with increased tolerances.

Rated uninterrupted current (Iu) DIN EN 60947-1; 4.3.2.4

The current that a switching device can carry during continuous operation (for weeks, months or years).

Specification of rated values

The manufacturers of low-voltage switchgear and controlgear assemblies specify rated values in compliance with DIN EN 61439-1. These rated values apply to specified operating conditions and characterise the suitability of a switchgear assembly. Use these ratings for coordination of the equipment and configuration of the switchgear assemblies.

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Further Information

Medium Voltage & Systems:
www.siemens.com/mediumvoltage

For more information, please contact,
our Customer Support Center:
E-Mail: support.energy@siemens.com

Download catalogs and information material:
www.siemens.com/lowvoltage/infomaterial

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Busbar Trunking
Systems
SIVACON 8PS