Electrical installation solutions for buildings – Technical details

SMISSLINE TP plug-in system

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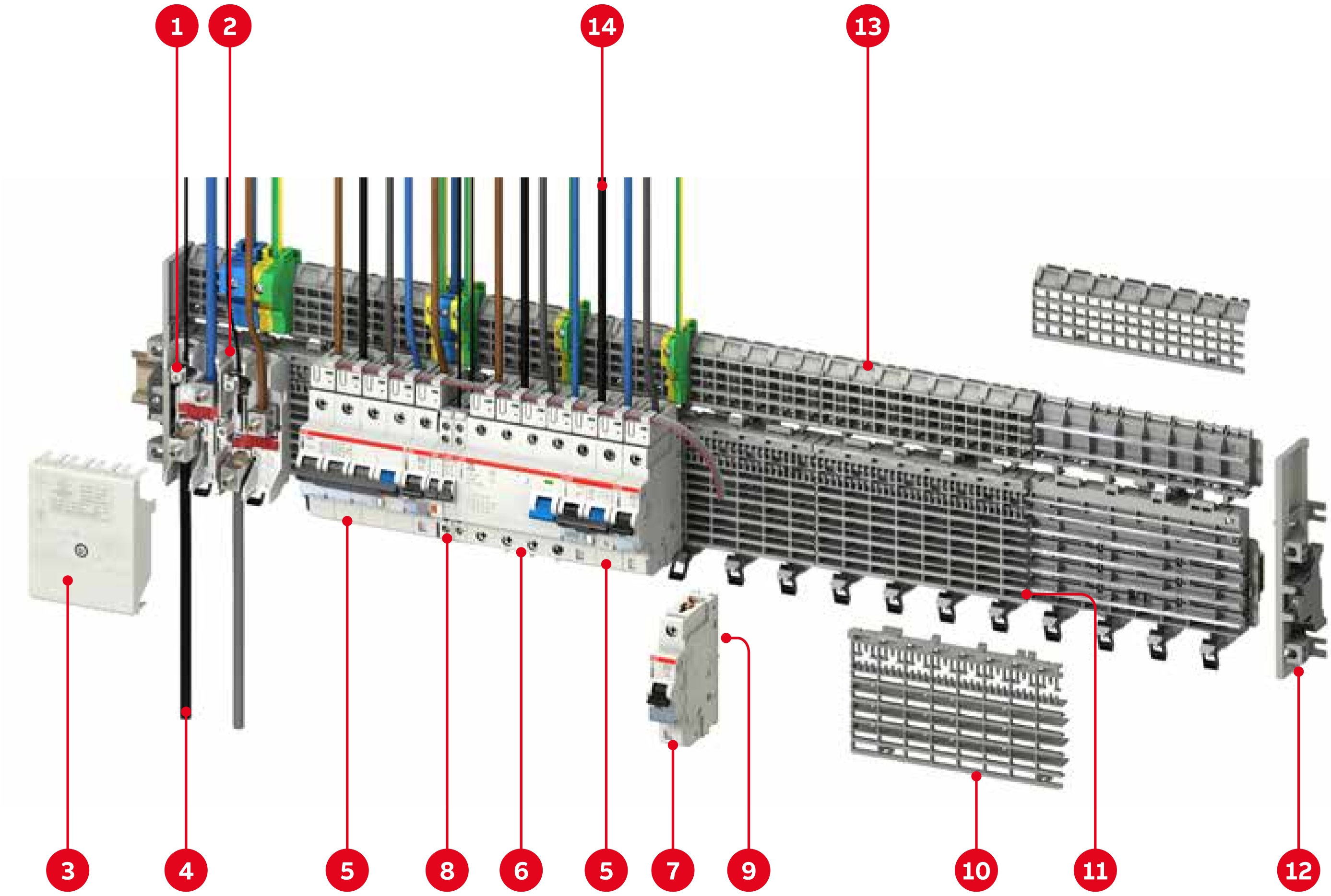
SMISSLINE TP technical details

Busbar system 125 A Overview



1 **Supply terminal**

2 **Incoming terminal block with a max. current rating of 160 A 50 mm² (2 x 25 mm²) + 2 x 10 mm² (LA, LB)**

3 **Cover for incoming terminal block**

4 **Supply cable**

5 **Residual current operated circuit breaker with overcurrent protection RCBO FS401 and FS403**

6 **Residual-current circuit breaker F404**

7 **Miniature circuit breaker S401 M**

8 **Signal contact**

9 **Plug contacts**

10 **Cover for socket**

11 **Socket**

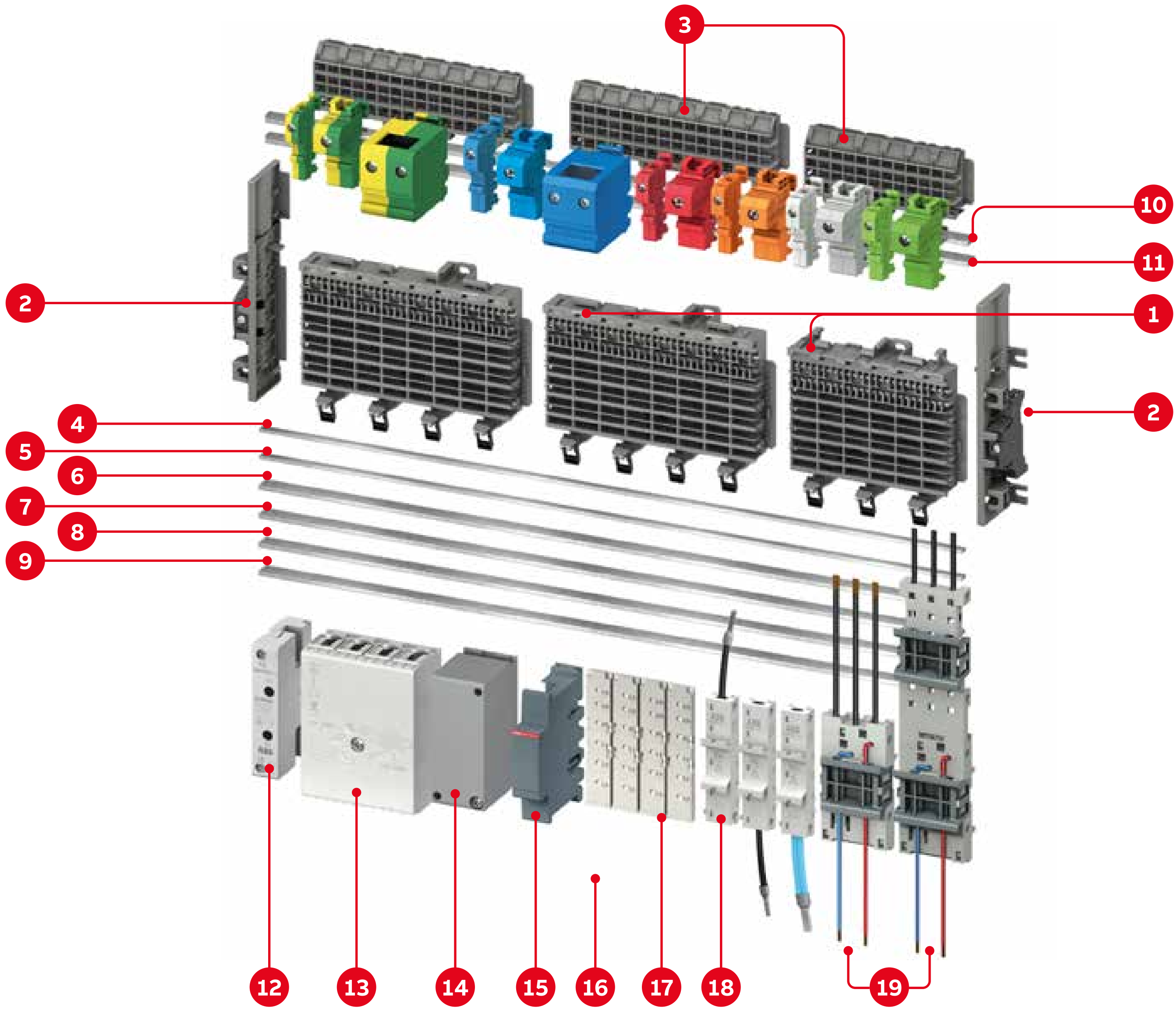
12 **End piece**

13 **Additional socket**

14 **Outgoing cable**

SMISSLINE TP technical details

Busbar system 125 A Overview



1 **6 and 8-module socket**

2 **end piece on left and right**

3 **6 and 8 module additional socket**

4 **Busbar LA 40A**

5 **Busbar LB 40A**

6 **Busbar 125A N**

7 **Busbar 125A L1 or DC +, –**

8 **Busbar 125A L2 or DC +, –**

9 **Busbar 125A L3 or DC +, –**

10 **Busbar 125A PE**

11 **Busbar 125A N**

12 **Incoming terminal block 63A**

13 **Incoming terminal block 160A**

14 **Incoming terminal component, centre power supply 200 A, maximum 95 mm2**

15 **Isolator**

16 **DIN adapter**

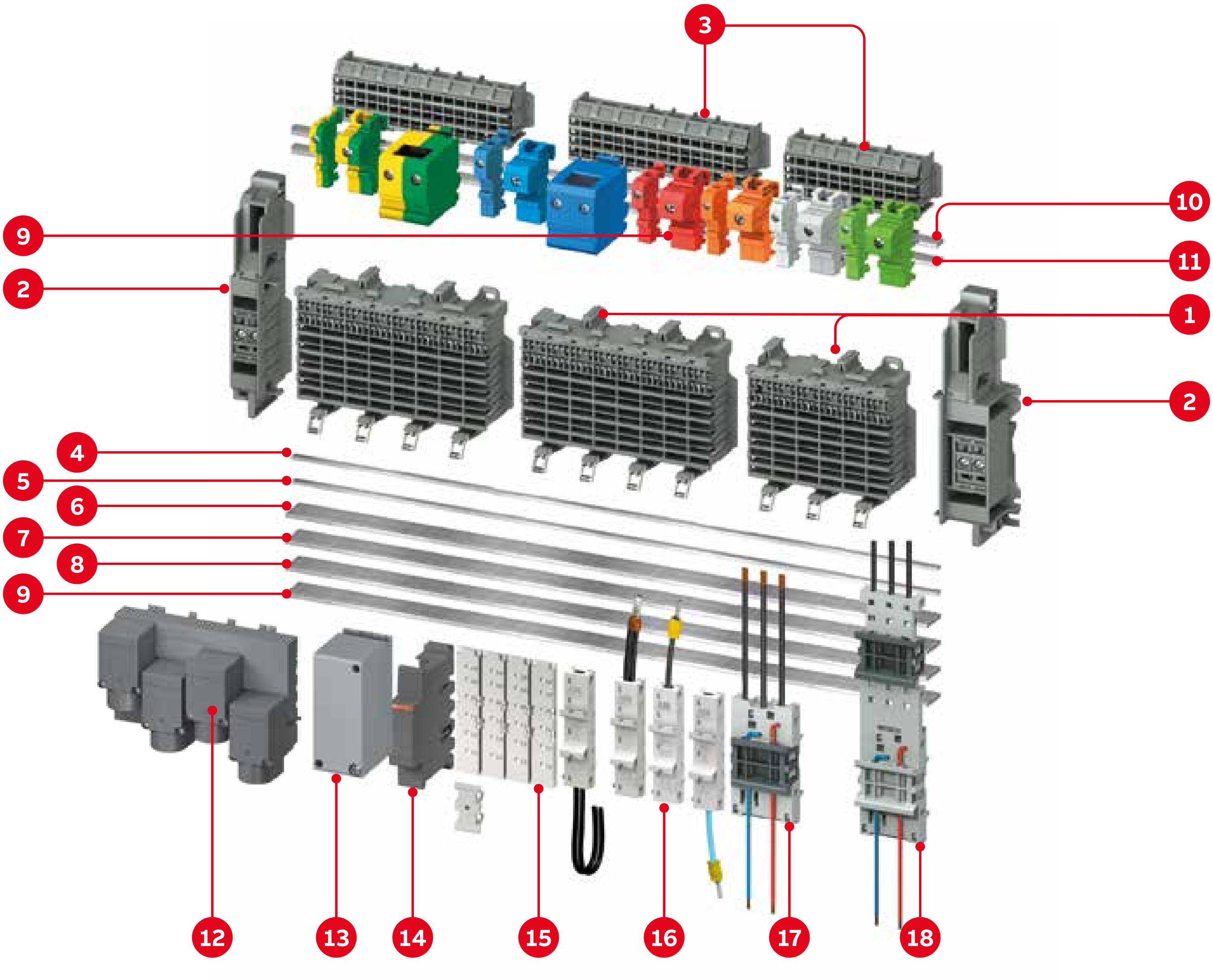
17 **Spare way cover**

18 **Adapter for DIN rail components**

19 **Combi module with a current rating of 32 A**

SMISSLINE TP technical details

Busbar system 250 A Overview



1 6 and 8-module socket

2 end piece on left and right

3 6 and 8 module additional socket

4 Busbar LA 40 A

5 Busbar LB 40 A

6 Busbar 250 A N

7 Busbar 250 A L1 or DC +,–

8 Busbar 250 A L2 or DC +,–

9 Busbar 250 A L3 or DC +,–

10 Busbar 250 A PE

11 Busbar 250 A N

12 Incoming block, supply 250 A, M8 bolt on maximum 150 mm²

13 Incoming terminal component, supply 250 A, maximum 120 mm²

14 Isolator

15 Spare way cover

16 Adapter for DIN rail components

17 Adapter for Motor starter MS116/132

18 Combi module with a current rating of 32 A

SMISSLINE TP technical details

Socket/additional socket/busbars

Socket bases ZLS906, ZLS908
The SMISSLINE socket system is a totally new kind of assembly and connection technology for the construction of distributions. Besides the classic method of snapping the devices onto 35-mm mounting rails, the new family of devices can be directly attached to the socket bases with integrated busbars. The time-consuming process of connecting up the supply is thereby no longer needed. In addition, in the event of rearrangement or expansion, the replacement of devices in existing systems is made significantly easier.

The socket sections and the wide range of accessories make it possible to plan with the capability for expansion and to construct distribution systems of any desired size in a short period of time.

6- and 8-module sockets are installed either by screwing them onto any flat surface or by snapping them onto a 35 mm DIN mounting rail. Lateral movement or detachment of the sockets again is possible before final fixing.

In order to determine the required socket length, the space necessary for
- the devices required
- the incoming terminal block and
- any reserve spaces needed must be determined.

Snap mounting
Pull down the slide with a screwdriver until it latches (socket can be moved).

Press on front of slid:
Fixed position
(Sockets fixed)

The key features
- System of any desired length (even number of poles)
- Integrated busbars
- Simple device change
- Long-term planning and problem free extension possible
- Significant time savings during assembly and connection

Busbars for the sockets and additional socket ZLS200
The busbars of size 10 x 3 mm can be loaded with currents up to 100 A. They are plated for perfect contact wiith the devices plug-in contacts. The maximum available busbar length is 1979 mm. The same busbar type is used, regardless whether it is fitted in the socket (L1, L2, L3, N) or in the additional socket (N, PE). The busbars are inserted in to the socket from the front.

Auxiliary busbars for the socket ZLS202
The 5 x 2 mm auxiliary busbars are intended for a common power supply of auxiliary switches and signal contacts. They are also plated and their max. delivery length is 1979 mm.
Like the main busbars, the auxiliary busbars are inserted in holders LA and LB from the front.
Of course, only on auxiliary busbar can be fitted.

SMISSLINE TP technical details

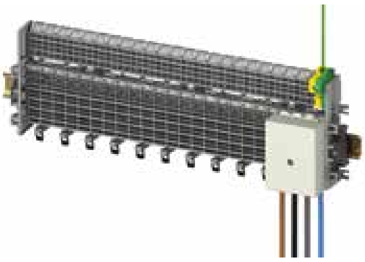
Incoming terminal block/Incoming terminal components

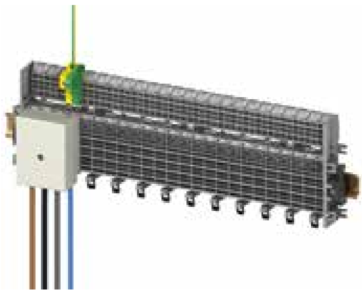
General

The incoming terminal block is used to connect cables directly to the busbars. The terminals act directly on the busbars and therefore fix the incoming terminal block. Removable terminal tops permit the connection of continous conductrors (risers) white horizontal or vertical cable entry is also possible.
Instead of using the incoming terminal block, the power supply can also be realized via a device (e.g. residual current operated circuit breaker, miniature circuit breaker or switch disconnector).

Power supply left or right, maximum 125 A.

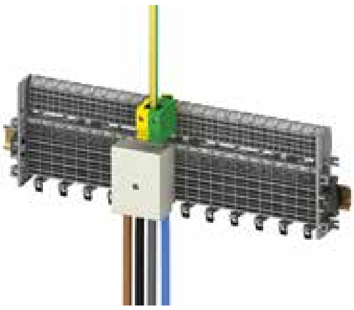
Max. 35 °C Ambient air temperature for 125 A continuously.

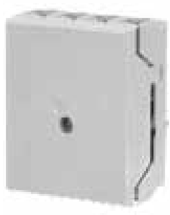




Power supply in centre, maximum 160 A.

A maximum of 125 A is permitted on either side. A total of 160 A must not be exceeded.





ZLS924 right version

Incoming terminal blocks ZLS924

A standard incoming terminal block whose cover provides protection against accidental contact. Construction height 50 mm. The base plate can be fitted with a maximum of 4 main terminals L1, L2, L3 and N for the busbars, and 2 auxiliary termiinals LA and LB for the auxiliary busbars.

Feed block left and right

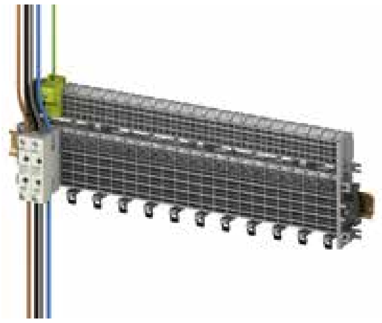
In order to prevent the cables from crossing, when two sockets rows are connected, it is a good solution to use a left and a right incoming block (see photo).

ZLS924 left version

SMISSLINE TP technical details

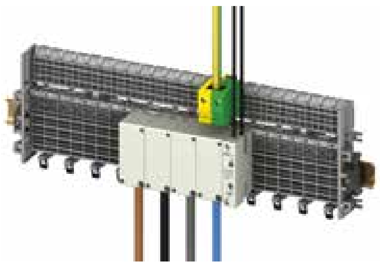
Incoming terminal block/Incoming terminal components

Incoming terminal blocks ZLS260 to 262
Compact terminal block with the construction width of 18 mm for 2 poles. The maximum rated current is 63 A for L1, L2, L3N and 6 A for LA, LB.



Incoming maximum 63 A.

Incoming terminal component ZLS250 to 255
The incoming terminal component, with an installation width of 36 mm is available as a single-pole component for the line conductors L1, L2, L3 and as neutral. The terminals act directly on the busbars and thereby fix the incoming terminal component. The incoming terminal component, L1, L2, L3 and N can be combined to meet specific needs. A maximum cable cross-section of 95 mm² can be connected to the incoming terminal component.

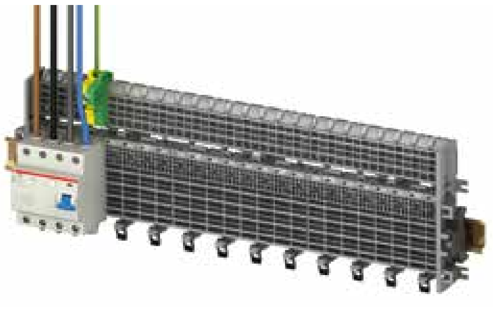


Incoming terminal component, in centre, maximum 200 A.
But on each side not more than 125 A.

Incoming bolt-on solution M8 50 mm² up to 150 mm² or 4/0AWG for UL
This Incoming block can be used for side feed Incoming with 250A for IEC and UL applications. It is an bolt-on solution for a connection up to 150 mm². For a safe and strong connection to Incoming molded case circuit breaker upstream. Can only used for the 250 A Power Bar System.

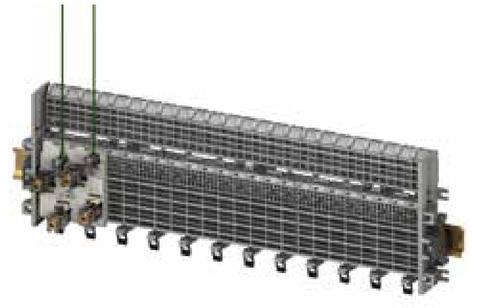
SMISSLINE TP technical details

Power supply



Indirect supply via residual current operated circuit breaker (RCCB) (or switch disconnector)

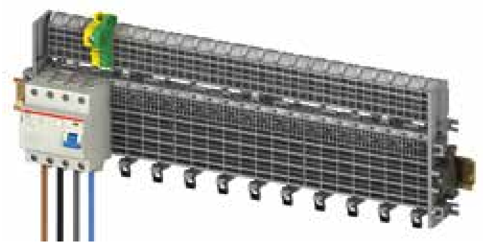
The supply cable is connected at the top of the RCCB. This supply variant gives the busbars and therefore all subsequent devices RCCB protection. If several RCCB groups are planned, the busbars should be separated and spaced using the dark grey busbar insulator ZLS938. Attention must then be paid to the regulations governing protection of the residual current circuit breaker by subsequent miniature circuit breakers. The supply can also be fed in through the switch disconnector.



Direct supply to residual current operated circuit breaker (or switch disconnector)

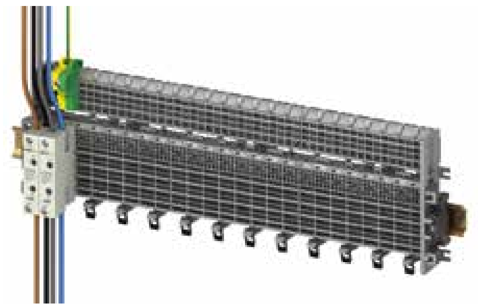
Instead of using the incoming terminal block, the power can also be supplied via a device

In this case, the supply cable is connected to the lower terminal of the device. The residual current operated circuit breaker or switch disconnector can be supplied with 63 A regardless of its rated current, since the plug-in connection arrangement of the device is suitable for this amount of current. For current in excess of 63 A, the incoming terminal block or the incoming terminal component should be used.



Supply of auxiliary busbars LA and LB

The two auxiliary busbars LA and LB can be supplied using the additional terminal ZLS 233 via a incoming terminal block. The maximum operating current of the auxiliary busbars is 40 A.



Incoming block for two auxiliary busbars LA, LB

The pluggable incoming block is especially for the two auxiliary busbars LA, LB. The maximum rated current is 6 A.

SMISSLINE TP technical details

Power supply SMISSLINE TP Power Bar System 250 A IEC/EN 61439-6

—
01 Power supply side feed, (ZLSP25X, ZLSP95X) with terminals for 50 mm² up to 120 mm² flexible wire with ferrule, max. 1 wire, 10 mm² – 25 mm² two wires, 250 A
—
02 Ring terminal solution M8, 50 mm² up to 150 mm² are possible. It is possible to run the connection cable through several SMISSLINE socket rows.
—
03 Central feed 400 A total. The cables in the connections must have the same length. For 400 A Incoming for upstream protection are two fuses or XT breaker necessary.

Two power supply solution are possible for the 250A SMISSLINE TP System:

- Solution one is the 144 mm (8PLE) wide ring terminal solution (ZLSP934). This is directly attached to the Power Bar socket ZLSP908. The connection is made via ring terminal M8. It is possible to run the connection cable through several SMISSLINE socket rows.
- Solution two are the incoming terminal component (ZLSP25X, ZLSP95X) with terminals for 50 mm² up to 120 mm²

—
01

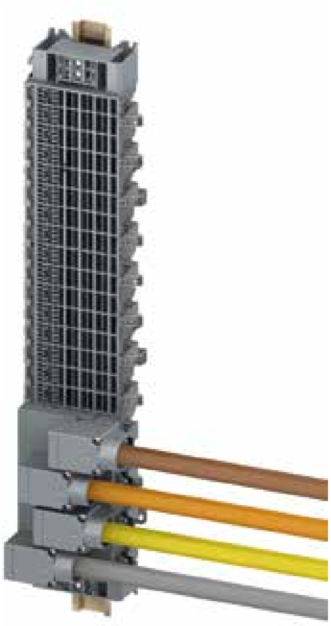
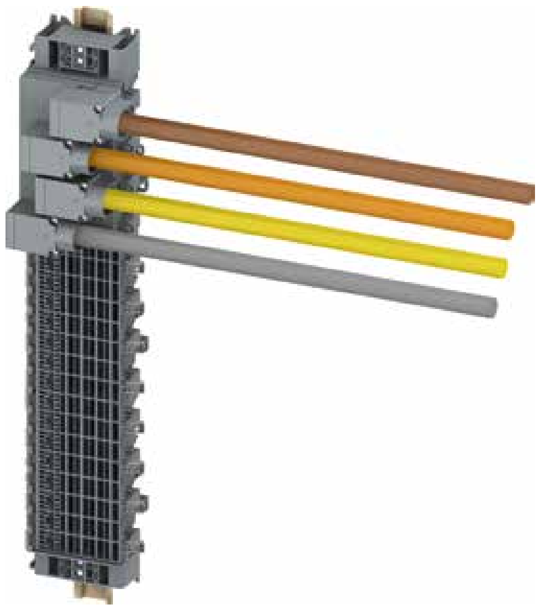
—
02

—
03

SMISSLINE TP technical details

Power supply SMISSLINE TP Power Bar System 250 A
SMISSLINE TP for UL 508 – Industrial Control Equipment

—
01 Incoming with Incoming solution ZLSP934 bolt on M8 max. 4/0 AWG – 250 kcmil. 250A side feed

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01

SMISSLINE TP technical details

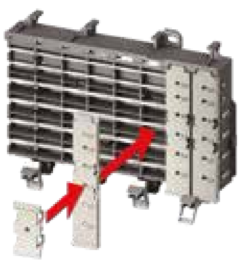
Busbar system accessories

Socket end piece ZLS920
To prevent displacement of sockets and busbars (particulary when installed vertically) end pieces can be fitted at the start and finish of each row of sockets. These simultaneously ensure electrically protected covering of the busbar end faces and mechanical fixing of the sockets oh the mounting rail.

Intermediate piece ZLS725
The light grey intermediate piece matches the device profile and fills empty module spaces.

Busbar insulator ZLS938
The dark grey busbar insulator electrically isolates the separated busbar ends from each other (e.g. when using several RCD protected groups) and also identifies the isolation point from outside. It conforms with the device profile and its space requirement is 1 module.

Busbar cover ZLS100
If component modules or spare modules are not requiered, the busbar cover ensures electrically protected covering of the main and auxiliary busbars. The cover (4 modules) can be divided anywhere. The openings allow voltage measurements on the busbars without removing the cover.



Extension adapter ZLS101
The extension adapter, single or several side by side, can be plugged into the busbar cover via the built-in holding device. This enables conventional DIN devices with 45 mm cap size to be snapped onto the SMISSLINE socket. By plugging in several extension adapters one on top of the other, heights can be adjusted in multiples of 7 mm

SMISSLINE TP technical details

Combi module: starting solutions in kit form

Direct-On-Line Starters

MS116
+ BEA16-4
+ AF09, AF12, AF16

MS116 up to 16 A
+ BEA26-4
+ AF26, AF30, AF38

MS116 > 16 A
+ BEA38-4
+ AF26, AF30, AF38

MS132
+ BEA16-4
+ AF09, AF12, AF16

MS132 up to 10 A
+ BEA26-4
+ AF26, AF30, AF38

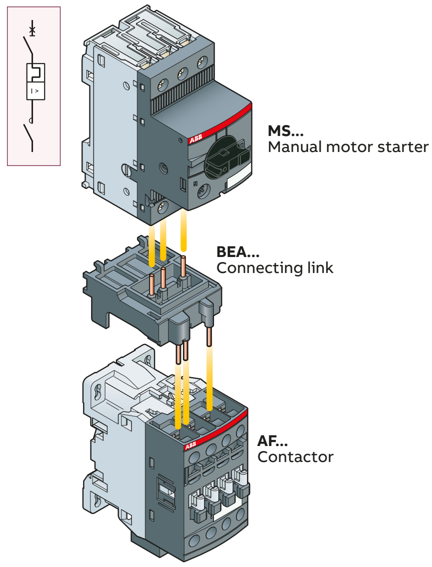
MS132 > 10 A
+ BEA38-4
+ AF26, AF30, AF38

with control voltage

Mounting possibilities on the combi module:

The following combinations of contactor, motor circuit breaker and connector are possible on the combi module.

+



Reversing Starters

MS116
+ BEA16-4, BER16-4, VEM4
+ AF09, AF12, AF16

MS116 up to 16 A
+ BEA26-4, BER38-4, VEM4
+ AF26, AF30, AF38

MS116 > 16 A
+ BEA38-4, BER38-4, VEM4
+ AF26, AF30, AF38

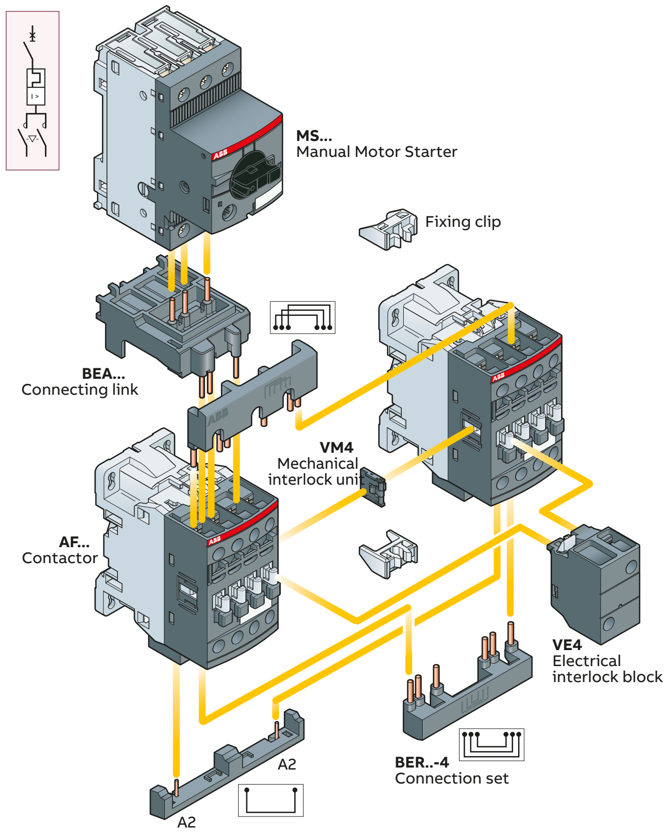
MS132
+ BEA16-4, BER16-4, VEM4
+ AF09, AF12, AF16

MS132 up to 10 A
+ BEA26-4, BER38-4, VEM4
+ AF26, AF30, AF38

MS132 > 10 A
+ BEA38-4, BER38-4, VEM4
+ AF26, AF30, AF38

without control voltage

+



SMISSLINE TP technical details

Definitions

Rated short-circuit breaking capacity I_{cn}
According to EN 60898-1
The maximum current which a switching device can switch off without damage at a rated operational voltage and rated operational frequency. It is specified as an effective value.

Rated ultimate short-circuit breaking capacity I_{cu}
According to EN 60947-2
Ultimate short-circuit breaking capacity that a circuit breaker can switch off without damage at a rated operational voltage and rated operational frequency. It is specified as an effective value.

Rated service short-circuit breaking capacity I_{cs}
According to EN 60947-2
Service short-circuit breaking capacity that a circuit breaker can switch off without damage at a rated operational voltage and rated operational frequency. It is specified as an effective value.

Rated insulation voltage U_i
The rated insulation voltage (U_i) is the voltage to which dielectric checks and creepage distances refer. The maximum rated operational voltage must not exceed its rated insulation voltage.

Rated impulse withstand voltage U_{imp}
Peak of a withstand voltage of a specified form and polarity with which the circuit can be loaded under specified test conditions without a breakdown and to which clearances relate. The rated impulse withstand voltage must be equal to or greater than the values of the withstand over-voltages (transient overvoltages) which occur in the system in which the device is used.

Rated short-time withstand current I_{cw}
The rated short-time withstand current is the effective value of the short-circuit current, as specified by the manufacturer for this circuit, that the circuit can conduct without damage. Unless otherwise specified, a time of 1 s shall apply.

Rated conditional short-circuit current I_{cc}
The rated conditional short-circuit current is the value of the prospective short-circuit current, as specified by the manufacturer, for a switching device combination that the latter can conduct during the total break time. The information about the specified short-circuit device must be given by the manufacturer.

Rated fused short-circuit current I_{cf}
The rated fused short-circuit current is the conditional rated short-circuit current if the short-circuit device is a fuse in accordance with IEC 60269 [IEV 441-17-21, modified].

Rated peak withstand current I_{pk}
The rated peak withstand current is the peak value of the withstand current of the circuit of a combination of switching devices, as specified by the manufacturer.

Back-up protection
Assignment of two overcurrent protective devices in series, where the protective device, generally but not necessarily on the supply side, effects the overcurrent protection with or without the assistance of the other protective device and prevents excessive stress on the latter [IEC 60947-1, definition 2.5.24].

Total selectivity
Overcurrent discrimination where, in the presence of two overcurrent protective devices in series, the protective device on the load side effects the protection without causing the other protective device to operate [IEC 60947-2, definition 2.17.2].

Partial selectivity
Overcurrent discrimination where, in the presence of two overcurrent protective devices in series, the protective device on the load side effects the protection up to a given level of overcurrent, without causing the other protective device to operate [IEC 60947-2, definition 2.17.3].

SMISSLINE TP technical details

Approvals according to IEC/EN 61439-6. Busbar system 125 A

Busbar system touch proof:
Use only for wall mounted application (horizontal or vertical).
When installed correctly the requirements of IEC/EN 61439-2 are met.

Number of poles	max. 6 to 110 3p+N / 2 additional bars PE+N
Rated operational voltage (U_e)	690 VAC, 440 VDC (400 V for LA, LB busbars)
Rated insulation voltage (U_i)	690 VAC, 1000 VDC
IP Code	IP20B
Mounting position	horizontal or vertical, direct mounting or mounting on DIN rail acc. to EN 60715 35 mm
Pollution degree	3 (690 V a.c.) 2 (1000 V d.c.)
Rated impulse voltage (U_{imp})	8 kV Main busbars; 6 KV Auxiliary busbars
Rated current of the assembly (I_nA)	Max. 125 A (side feeding) Max. 200 A (center feeding) Max. 250 A (Double feed side or center)
Auxiliary circuit	max. 40 A
Rated current of a circuit (I_{nc})	Main circuit: Max. 125 A
Rated current of Auxiliary circuit	40 A
Rated short-time withstand current (I_{cw})	10 kA / 300 ms
Auxiliary circuit	4 kA / 50 ms
Rated peak withstand current (I_{pk})	Main circuit: 30 kA
Auxiliary circuit	Auxiliary busbars LA, LB 6 kA
Rated frequency (f)	50/60 Hz, DC
Rated conditional short-circuit current (I_{cc})	100 kA (415V), 50 kA (690 V)
Ambient air temperature	max. 60°C
Environmental conditions (damp heat) acc. to IEC/EN 60068-2-30	1 cycle with 55 °C/90…96 % and 25 °C/95…100 %
Size of CU bars 3P+N+PE	3 x 10 mm (30 mm²)
Size of CU auxiliary bars La Lb	2 x 5 mm (10 mm²)

	Maximum rated voltage	Maximum rated current	Cross-section of conductors
Incoming terminal block ZLS250–253	690 VAC 1000 VDC	160 A	35 mm²–95 mm² max. 1 wire, 10–25 mm² 1 or 2 wires
Busbar ZLS200	690 VAC 1000 VDC	125 A	
Busbar ZLS202	690 VAC 600 VDC	40 A	
DIN Rail adapters 32 A	690 VAC 600 VDC	32 A Line or neutral	
DIN Rail adapters 63 A	690 VAC 600 VDC	63 A Line or neutral	
Combi module	690 VAC 600 VDC	32 A Line or neutral 6A LA, LB	

The SMISSLINE system and components are tested for vibration according to IEC 60068-2-6 (2–13.2 Hz/1 mm displacement, 13.2–100 Hz/0.7 g) and for Miniature circuit breakers (5 g, 20 frequency cycles 5 …150 … 5 Hz at 0.8 rated current)

Standard: IEC 60068-2-6
Environmental testing – Part 2–6: Test Fc. Vibration (sinusoidal)

Rated Voltage (U_e)	Rated conditional short-circuit current (I_{cc})	Incoming current of main busbars (L1, L2, L3, N)	Short circuit protection device (SCPD)	
			Fuse	**MCCB**
415 V	100 kA	250 A	NH1 gG 690 V/250 A	ABB T_{max} XT Serie up to 250 A
690 V	25 kA	250 A	NH1 gG 690 V/250 A	ABB T_{max} XT Serie up to 250 A
		Inocming current of auxiliary busbars (La, Lb)		
	25 kA	40 A	NH00 gG 415 V/40 A	ABB Type S800 (240/415 VAC)

SMISSLINE TP technical details

Approvals according to UL508. Busbar system 125 A.

SMISSLINE TP system for UL 508 – Industrial Control Equipment, CSA C22.2 No. 14 – Industrial Control Equipment UL File E222110

Technical data UL508 Industrial Control Equipment SMISSLINE TP busbar system	
Rated Voltage	600 V AC
Rated Current	125 A
Rated Current (End Feed, left and right)	125 A left, 125 A right
Rated Current (Center)	250 A max. (double feed)
Rated Current (Center Feed)	250 A max. if used with two feeder blocks
Short Circuit Ratings ABB T_{max} XT2, XT3, XT4	50 kA, max. 480 V AC, 480 Y/277 V and 240 V AC or 35 kA, max. 600 V AC and 600 Y/347 V

Technical data UL508 Industrial Control Equipment (ZLS906,ZLS908,ZLS920,ZLS926,ZLS928)

	Busbar ZLS200	Feeder ZLS924	Feeder block ZLS95X	Combimodule ZLS840X, 842X	DIN Rail adapter ZLS97X	Terminals ZLS95XUL, 91XUL	Combi modul ZMS132X	Adapter moter strater ZMS93X
Maximum rated voltage	600 V AC	600 V AC	600 V AC	600 V AC	600 V AC	600 V AC	600 V AC	600 V AC
Maximum rated current	125 A	150 A	150 A	30 A	32 A, 63 A	32 A, 100 A, 150 A	32 A	32 A

Terminals for 125 A SMISSLINE TP System

ZLS954UL – Terminal 150 A (Neutral)
ZLS959UL – Terminal (PE)
ZLS913UL – Terminal 63 A (Neutral)
ZLS918UL – Terminal 32 A (Neutral)
ZLS919UL – Terminal (PE)
ZLS929UL – Terminal (PE)

DIN Rail adapters for MCB SU200 and SUP200

	970UL, 971UL, 972UL or 973UL
Maximum nominal current	25 A, 45 A

Incoming devices and terminals

Technical data IEC/EN 61439-6 and UL508

Incoming blocks

	ZLS26X	ZLS924	ZLS25X,95X
General data			
Standards	IEC/EN 61439-6	IEC/EN 61439-6, UL508	IEC/EN 61439-6, UL508
Rated voltage U_e acc. IEC	690 VAC, 1000 VDC	690 VAC, 1000 VDC	690 VAC, 1000 VDC
Rated Voltage acc. UL		600 VAC	600 VAC
Rated current In acc. IEC	63 A	160 A	200 A
Rated current In acc. UL		150 A	
Rated conditional short-circuit current (Icc)	100 kA (415V)	100 kA (415V)	100 kA (415V)
Installation			
Terminal rigid IEC connections (solid/stranded)	2,5 mm² to 25 mm² max. 1 wire	10 mm² up to 50 mm² (3LN) 1.5 mm² up to 10 mm² (LA,LB) Multiple 3LN: – Multiple LA, LB: –	10 mm² to 95 mm²
Terminal flexible IEC connections	2,5 mm² to 25 mm² max. 1 wire flexible wire with ferrules	10 mm² up to 50 mm² single wire 1.5 mm² up to 10 mm² (LA,LB) single wire 2x25 mm² cable withe the same type and size Multiple LA, LB: –	10 mm² to 95 mm² flexible wire with ferrules
Other connections		Flat cable 9x2x0,8 up to 9x9x0,8 mm and 10x3 mm Busbar 10x3 mm combined with 10 mm² up to 25 mm² rigid or flexible IEC connections	10 mm² to 95 mm²
Terminal rigid UL connections		Single: 8 up to 1/0 AWG, Cu only Multiple: –	2 AWG – 1/0 AWG
Torque	2.8 Nm	4.0 Nm (L,N); 1.5 Nm (LA, LB); 1.2 Nm Cover screw	2.0 Nm
Stripping length	13 mm	18 mm (L,N); 11 Nm (LA, LB)	21 mm

Terminals for additional socket

Technical data IEC/EN 61439-6 and UL508

Terminals

	10 mm² IEC ZLS918, ZLS919	10 mm² UL ZLS918UL, ZLS919UL	35 mm² IEC ZLS913, ZLS916, ZLS929	35 mm² UL ZLS913UL, ZLS929UL	95 mm² IEC ZLS954, ZLS959	95 mm² UL ZLS954UL, ZLS959UL
General data						
Standards	IEC/EN 61439-6	UL 508 CSA C22.2 No. 14-13	IEC/EN 61439-6	UL 508 CSA C22.2 No. 14-13	IEC/EN 61439-6	UL 508 CSA C22.2 No. 14-13
Rated voltage Ue acc. IEC	690 VAC, 1000 VDC	–	690 VAC, 1000 VDC	–	690 VAC, 1000 VDC	–
Rated voltage acc. UL	–	600 VAC	–	600 VAC	–	600 VAC
Rated current In acc. IEC	32 A	–	63 A	–	200 A	–
Rated current acc. UL	–	32 A	–	63 A	–	150 A
Installation						
Terminal rigid IEC connections (solid/stranded)	Single: 1 … 10 mm² Multiple: 2 x 1.5 … 2.5 mm², with cables of same type and size	–	–	–	–	–
Terminal flexible IEC connections	Single: 0.7 … 10 mm² Multiple: 2 x 1.5 … 2.5 mm², with cables of same type and size	–	Single: 16 … 35 mm² Multiple: –	–	Single: 10 … 95 mm² Multiple: 2 x 10 … 25 mm², with cables of same type and size	–
Terminal UL connections	–	Single: 14 … 8 AWG Multiple: –	–	Single: 6 … 2 AWG Multiple: –	–	Single: 2 … 1/0 AWG Multiple: –
Torque	1.2 Nm	1.2 Nm	2.5 Nm	2.5 Nm	2.0 Nm	2.0 Nm
Stripping length:	12 mm	12 mm	15 mm	15 mm	21 mm	21 mm

SMISSLINE TP technical details

Combi modules cdapter for manual motor starter and DIN adapters
Technical data IEC/EN 61439-6 and UL508

	ZMS132 Combi Module	ZMS 930 Adapter	ZLS970 DIN Adapter IEC	ZLS970UL DIN Adapter UL489
Standards	IEC/EN 61439-6, UL508	IEC/EN 61439-6, UL508	IEC/EN 61439-6, UL508	UL489 (USL, CNL - Circuit Breaker Accessory)
Rated voltage Ue acc.IEC acc. IEC	690 VAC, 440 V DC	690 VAC, 440 V DC	690 VAC, 440 V DC	
Rated Voltage acc. UL	600 V AC	600 V AC	600 V AC	240 V AC
Rated current In acc.. IEC	32A	32A	32A, 63AMaximum rated current of outgoing circuits (Inc) max. 50 A for S800 with ZLS972X, ZLS973X.	
Rated current In acc. UL	30A	30A	30A, 60A	25A, 45A

SMISSLINE TP technical details

Technical data according to IEC/EN 61439-6
Power Bar System 250 A

Busbar system touch proof:
Use only for wall mounted application (horizontal or vertical).
When installed correctly the requirements of EN/IEC 61439-2 are met.

Number of poles	30 to 110 3p+N / 2 additional bars PE+N
Rated operational voltage (U_e)	690 VAC, 440 VDC (400 V for LA, LB busbars)
Rated insulation voltage (U_i) Main circuit	690 VAC, 440 VDC
Rated insulation voltage (U_i) Auxilary circuit	415 VAC
IP Code	IP20B
Mounting position	horizontal or vertical
Overvoltage category	IV
Pollution degree	3 (690 V a.c.) 2 (1000 V d.c.)
Rated impulse voltage (U_{imp})	8 kV mainbusbars; 6 KV auxillary busbars
Rated current of the assembly (I_nA)	Side feed: 250 A, Middle feed 400 A, Auxiliary busbars: 40 A
Rated current of a circuit (I_{nc})	Main circuit: Max. 100 A
Rated current of Auxiliary circuit	40 A
Rated short-time withstand current (I_{cw})	15 kA/100 ms Main circuit, 4 kA/50 ms Auxiliary circuit
Rated peak withstand current Main circuit (I_{pk})	30 kA
Rated peak withstand current Auxilary circuit (I_{pk})	6 kA
Rated frequency (f)	50/60 Hz
Rated conditional short-circuit current (I_{cc})	see table below
Ambient air temperature	max. 60°C
Environmental conditions (damp heat) acc. to IEC/EN 60068-2-30	1 cycle with 55 °C/90…96 % and 25 °C/95…100 %
Size of CU bars 3P+N+PE	3x25 mm (75 mm²)
Size of CU auxiliary bars La Lb	2 x 5 mm (10 mm²)

Rated Voltage (U_e)	Rated conditional short-circuit current (I_{cc})	Incoming current of main busbars (L1, L2, L3, N)	Short circuit protection device (SCPD)	
			Fuse	MCCB
415 V	100 kA	250 A	NH2 gG 690V/250 A*	ABB T_{max} XT Serie up to 250 A*
690 V	25 kA	250 A	NH2 gG 690V/250A	ABB T_{max} XT Serie up to 250 A*
		Inocming current of auxiliary busbars (La, Lb)		
	25 kA	40 A	NH00 gG 415 V/40 A	ABB Type S800 (240/415 VAC)

* For 400 A Incoming for upstream protection are two fuses or XT breaker necessary or two XT circuit breaker

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SMISSLINE TP technical details

Approvals according to UL508. Busbar system 250 A.

SMISSLINE TP system for UL 508 – Industrial Control Equipment, CSA C22.2 No. 14 – Industrial Control Equipment UL File E222110

Rated Voltage	600 V AC
Rated Current	250 A left or right
Short Circuit Ratings ABB T_{max} XT2, XT3, XT4	50 kA, max. 480 V AC, 480 Y/277 V and 240 V AC or 35 kA, max. 600 V AC and 600 Y/347 V

Technical data UL508 Industrial Control Equipment (ZLSP906, ZLSP908,ZLSP920)

	Busbar ZLSP200	**Feeder ZLSP934**	**Feeder block ZLS95X**	**Combimodule ZLS840X, 842X**	**DIN Rail adapter ZLS97X**	**Terminals ZLS95XUL, 91XUL**	**Combi modul ZMS132X**	**Adapter moter strater ZMS93X**
Maximum rated voltage	600 V AC	600 V AC	600 V AC	600 V AC	600 V AC	600 V AC	600 V AC	600 V AC
Maximum rated current	250 A	250 A	150 A	30 A	32 A, 63 A	32 A, 100 A, 150 A	32 A	32 A

DIN rail adapters for MCB SU200 and SUP200

	970UL, 971UL, 972UL or 973UL
Maximum nominal current	25 A, 45 A

Incoming devices and terminals

Technical data IEC/EN 61439-6 and UL508

	ZLSP934 and 935	ZLSP25X,ZLSP95X
Standards	IEC/EN 61439-6	IEC/EN 61439-7, UL509
Rated voltage Ue acc. IEC acc. IEC	690 VAC	690 VAC
Rated Voltage acc. UL	600 V AC	-
Rated current In acc.. IEC	250A (center feed or side feed): 400 A max. when used with two feeder blocks	250A
Rated current In acc. UL	250A (short circuit protection 250 A Circuit-Breaker (DIVQ/7) 50 kA (480 V); 35 kA (600 V))	-
Wire size IEC connections	Cable: 50 mm2 up to 150 mm2; no flat cable Ring lug M8	35–120 mm2 one flexible wire with ferrule10–25 mm2 one or two flexible wire with ferrule
Wire size UL connections	4/0AWG – 250 kcmil	-
Torque	8NmCover 1,2 Nm	ZLSP250–253 2,5 NmZLSP954, 959 2,0 NmCover 1,2 Nm
Rated voltage Ue acc. IEC acc. IEC	690 VAC	690 VAC
Stripping length	Ring lug M8; Width: max 22 mm (ring lug like Klauke 9SG8 for 120mm2 or 10SG8 for 150mm2. Connection of two socket rows is possible)	21mm

SMISSLINE TP technical details

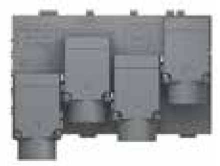
Incoming bolt on 250A

Technical data IEC/EN 61439-6 and UL508

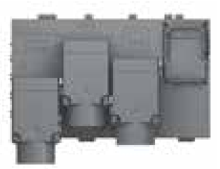
	ZLSP934 and 935	ZLSP25X,ZLSP95X
Standards	IEC/EN 61439-6	IEC/EN 61439-7, UL508
Rated voltage Ue acc. IEC acc. IEC	690 VAC	690 VAC
Rated Voltage acc. UL	600 V AC	-
Rated current In acc.. IEC	250A (center feed or side feed): 400 A max. when used with two feeder blocks	250A
Rated current In acc. UL	250A (short circuit protection 250 A Circuit-Breaker (DIVQ/7) 50 kA (480 V); 35 kA (600 V))	-
Wire size IEC connections	Cable: 50 mm² up to 150 mm2; no flat cable Ring lug M8 (for example Klauke 9SG8 for 120mm2 or 10SG8 for 150mm²)	35–120 mm2 one flexible wire with ferrule10–25 mm2 one or two flexible wire with ferrule
Wire size UL connections	4/0AWG – 250 kcmil	-
Torque	8NmCover 1,2 Nm	ZLSP250–253 2,5 NmZLSP954, 959 2,0 NmCover 1,2 Nm
Stripping length	Ring lug M8; Width: max 22 mm	21mm

ZLSP934-3LN

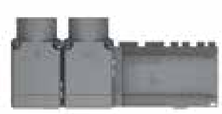
ZLSP934-3L-1



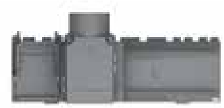
ZLSP934-3LN-R



ZLSP934-3L-R



ZLSP935-8NPE



ZLSP935-8PE_L_PE

ZLSP935-8NPE-R

ZLSP935-8PE-R_PE

SMISSLINE TP plug-in system

Busbar system 250 A
Direct feed to plug-in circuit-breaker Tmax XT4

The direct feed starter pack solution allows a direct connection from the 250A Power Bar System to the Installation for plug-in circuit-breaker Tmax XT4 Moulded Case Circuit Breaker. Lower part for plug-in for Tmax XT4, 3pole (1SDA068196R1) or 4pole (1SDA068198R1) is needed.
For fixed XT4 version a conversion kit for moving part plug-in is needed additional. 3pole (1SDA066282R1) and 4 pole (SDA066283R1).
The solution is built for a vertical design. The additional heat sink part is helpful to reduce the heat on the system.

Direct Feed 250A

Number of poles	32 to 80 3p+N/2 additional bars PE+N
Rated operational voltage (U_e)	690 VAC, 440 VDC (400 V for LA, LB busbars)
Rated insulation voltage (U_i)	690 VAC, 1000 VDC
IP Code	IP20B
Pollution degree	3 (690 V a.c.) 2 (1000 V d.c.)
Rated impulse voltage (U_{imp})	8 kV (L1L2L3N)
Rated current of the assembly (I_{nA})	250 A
Rated current of a circuit (I_{nc}): main circuit	Max. 250 A
Rated current of Auxiliary circuit	40 A
Rated short-time withstand current (I_{cw})	15 kA/100 ms Main circuit, 4 kA/50 ms Auxiliary circuit
Rated peak withstand current Main circuit (I_{pk})	30 kA
Rated peak withstand current Auxilary circuit (I_{pk})	6 kA
Rated frequency (f)	50/60 Hz
Rated conditional short-circuit current (I_{cc}): see table below	
Ambient air temperature	max. 60 °C
Size of CU bars 3P+N+PE	3 x25 mm (75 mm²)
Size of CU auxiliary bars La Lb	2 x 5 mm (10 mm²)
Environmental conditions (damp heat)	1 cycle with 55 °C/90…96 % and 25 °C/95…100 %

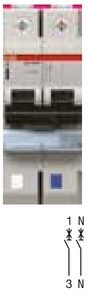
Voltage (VAC)	**Rated conditional short-circuit current (I_{cc})**	**Incoming current of main busbars (L1, L2, L3, N)**	**Short circuit protection device (SCPD)**
415 V	100 kA	250 A	ABB Tmax XT4 250 A
690V	25 kA	250 A	

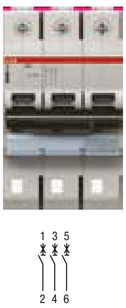
Technical data data UL508; Approvals for US and CA: cULus
Direct Feed 250A

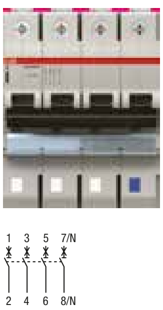
SMISSLINE TP system for UL 508 – Industrial Control Equipment, CSA C22.2 No. 14 – Industrial Control Equipment UL File E222110	**Control Equipment UL File E222110**
UL Rated Voltage	600 VAC
UL Rated Current (End Feed)	250 A
UL Short Circuit Rating	50 kA (480 V), 35 kA (600 V) with XT4 250 A

SMISSLINE TP technical details

Miniature circuit breaker Properties







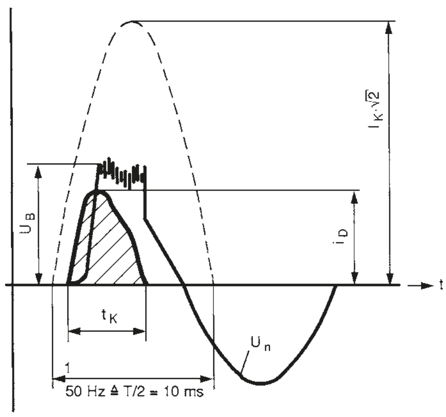
General Information
The SMISSLINE miniature circuit-breaker is an energy-restricting circuit-breaker that has high performance values and that is equally suitable for the industrial sector, for commercial use and for installation at home.
If a short-circuit occurs, it guarantees excellent selectivity conditions to upstream overcurrent circuit breakers while the load on equipment that is connected downstream is limited to a minimum amount.
The most important features
- High rated breaking capacity of 6kA and 10kA acc. IEC/EN60989-1 and 25kA, 30kA and 40kA acc. IEC/EN 60947-2
- Optimum ease of installation and connection
- The pole conductors are protected against accidental contact
- Tripping characteristic on B, C, D, K, UCZ/UCC

Miniature circuit-breaker in accordance with standard EN 60898-1
This standard is for electrical installation material for household installations and for similar purposes. It regulates the use of miniature circuit-breakers by the layman up to a maximum of 125 A, a voltage of 440 VAC and up to a maximum of 25 kA.
Miniature circuit-breaker in accordance with standard EN60947-2
This standard is for low-voltage material used for industrial purposes. It regulates the use of circuit-breakers (and not miniature circuit-breakers) by qualified personnel up to a maximum voltage of 1000 VAC or 1500 VDC. This standard does not recognise any maximum values when it comes to current and breaking capacity. In practice, the standard is also applied to miniature circuit-breakers.

Brief description of tripping
The SMISSLINE miniature circuit breakers have a current-limiting operation.
They have two different releases acting on the mechanism.
1. Thermal release, operating with a time delay, for overload protection
2. Electro-magnetic release plunger operated for short-circuit protection.

They offer:
- high short-circuit breaking capacity
- high selectivity to the back-up fuse
- In the event of short-circuits, low electrodynamic and heating effects on the cable and the point of fault location due to the drastically limited let through energy $\int i^2 dt$.

Oscillogram of a short-circuit current interruption



$I_K \cdot \sqrt{2}$ = peak value of prospective short-circuit current
i_D = Max. peak let through current of circuit breaker S 400
U_n = Supply voltage
U_B = Arc voltage of circuit breaker
t_K = Total interruption time

Miniature circuit breaker (MCB) for IEC

S400E technical features

When installed correctly the requirements of EN/IEC 61439-2 are met.

	S400E
General data	
Tripping characteristics	B,C
Poles	1P, 1P+NP, 2P, 3P, 3P+NP
Rated current I_n	6 A … 63 A
Rated frequency f	50/60 Hz
Rated insulation voltage U_i acc. to DIN EN 60664-1	440 VAC
Rated impulse withstand voltage $U_{imp.}$ (1.2/50 µs)	4 kV
Overvoltage category	III
Pollution degree	3
Data acc. to IEC/EN 60898-1	
Rated operational voltage U_e	1P: 230/400 V AC; 1P+NP: 230 V AC ; 2…3P: 400 V AC; 3P+NP: 400 V AC; 1P 72 V DC; 2P 125 V DC
Min. operating voltage	12 V AC
Rated short-circuit capacity I_{cn}	6kA
Energy limiting class	3
Reference Ambient Air Temperature for Overload Tripping	B, C: 30 °C
Mechanical Data	
Classification acc. To NF F 126-101, NF F 16-102	Acc. to I2/F3
IP Code	IP20, IP40 in enclosure with cover
Endurance	Electrical endurance: 10 000 ops Mechanical endurance: 10 000 ops
Shock resistance acc. to IEC/EN 61373	5 g – 30 ms, 3 shocks
Vibration resistance acc. to IEC/EN 60068-2-6	2 … 13.2 Hz / 1 mm 13.2 … 100 Hz / 0.7 g, 5 cycles 5 … 150 … 5 Hz / 1 g, 4 waves
Ambient temperature	–25 … +60°C
Storage temperature	–40 … +70°C
Installation	
Terminal type	Failsafe bi-directional cylinder-lift terminal (shock protected)
Terminal rigid IEC connections (solid/stranded)	Single: 0.75 … 35 mm² (front slot), 0.75 … 6 mm² (rear slot) Multiple: 2 x 0.75 … 10 mm² (front slot), 2 x 0.75 … 6 mm² (rear slot), with cables of same type and size
Terminal flexible IEC connections	Single: 0.75 … 25 mm² (front side), 0.75 … 6 mm² (rear slot) Multiple: 2 x 0.75 … 10 mm² (front slot), 2 x 0.75 … 6 mm² (rear slot), with cables of same type and size
Tightening torque	2.8 Nm
Screwdriver	No. 2 Pozidrive
Mounting	Plug in on bus bar system SMISSLINE
Mounting position	Any
Supply	Any
Dimensions and weight	
Pole dimensions (H x D x W)	91 x 18 x 82
Pole weight	110 g

SMISSLINE TP technical details

Miniature circuit breaker S400M

When installed correctly the requirements of EN/IEC 61439-2 are met.

	S400M
General data	
Tripping characteristics	B,C,D,K
Poles	1P, 1P+NP, 2P, 3P, 3P+NP
Rated current I_n	0.5A…63A
Rated frequency f	50/60Hz
Rated insulation voltage U_i acc. to DIN EN 60664-1	440VAC
Rated impulse withstand voltage $U_{imp.}$ (1.2/50µs)	4kV
Overvoltage category	III
Pollution degree	2
Data acc. to IEC/EN 60898-1	
Rated operational voltage U_e	1P: 230/400VAC; 1P+NP: 230VAC ; 2...3P: 400VAC; 3P+NP: 400VAC; 1P 72VDC; 2P 125VDC
Min. operating voltage	12VAC
Rated short-circuit capacity I_{cn}	10kA
Energy limiting class	3
Reference Ambient Air Temperature for Overload Tripping	B, C, D: 30°C
Data acc. to IEC/EN 60947-2	
Rated operational voltage U_e	1P: 240VAC; 1P+N: 240VAC; 2…4P: 415VAC; 3P+N: 415VAC; 254/440V 1P: 72 V DC; 2P: 125 V DC (Umax)
Min. operating voltage	12V AC–12V DC
Rated ultimate short-circuit capacity I_{cu}	25kA (0,5 up to 16A, 240/415V); 0,5 to 2A 50kA on request 15kA (20 up to 63A, 240/415V) 15kA (0,5 up to 16A, 254/440V) 6kA (20 up to 63A, 254/440V)
Rated service short-circuit capacity I_{cs}	15kA (0,5 up to 16A, 240/415V) 7,5kA (20 up to 63A, 240/415V) 6kA (0,5 up to 16A, 254/440V) 3kA (20 up to 63A, 254/440V)
Reference Ambient Air Temperature for Overload Tripping	C: 30°C K: 40°C
Mechanical Data	
Classification acc. To NF F 126-101, NF F 16-102	Acc. to I2/F3
IP Code	IP20, IP40 in enclosure with cover
Endurance	Electrical endurance: 10000ops Mechanical endurance: 10000ops
Shock resistance acc. to IEC/EN 61373	5g – 30ms, 3 shocks
Vibration resistance acc. to IEC/EN 60068-2-6	2…13.2Hz / 1mm 13.2…100Hz / 0.7g, 5 cycles 5…150…5Hz / 1g, 4 waves
Ambient temperature	–25…+60°C
Storage temperature	–40…+70°C
Installation	
Terminal type	Failsafe bi-directional cylinder-lift terminal (shock protected)
Terminal rigid IEC connections (solid/stranded)	Single: 0.75 ÷ 35mm² (front slot), 0.75 ÷ 6mm² (rear slot) Multiple: 2x0.75 ÷ 10mm² (front slot), 2x0.75 ÷ 6mm² (rear slot), with cables of same type and size
Terminal flexible IEC connections	Single: 0.75 ÷ 25mm² (front side), 0.75 ÷ 6mm² (rear slot) Multiple: 2x0.75 ÷ 10mm² (front slot), 2x0.75 ÷ 6mm² (rear slot), with cables of same type and size
Tightening torque	2.8Nm
Screwdriver	No. 2 Pozidrive
Mounting	Plug in on bus bar system SMISSLINE
Mounting position	Any
Supply	Any
Dimensions and weight	
Pole dimensions (HxDxW)	91x18x82
Pole weight	110g

SMISSLINE TP technical details

Miniature circuit breaker S400P

	S400P	
Standards		
IEC/EN 606947-2	x	
General data		
Tripping characteristics	B, C, K	
Poles	1P, 1P+NP, 2P, 3P, 3P+NP	
Rated current I_n	2, 3, 4, 6, 8, 10, 13, 16, 20, 25, 32, 40, 50, 63 A	
Calibration temperature	B,C 30 °C; K 40 °C	
Rated frequency	50/60 Hz	
Rated insulation voltage U_i AC 240/415 V	440 V	
Rated insulation voltage U_i AC 277/480 V	500 V	
Rated impulse withstand voltage U_{imp}	4kV	
Overvoltage category	III	
Pollution degree	AC 240/415 V: 3	AC 277/480 V: 2
Data acc. to IEC/EN 60947-2		
Rated operational voltage U_e	1P 60 V DC; 2P 125 V DC (Umax)	1P, 1P+NP: AC 277 V 2P, 3P, 3P+NP: AC 277/480 V
Minimum operating voltage	AC 12 V	
Rated ultimate short-circuit capacity I_{cu}	40kA (2 up to 16 A, 240/415 VAC) 30 kA (20 up to 40 A, 240/415 VAC) 20 kA (50 up to 63 A, 240/415 VAC)	20 kA (2 up to 16 A, 277/480 VAC) 15 kA (20 up to 40 A, 277/480 VAC) 5 kA (50 up to 63 A, 277/480 VAC)
Rated service short-circuit capacity I_{cs}	20kA (2 up to 16 A, 240/415 VAC) 15kA (20 up to 40 A, 240/415 VAC) 7.5kA (50 up to 63 A, 240/415 VAC)	10 kA (2 up to 16 A, 277/480 VAC) 5 kA (20 up to 40 A, 277/480 VAC) 2.5 kA (50 up to 63 A, 277/480 VAC)
Reference ambient air temperature for overload tripping	B, C: 30 °C, K: 40 °C	
Mechanical Data		
Contact position indication (green OFF/red ON)	x	
L1/L2/L3 position indication	x	
N position indication	x	
Label holder	x	
IP Code	IP20B, IP40 in enclosure with cover	
Endurance	Electrical endurance: 10000 ops Mechanical endurance: 10000 ops	
Shock resistance acc. to IEC/EN 61373	5 g / 30 ms, 3 shocks	
Vibration resistance acc. to IEC/EN 60068-2-6	2...13.2 Hz/1 mm 13.2...100 Hz/0.7 g, 5 cycles 5...150...5 Hz/1 g, 4 sweeps	
Environmental conditions (damp heat) acc. to IEC/EN 60068-2-30	28 cycles with 55 °C/90…96 % and 25 °C/95…100 %	
Ambient temperature	−25...+55 °C	
Storage temperature	−40...+70 °C	
Installation		
Top terminal type	Failsafe bi-directional cylinder-lift terminal with double slot 35/10 mm²	
Top terminal rigid IEC connections (solid/stranded)	Single: 0.75 ÷ 35 mm² (front slot), 0.75 ÷ 6 mm² (rear slot) Multiple: 2x 0.75 ÷ 10 mm² (front slot), 2x 0.75 ÷ 6 mm² (rear slot), with cables of same type and size	
Top terminal flexible IEC connections	Single: 0.75 ÷ 25 mm² (front side), 0.75 ÷ 6 mm² (rear slot) Multiple: 2x 0.75 ÷ 10 mm² (front slot), 2x 0.75 ÷ 6 mm² (rear slot), with cables of same type and size	
Top terminal screwdriver	No. 2 Pozidrive	
Top terminal stripping length	12.5 mm	
Top terminal tightening torque	2.8 Nm	
Bottom terminal type	Movable plug-on terminal L1/L2/L3, fixed plug-on terminal N	
Mounting	SMISSLINE TP socket system only	
Mounting position	Any	
Supply	Any	

SMISSLINE TP technical details

Miniature circuit breaker S400M-UC

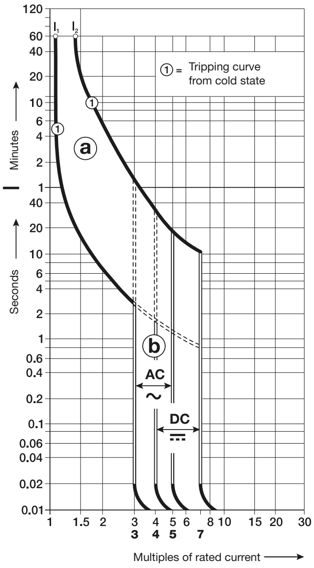
	S400M-UC
General data	
Tripping characteristics	UCC, UCZ
Standards	IEC/EN 60947-2
Poles	1P, 2P
Rated current I_n	0.5 A … 63 A
Rated frequency f	50/60 Hz
Rated insulation voltage U_i acc. to DIN EN 60664-1	440 V AC
Rated impulse withstand voltage $U_{imp.}$ (1.2/50 µs)	4 kV
Overvoltage category	III
Pollution degree	3
Data acc. to IEC/EN 60947-2	
Rated operational voltage U_e	110 VDC (1pole) 220VDC (poles 1; 2) 440VDC (2pole) 230/400 VAC (poles 1; 2)
Min. operating voltage	12 VAC–12 VDC
Rated ultimate short-circuit capacity I_{cu}	10 kA (0,5 up to 63 A, 220VDC 1pole) 20 kA (0,5 up to 63 A, 110VDC 1pole) 25 kA (0,5 up to 63 A, 220VDC 2pole) 10 kA (0,5 up to 63 A, 440VDC 2pole) 10 kA (0,5 up to 63 A, 230/400VAC)
Rated service short-circuit capacity I_{cs}	10 kA (0,5 up to 63 A, 220VDC 1pole) 10 kA (0,5 up to 63 A, 110VDC 1pole) 20 kA (0,5 up to 63 A, 220VDC 2pole) 10 kA (0,5 up to 63 A, 440VDC 2pole) 6 kA (0,5 up to 63 A, 230/400VAC)
Reference Ambient Air Temperature for Overload Tripping	30 °C
Mechanical Data	
IP Code	IP20B, IP40 in enclosure with cover
Mechanical endurance	Electrical endurance: 10 000 ops Mechanical endurance: 10 000 ops
Shock resistance acc. to IEC/EN 61373	5 g – 30 ms, 3 shocks
Vibration resistance acc. to IEC/EN 60068-2-6	2 … 13.2 Hz / 1 mm 13.2 … 100 Hz / 0.7 g, 5 cycles 5 … 150 … 5 Hz / 1 g, 4 waves
Environmental conditions (damp heat) acc. to IEC/EN 60068-2-30	2 cycles with 55 °C/90–96 % and 25 °C/95–100 %
Ambient temperature	–25 … +60 °C
Storage temperature	–40 … +70 °C
Installation	
Top terminal type	Failsafe bi-directional cylinder-lift terminal with double slot 35/10 mm²
Top terminal rigid IEC connections (solid/stranded)	Single: 0.75 ÷ 35 mm² (front slot), 0.75 ÷ 6 mm² (rear slot) Multiple: 2 x 0.75 ÷ 10 mm² (front slot), 2 x 0.75 ÷ 6 mm² (rear slot), with cables of same type and size
Top terminal flexible IEC connections	Single: 0.75 ÷ 25 mm² (front side), 0.75 ÷ 6 mm² (rear slot) Multiple: 2 x 0.75 ÷ 10 mm² (front slot), 2 x 0.75 ÷ 6 mm² (rear slot), with cables of same type and size
Tightening torque	2.8 Nm
Screwdriver	No. 2 Pozidrive
Mounting	plug in on bus bar system SMISSLINE
Mounting position	any
Supply	any
Dimensions and weight	
Pole dimensions (H x D x W)	91 x 18 x 82
Pole weight	110 g

Notes

SMISSLINE TP technical details

Miniature circuit breaker Trip characteristics

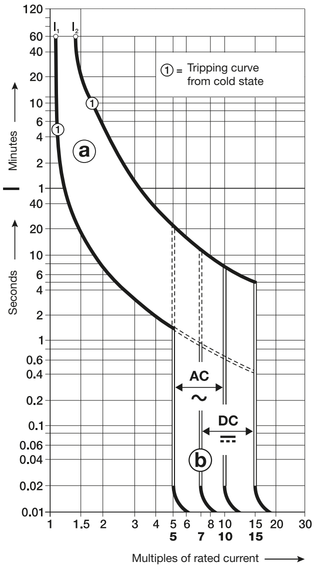
EN60898-1



Trip characteristics: B

Thermal trip
1.13...1.45 x I_n
Electromagnetic trip
3...5 x I_n AC
4...7 x I_n DC
Calibration temperature 30°C

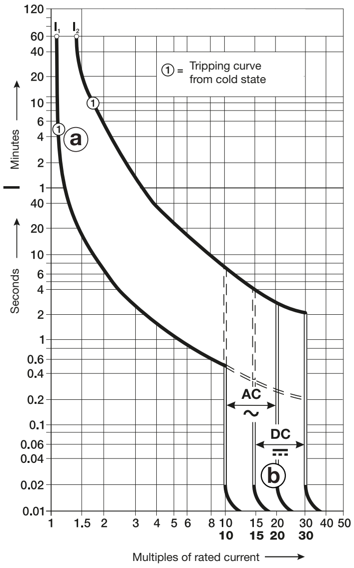
EN60898-1



Trip characteristics: C

Thermal trip
1.13...1.45 x I_n acc. to EN60898-1
Thermal trip
1.05...1.3 x I_n acc. to EN60947-2
Electromagnetic trip
5...10 x I_n AC
7...14 x I_n DC
Calibration temperature 30°C

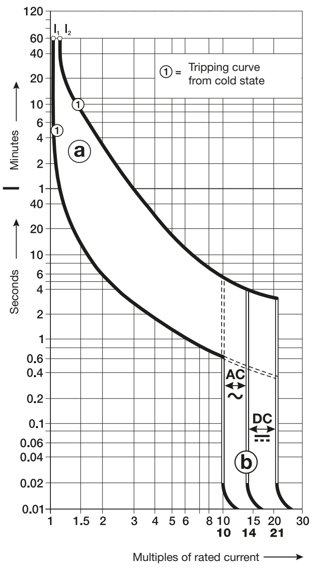
EN60898-1



Trip characteristics: D

Thermal trip
1.13...1.45 x I_n
Electromagnetic trip
10...20 x I_n AC
15...30 x I_n DC
Calibration temperature 30°C

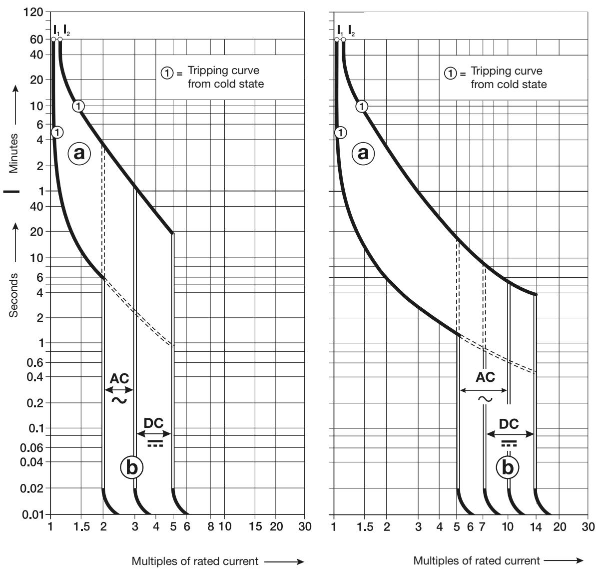
EN60947-2



Trip characteristics: K

Thermal trip
1.05...1.3 x I_n
Electromagnetic trip
10...14 x I_n AC
14...20 x I_n DC
Calibration temperature 40°C

EN60947-2



Trip characteristics: UC

Z	C
1.05...1.35 x I_n	1.13...1.45 x I_n
3...5 x I_n DC	7...14 x I_n DC
2...3 x I_n AC	5...10 x I_n AC

Calibration temperature 30°C

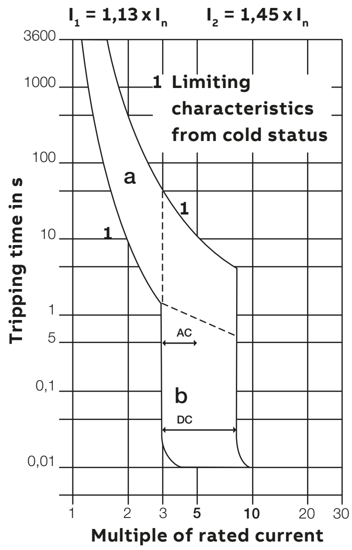
SMISSLINE TP technical details

Miniature circuit breaker Trip characteristics

Trip characteristics example of trip curve interpretation of B-characteristics

a **Thermal trip characteristics:**
Lower test current I_1 = defined as non-tripping current.
The circuit breaker withstands 1.13 times the rated current for at least 60 minutes.
Upper test current I_2 = defined as trip current.
The circuit breaker trips at 1.45 times the rated current within 60 minutes.

b **Electro-magnetic trip characteristics AC:**
The circuit breaker withstands 3 times the rated current for more than 0.1 sec. (in this example, up to around 2 sec.).
The circuit breaker trips in less than 0.1 sec. at 5 times the rated current.



Trip behaviour of different trip characteristics

Trip characteristics and current ratings		Thermal release Test currents: lower test current I_1	upper test current I_2	Trip time	Electromagnetic release Test currents: lower test current	upper test current	Trip time
B	4 to 63 A	1.13 x I_n	1.45 x I_n	> 1 h < 1 h	3 x I_n	5 x I_n	> 0.1 s < 0.1 s
C	0.5 to 63 A	1.13 x I_n	1.45 x I_n	> 1 h < 1 h	5 x I_n	10 x I_n	> 0.1 s < 0.1 s
D	6 to 63 A	1.13 x I_n	1.4 x I_n	> 1 h < 1 h	10 x I_n	20 x I_n	> 0.1 s < 0.1 s
K	0.5 to 63 A	1.05 x I_n	1.2 x I_n 1.5 x I_n 6.0 x I_n	> 2 h < 2 h < 2 min > 2 s	8 x I_n	12 x I_n	> 0.2 s < 0.2 s

Application characteristics: B
Miniature circuit breaker for circuits supplying loads generating no or only minor inrush currents (boilers, electric heaters, cookers).

Application characteristics: C
The ‘standard’ miniature circuit breaker for circuits supplying loads producing inrush currents particular to inductive loads (TV sets, fluorescent and discharge lamps) and for socket outlets.

Application characteristics: D
Miniature circuit breaker for circuits supplying loads producing very high inrush currents (transformers, capacitor banks).
Main circuit breaker for the back-up protection of downstream connected circuit breakers.

Application characteristics: K
Circuit breaker for equipment:
The characteristics of these types enable the close protection requirements for equipment to be met.

Application characteristics: UC
Device protection in DC systems of up to 250 V = with a time constant of <15 ms (emergency networks, electroplating, etc.).

SMISSLINE TP technical details

Miniature circuit breaker

Internal resistances at rated voltage and power losses

Internal resistances and power loss per pole (cold resistance at room temperature)

S400E, S400M

B, C tripping characteristics		
I_n [A]	R_i [mΩ]	P_v [W]
0.5	5023	1.3
1	1424	1.4
1.6	677	1.7
2	338	1.4
3	146	1.3
4	109	1.7
6	50	1.8
8	22	1.4
10	17	1.7
13	12	2.0
16	8.4	2.2
20	5.1	2.0
25	3.9	2.4
32	3.1	3.2
40	2.3	3.7
50	1.5	3.8
63	1.4	5.6

S400E, S400M

D, K tripping characteristics		
I_n [A]	R_i [mΩ]	P_v [W]
0.5	4419	1.1
1	1311	1.3
1.6	627	1.6
2	326	1.3
3	135	1.2
4	85	1.4
6	46	1.7
8	20	1.3
10	16	1.6
13	11	1.9
16	7.8	2.0
20	5.0	2.0
25	3.8	2.4
32	3.0	3.1
40	2.3	3.7
50	1.5	3.8
63	1.4	5.6

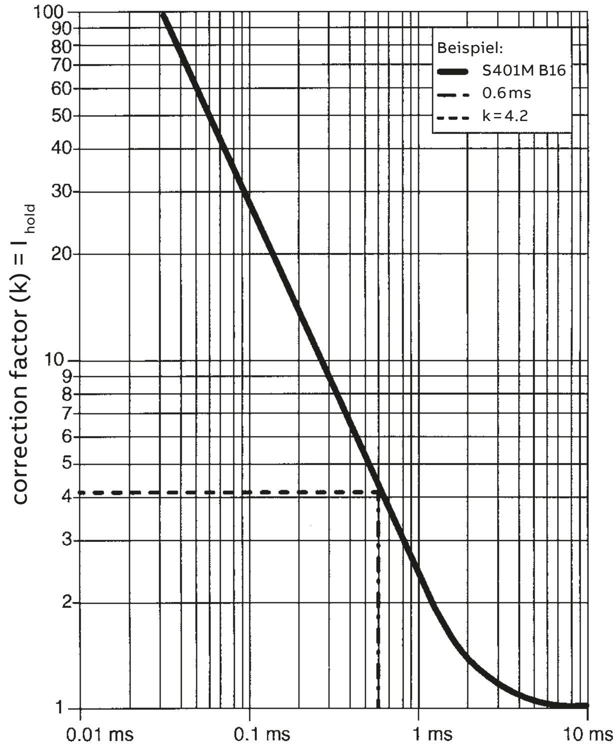
S400M-UC

C, Z tripping characteristics		
I_n [A]	R_i [mΩ]	P_v [W]
0.5	8173	2.0
1	2174	2.2
1.6	1039	2.7
2	521	2.1
3	235	2.1
4	132	2.1
6	67	2.4
8	29	1.8
10	20	2.0
13	15	2.5
16	10	2.6
20	5.6	2.2
25	4.3	2.7
32	3.7	3.8
40	2.6	4.2
50	1.7	4.2
63	1.4	5.6

S400P, SUP400M

B, C, K tripping characteristics		
I_n [A]	R_i [mΩ]	P_v [W]
2	333	1.3
3	137	1.2
4	83	1.3
5	45	1.1
6	45	1.6
8	19	1.2
10	13	1.3
13	10	1.7
15	7.6	1.7
16	7.6	1.9
20	5.0	2.0
25	3.7	2.3
30	3.0	2.7
32	2.9	3.0
40	2.3	3.6
50	1.5	3.7
63	1.4	5.5

RCDs technical details
Properties



Example 1:	Non tripping (Electromagnetic tripping)	
S 401-B16	I_{hold} = k x non tripping I_{hold} = 4,2 x 3 x 16 I_{hold} = 201,6 A	B-Characteristic = 3 x I_n C-Characteristic = 5 x I_n K-Characteristic = 10 x I_n Z-Characteristic = 2 x I_n

The MCB S 401-B16 hold is keeping by an Impulse of 0.6 ms up to a current of 201.6 A.

Example 2:

S 401-K25	I_{hold} = k x non tripping I_{hold} = 4,2 x 10 x 25 I_{hold} = 1050 A

The MCB S 401-K25 is keeping by an Impulse of 0.6 ms up to a current of 1050 A.

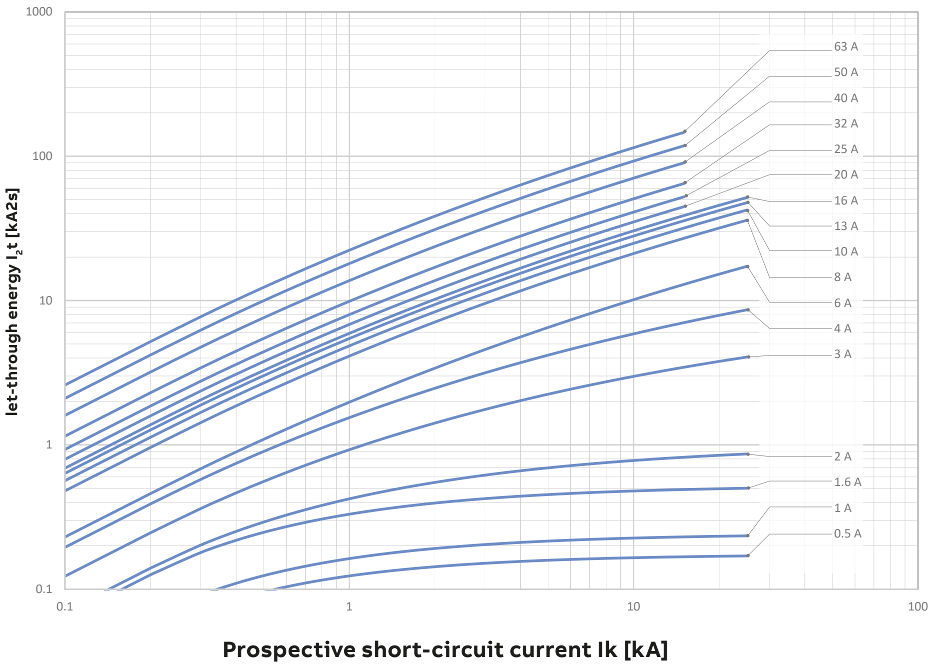
MCBs technical details

Limitation of specific let-through energy I^2t

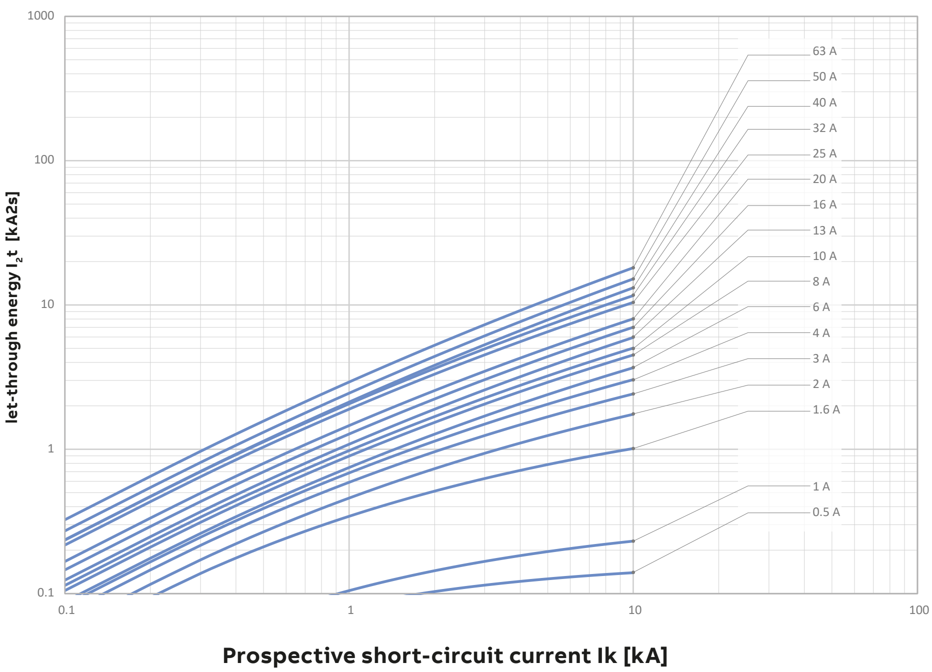
I^2t diagrams - Specific let-through energy value I^2t

The I^2t curves give the values of the specific let-through energy expressed in A^2s (A=amps; s=seconds) in relation to the perspective short-circuit current (I_{rms}) in kA.

S400M; B, C, D, K



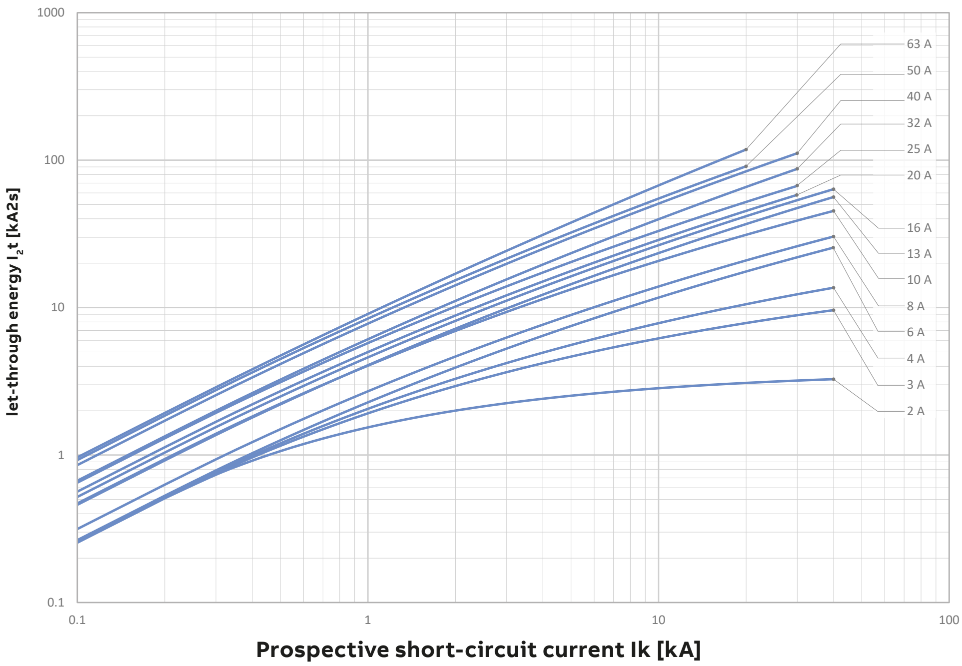
S400UC, S400UCZ



MCBs technical details

Limitation of specific let-through energy I^2t

S400P; B, C, K, SU401 and SUP400



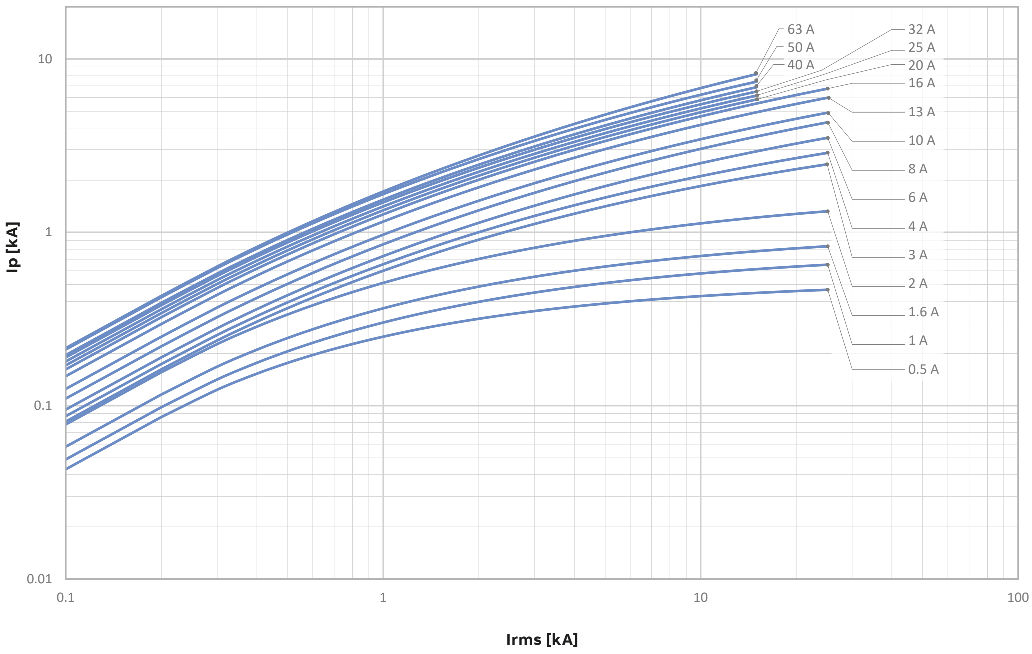
MCBs technical details

Peak current I_p

Limitation curves – Peak current values

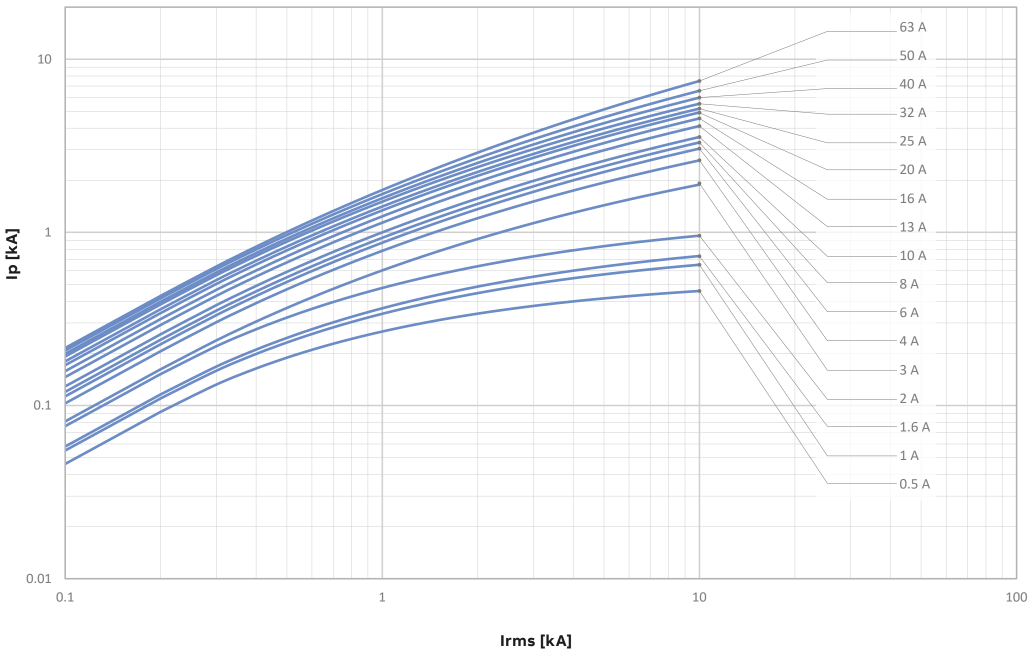
The I_p curves give the values of the peak current, expressed in kA, in relation to the perspective symmetrical short-circuit current (kA).

S400M; B, C, D, K



Prospective short-circuit current Ik [kA]

S400UC, S400UCZ



Prospective short-circuit current Ik [kA]

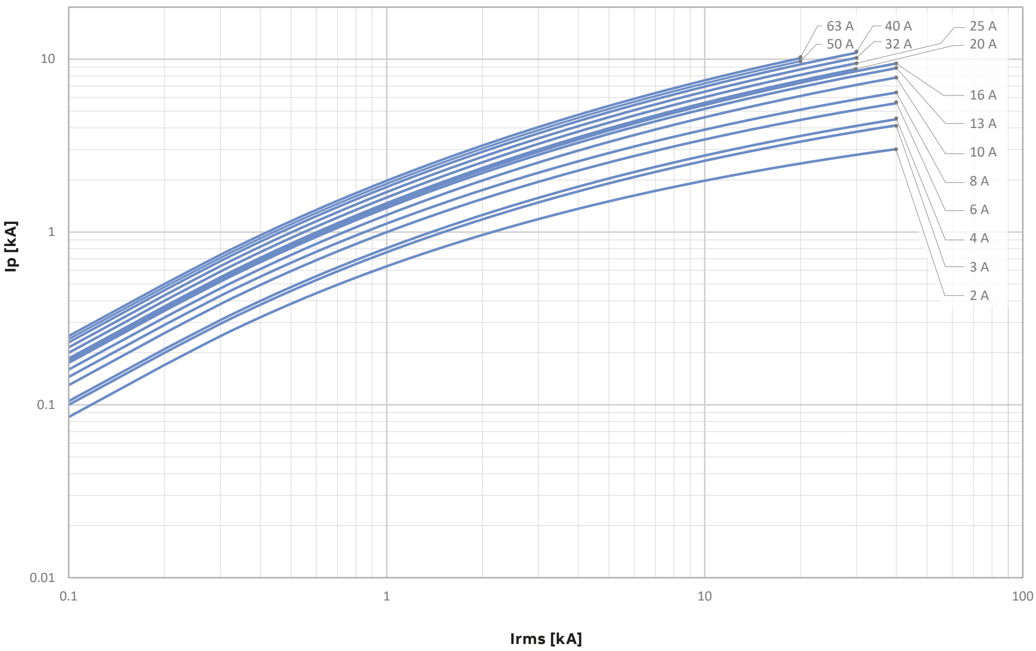
MCBs technical details

Limitation of specific let-through energy I^2t

Limitation curves – Peak current values

The I_p curves give the values of the peak current, expressed in kA, in relation to the perspective symmetrical short-circuit
current (kA).

S400P; B ,C, K, SU401 and SUP400



Prospective short-circuit current Ik [kA]

SMISSLINE TP technical details

Power supply: overload and short-circuit protection

Overload and short-circuit protection of the plug-in socket system

Protection of the busbar system without upstream overcurrent protection

An important factor for the protection of the busbar system (sockets, incoming terminal block, incoming terminal component, adapter, combi module or terminals) is the characteristic of the rated peak withstand current I_{pk}. The rated peak withstand current I_{pk} of the SMISSLINE busbar system is 17 kA.

Protection of the busbar system with up-stream overcurrent protection

The rated short-circuit current Icf of the SMISSLINE busbar system is 50 kA.

If, on the power supply side, a circuit breaker of the type Sace Tmax 200 A, a high performance circuit breaker S800 or a NH fuse is positioned upstream of the busbar system, then due to the short-circuit current limiting effect of this protection device, a larger prospective short-circuit current of up to 50 kA for the plug-in socket system is permissible.

Overload and short-circuit protection of devices on the busbar system

The rated short-circuit breaking capacity (or rated breaking capacity) of the protective devices, together with the maximum short-circuit current at the installation location of the devices on the busbar system, must be taken into consideration.

This is not only relevant for the SMISSLINE busbar system, but is also applicable to the distribution construction.

Miniature circuit breaker

If the prospective short-circuit current at the installation location of a miniature circuit breaker is not greater than its rated breaking capacity, no back-up protection via an upstream overcurrent protection device is necessary.

If the prospective short-circuit current at the installation location of a miniature circuit breaker is greater than its rated short-circuit breaking capacity, the current ratings of the upstream overcurrent protection device must not exceed the table values in the back-up tables (catalogue, page 2/20 onwards).

Residual-current circuit breaker

A back-up fuse with max. 100 A gL/gG or a high performance circuit breaker S800 100 A is required for short-circuit protection upstream or downstream (see Coordination table, page 2/42). A back-up fuse is not required up to the level of the internal short-circuit withstand rating. Thermal protection can be ensured by means of downstream miniature circuit breakers, but only if the rated currents do not exceed the value of the current rating of the residual-current circuit breaker in consideration of a utilisation factor.

Surge arrester OVR

An upstream overcurrent protection device with max. 125 A gL/gG is necessary for short-circuit protection (in the case of non-independent interruptions of the secondary current).

Back-up fuses for devices with a universal adapter

In principle, the same requirements apply as for directly plugged-in devices.

SMISSLINE TP technical details
Back-up and selectivity dates

SOC - Selected Optimized Coordination
See as well ABB on https://applications.it.abb.com/SOC/

SMISSLINE TP technical details

Miniature circuit breaker

Performances at different ambient temperatures

Allowable current of miniature circuit breakers depending on ambient temperature and max. load current for row mounted miniature circuit breakers.

Practical procedure

Conditions often arise which allow for simple consideration of the ambient temperature and thermal influences of row mounted circuit breakers according to EN 60898 and EN 60947-2. The following procedure has proven to be effective:

1. Selection of circuit breaker according to the rated current of the equipment or the current carrying capacity of the cable depending on which of these is the lower value.
2. Consideration of thermal factors
   – for an ambient temperature,
   – for thermal influence of row mounted circuit breakers.
3. This results in the rated current of the circuit breaker to be selected for the relevant current.

This procedure considers all thermal influence factors and results in an optimum choice of the rated current for the circuit breaker.

Basis for the simplified procedure

1. Different ambient temperature

The thermal releases are set to a reference ambient temperature. For trip characteristic K, this is 40 °C, for trip characteristics B, C and D, this is 30 °C. At different ambient temperatures, the specified current values.

2. Influence of row mounted devices at continuous load

If the circuit breakers are lined up close to one another and have equally high load levels, a correction factor must be taken. This influence can be reduced if fillers and/or spacers (9 mm wide) are used.

Influence of adjacent poles Correction factor Fm	
No. of adjacent devices	fm
1	1
2	0.95
3	0.9
4	0.86
5	0.82
6	0.8
7	0.78
8	0.77
9	0.76
>9	0.76

SMISSLINE TP technical details

Miniature circuit breaker

Influence of ambient temperature

Max. operating currents depending on ambient temperature for S400 miniature circuit breakers of tip characteristics B, C, D, UC-C and UC-Z

I_n(A)	Ambient temperature T (°C)										
	0	10	15	20	25	30	35	40	45	50	55	60
0.5*	0.58	0.55	0.53	0.52	0.51	0.50	0.48	0.47	0.46	0.44	0.43	0.42
1.0*	1.15	1.09	1.07	1.04	1.02	1.0	0.97	0.94	0.91	0.89	0.86	0.83
1.6*	1.85	1.75	1.71	1.67	1.63	1.6	1.55	1.50	1.46	1.42	1.38	1.34
2.0*	2.31	2.19	2.13	2.08	2.03	2.0	1.93	1.88	1.83	1.77	1.72	1.67
3.0*	3.5	3.32	3.24	3.16	3.09	3.0	2.93	2.85	2.77	2.69	2.61	2.53
4.0*	4.6	4.37	4.27	4.17	4.07	4.0	3.86	3.76	3.66	3.56	3.45	3.34
6.0	6.9	6.59	6.44	6.29	6.14	6.0	5.83	5.68	5.53	5.37	5.22	5.07
8.0	9.2	8.84	8.63	8.42	8.22	8.0	7.81	7.6	7.39	7.19	6.98	6.77
10.0	11.5	10.9	10.7	10.4	10.2	10.0	9.65	9.39	9.14	8.88	8.63	8.38
13.0	15.0	14.4	14.0	13.7	13.3	13.0	12.7	12.3	12.0	11.6	11.3	11.00
16.0	18.5	17.6	17.2	16.8	16.4	16.0	15.6	15.2	14.7	14.3	13.9	13.50
20.0	23.1	22.1	21.6	21.0	20.5	20.0	19.5	19.0	18.5	18.0	17.5	17.00
25.0	28.9	27.5	26.9	26.3	25.6	25.0	24.3	23.7	23.0	22.4	21.8	21.20
32.0	37.0	35.3	34.5	33.7	32.8	32.0	31.2	30.4	29.5	28.7	27.9	27.10
40.0	46.2	44.1	43.0	42.0	41.0	40.0	39.0	37.9	36.9	35.9	34.9	33.90
50.0	57.7	55	53.7	52.4	51.1	50.0	48.6	47.3	46.0	44.7	43.4	42.10
63.0	72.7	69.3	67.7	66.1	64.5	63.0	61.3	59.7	58.1	56.4	54.8	53.20

* only applies to C

Max. operating currents depending on ambient temperature for S400M, S400P, SU400M, SUP400M miniature circuit breakers K tripping characteristic

I_n (A)	Ambient temperature T (°C)										
	0	**10**	**15**	**20**	**25**	**30**	**35**	**40***	**45**	**50**	**55**	**60**
0.5	0.56	0.54	0.52	0.51	0.50	0.49	0.47	0.5	0.45	0.43	0.42	0.41
1	1.16	1.14	1.12	1.09	1.07	1.05	1.02	1.0	0.96	0.94	0.91	0.88
1.6	1.89	1.85	1.81	1.77	1.73	1.70	1.65	1.6	1.56	1.52	1.48	1.44
2	2.35	2.29	2.23	2.18	2.13	2.10	2.03	2.0	1.93	1.87	1.82	1.77
3	3.56	3.48	3.40	3.32	3.25	3.20	3.09	3.0	2.93	2.85	2.77	2.69
4	4.68	4.58	4.48	4.38	4.28	4.20	4.07	4.0	3.87	3.77	3.66	3.55
5	6.06	5.91	5.76	5.61	5.46	5.30	5.15	5.0	4.85	4.69	4.54	4.39
6	7.06	6.91	6.76	6.61	6.46	6.30	6.15	6.0	5.85	5.69	5.54	5.39
8	9.45	9.24	9.03	8.82	8.62	8.40	8.21	8.0	7.79	7.59	7.38	7.17
10	11.80	11.50	11.20	11.00	10.70	10.50	10.20	10.0	9.69	9.43	9.18	8.93
13	15.50	15.10	14.70	14.40	14.00	13.70	13.40	13.0	12.70	12.30	12.00	11.70
15	17.80	17.40	17.00	16.60	16.20	15.80	15.40	15.0	14.60	14.20	13.80	13.40
16	18.80	18.40	18.00	17.60	17.20	16.80	16.40	16.0	15.60	15.20	14.80	14.40
20	23.50	23.00	22.50	22.00	21.50	20.90	20.40	20.0	19.40	18.90	18.40	17.90
25	29.50	28.90	28.30	27.60	27.00	26.30	25.70	25.0	24.40	23.80	23.10	22.40
30	35.70	34.90	34.10	33.30	32.40	31.60	30.80	30.0	29.10	28.30	27.50	26.70
32	37.70	36.90	36.10	35.30	34.40	33.60	32.80	32.0	31.10	30.30	29.50	28.70
40	47.30	46.20	45.10	44.10	43.10	42.10	41.10	40.0	39.00	38.00	37.00	36.00
50	59.00	57.70	56.40	55.10	53.80	52.50	51.30	50.0	48.70	47.40	46.10	44.80
63	74.10	72.50	70.90	69.30	67.70	66.10	64.50	63.0	61.30	59.60	58.00	56.40

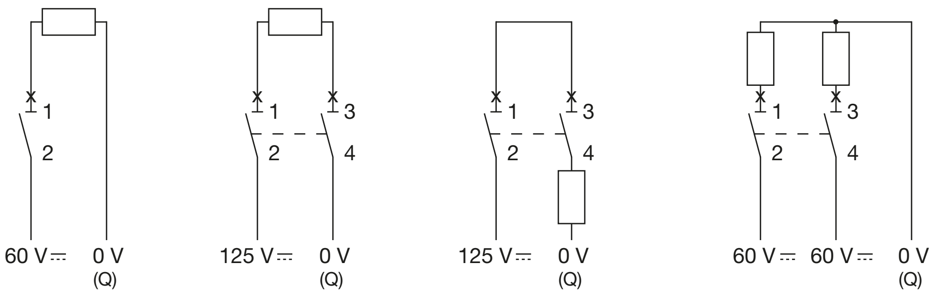
* Reference ambient air temperature for overload tripping

SMISSLINE TP technical details

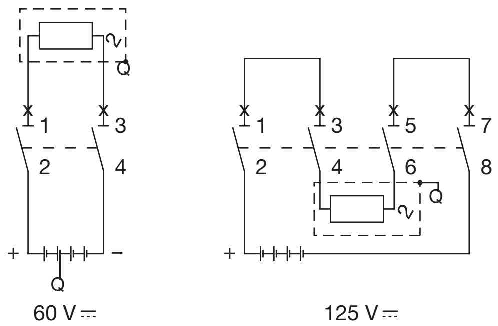
Miniature circuit breaker
Use for for DC systems

Use of miniature circuit breakers S400 M for DC systems
A standard miniature circuit breaker type S400 M and S400 E can be used in a DC system by observing the following conditions: Single pole miniature circuit breaker max. 72 V DC. 2-pole miniature circuit breaker with 2-poles in series max. 125 V DC. The polarity needs not to be taken into account. Load connection can either be at the top or at the bottom of the MCB.

Example of permissible DC voltages depending on the number of poles and the circuit configeration in earthed DC systems:



Examples for different voltages between a conductor and earth where voltages between conductors are identical:



SMISSLINE TP technical details

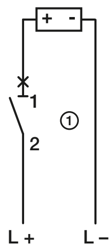
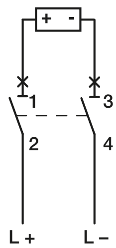
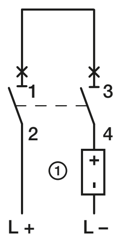
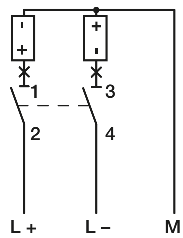
Miniature circuit breaker
S400UC

UC = Universal Current = AC/DC

S400UC MCBs can be used in the one-pole version as 250 V d.c., and in the 2-pole version with series connection of two poles up to 440 V d.c..

For DC incoming supply from above
S400 UC-... MCBs have, in the area of arc chutes, permanent magnets, it is therefore necessary to take into account the polarity during the installation process.
Doing so ensures that in the case of a short circuit the magnetic field of the permanent magnets corresponds with the electromagnetic field of the short-circuit current, therefore safely leading the short circuit into the arc chute. Incorrect polarities may cause damage to the MCB.
This is why – in the case of top-fed devices – terminal 1 must be connected to (–) and terminal 3 (+).

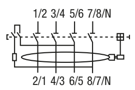
Example for permissible voltages between the conductors depending on the number of poles and circuit layout:

voltage U_N between conductors	250 V d.c.	440 V d.c.	440 V d.c.	440 V d.c.
voltage U_N between conductor and earth	250 V d.c.	250 V d.c.	440 V d.c.	250 V d.c.
supply				

SMISSLINE TP technical details

Residual current operated circuit breaker F402, F404

Properties



General information about residual current operated circuit breakers

The residual current operated circuit breaker prevents personal injury and damage to property caused by electric current. Use of this circuit breaker is required in various national and international standards for electrical installations.

Modern residual current operated circuit breakers respond to small residual currents. Interruption occurs in a fraction of a second even before a hazardous situation for people, animals and property can arise.

The principle of magnetic tripping independable of the supply voltage ensures perfect and safe operation even in the event of undervoltage and neutral interruptions.

The key features

- High short-circuit resistance 10 kA
- Sensitive for alternating and pulsating DC residual currents
- 2- and 4-pole types
- Nominal residual trip currents 10, 30, 100, 300 mA
- Snap-on auxiliary switches and signal contacts
- Nominal currents 25, 40, 63 A
- Double terminals

According to the wave form of the earth leakage currents they are sensitive to, the RCDs may be classed as:

- AC type (for alternating current only) AC are not in the Smissline portfolio
- A type (for alternating and/or pulsating current with DC components)
- B type (for alternating and/or pulsating current with DC components and continuous fault current).

Shape of the fault current			Correct RDC function alternating current Type AC	pulsating current sensitiv Type A
sinusoidal a.c.	rampant	slowly rising		
pulsating d.c.	rampant with or without overlapping DC components from 6 mA	slowly rising		

Selectivity

RCDs raise similar issue to those surrounding the installation of MCBs, and in particular the need to reduce to a minimum the parts of the system out of order in the event of a fault. For RCBOs the problem of selectivity in the case of short-circuit currents may be handled with the same specific criteria as for MCBs.

However, for correct residual current protection, the more important aspects are linked to tripping times. Protection against contact voltages is only effective if the maximum times indicated on the safety curve are not exceeded.

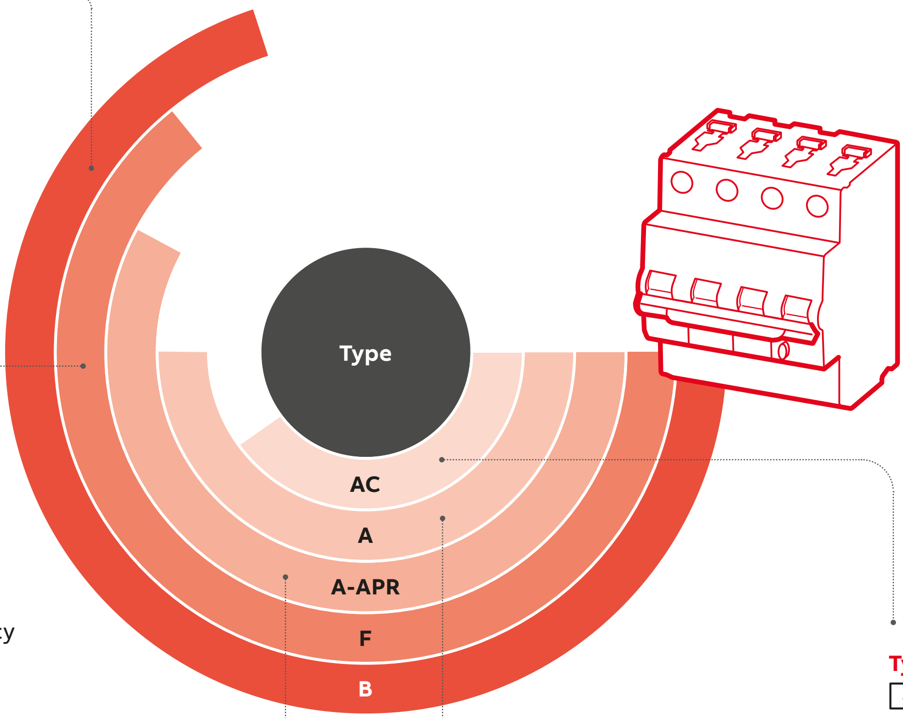
RCDs technical details

Properties

The variety of residual current devices has continuously increased in last decades following the technology evolution and the massive introduction of electronics in all fields of applications. According to the capability to detect different waveforms of residual current and the relative sophisticated type testing, today the spectrum of RCDs types covers from pure AC loads up to high frequency and DC related applications with an increasing level of protection passing from AC types up to F and B types.

Type B

Full type F features.
+ Detection of smooth DC currents.



Type F

Full type A-APR short delay features.
+ Detection of high frequency currents
up to 1 kHz.

Type AC

Alternating current only.

Type A-APR

APR

Full type A features.
+ High immunity to unwanted tripping.

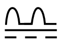
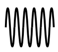
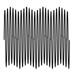
Type A

Full type AC features.
+ Detection of pulsating current with DC components.

RCDs technical details

Properties

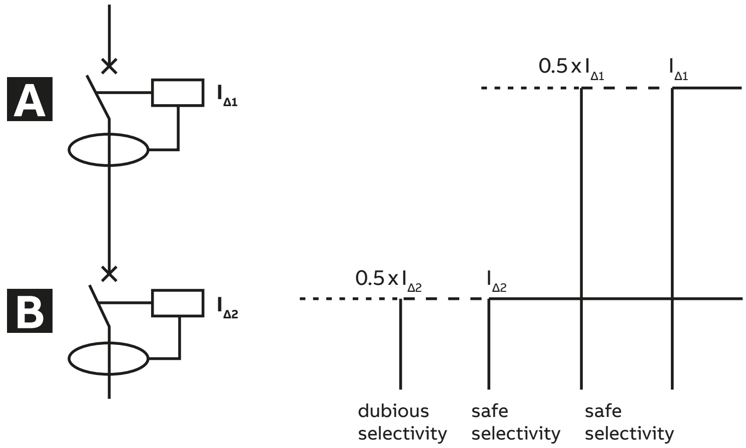
Release current

Proper functionning of residual current protective devices of type		RCD type Type AC	 Type A	 Type F	 Type B
	0,5 … 1 $I_{\Delta n}$	■	■	■	■
	0,35 … 1,4 $I_{\Delta n}$	–	■	■	■
	0,25 … 1,4 $I_{\Delta n}$	–	■	■	■
	0,11 … 1,4 $I_{\Delta n}$				
	max. 1,4 $I_{\Delta n}$ + 6 mA	–	■	■	■
	max. 1,4 $I_{\Delta n}$ + 10 mA	–	–	■	■
	0,5 … 1,4 $I_{\Delta n}$	–	–	■	■
	0,5 … 2 $I_{\Delta n}$	–	–	–	■
	0,5 … 2,4 $I_{\Delta n}$	–	–	–	■
	0,5 … 6 $I_{\Delta n}$				
	0,5 … 14 $I_{\Delta n}$				

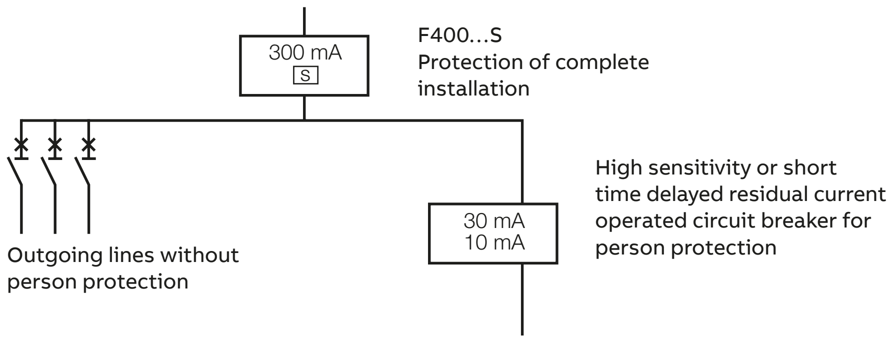
SMISSLINE TP technical details

Residual current operated circuit breaker F402, F404
Properties

Partial selectivity



Total selectivity



Amperometric (partial) selectivity
Selectivity may be created by placing low-sensitivity RCDs upstream and higher-sensitivity RCDs downstream.
An essential condition which must be satisfied in order to achieve selective co-ordination is that the $I_{\Delta 1}$ value of the breaker upstream (main breaker) is more than double the $I_{\Delta 2}$ value of the breaker downstream. The operative rule to obtain an amperometric (partial) selectivity is $I_{\Delta n}$ of the upstream breaker = $3 \times I_{\Delta n}$ of the downstream breaker (e.g.: F404, 300 mA upstream; F402, 100 mA downstream).
In this case, selectivity is partial and only the downstream breaker trips for earth fault currents $I_{\Delta 2} < I_{\Delta m} < 0{,}5 \times I_{\Delta 1}$).

Chronometric (total) selectivity
To achieve total selectivity, delayed or selective RCDs must be installed.
The tripping times of the two devices connected in series must be co-ordinated so that the total interruption time t_2 of the downstream breaker is less than the upstream breaker's no-response limit time t_1, for any current value. In this way, the downstream breaker completes its opening before the upstream one.
To completely guarantee total selectivity, the I_{Δ} value of the upstream device must also be more than double that of the downstream device in accordance with IEC 64-9/563.3, comments. The operative rule to obtain an amperometric (partial) selectivity is $I_{\Delta n}$ of the upstream breaker = 3 x $I_{\Delta n}$ of the downstream breaker (e.g.: F404, S type, 300 mA upstream).
For safety reasons, the delayed tripping times of the upstream breaker must always be below the safety curve.

SMISSLINE TP technical details

Residual current operated circuit breaker F402, F404
Standard, short-time delayed and selective type

The use of multiple electronic reactors for the supply of fluorescent lamps instead generates permanent leakage currents and inrush currents that can provoke nuisance tripping of a standard residual current breaker.
IT system loads and other electronic equipment (e.g. dimmers, computers, inverters) with capacitive input filters connected between the phases and ground can also generate permanent earth leakage currents whose sum may provoke the nuisance tripping of a standard residual current breaker.
For these situations, the SHORT-TIME DELAY breakers allow a greater number of devices to be connected to the installation.
Soft-starters for motors are loads which can generate high-frequency capacitive currents (provoked by the harmonics) toward ground or fed into the network. Also in this case, the use of SHORT-TIME DELAY residual breakers reduces the sensibility to nuisance tripping.

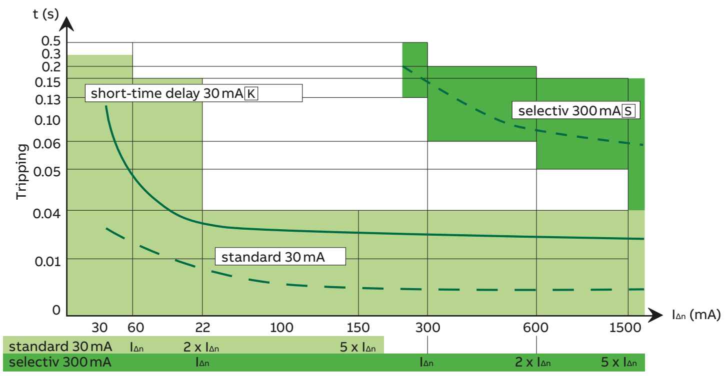
Compared with standard type breakers, SHORT-TIME DELAY residual current breakers are therefore characterised, for any given sensibility, by:

- Higher residual trip current
- Tripping time delay
- Better resistance to overvoltages, harmonics and impulse disturbances.

Regulations
The tests set out in the IEC 61008 and IEC 61009 standards verify the resistance of residual current breakers to unwanted tripping provoked by operation overvoltages, using a ring wave impulse shape of 0.5 µs/100 kHz. All residual current circuit-breakers are required to pass this test with a peak current value of 200 A.
For what concerns atmospheric overvoltages, the IEC 61008 and 61009 standards prescribe the 9/20 µs surge test with a 3000 A peak current, but limit the requirement to residual current devices classified as selective; no test is required for other types.

The ABB range of SHORT-TIME DELAY anti-nuisance tripping breakers and blocks pass the general 0.5 µs/100 kHz ring wave test and also withstand the 9/20 µs impulse test with the same peak current of 3000 A prescribed for selective devices.
The F402 K and F404 K should therefore be used to prevent unwanted tripping.

Three different types of Residual current operated circuit breaker
- standard RCD 30 mA
- selective RCD 300 mA S
- short-time delay RCD 30 mA K



- The standard RCD 30 mA tripp after circa 22 mA and a release time of ≤ 35 ms.
- The selectiv RCD 300 mA tripp after circa 200 mA and a release time of circa 180 ms.
- The short-time delay RCD 30 mA tripp after circa 25 mA and a release time of 100 … 120 ms.

SMISSLINE TP technical details

Residual current operated circuit breaker F402, F404
Standard, short-time delayed and selective type

Unwanted tripping
In the event of disturbance in the mains, the RCDs normally present in the system are tripped, breaking the circuit even in the absence of a true earth fault.
Disturbances of this kind are most often caused by:
- operation overvoltages caused by inserting or removing loads (opening or closing protection of control devices, starting and stopping motors, switching fluorescent lighting systems on and off, etc.)
- overvoltages of atmospheric origin, caused by direct or indirect discharges on the electrical line.

Under these circumstances, breaker tripping is unwanted, since it does not satisfy the need to avoid the risks due to direct and indirect contacts. On the contrary, the sudden and unjustified interruption of the power supply may result in very serious problems.

SHORT-TIME DELAY RCDs
The ABB range of SHORT-TIME DELAY anti-disturbance residual current circuitbreakers and blocks was designed to overcome the problem of unwanted tripping due to overvoltages of atmospheric or operation origin.
The electronic circuit in these devices can distinguish between temporary leakage caused by disturbances on the mains and permanent leakage due to actual faults, only breaking the circuit in the latter case.
SHORT-TIME DELAY residual current circuit-breakers and blocks have a slight delay into the tripping time, but this does not compromise the safety limits set by the Standards in force (release time at 2 $I_{\Delta n}$ =150 ms).
Guaranteeing conventional residual current protection, their installation in the electrical circuit therefore allows any unwanted tripping to be avoided in domestic and industrial systems in which service continuity is essential.
This delay makes the SHORT-TIME DELAY residual current devices especially suited for installations involving motor starters/variable speed drives, fluorescent lamps or IT/electronic equipment.

Table of RDC selectivity

Downstream $I_{\Delta n}$ [mA]	Upstream $I_{\Delta n}$	10 [mA] inst	30 inst	100 inst	300 inst	300 S	500 inst	500 S
10			□	□	□	■	□	■
30	inst			□	□	■	□	■
100	inst				□	■		■
300	inst							
300	S							
500	inst							

inst = instantaneous S = selective □ = amperometric (partial) selectivity ■ = chronometric (total) selectivity

Residual current operated circuit breaker RCCBs

F402 technical features, A type and APR-F (K type)

	F402	F402 APR
Standards	IEC/EN 61008-1 IEC/EN 61008-2-1	IEC/EN 61008-1 IEC/EN 61008-2-1 IEC/EN 62423
Electrical features		
Type (wave form of the earth leakage sensed)	A	APR - F
Number of poles	1P + N	1P + N
Rated current I_n	25, 40 A	40 A
Rated sensitivity $I_{\Delta n}$	0.01, 0.03, 0.1 A	0.03 A
Rated voltage U_e	230 V	230/400 V
Rated insulation voltage (U_i)	500 V	500 V
Overvoltage category	III	III
Pollution degree	2	2
Operating voltage of circuit test	110 V (170 for 30 mA) – 254 V	170 – 254 V
Rated frequency	50/60 Hz	50/60 Hz
Rated conditional short-circuit current I_{nc}	10 kA with SCPD - fuse gG 100 A or high performance MCB S800 100 A	
Rated residual breaking capacity $I_{\Delta m}$	1 kA	
Surge current resistance (wave 8/20)	N/A	3000 A
Mechanical features		
Housing	Light grey RAL 7035	Light grey RAL 7035
Toggle	Blue RAL 5015, sealable in ON-OFF positions	Blue RAL 5015, sealable in ON-OFF positions
Contact position indication	Green/Red Window	Green/Red Window
Endurance	Electrical endurance: 10000 ops Mechanical endurance: 10000 ops	Electrical endurance: 10000 ops Mechanical endurance: 10000 ops
IP code	IP20, IP40 in enclosure with cover	IP20, IP40 in enclosure with cover
Shock resistance acc. to IEC/EN 61373	5 g – 30 ms, 3 shocks	5 g – 30 ms, 3 shocks
Vibration resistance acc. to IEC/EN 60068-2-6	2 ... 13.2 Hz/1 mm 13.2 ... 100 Hz/0.7 g, 5 cycles 5 ... 150 ... 5 Hz/1 g, 4 waves	2 ... 13.2 Hz/1 mm 13.2 ... 100 Hz/0.7 g, 5 cycles 5 ... 150 ... 5 Hz/1 g, 4 waves
Environmental conditions (damp heat) acc. to IEC/EN 60068-2-30	28 cycles with 55 °C/90…96 % and 25 °C/95…100 %	
Ambient temperature	–25 ... +55 °C	–25 ... +55 °C
Storage temperature	–40 ... +70 °C	–40 ... +70 °C
Installation		
Terminal type	failsafe bi-directional cylinder-lift terminal (shock protected)	
Top terminal rigid IEC connections (solid/stranded)	Single: 0.75…25 mm2 (front slot), 0.75…10 mm2 (rear slot) Multiple: 2 x 0.75…10 mm² (front slot), 2 x 0.75…6 mm² (rear slot), with cables of same type and size	
Top terminal flexible IEC connections	Single: 0.75…16 mm² (front side), 0.75…6 mm² (rear slot) Multiple: 2 x 0.75…10 mm² (front slot), 2 x 0.75…6 mm² (rear slot), with cables of same type and size	

Residual current operated circuit breaker RCCBs

F404 technical features, A type and APR-F (K type)

	F404 A	F404 A-K	F404 S	F404 LF
Standards	IEC/EN 61008-1 IEC/EN 61008-2-1	IEC/EN 61008-1 IEC/EN 61008-2-1 IEC/EN 62423	IEC/EN 61008-1 IEC/EN 61008-2-1	IEC/EN 61008-1 IEC/EN 61008-2-1
Electrical features				
Type (wave form of the earth leakage sensed)	A	APR - F	A	A
Number of poles	3P + N	3P + N	3P + N	3P + N
Rated current I_n	25, 40, 63 A	40, 63 A	63 A	63 A
Rated sensitivity $I_{\Delta n}$	0.03, 0.1, 0.3 A	0.03–0.1 A	0.1, 0.3 A	0.03, 0.3 A
Rated voltage U_e	230/400 V	230/400 V	230/400 V	230/400 V
Rated insulation voltage (U_i)	500 V	500 V	500 V	500 V
Overvoltage category	III	III	III	III
Pollution degree	2	2	2	2
Operating voltage of circuit test	110 V (170 for 30 mA) – 254 V	110 V (170 for 30 mA) – 254 V	110 – 254 V	110 (170 for 30 mA) – 254 V
Rated frequency Hz	50/60 Hz	50/60 Hz	50/60 Hz	$16^2/_3$ Hz
Rated conditional short-circuit current I_{nc}	10 kA with SCPD – fuse gG 100 A or high performance MCB S800 100 A			
Rated residual breaking capacity $I_{\Delta m}$	1 kA	1 kA	1 kA	1 kA
Surge current resistance (wave 8/20)	N/A	3000 A	5000 A	N/A
Mechanical features				
Housing	Insulation group I, light grey RAL 7035	Insulation group I, light grey RAL 7035	Insulation group I, light grey RAL 7035	Insulation group I, light grey RAL 7035
Toggle	Insulation group II, blue RAL 5015, sealable in ON-OFF positions	Insulation group II, blue RAL 5015, sealable in ON-OFF positions	Insulation group II, blue RAL 5015, sealable in ON-OFF positions	Insulation group II, blue RAL 5015, sealable in ON-OFF positions
Contact position indication	Green/Red Window	Green/Red Window	Green/Red Window	Green/Red Window
Endurance	Electrical endurance: 10 000 ops Mechanical endurance: 10 000 ops	Electrical endurance: 10 000 ops Mechanical endurance: 10 000 ops	Electrical endurance: 10 000 ops Mechanical endurance: 10 000 ops	Electrical endurance: 10 000 ops Mechanical endurance: 10 000 ops
IP code	IP20, IP40 in enclosure with cover	IP20, IP40 in enclosure with cover	IP20, IP40 in enclosure with cover	IP20, IP40 in enclosure with cover
Shock resistance acc. to IEC/EN 61373	5 g – 30 ms, 3 shocks	5 g – 30 ms, 3 shocks	5 g – 30 ms, 3 shocks	5 g – 30 ms, 3 shocks
Vibration resistance acc. to IEC/EN 60068-2-6	2 ... 13.2 Hz/1 mm, 13.2 ... 100 Hz/0.7 g, 5 cycles, 5 ... 150 ... 5 Hz/1 g, 4 waves			
Environmental conditions (damp heat) acc. to IEC/EN 60068-2-30	28 cycles with 55 °C/90 … 96 % and 25 °C/95 … 100 %			
Ambient temperature	–25 … +55 °C	–25 … +55 °C	–25 … +55 °C	–25 … +55 °C
Storage temperature	–40 … +70 °C	–40 … +70 °C	–40 … +70 °C	–40 … +70 °C
Installation				
Terminal type	failsafe bi-directional cylinder-lift terminal (shock protected)			
Top terminal rigid IEC connections (solid/stranded)	Single: 0.75…25 mm² (front slot), 0.75…10 mm² (rear slot) Multiple: 2 x 0.75…10 mm² (front slot), 2 x 0.75…6 mm² (rear slot), with cables of same type and size			
Top terminal flexible IEC connections	Single: 0.75…16 mm² (front side), 0.75…6 mm² (rear slot) Multiple: 2 x 0.75…10 mm² (front slot), 2 x 0.75…6 mm² (rear slot), with cables of same type and size			

Tripping time settings type A

Tripping time

Type	Rated sensitivity	Tripping time			
	Alternating current	$1 \times I_{\Delta n}$	$2 \times I_{\Delta n}$	$5 \times I_{\Delta n}$	500 A
	Pulsating current with DC components	$1{,}4 \times I_{\Delta n}$	$2 \times 1{,}4 \times I_{\Delta n}$	$5 \times 1{,}4 \times I_{\Delta n}$	500 A
	Detection of smooth DC currents	$2 \times I_{\Delta n}$	$2 \times 2 \times I_{\Delta n}$	$5 \times 2 \times I_{\Delta n}$	500 A
Standard or short time		max. 0,3 s	max. 0,15 s	max. 0,04 s	max. 0,04 s

Residual current operated circuit breaker RCCBs

F404 technical features, B type

	F404 B
Standards	IEC/EN 61008-1 IEC/EN 61008-2-1 IEC/EN 62423"
Electrical features	
Type (wave form of the earth leakage sensed)	B
Number of poles	3P + N
Rated current I_n	25, 40, 63 A
Rated sensitivity $I_{\Delta n}$	0.03, 0.3 A
Rated voltage U_e	230/400 V
Rated insulation voltage (U_i)	500 V
Overvoltage category	III
Pollution degree	2
Operating voltage of circuit test	110 V (170 for 30 mA) – 254 V
Rated frequency	50/60 Hz
Rated conditional short-circuit current I_{nc}	10 kA with SCPD – fuse gG 100 A or high performance MCB S800 100 A
Rated residual breaking capacity $I_{\Delta m}$	1 kA
Surge current resistance (wave 8/20)	3000 A
Operating voltage of circuit test Ut IEC/EN	110 - 253 V AC 170 - 253 V AC (30 mA)
Maximum electronic consumption	1.2W
Mechanical features	
Housing	Light grey RAL 7035
Toggle	Blue RAL 5015, sealable in ON-OFF positions
Contact position indication	Green/Red Window
Electrical life	10000 operations
Mechanical life	10000 operations
IP code	IP20, IP40 in enclosure with cover
Shock resistance acc. to IEC/EN 61373	5 g – 30 ms, 3 shocks
Vibration resistance acc. to IEC/EN 60068-2-6	2 ... 13.2 Hz/1 mm 13.2 ... 100 Hz/0.7 g, 5 cycles 5 ... 150 ... 5 Hz/1 g, 4 waves
Environmental conditions (damp heat) acc. to IEC/EN 60068-2-30	28 cycles with 55 °C/90 … 96 % and 25 °C/95 … 100 %
Ambient temperature	–25...+70 for system current <= 32 A –25...+65 for system current = 40 A –25...+50 for system current = 63 A
Storage temperature	–40 … +70 °C
Installation	
Terminal type	failsafe bi-directional cylinder-lift terminal (shock protected)
Top terminal rigid IEC connections (solid/stranded)	Single: 0.75…25 mm² (front slot), 0.75…10 mm² (rear slot) Multiple: 2 x 0.75…10 mm² (front slot), 2 x 0.75…6 mm² (rear slot), with cables of same type and size
Top terminal flexible IEC connections	Single: 0.75…16 mm² (front side), 0.75…6 mm² (rear slot) Multiple: 2 x 0.75…10 mm² (front slot), 2 x 0.75…6 mm² (rear slot), with cables of same type and size

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SMISSLINE TP technical details

Residual current operated circuit breaker F402, F404

Technical data

Coordination tables between Short Circuit Protection Devices (SCPD) and F404 RCCBs
If you are using an RCCB you must verify that the Short Circuit Protection Device (SCPD) protects it from the effects of high current that arise under short-circuit conditions. The IEC/EN 61008 provides some tests to verify the behaviour of RCCB in short-circuit conditions. The tables below provide the maximum withstanding short-circuit current expressed in eff. kA for which the RCCBs are protected thanks to the coordination with the SCPD with a rated current (thermal protection) less than or eqaul to the rated current of the associated RCCB.

	F404 25 A	F404 40 A	F404 63 A
gG fuse 25 A	100		
gG fuse 40 A	60	60	
gG fuse 63 A	20	20	20
gG fuse 100 A	10	10	10
S403M	10	10	10
S803N	20	20	20
S803S	25	25	25

For RCBO internal resistance and power loss are intended per device (cold resistance at room temperature)

F402

I_n [A]	R_i [mΩ]	P_v [W]
25	6.1	3.8
40	5.8	9.3

F404			**F404B**
I_n [A]	R_i [mΩ]	P_v [W]	
25	6.3	3.9	1.2
40	6.0	9.6	1.2
63	4.5	17.9	1.2

SMISSLINE TP technical details

Residual current operated circuit breaker FS401

Residual current operated circuit breakers with overcurrent protection (RCBO)
The SMISSLINE residual current operated circuit breakers with overcurrent protection (RCBO) are ideal for protecting people and property in all new and existing distribution systems. The combination of standby current and cable protection in one single device greatly simplifies planning and offers cost benefits. Using a RCBO can e.g. satisfy the minimum level of protection required by regulations in an apartment or in a particular distribution system. Should a residual current arise, only the circuit directly affected is switched off while all other circuits remain in operation.

The short time-delayed residual current operated circuit breaker with overcurrent protection FS401 K is a version particularly suited to unfavourable distribution and load situations. Without limiting the personal protection function in any way, the electronic short time delay prevents nuisance tripping which may arise as a result of capacitive discharge currents.

Residual current operated circuit breaker (RCBO)

FS401 technical features

		FS401E	FS401M	FS401MK (APR)
Standards		IEC/EN 61009-1, IEC/EN 61009-2-1	IEC/EN 61009-1, IEC/EN 61009-2-1	IEC/EN 61009-1, IEC/EN 61009-2-1 IEC/EN 62423
Electrical features				
type (wave form of the earth leakage sensed)		A	A	APR - F
Number of poles		1P + N	1P + N	1P + N
Rated current I_n		$6 \le I_n \le 32$ A	$6 \le I_n \le 32$ A	$6 \le I_n \le 32$ A
Rated sensitivity $I_{\Delta n}$		0.03 A	0.03–0.1 A	0.03–0.3 A
Rated voltage U_e		240 V	240 V	240 V
Insulation voltage U_i		500 V	500 V	500 V
Overvoltage category		III	III	III
Pollution degree		2	2	2
Operating voltage of circuit test		110 V (170 for 30 mA) – 264	110 V (170 for 30 mA) – 264	110 V (170 for 30 mA) – 264
Rated frequency		50/60 Hz	50/60 Hz	50/60 Hz
Rated breaking capacity acc. to IEC/EN 61009-1 I_{cn}		6000 A	10000 A	10000 A
Rated ultimate short-circuit capacity I_{cu} acc. to IEC/EN 60947-2 (only referring to short circuit test)	6…16 A 20…32 A		25 kA 15 kA	25 kA 15 kA
Rated service short-circuit capacity I_{cs} acc. to IEC/EN 60947-2 (only referring to short circuit test)	6…16 A 20…32 A		15 kA 7.5 kA	15 kA 7.5 kA
Rated residual breaking capacity acc. to IEC/EN 61009-1 $I_{\Delta m}$		6000 A	10000 A	10000 A
Rated impulse withstand voltage (1.2/50) U_{imp}		4 kV	4 kV	4 kV
Dielectric test voltage at ind. freq. for 1 min.		2.5 kV (50/60 Hz, 1 min.)	2.5 kV (50/60 Hz, 1 min.)	2.5 kV (50/60 Hz, 1 min.)
Thermomagnetic release – characteristic	B: $3\,I_n \le I_n \le 5\,I_n$	X	X	X
	C: $5\,I_n \le I_n \le 10\,I_n$	X	X	X
Energy limiting class acc. to EN 61009-1		3	3	3
Mechanical features				
Housing		Insulation group I, light grey RAL 7035	Insulation group I, light grey RAL 7035	Insulation group I, light grey RAL 7035
Toggle		Insulation group II, black RAL 9005, sealable in ON-OFF positions	Insulation group II, black RAL 9005, sealable in ON-OFF positions	Insulation group II, black RAL 9005, sealable in ON-OFF positions
Contact position indication		Green/Red Window	Green/Red Window	Green/Red Window
Endurance		Electrical endurance: 10000 ops Mechanical endurance: 10000 ops		
IP code		IP20, IP40 in enclosure with cover	IP20, IP40 in enclosure with cover	IP20, IP40 in enclosure with cover
Shock resistance acc. to IEC/EN 61373		5 g – 30 ms, 3 shocks	5 g – 30 ms, 3 shocks	5 g – 30 ms, 3 shocks
Vibration resistance acc. to IEC/EN 60068-2-6		2…13.2 Hz/1 mm 13.2…100 Hz/0.7 g, 5 cycles 5…150 … 5 Hz/1 g, 4 waves	2…13.2 Hz/1 mm 13.2…100 Hz/0.7 g, 5 cycles 5…150 … 5 Hz/1 g, 4 waves	2…13.2 Hz/1 mm 13.2…100 Hz/0.7 g, 5 cycles 5…150 … 5 Hz/1 g, 4 waves
Reference temperature for setting of thermal element		30 °C	30 °C	30 °C
Ambient temperature		–25…+60 °C	–25…+60 °C	–25…+60 °C
Storage temperature		–40…+70 °C	–40…+70 °C	–40…+70 °C
Installation				
Terminal type		failsafe bi-directional cylinder-lift terminal (shock protected)		
Top terminal rigid IEC connections (solid/stranded)		Single: 0.75 … 35 mm² (front slot), 0.75 … 10 mm² (rear slot) Multiple: 2 x 0.75 … 10 mm² (front slot), 2 x 0.75 … 6 mm² (rear slot), with cables of same type and size		
Top terminal flexible IEC connections		Single: 0.75 … 25 mm² (front side), 0.75 … 6 mm² (rear slot) Multiple: 2 x 0.75 … 10 mm² (front slot), 2 x 0.75 … 6 mm² (rear slot), with cables of same type and size		

RCBO technical details

Internal resistances and power losses, Derating

Internal resistances and power losses

For RCBO internal resistance and power loss are intended per device (cold resistance at room temperature)

FS401E, FS401M
B, C tripping characteristics

I_n [A]	R_i [mΩ]	P_v [W]
6	53	1.9
10	19	1.9
13	14	2.3
16	11	2.7
20	7.6	3.0
25	7.0	4.4
32	5.5	5.6

FS400E, FS400M, FS400MK
B, C tripping characteristics

I_n [A]	Ambient temperature T (°C)										
	0	10	15	20	25	30*	35	40	45	50	55	60
6	7.10	6.70	6.55	6.40	6.20	6.00	5.80	5.60	5.40	5.20	5.00	4.80
10	11.00	10.70	10.50	10.30	10.15	10.00	9.85	9.70	9.55	9.40	9.25	9.10
13	14.40	14.00	13.75	13.50	13.25	13.00	12.75	12.50	12.25	12.00	11.75	11.50
16	17.40	17.00	16.75	16.50	16.25	16.00	15.75	15.50	15.25	15.00	14.75	14.50
20	21.70	21.10	20.85	20.60	20.30	20.00	19.70	19.40	19.10	18.80	18.50	18.20
25	28.20	27.10	26.60	26.10	25.55	25.00	24.45	23.90	23.35	22.80	22.25	21.70
32	36.00	34.70	34.00	33.30	32.65	32.00	31.35	30.70	30.05	29.40	28.75	28.10

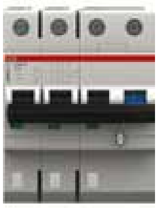
* Reference ambient air temperature for overload tripping

Influence of adjacent poles Correction factor Fm

No. of adjacent poles	correction factor
1 ... 3 poles	1
5 ... 6 poles	0.86
6	0.8
7	0.78
8	0.77
9	0.76
10	0.76

SMISSLINE TP technical details

Residual current operated breaker RCBO FS403



4-pole RCBO from the ABB SMISSLINE protective devices range
The combination of circuit protection and a residual current protection in one device as 4-pole RCBO simplifies both – planning and installation. It enables you to provide perfect protection in one device. This protection consists of:

- Short circuit protection
- Overload protection
- Residual current protection
- Preventive fire protection

High rated short-circuit breaking capacity of 10 kA, conforming to EN 61009-1
The I_{cn} 10 kA short-circuit breaking capacity of the RCBO complies with standard EN 61009-1. This standard specifies testing and usage of RCBO's for household and similar uses. The devices can also be used by non-professionals.

Features and benefits of the new devices:

- Overall width of 72 mm (4 modules)
- Rated sensitivity 30 mA
- Current rating 10 A to 32 A
- B and C tripping characteristics
- Easy Drive double deck terminals on the output side for connecting two conductors in one chamber. The two chambers can accommodate conductors with different cross sections.

Residual current operated circuit breaker (RCBO)

FS403 technical features

		FS403E	FS403M	FS403MK (APR)
Standards		IEC 61009-1, EN 61009-1, EN 61009-2-1	IEC 61009-1, EN 61009-1, EN 61009-2-1	IEC/EN 61009-1, IEC/EN 61009-2-1, IEC/EN 62423
Electrical features				
type (wave form of the earth leakage sensed)		A	A	APR - F
Number of poles		3P + N	3P + N	3P + N
Rated current I_n		$6 \le I_n \le 32$ A	$6 \le I_n \le 32$ A	$6 \le I_n \le 32$ A
Rated sensitivity $I_{\Delta n}$		0.03 A	0.03–0.1 A	0.03–0.3 A
Rated voltage U_e		240/415 V	240/415 V	240/415 V
Insulation voltage U_i		500 V	500 V	500 V
Overvoltage category		III	III	III
Pollution degree		2	2	2
Operating voltage of circuit test		110 V (170 for 30 mA) – 264	110 V (170 for 30 mA) – 264	110 V (170 for 30 mA) – 264
Rated frequency		50/60 Hz	50/60 Hz	50/60 Hz
Rated breaking capacity acc. to IEC/EN 61009-1 I_{cn}		6000 A	10 000 A	10 000 A
Rated ultimate short-circuit capacity I_{cu} acc. to IEC/EN 60947-2 (only referring to short circuit test)	6…16 A 20…32 A		25 kA 15 kA	25 kA 15 kA
Rated service short-circuit capacity I_{cs} acc. to IEC/EN 60947-2 (only referring to short circuit test)	6…16 A 20…32 A		15 kA 7.5 kA	15 kA 7.5 kA
Rated residual breaking capacity acc. to IEC/EN 61009-1 $I_{\Delta m}$		6000 A	10 000 A	10 000 A
Rated impulse withstand voltage (1.2/50) U_{imp}		4 kV	4 kV	4 kV
Dielectric test voltage at ind. freq. for 1 min.		2.5 kV (50/60 Hz, 1 min.)	2.5 kV (50/60 Hz, 1 min.)	2.5 kV (50/60 Hz, 1 min.)
Thermomagnetic release – characteristic	B: $3 I_n \le I_n \le 5 I_n$		X	X
	C: $5 I_n \le I_n \le 10 I_n$	X	X	X
Energy limiting class acc. to EN 61009-1		3	3	3
Mechanical features				
Housing		Insulation group I, light grey RAL 7035	Insulation group I, light grey RAL 7035	Insulation group I, light grey RAL 7036
Toggle		Insulation group II, black RAL 9005, sealable in ON-OFF positions	Insulation group II, black RAL 9005, sealable in ON-OFF positions	Insulation group II, black RAL 9005, sealable in ON-OFF positions
Contact position indication		Green/Red Window	Green/Red Window	Green/Red Window
Endurance		Electrical endurance: 10 000 ops Mechanical endurance: 10 000 ops	Electrical endurance: 10 000 ops Mechanical endurance: 10 000 ops	Electrical endurance: 10 000 ops Mechanical endurance: 10 000 ops
IP code		IP20, IP40 in enclosure with cover	IP20, IP40 in enclosure with cover	IP20, IP40 in enclosure with cover
Shock resistance acc. to IEC/EN 61373		5 g – 30 ms, 3 shocks	5 g – 30 ms, 3 shocks	5 g – 30 ms, 3 shocks
Vibration resistance acc. to IEC/EN 60068-2-6		2…13.2 Hz/1 mm 13.2…100 Hz/0.7 g, 5 cycles 5…150 … 5 Hz/1 g, 4 waves	2…13.2 Hz/1 mm 13.2…100 Hz/0.7 g, 5 cycles 5…150 … 5 Hz/1 g, 4 waves	2…13.2 Hz/1 mm 13.2…100 Hz/0.7 g, 5 cycles 5…150 … 5 Hz/1 g, 4 waves
Reference temperature for setting of thermal element		30 °C	30 °C	30 °C
Ambient temperature		–25…+60 °C	–25…+60 °C	–25…+60 °C
Storage temperature		–40…+70 °C	–40…+70 °C	–40…+70 °C
Installation				
Terminal type		failsafe bi-directional cylinder-lift terminal (shock protected)		
Top terminal rigid IEC connections (solid/stranded)		Single: 0.75 … 35 mm² (front slot), 0.75 … 10 mm² (rear slot) Multiple: 2 x 0.75 … 10 mm² (front slot), 2 x 0.75 … 6 mm² (rear slot), with cables of same type and size		
Top terminal flexible IEC connections		Single: 0.75 … 25 mm² (front side), 0.75 … 6 mm² (rear slot) Multiple: 2 x 0.75 … 10 mm² (front slot), 2 x 0.75 … 6 mm² (rear slot), with cables of same type and size		

RCBO technical details

Internal resistances and power losses, Derating

Internal resistances and power losses

For RCBO internal resistance and power loss are intended per device (cold resistance at room temperature)

FS403E, FS403M
B, C tripping characteristics

I_n [A]	R_i [mΩ]	P_v [W]
6	146	5.3
10	49	4.9
13	32	5.4
16	26	6.6
20	19	7.5
25	16	10.1
32	12	12.6

NOTE 1. For RCBO internal resistance and power loss are intended per device

FS400E, FS400M, FS400MK
B, C tripping characteristics

I_n [A]	Ambient temperature T (°C)											
	0	10	15	20	25	30*	35	40	45	50	55	60
6	7.10	6.70	6.55	6.40	6.20	6.00	5.80	5.60	5.40	5.20	5.00	4.80
10	11.00	10.70	10.50	10.30	10.15	10.00	9.85	9.70	9.55	9.40	9.25	9.10
13	14.40	14.00	13.75	13.50	13.25	13.00	12.75	12.50	12.25	12.00	11.75	11.50
16	17.40	17.00	16.75	16.50	16.25	16.00	15.75	15.50	15.25	15.00	14.75	14.50
20	21.70	21.10	20.85	20.60	20.30	20.00	19.70	19.40	19.10	18.80	18.50	18.20
25	28.20	27.10	26.60	26.10	25.55	25.00	24.45	23.90	23.35	22.80	22.25	21.70
32	36.00	34.70	34.00	33.30	32.65	32.00	31.35	30.70	30.05	29.40	28.75	28.10

* Reference ambient air temperature for overload tripping

Influence of adjacent poles Correction factor Fm

No. of adjacent poles	correction factor
1 ... 3 poles	1
5 ... 6 poles	0.86
6	0.8
7	0.78
8	0.77
9	0.76
10	0.76

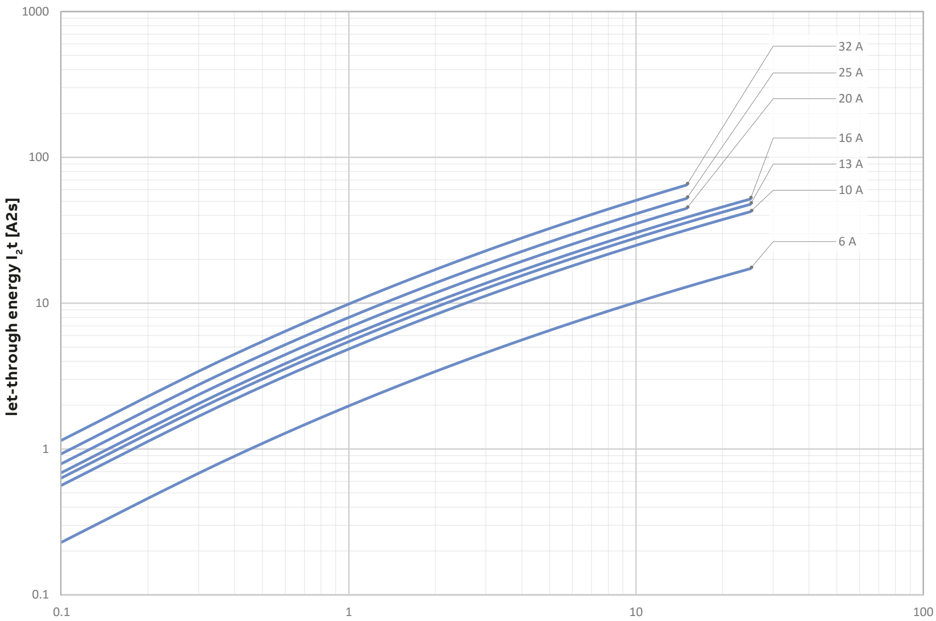
RCBO technical details

Limitation of specific let-through energy I^2t, peak current I_p

I^2t diagrams - Specific let-through energy value I^2t

The I^2t curves give the values of the specific let-through energy expressed in kA^2s (A=amps; s=seconds) in relation to the perspective short-circuit current (I_{rms}) in kA.

FS400M characteristics B–C

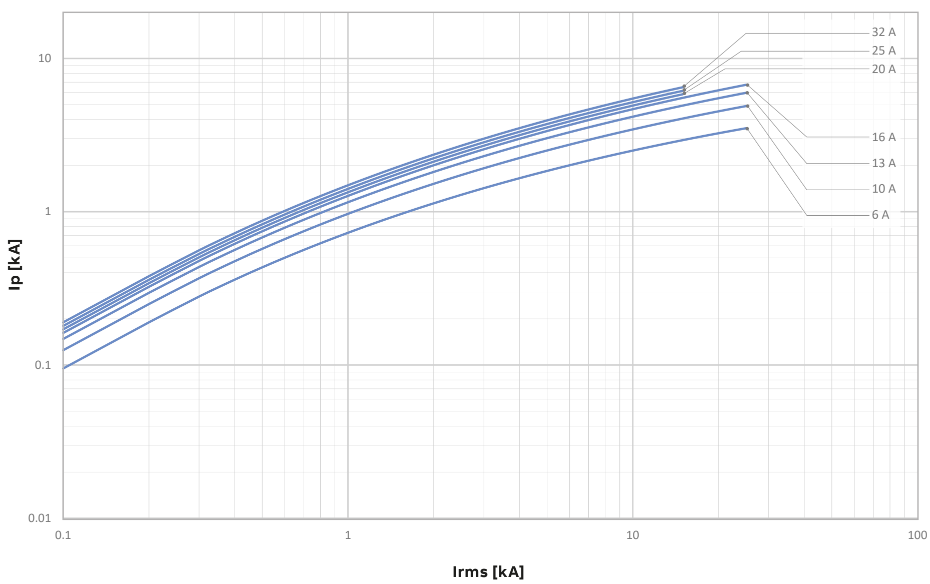


Prospective short-circuit current Ik [kA]

Limitation curves – Peak current values

The I_p curves give the values of the peak current, expressed in kA, in relation to the perspective symmetrical short-circuit current (kA).

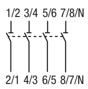
FS400M Characteristics B–C



Prospective short-circuit current Ik [kA]

SMISSLINE TP technical details

Switch disconnector



General switch disconnector

When used in a smissline socket system, the switch disconnector can be used instead of the incoming terminal block for up to 63 A With the smissline IS404 switch disconnector, individual loads, groups of loads or entire system parts can be separated or connected to the input supply.

The key features of the switch disconnector

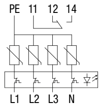
- Input supply switch
- On-Off function
- Clear indication of switching position
- Snap-on auxiliary switch available
- Uniform smissline design

Technical data for switch disconnector IS404

Rated voltage U_n:	230/400 V ~
Rated current I_n:	63 A
Rated frequency f_n:	50 Hz
Number of poles:	4
Rated impulse withstand voltage:	6 kV
Connection cross-sections C_u:	At top, touch finger-proof. Suitable for connecting up single-, multi- and fine-wire conductors of up to 25 mm²
Degree of protection:	IP40
Endurance, mechanical/electrical:	5000 operating cycles
Mounting position:	any
Ambient temperature:	–25 °C ... +40 °C
Specifications:	EN/IEC 60947-3
Weight (approx.):	250 g
Switching duty:	AC-22A

SMISSLINE TP technical details

Surge arrester OVR



Description of product
The ‘OVR’ surge protector is a 4-pole type II surge arrester meeting the requirements of IEC 61643-11.
The OVR is used to protect low voltage distribution systems and devices from overvoltages (DIN VDE 100) caused by remote lightning strikes or switching operations.
Typical sites of use are main and sub-distribution for low voltage systems where the arrester is plugged in directly on to the SMISSLINE busbar system.

Display and maintenance
The protective elements (high-performance varistors) are monitored thermally. In the event of a defect, this monitor automatically disconnects the overloaded high-performance varistors from the power supply and the operating indication changes from green to red. This status is also indicated by the signalling contact. In such cases, the arrester should be replaced immediately because the downstream devices are no longer protected against overvoltages.
If the operating indication is neither green nor red, you should check whether the connections are correct. You must also check whether there is any supply voltage.
If the device is connected correctly, the operating display (LED) lights up green.
The surge arrester requires no maintenance. A regular visual check is recommended.
Warning: When taking insulation resistance measurements on the electrical system, the arrester should be disconnected from the power supply since otherwise the measurement may be affected by the arrester characteristics. The enclosed sticker with the corresponding note should be placed in a clear position on the distribution board.

Assembly
Site of installation and electrical connection
The ‘OVR’ surge arrester installed at the input supply of the system to be protected.
The OVR404 is plugged in directly on to the SMISSLINE busbar system.

Earth conductor rating
The OVR should be linked to ground potential using the shortest route possible.
The earth conductor supplied with the device can be used for this purpose. The connection must be as short as possible. The minimum cross-section is 6 mm^2.

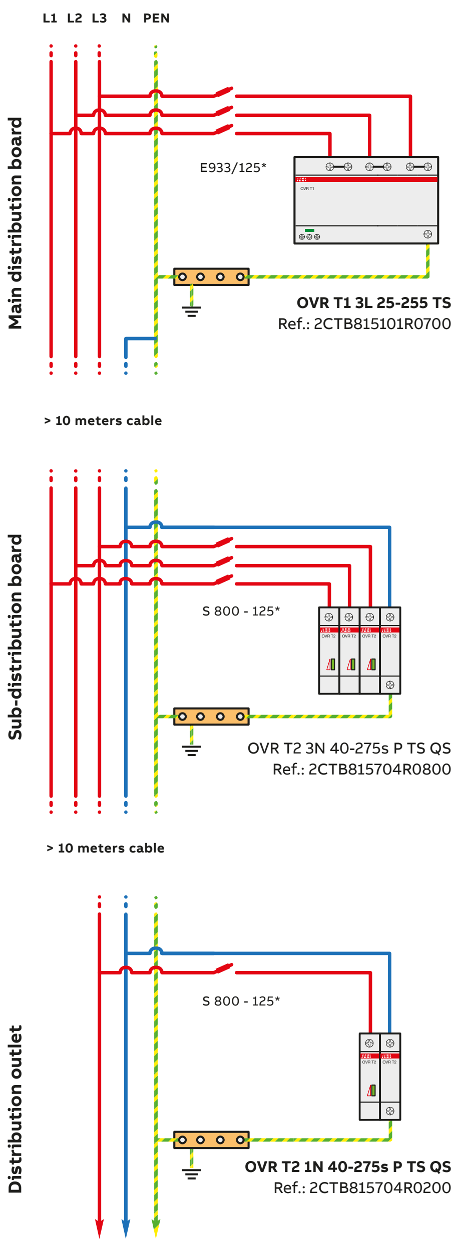
Running cables
Protected and unprotected cables (also including the earth conductor) must not be routed directly parallel to one another. They should be separated such that surge interference from unprotected to protected cables cannot occur. Cables should cross one another at right angles.

SMISSLINE TP technical details

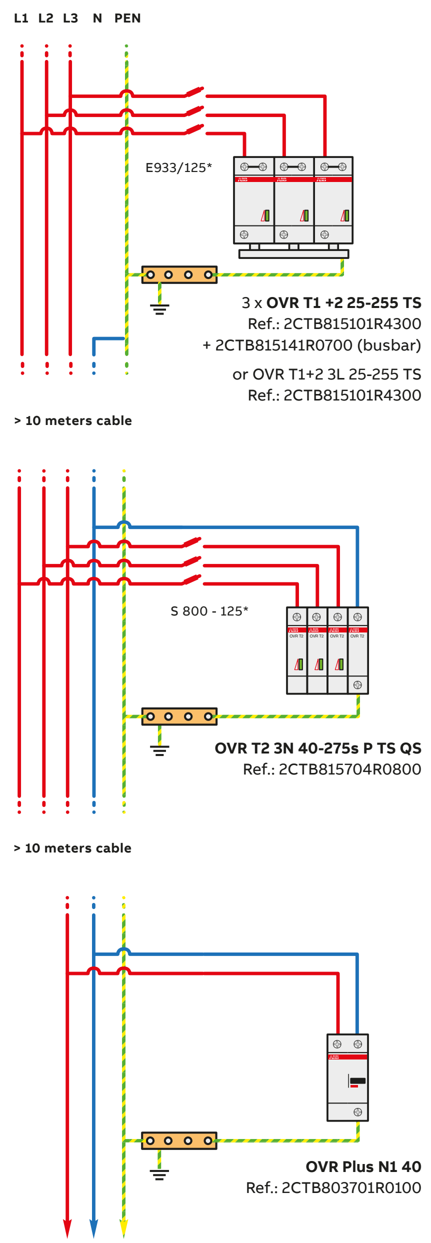
Surge arrester OVR

Coordination between surge arrester
In order to ensure a full and complete protection it is necessary to have coordination between different surge arrester types.

Configuration 1
15 kA ≤ I_p ≤ 50 kA



Configuration 2
7 kA ≤ I_p ≤ 15 kA

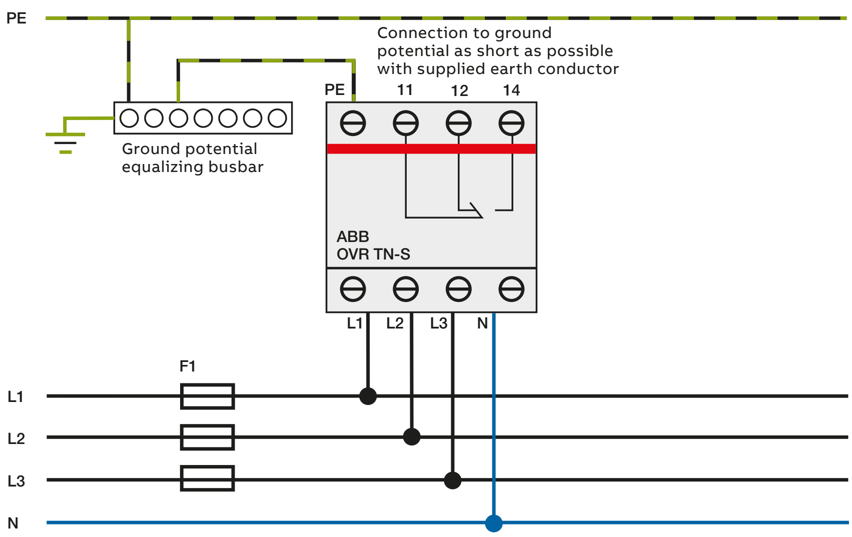


SMISSLINE TP technical details

Surge arrester OVR

Rated voltage U_n:	230/400 V AC
Max. Continuous voltage U_c:	275 V AC
Number of poles:	4 (TN-S system)
Power consumption at U_n:	1.2 W per device
Requirement class according to IEC 61643-1:	Type 2
Rated leakage surge current I_n (9/20 µs):	15 kA
Max. leakage surge current I_{smax} (9/20 µs):	30 kA
Protection level U_p at I_{sn}: U_p at I_s = 5 kV:	≤ 1.5 kV ≤ 1 kV
Max. leakage surge current I_{sg} (9/20 µs):	100 kA 4-pole
Response time t_a:	≤ 25 ms
Connection cross-sections PE / L1/L2/L3/N:	Opposing action stroke clamp on cylinder, touch finger-proof. Suitable for connecting up single-, multi- and fine-wire conductors up to 25 mm²
Max. Back-up fuse:	160 A gL/gG / 25 kA
Short-circuit withstandability with max. Back-up fuse:	25 kA
Signal contact max. operating voltage: max. load current: 1 changeover contact:	250 V AC 2 A 11/12 normally closed contact, 11/14 normally open contact
Temperature range:	–25 ... +60 °C
Degree of protection:	IP 20
Plastic parts: Contacts:	halogen-free cadmium-free

Surge protection TN-S system



SMISSLINE TP technical details

Auxiliary switches and signal contacts

General

The auxiliary switches and signal contacts are snapped on to the left of the protective devices. On the miniature circuit breakers an optional mounting on the right is also possible. For auxiliary switches and signal contacts supplied via SMISSLINE auxiliary busbars LA or LB a version with integrated contacting pieces is available Conventional supply via the terminals of the auxiliary devices is possible.

Function

The auxiliary switch works in the same way as the main contacts. The signal contact only operates when the protective device trips.
This can be simulated with the white test button. Each time the signal contact is tripped, it must be reset to its starting position using the orange-coloured reset button.
Auxiliary switch and signal contacts have special contacts whitch ensure high switching reliability even in systems with low voltages or low currents (PLC, signal systems etc.).

Auxiliary switch contacts operate at the same time as the contacts of the protective device (activated manually or automatically).

Normally open contact — 13
NO (normally open) — 14 — joint operation with protective device

Normally open contact — 21
NC (normally close) — 22 — opposing operation with protective device

Signal contacts only operate when the protective device is tripped electrically as a result of a short-circuit, a fault current or overcurrent (undervoltage for MS325).

Normally open contact — 97
NO (normally open) — 98 — closes during automatic trip

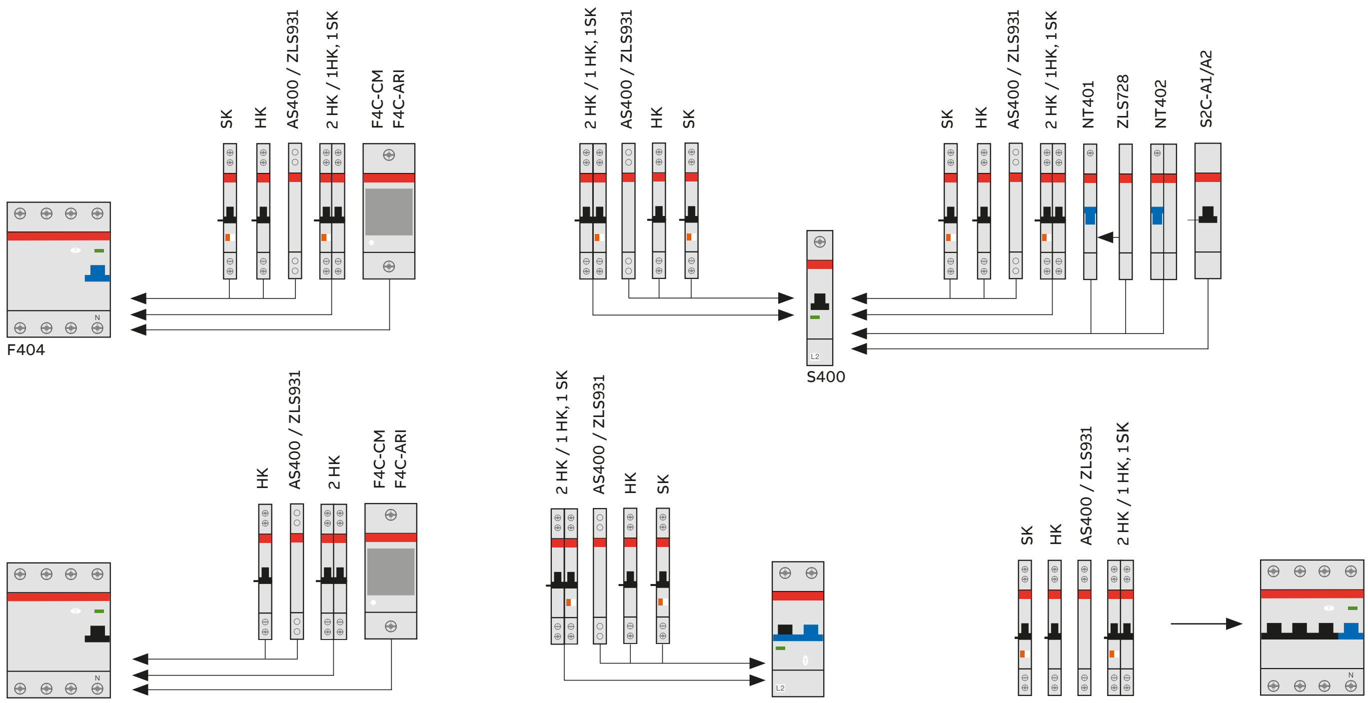
Normally closed contact — 05
NC (normally close) — 06 — opens during automatic trip

Technical data for auxiliary switch and signal contact

	Signal contact SK400	**Auxiliary switch HK400**
Rated voltage U_n:	400 V	400 V
Rated impulse withstand voltage:	4 kV	4 kV
Rated current: – I_{th}: – AC15 – DC13 – DC15	 6 A 2 A/230 V / 1 A/400 V 0.55 A/125 V= 0.27 A/250 V=	 6 A 2 A/230 V / 1 A/400 V 0.55 A/125 V= 0.27 A/250 V=
Minimum current/voltage:	10 mA 12 V=	10 mA 12 V= (to ensure reliable electrical operation)
Connection cross-sections:	Rigid IEC connections (solid/stranded) Single: 0.75…1.5 mm², Multiple: 2 x 0.75…1.5 mm², Flexible IEC connections Single: 0.75…1.5 mm², Multiple: 2 x 0.75…1.5 mm², Stripping length 7.5 mm	
Plastic parts:	Free of halogen und cad-mium	Free of halogen und cadmium
Internal resistance R_i:	0.0065 Ω	0.0065 Ω
Power loss at rated current P_v:	0.24 W	0.24 W
Ambient temperature:	$T_{max.}$ +55 °C T_{min} −25 °C	$T_{max.}$ +55 °C T_{min} −25 °C
Tightening torque:	1 Nm	1 Nm

SMISSLINE TP technical details

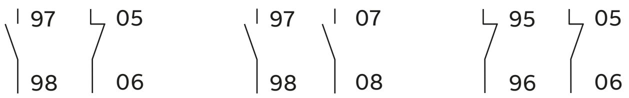
Accessory mounting



On each protective device can be mounted:

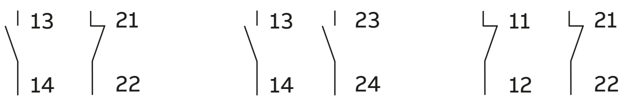
	1 auxiliary switch
or	1 signal contact
or	2 auxiliary contact switches
or	1 auxiliary switch and 1 signal contact

Contact description signal contact



SK40011 SK40020 SK40002

Contact description auxiliary switch



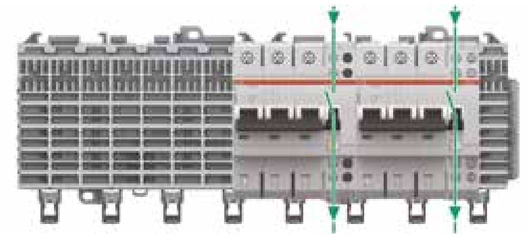
① If you use an auxiliary switch and a signal contact you must connect first the signal contact on the MS325

SMISSLINE TP technical details

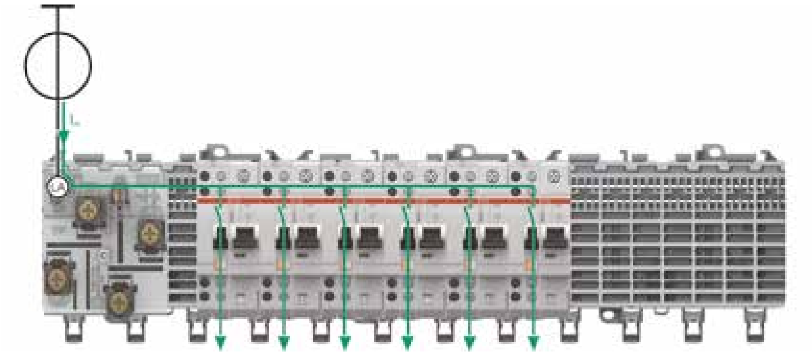
Auxiliary switches and signal contacts

1. Wiring without auxiliary busbars LA, LB

Wiring of auxiliary switch and signal contact blocks without contact to the auxiliary busbars LA and LB.

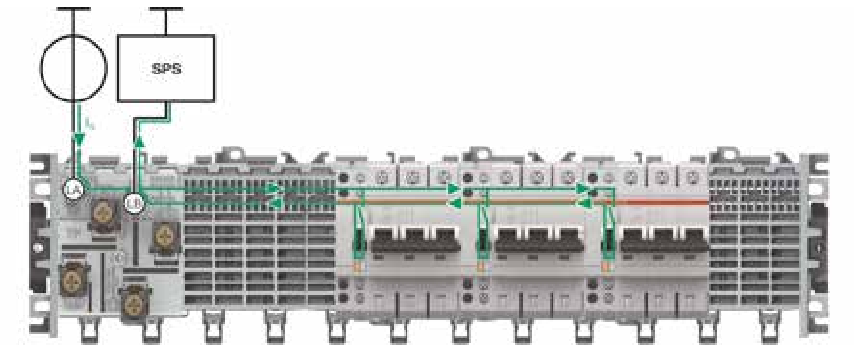


2. Input contacts the auxiliary busbars LA, LB. Standard output wiring.

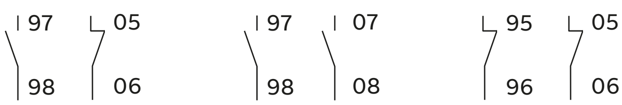


3. Collective alarm, signal contact contacts the auxiliary busbars LA, LB

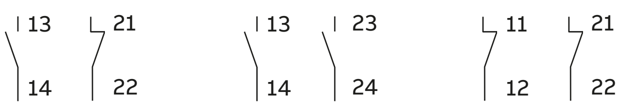
A cost-effective collective alarm solution can be implemented without additional wiring by using this arrangement.



Contact description signal contact



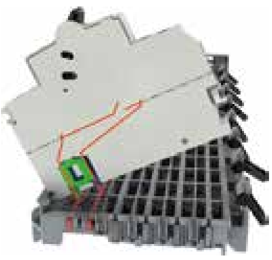
Contact description auxillary contact



SMISSLINE TP technical details

Auxiliary switches and signal contacts

Contact arrangements to auxiliary busbars

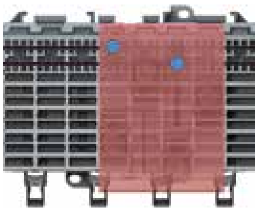


Left/right mounting of auxiliary switch/signal contact for miniature circuit breaker
Space-saving on the socket system
By mounting the auxiliary switches/signal contacts alternately on the left and right, the installation width on the SMISSLINE socket system can be reduced. A dummy housing is therefore not needed when just using auxiliary switches or signal contacts.

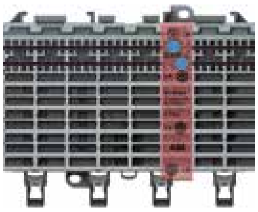
S400 miniature circuit breakers with auxiliary switches mounted on left and right: 25% space saving

S400 miniature circuit breakers with NT40163 9 mm on the right and S400 with auxiliary switch on the left: 20% space saving

Supply options for auxiliary busbars LA and LB



Supply option for auxiliary busbars using incoming terminal block.

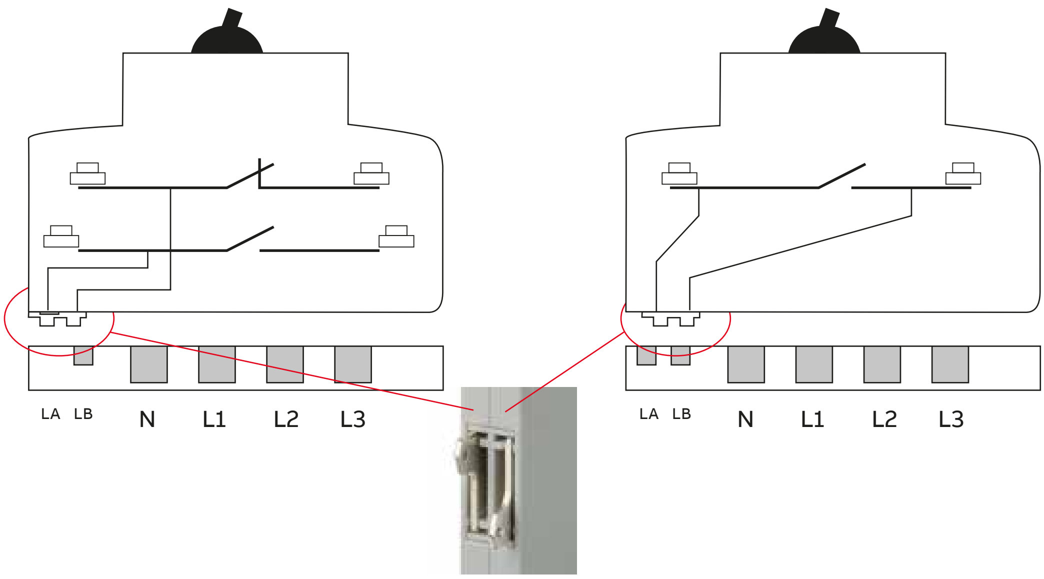


Supply option for auxiliary busbars using incoming terminal block.

Positioning of contacting piece ZLS632 on auxiliary switch and signal contact
The small auxiliary switch/signal contact contacting piece can be simply and quickly changed from the position of the LA to the LB auxiliary busbar by reversing it by 180 degree.

HK/SK 1NO, 1NC

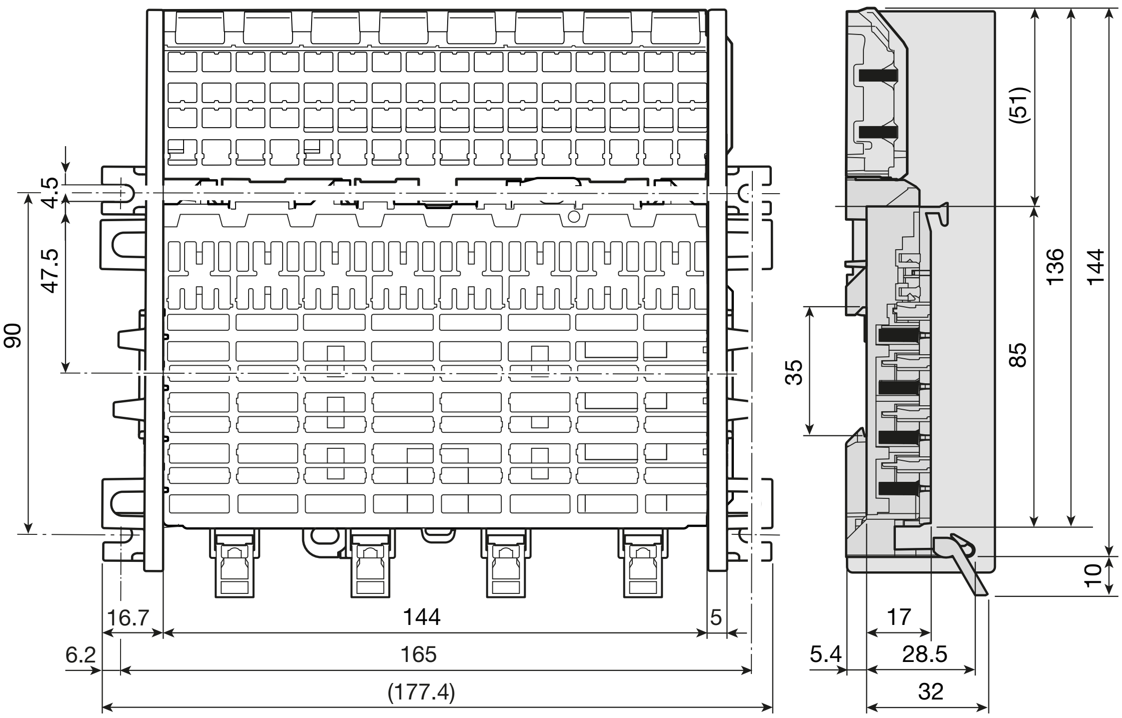
Signal or auxilary contact
Collective alarm



SMISSLINE dimension drawings

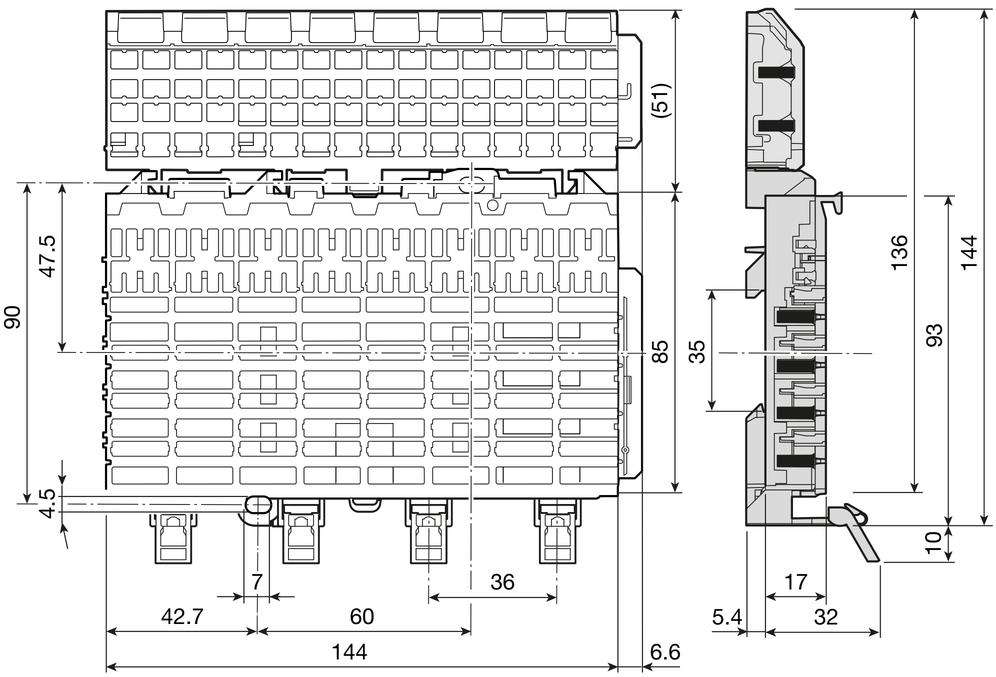
8-module socket ZLS908 and additional socket ZLS928 including end piece

2CCC451271Z0001



8-module socket ZLS908 and additional socket ZLS928

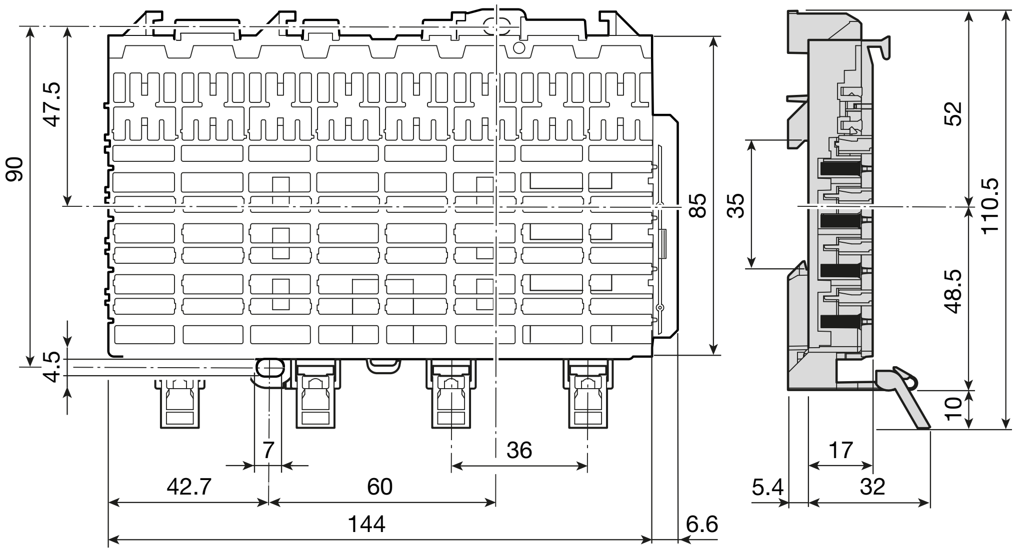
2CCC451272Z0001



SMISSLINE dimension drawings

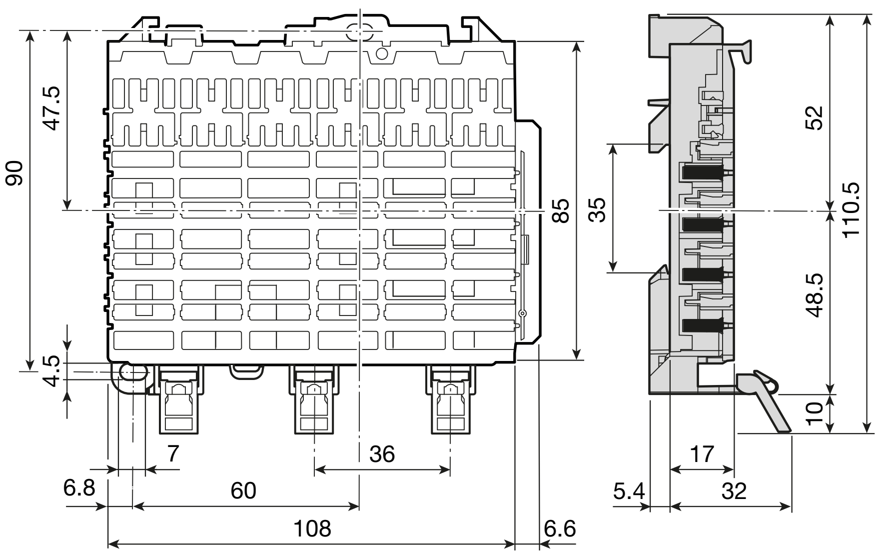
8-module socket ZLS908

2CCC451273Z0001



6-module socket ZLS906

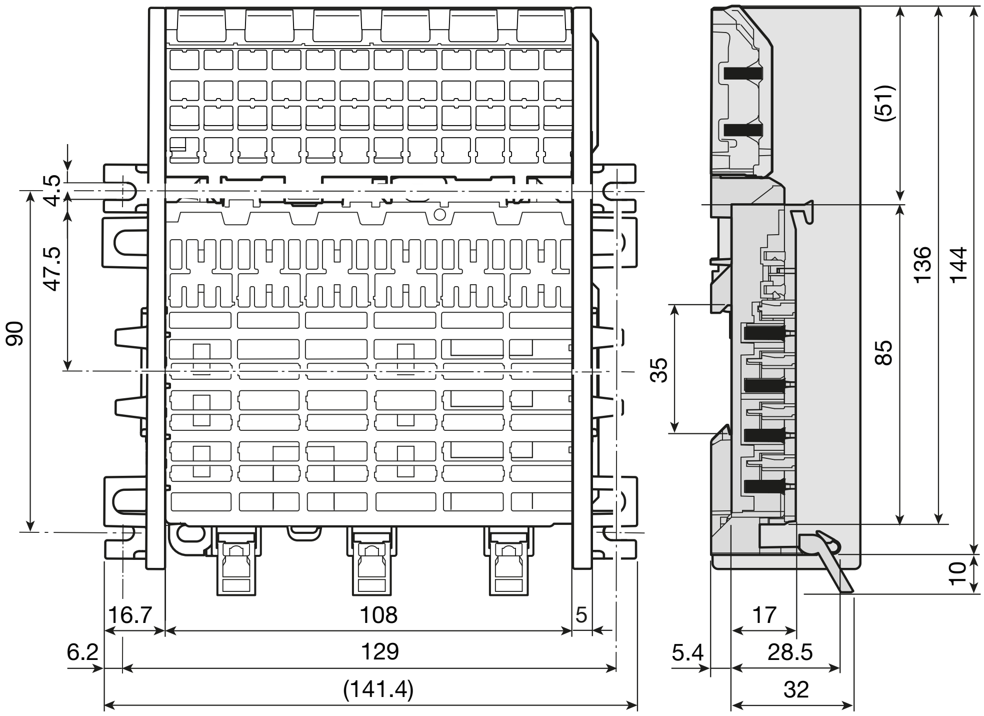
2CCC451279Z0001



SMISSLINE dimension drawings

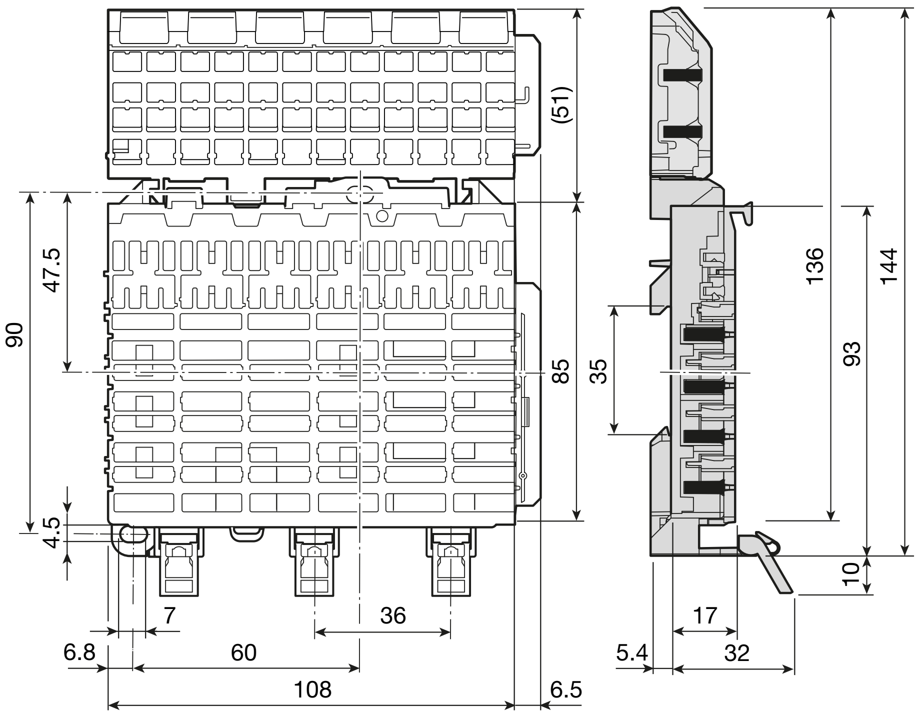
6-module socket ZLS906 and additional socket ZLS926 including end piece

2CCC451277Z0001



6-module socket ZLS906 and additional socket ZLS926

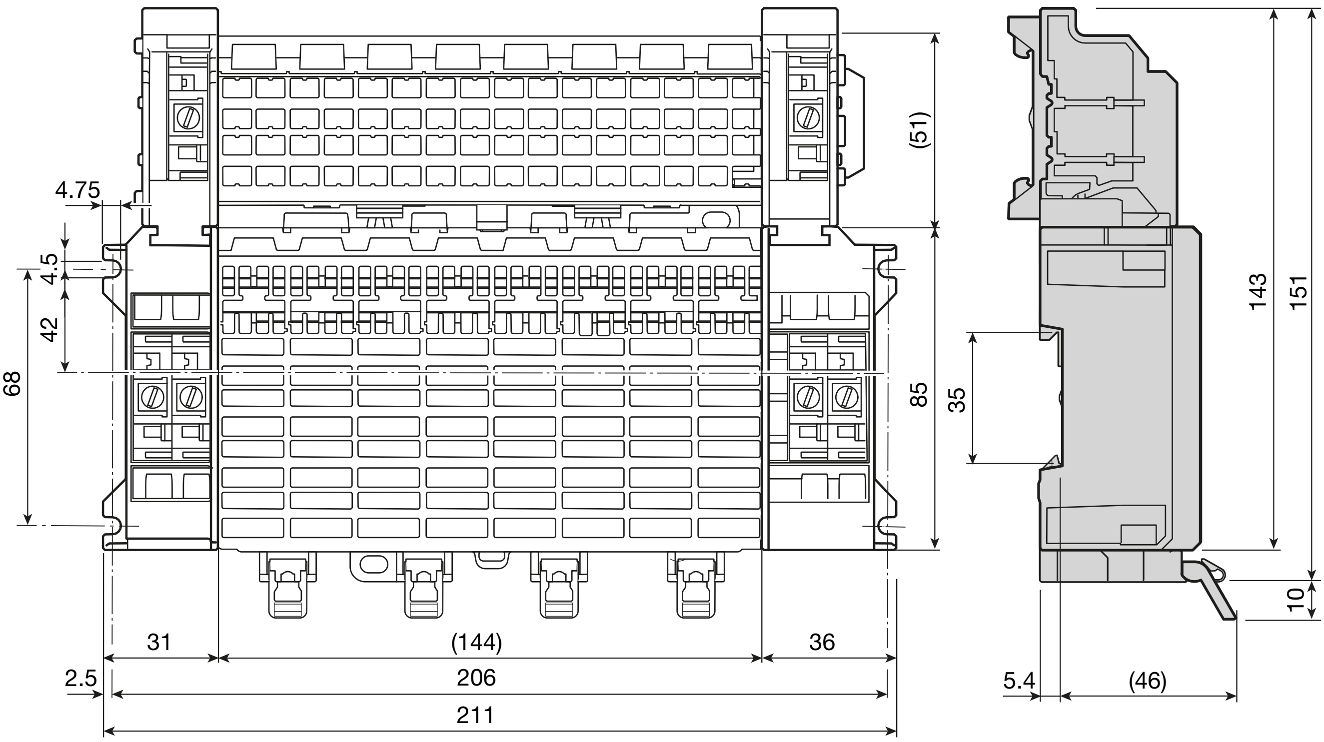
2CCC451278Z0001



SMISSLINE dimension drawings

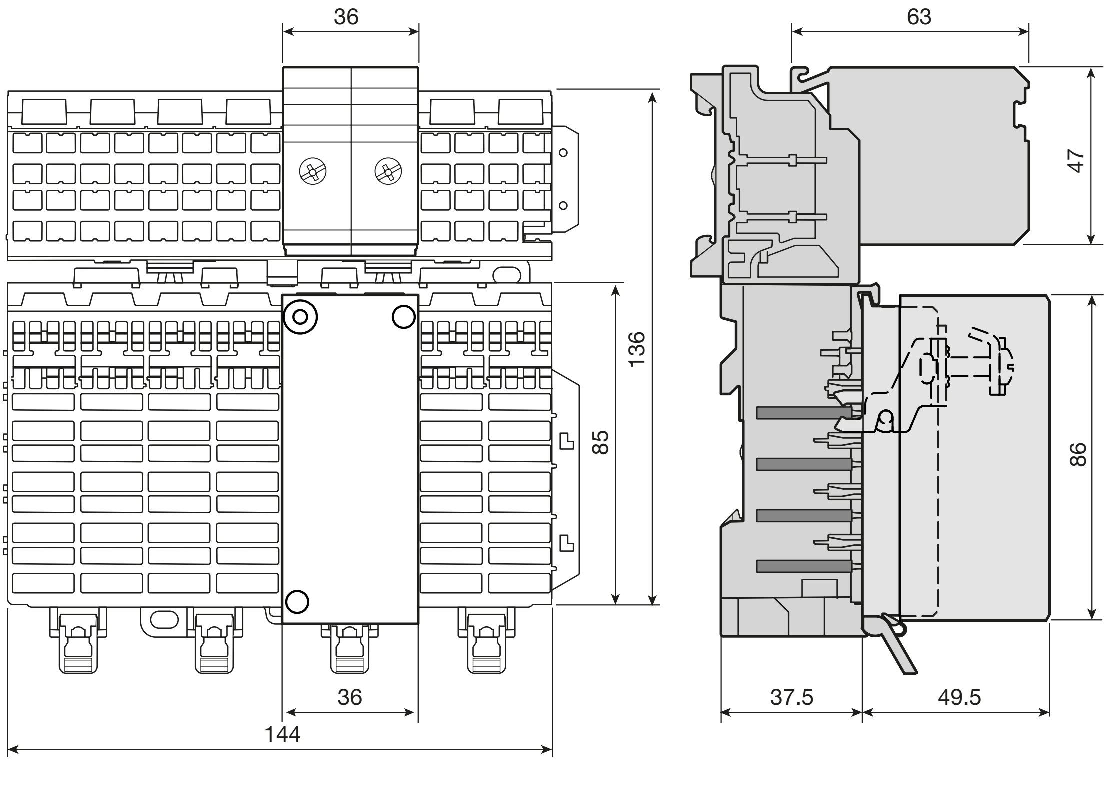
8-module socket ZLSP908 and additional socket ZLSP928 including end piece

2CCC451274Z0001



8-module socket ZLSP908 and additional socket ZLSP928

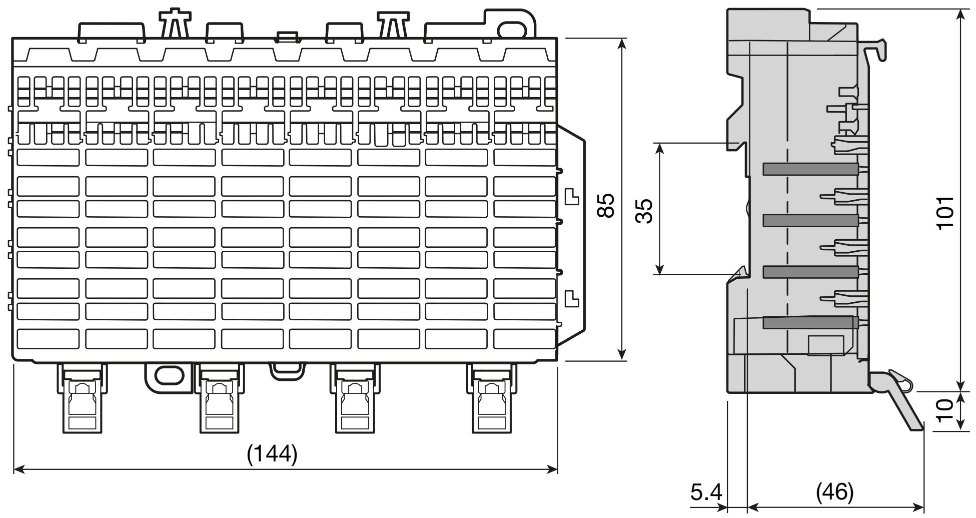
2CCC451275Z0001



SMISSLINE dimension drawings

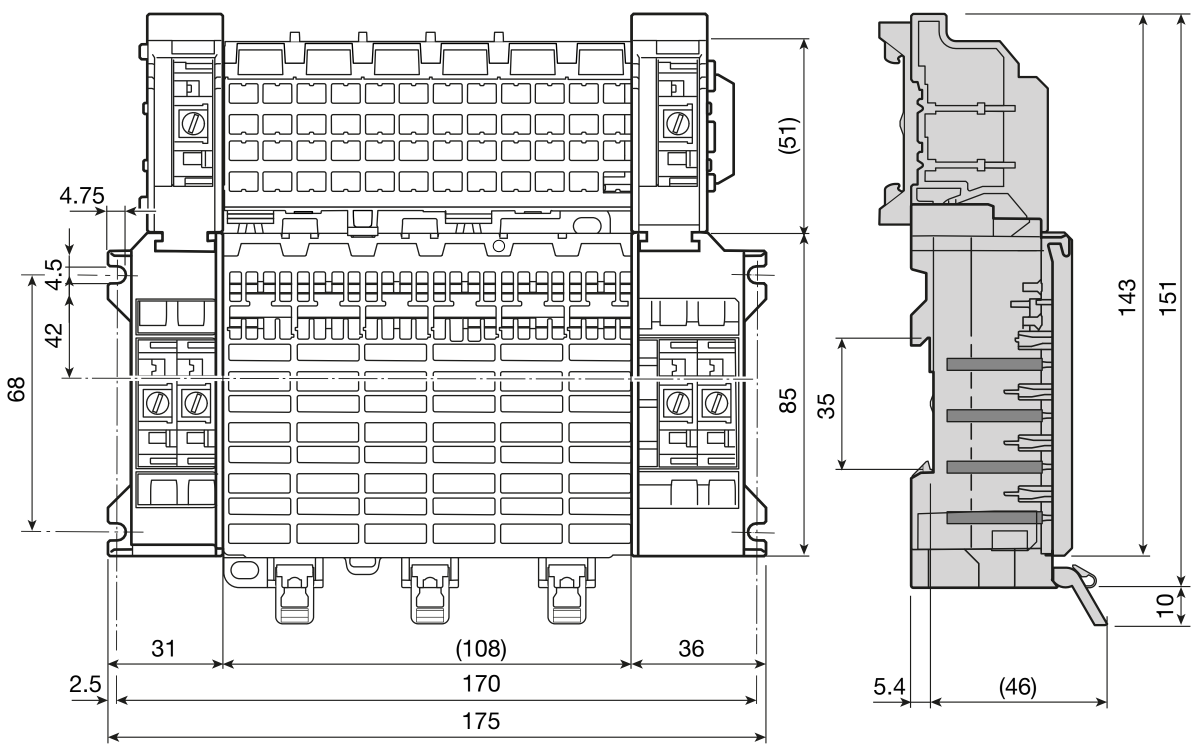
6-module socket ZLSP906

2CCC451276Z0001



6-module socket ZLSP906 and additional socket ZLSP926 including end piece

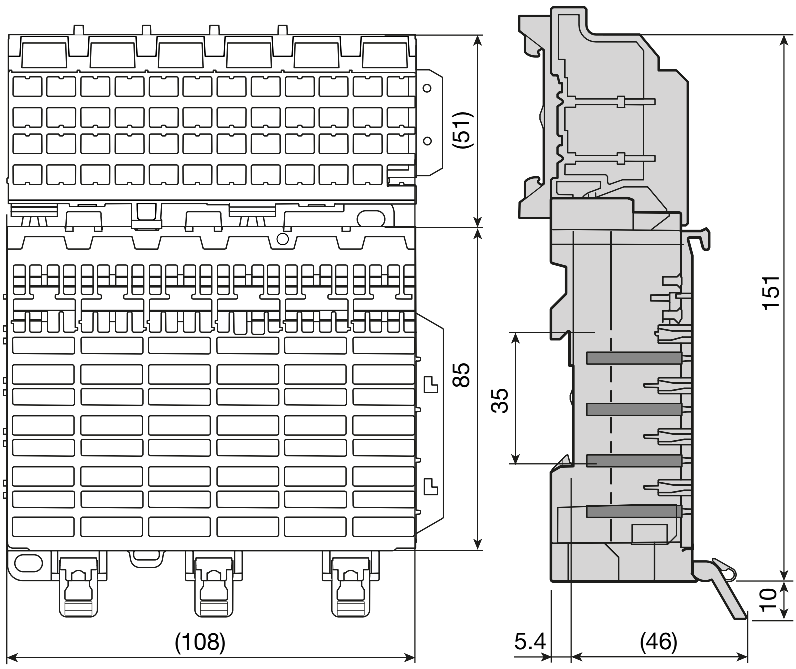
2CCC451280Z0001



SMISSLINE dimension drawings

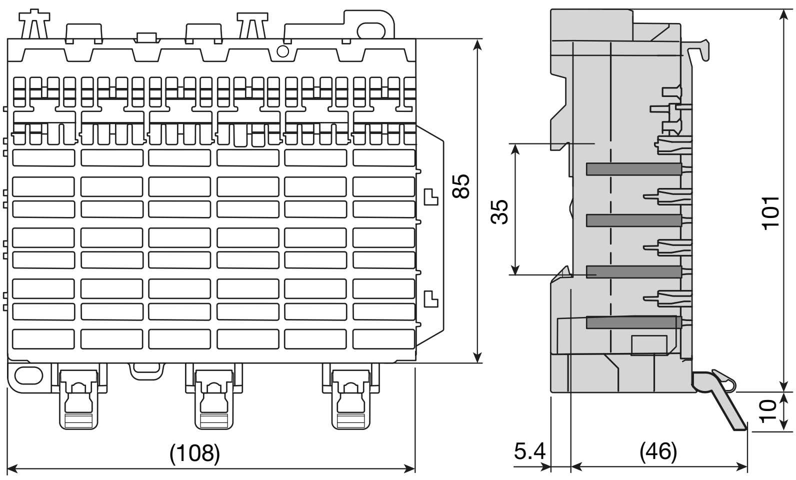
6-module socket ZLSP906 and additional socket ZLSP926

2CCC451281Z0001



6-module socket ZLSP906

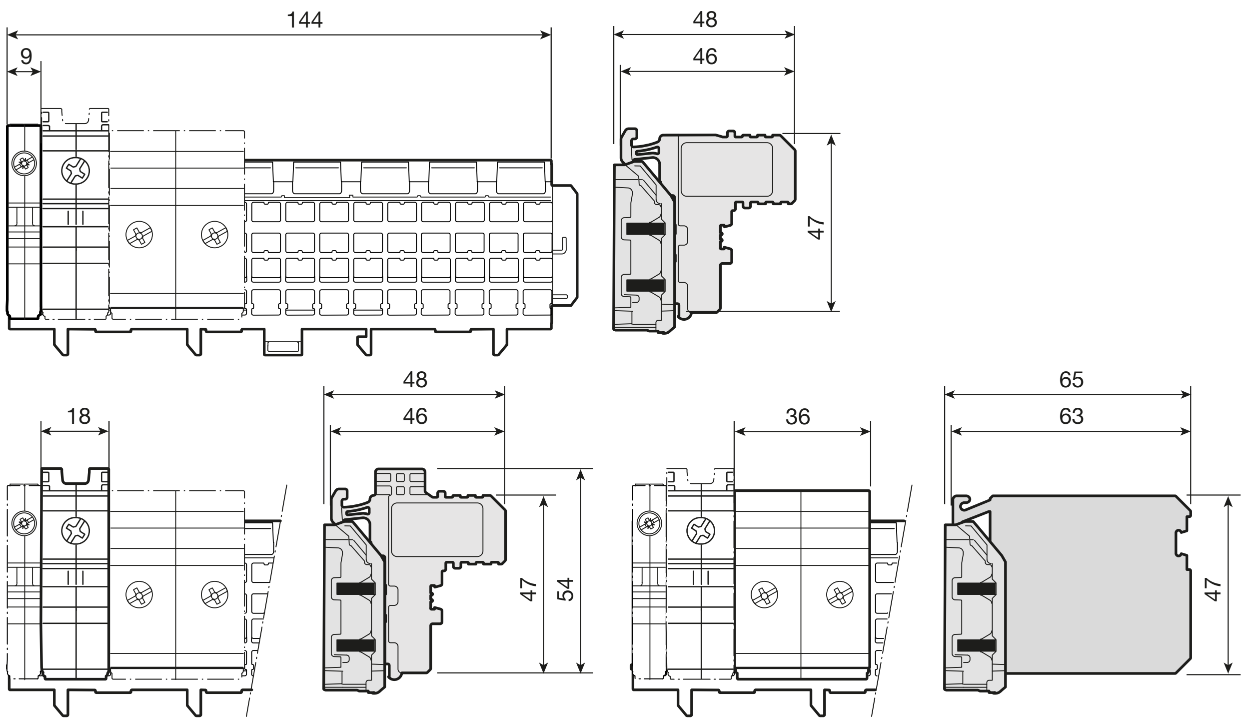
2CCC451282Z0001



SMISSLINE dimension drawings

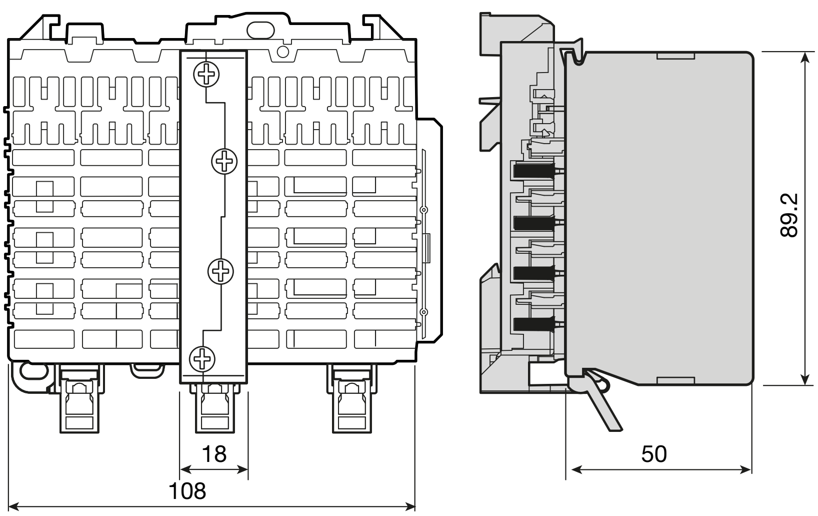
Terminal for additional socket

2CCC451289Z0001



Incoming terminal block 63A ZLS260-261

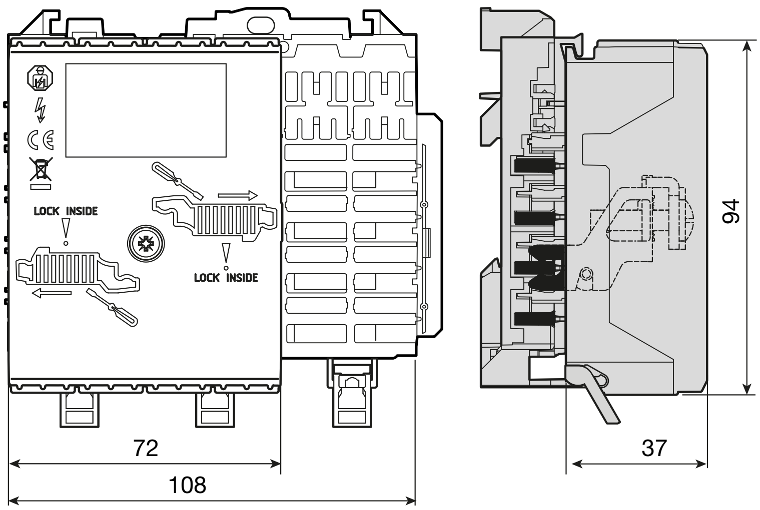
2CCC451283Z0001



SMISSLINE dimension drawings

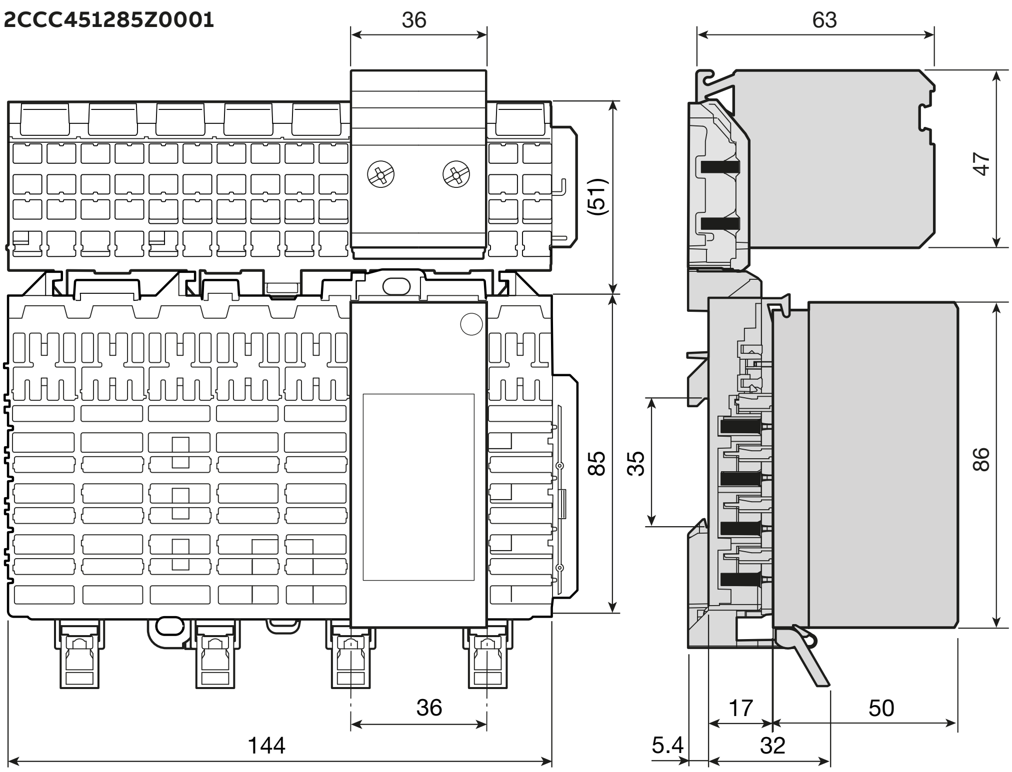
Incoming terminal block 160A ZLS924

2CCC451284Z0001



Incoming components 200A

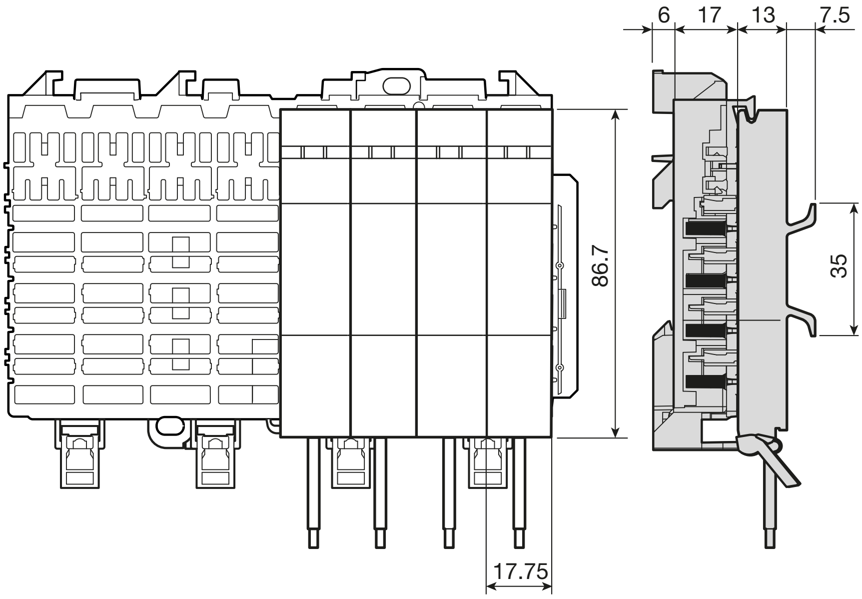
2CCC451285Z0001



SMISSLINE dimension drawings

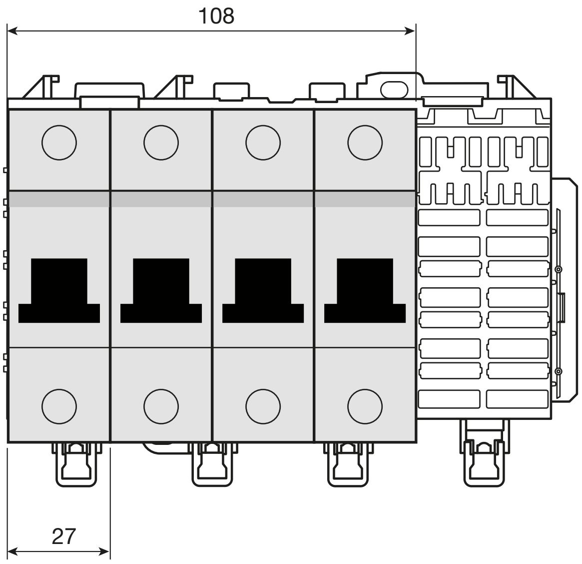
DIN rail adapters

2CCC451286Z0001



DIN rail adapters for S800

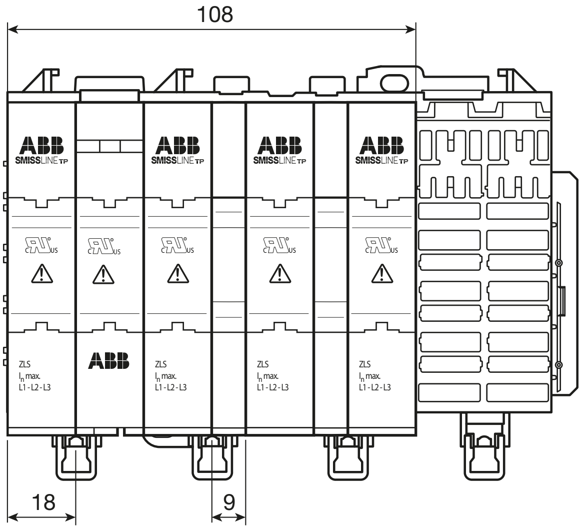
2CCC451287Z0001



SMISSLINE dimension drawings

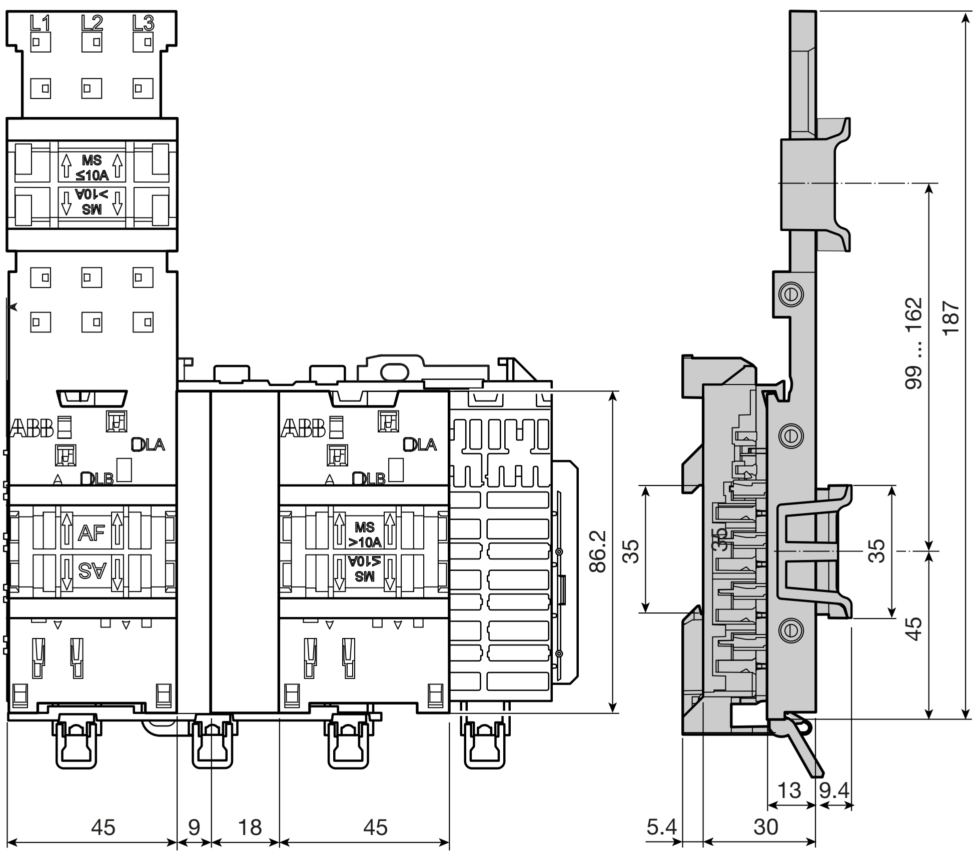
DIN rail adapters for S800

2CCC451288Z0001



Combi module and adapter for manual motor starter MS116 and MS132

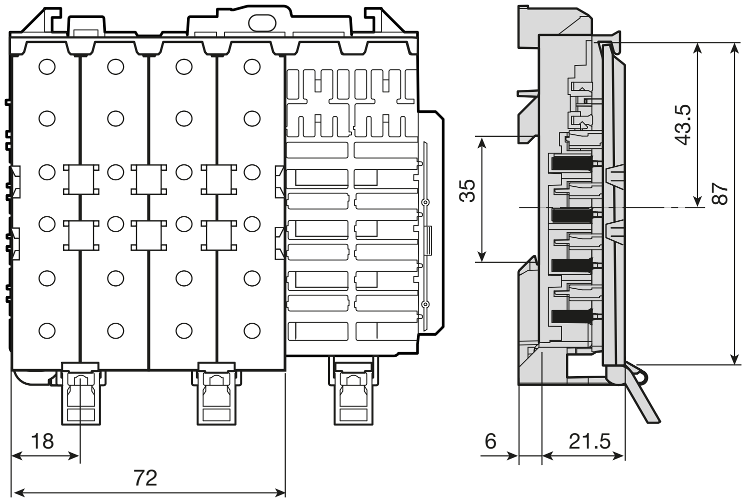
2CCC451290Z0001



SMISSLINE dimension drawings

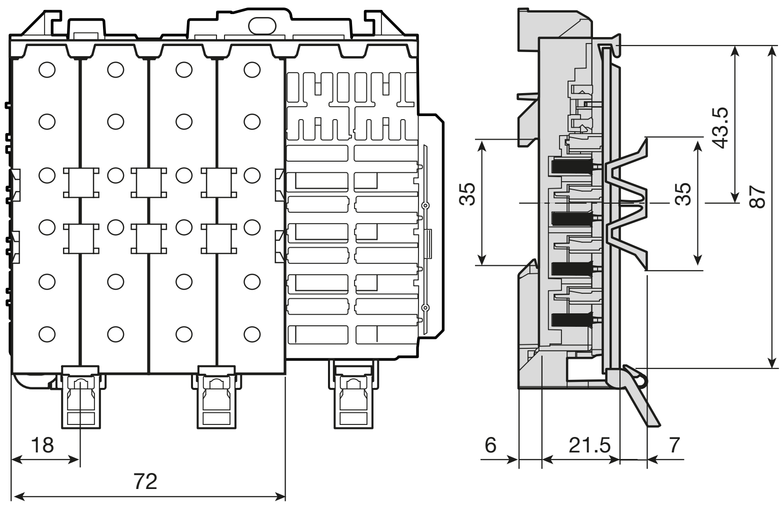
Covering of main and auxiliary busbars ZLS100

2CCC451291Z0001



Covering of main and auxiliary busbars ZLS100 with DIN adapter ZLS101

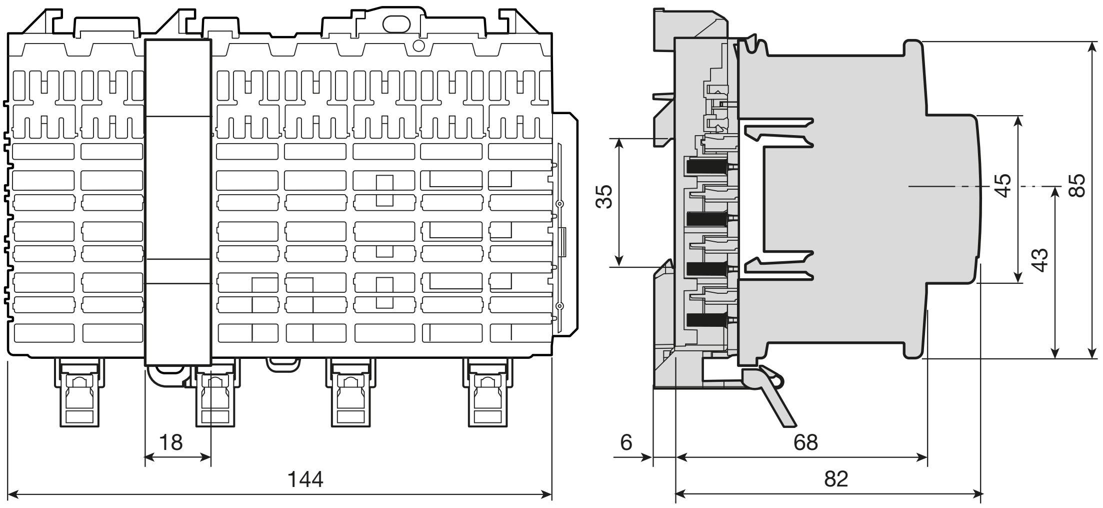
2CCC451292Z0001



SMISSLINE dimension drawings

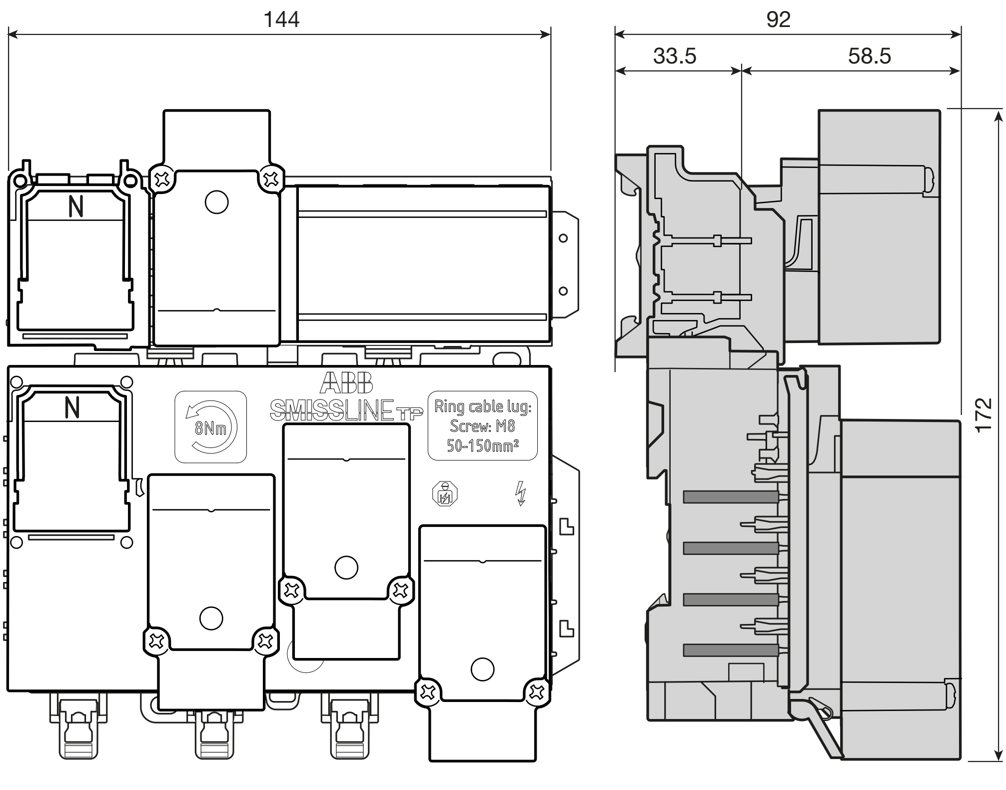
Intermediate piece ZLS725

2CCC451293Z0001



Incoming terminal block 250A ZLSP934 left version

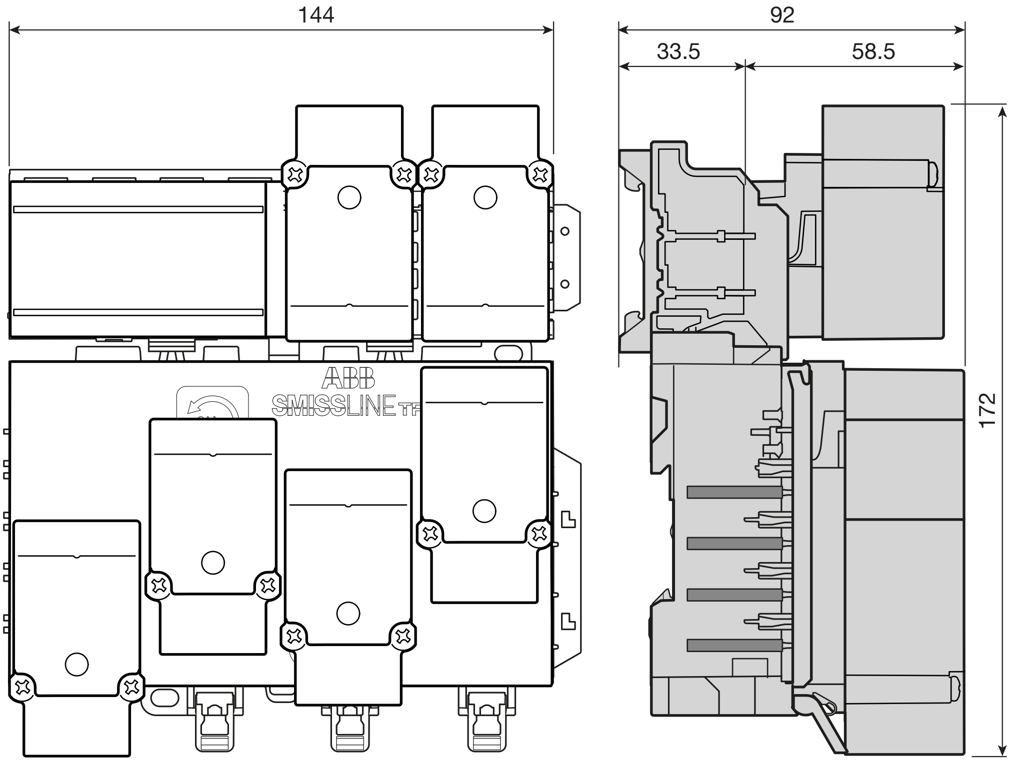
2CCC451295Z0001



SMISSLINE dimension drawings

Incoming terminal block 250A ZLSP934 right version

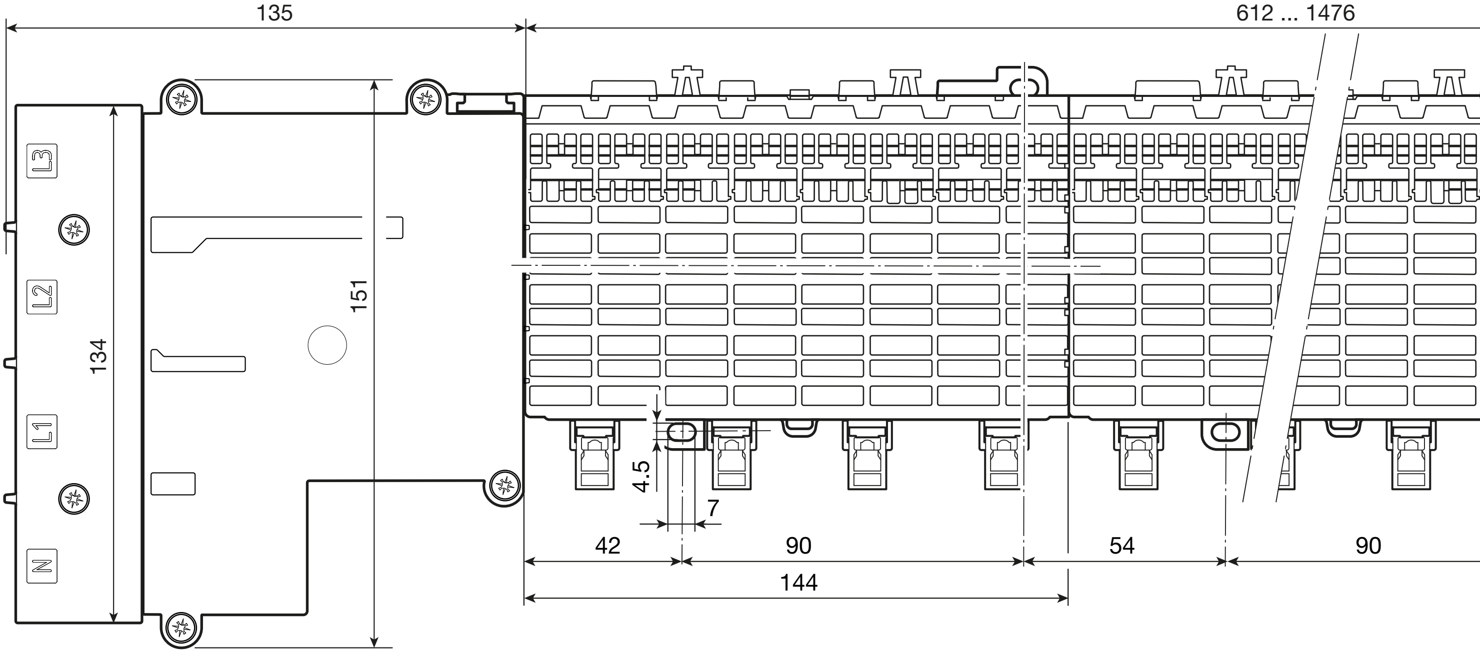
2CCC451296Z0001



SMISSLINE dimension drawings

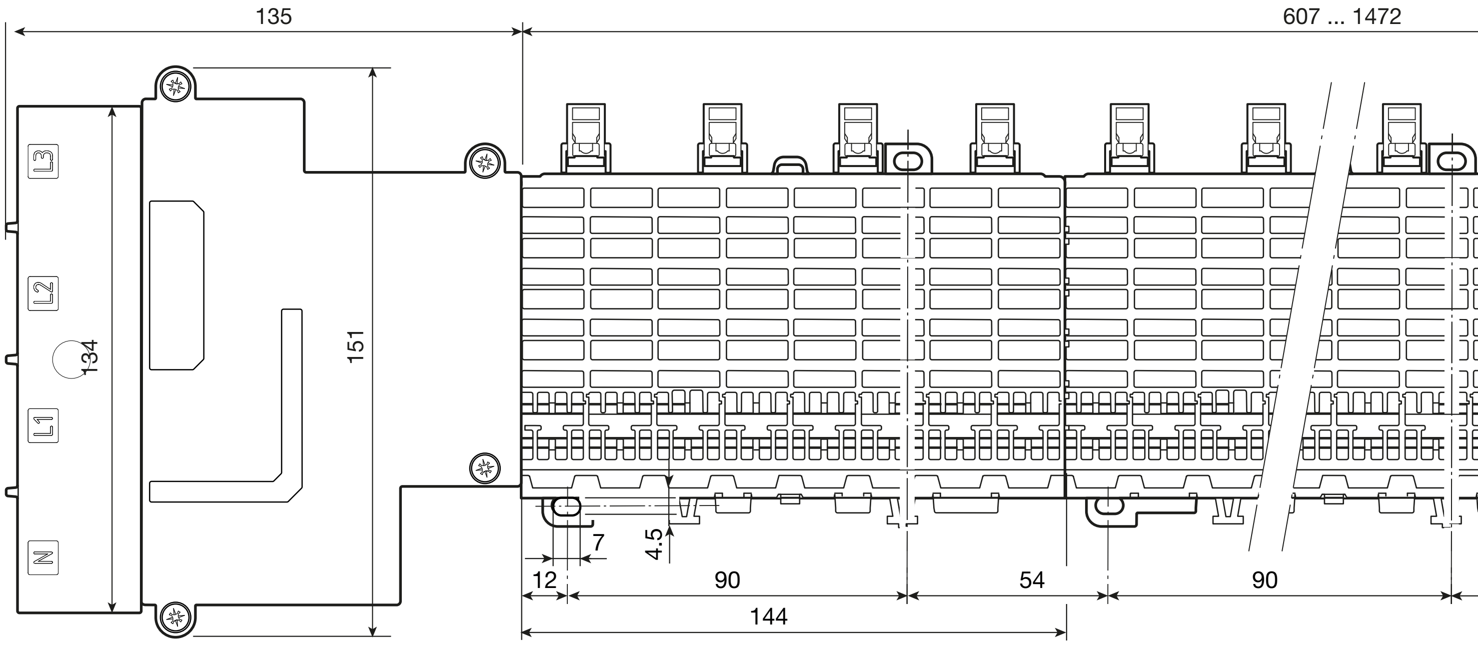
Busbar system 250 A Direct feed ZLSP960 left version

2CCC451297Z0001

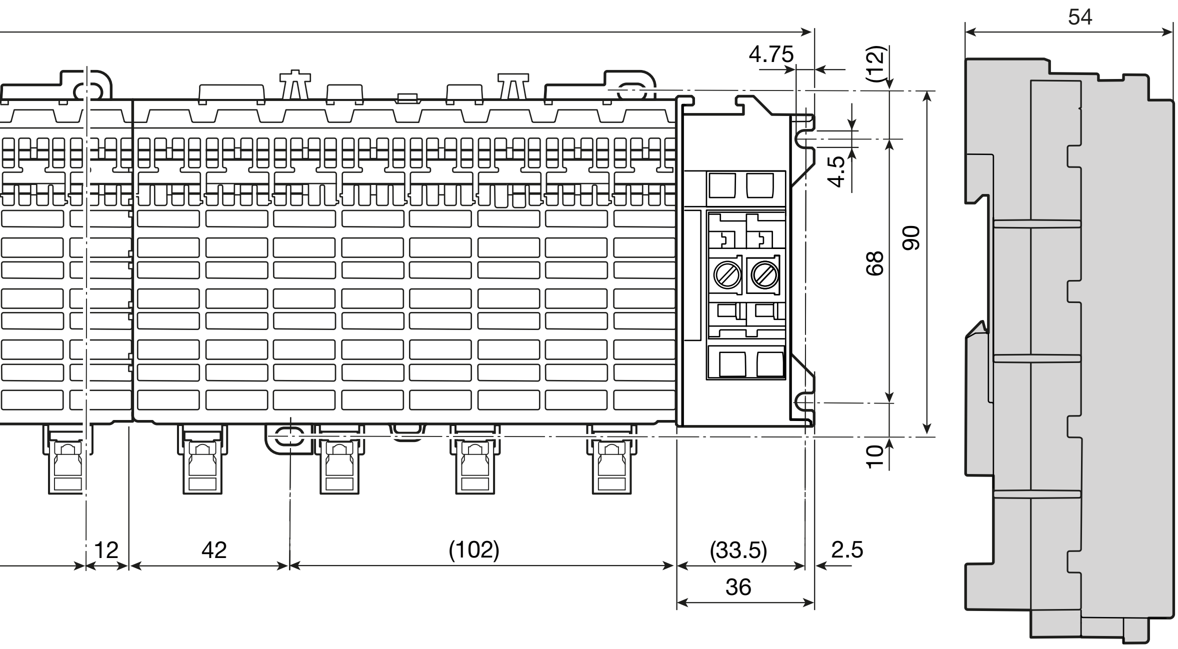


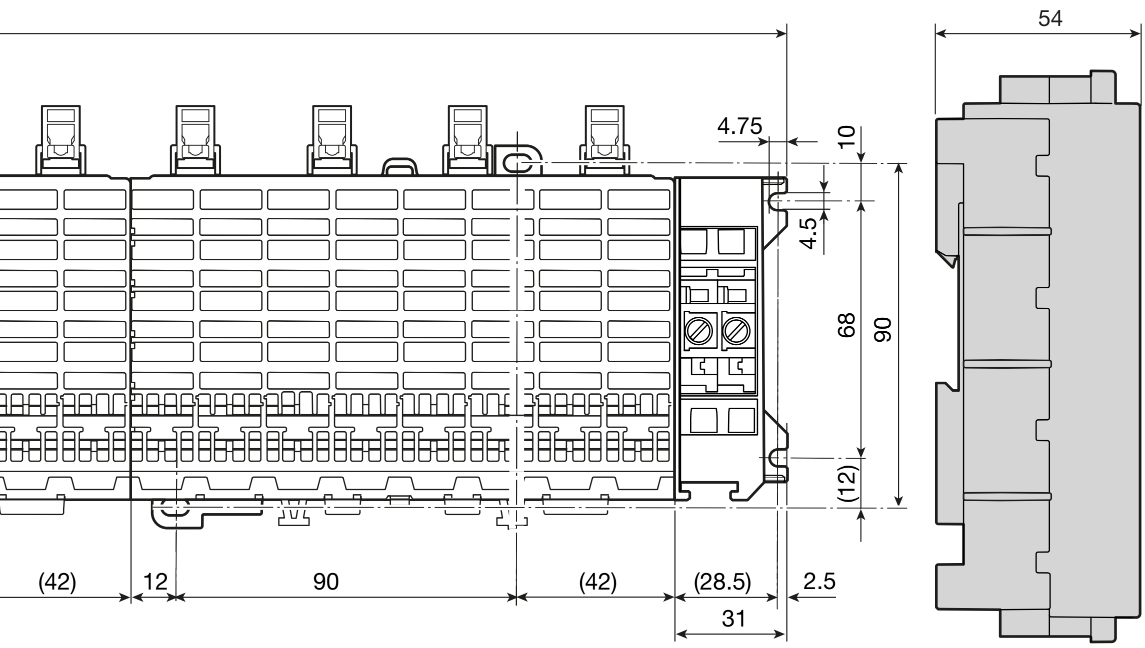
Busbar system 250 A Direct feed ZLSP960 right version

2CCC451298Z0001



SMISSLINE dimension drawings

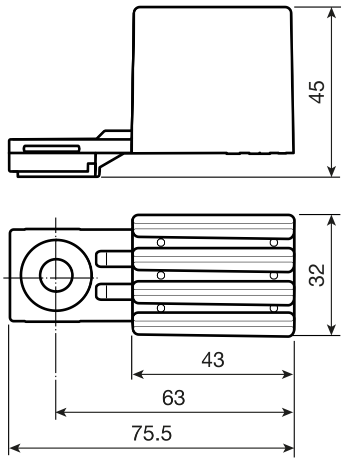




SMISSLINE dimension drawings

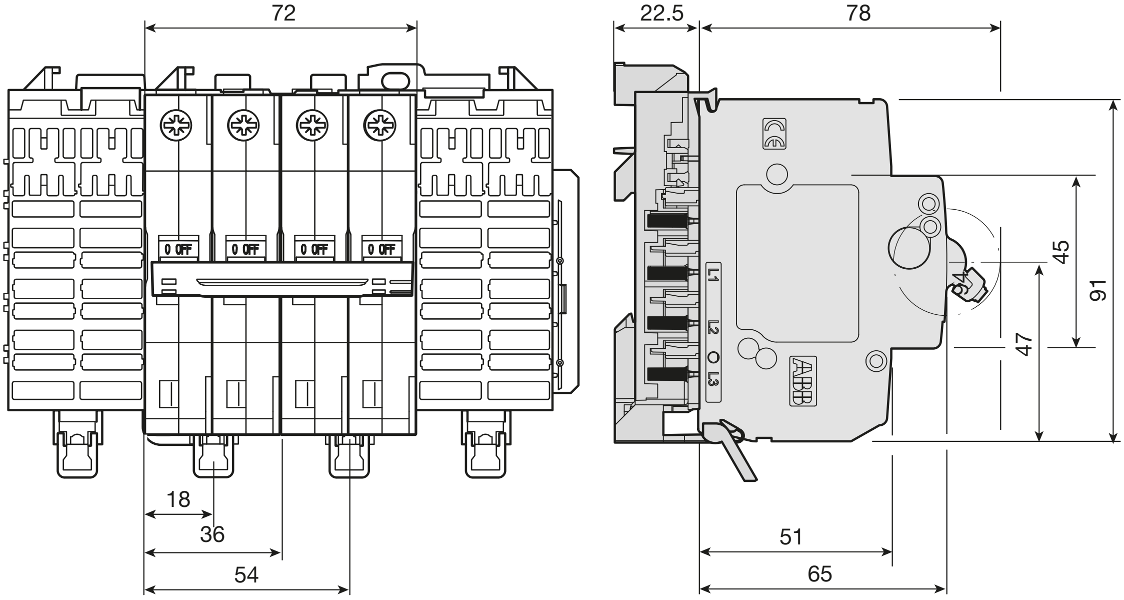
Direct feed heat sink

2CCC451299Z0001



Miniature circuit breaker S400

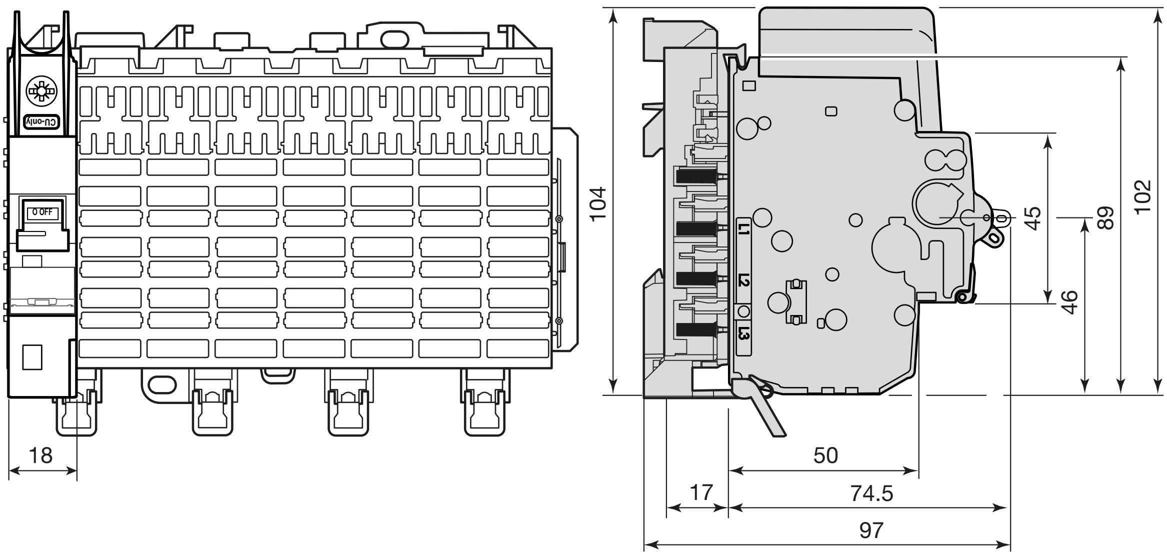
2CCC451300Z0001



SMISSLINE dimension drawings

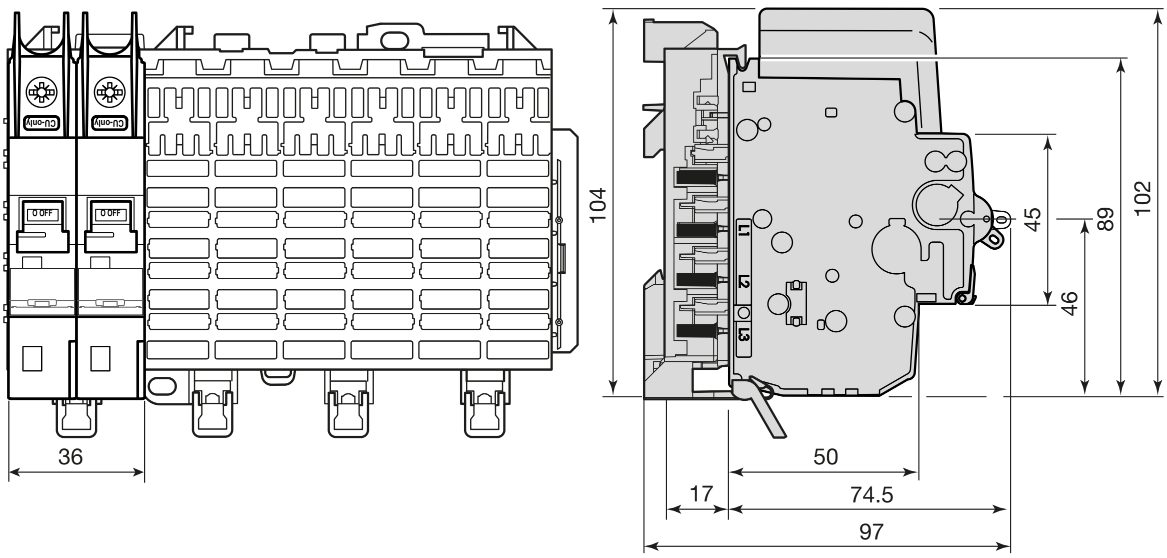
Miniature circuit breaker SUP401

2CCC451301Z0001



Miniature circuit breaker SUP402

2CCC451302Z0001

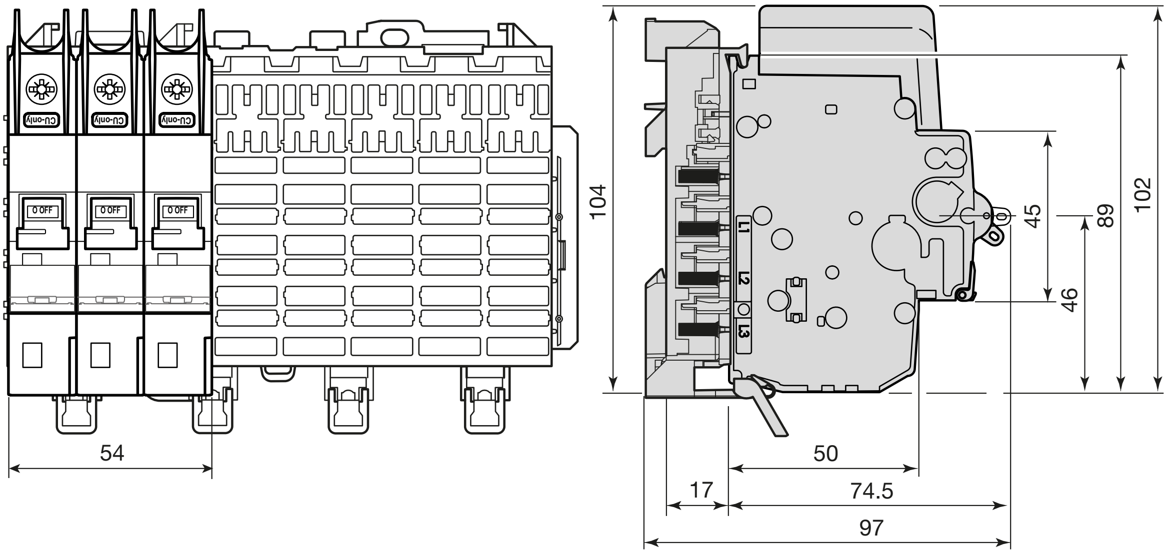


6

SMISSLINE dimension drawings

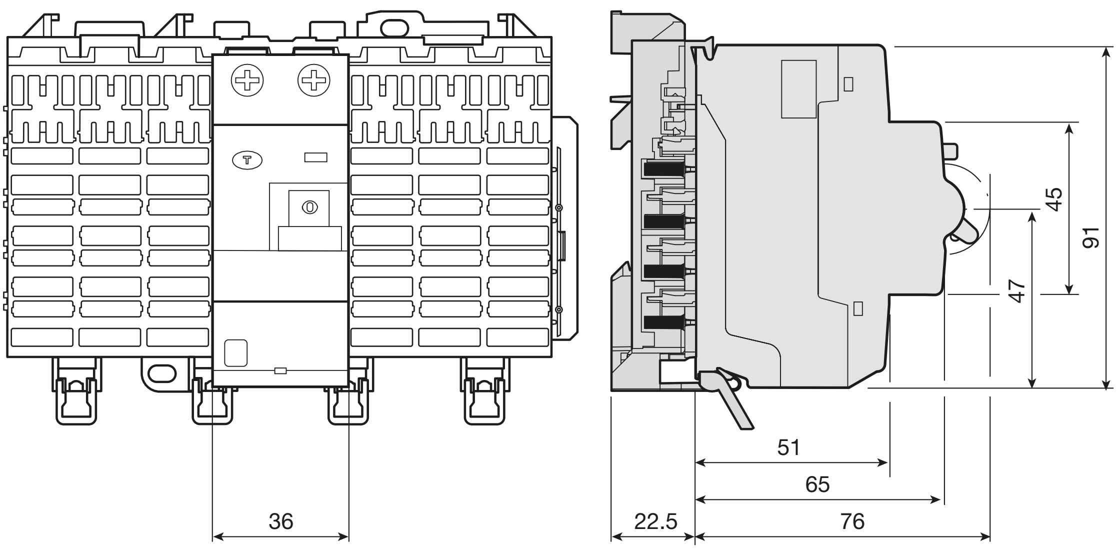
Miniature circuit breaker SUP403

2CCC451303Z0001



Residual current operated circuit breaker F402

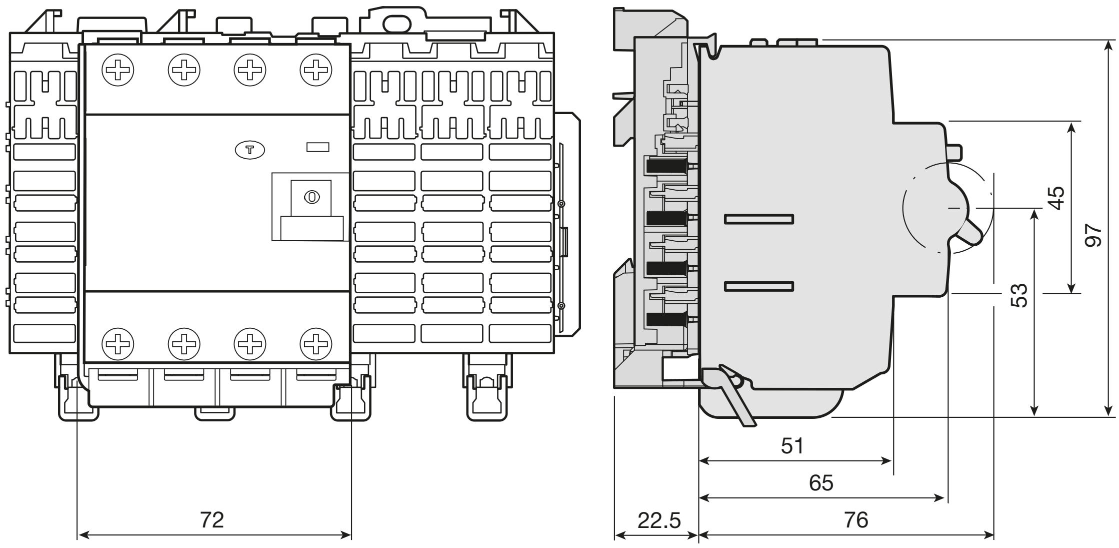
2CCC451304Z0001



SMISSLINE dimension drawings

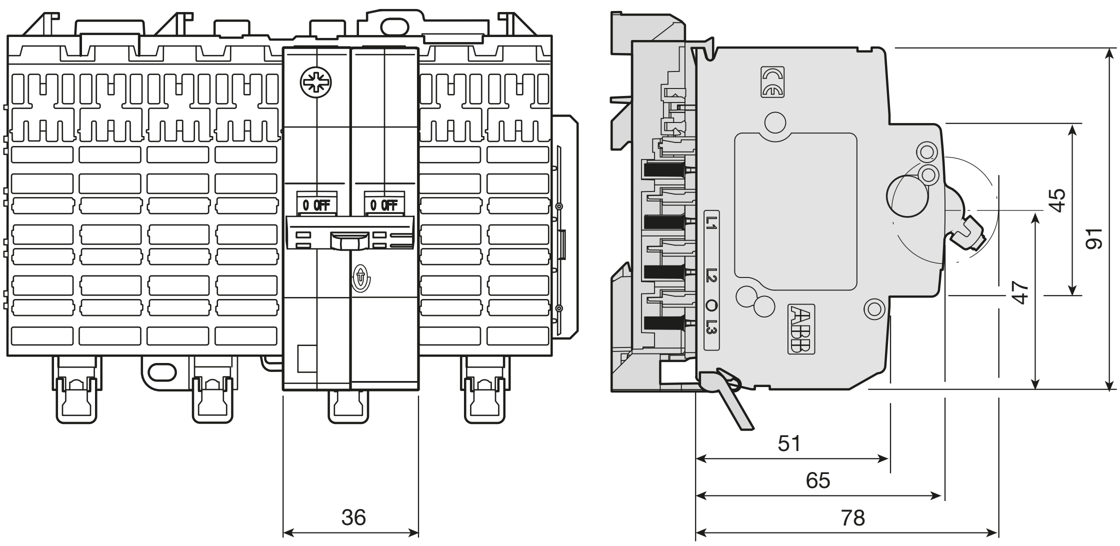
Residual current operated circuit breaker F404 type A

2CCC451305Z0001



Residual current operated circuit breaker (RCBO) FS401

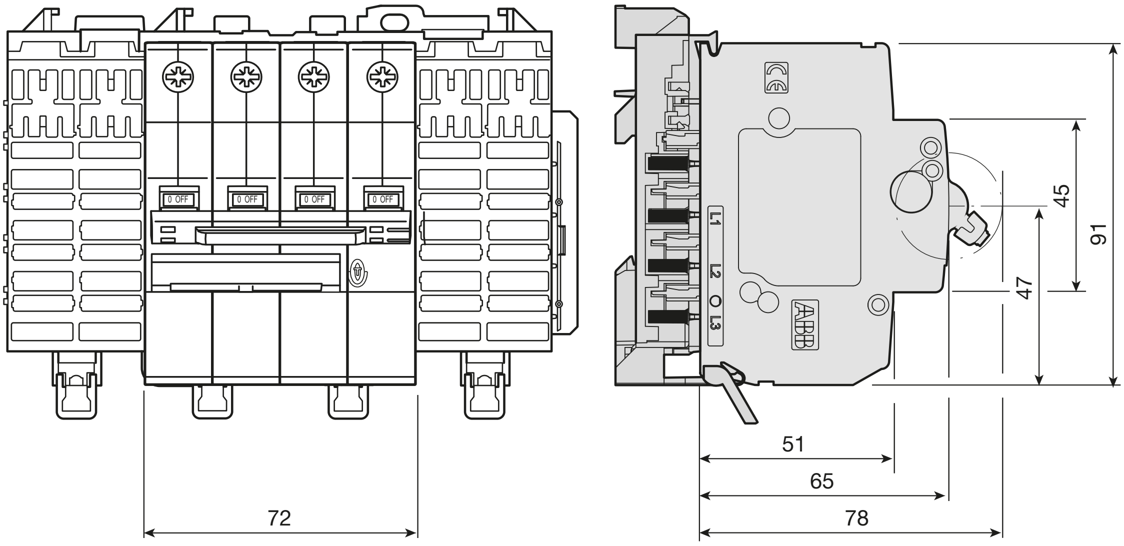
2CCC451306Z0001



SMISSLINE dimension drawings

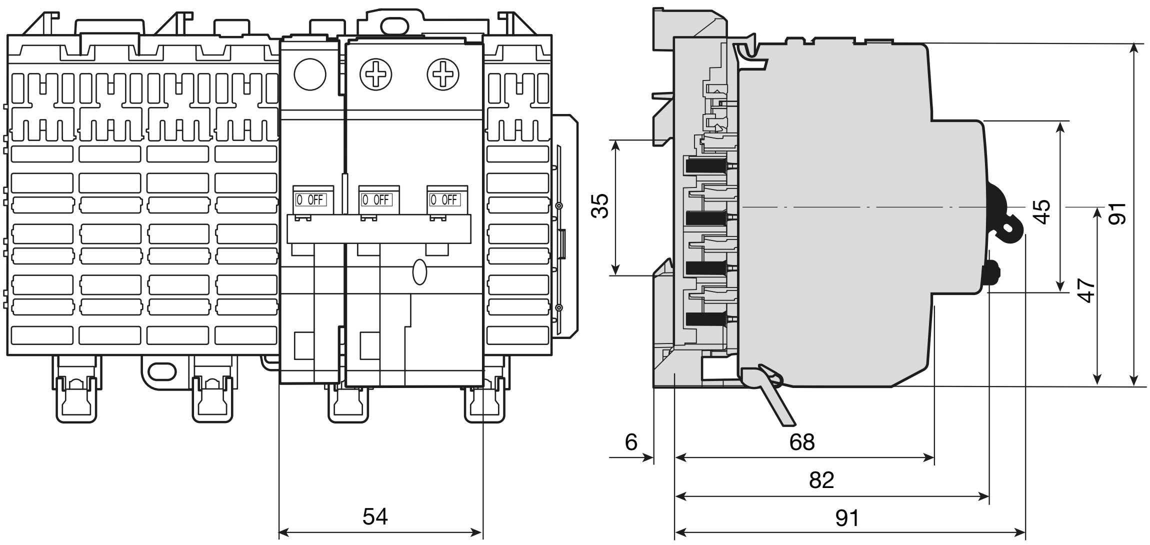
Residual current operated circuit breaker (RCBO) FS403

2CCC451307Z0001



Residual current operated circuit breaker (RCBO) FS402

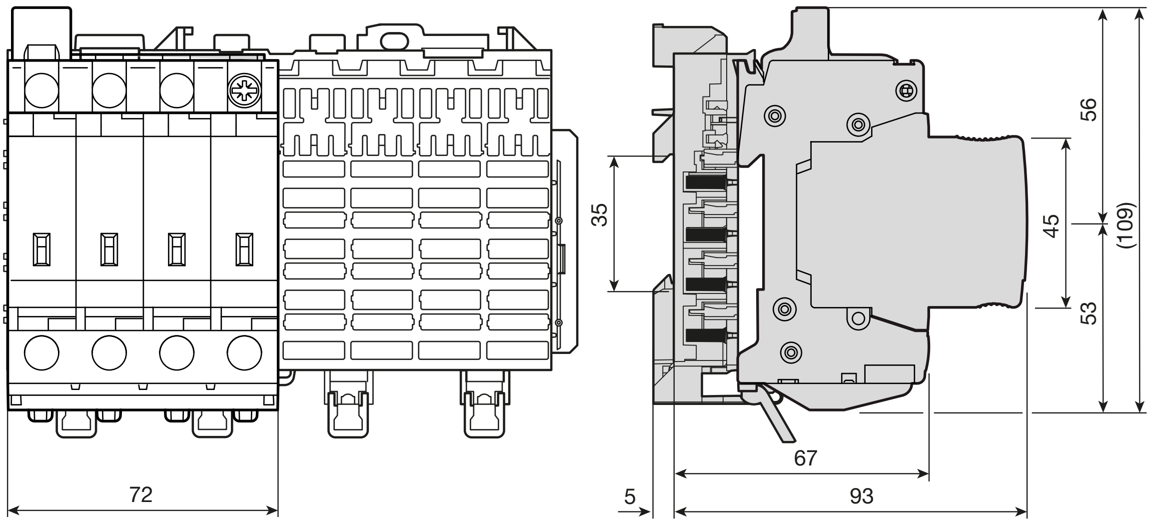
2CCC451308Z0001



SMISSLINE dimension drawings

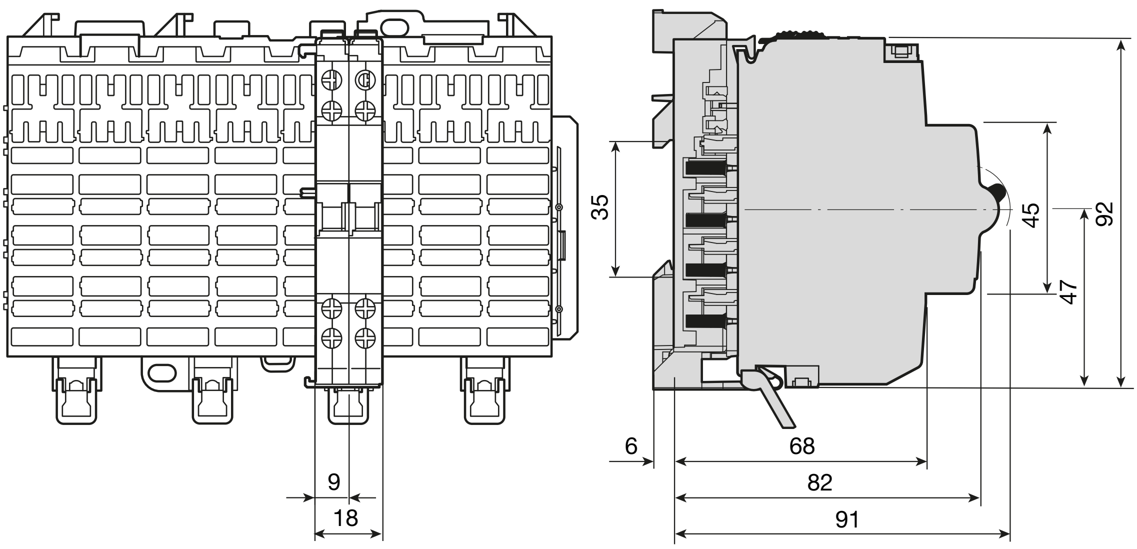
Surge arrester (SPD) OVR404

2CCC451309Z0001



Auxiliary switch and signal contacts

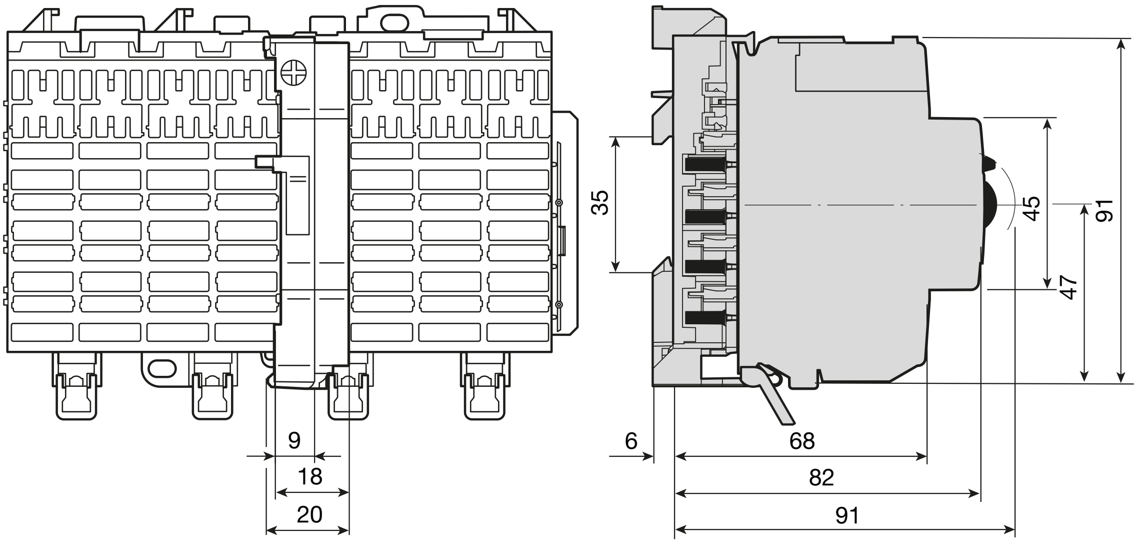
2CCC451310Z0001



SMISSLINE dimension drawings

Neutral disconnector NT400

2CCC451311Z0001



Residual current operated circuit breaker F404 type B

2CCC451312Z0001