Addendum - 2016

Solutions for electrical distribution in buildings
Technical details

Power and productivity
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Solutions for electrical distribution in buildings
Technical details

Two volumes, one objective: to always find the best solution
From a single catalogue with two complementary volumes: streamline to simplify, analyse to choose.

The new catalog Solutions for electrical distribution in buildings comes into two separate but integrated volumes: one dedicated to the description and easy selection of products code and one for professionals searching for in-depth details and specifications, installation examples and special technical solutions.

Solutions for electrical distribution in buildings
An indispensable tool for those who are looking for easy selection of a completely reliable range of products

This 'choice' catalogue which summarizes all the technicalcommercial characteristics of the products, allows one to navigate between the technical and commercial specifications of the System pro Solution: main characteristics, descriptions, specifications, accessories, product pictures, illustrations and other information about the individual codes leads directly to the heart of the ABB range and helps simplify something that is very complex in reality.
The cross references allow one to move immediately to the corresponding technical-applicative volume for an in-depth examination of the information indispensable for planning and implementing the systems.

Solutions for electrical distribution in buildings - Technical details
Technical details and information, application examples, installation solutions: the complete ABB know how at the service of professionals

The new publication dedicated to technical-applicative details provides professionals with a series of specialized information structured to simplify the implementation of System pro Solutions from the project and system point of view. The cross references to the corresponding technical- commercial catalogue and the clear presentation of the complex specifications - such as the operating curve, selectivity tables, connection diagrams, marks and approvals - allow one to move bi-directionally from one publication to the other, arriving at small and simple passages to easily elaborate all the information on the product that is most suitable for the specific application.

Two volumes that reference each other, which are manageable and easily consultable, designed for those who wish to find the clearest solution in the least possible time.

The volume
Solutions for electrical distribution in buildings
can be downloaded or requested in printed form

The volume
Solutions for electrical distribution in buildings - Technical details
can be downloaded here

Solutions for electrical distribution in buildings - Technical details
MCBs

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MCBs technical details

MCBs technical details
Definitions according to standards for miniature circuit breakers

Rated insulation voltage (Ui) according IEC/EN 60664-1:
Root mean square (R.M.S.) withstand voltage value assigned by the manufacturer to the equipment or to a part of it, characterizing the specified (long-term) withstand capability of its insulation.

NOTE:
The rated insulation voltage is not necessarily equal to the rated voltage of the equipment which is primarily related to functional performance.

IEC/EN 60898-1
Miniature Circuit Breakers according IEC/EN 60898-1 are intended for the protection against overcurrents of wiring installations of
buildings and similar applications; they are designed for use by uninstructed people and for not being maintained.
This part of IEC/EN 60898 applies for a.c. air-break circuit-breakers for operation at 50 Hz or 60 Hz, having a rated voltage not
exceeding 440 V (between phases), a rated current not exceeding 125 A and a rated short-circuit capacity not exceeding 25.000 A.
As far as possible, it is in line with the requirements contained in IEC/EN 60947-2.

Rated short-circuit capacity (Icn)
The rated short-circuit capacity of a circuit-breaker is the value of the ultimate short-circuit breaking capacity assigned to that circuit-breaker by the manufacturer.
The sequence of operations shall be: O – t – CO.*

Service short-circuit capacity (Ics)
A circuit-breaker having a given rated short-circuit capacity has a corresponding fixed service short-circuit capacity (Ics). This is therefore generally not indicated.

Rated operational voltage (Un)
The rated voltage of a circuit-breaker is the value of voltage, assigned by the manufacturer, to which its performance (particularly the short-circuit performance) is referred.
The same circuit-breaker may be assigned a number of rated voltages and associated rated short-circuit capacities.

2The voltage which appears across the terminals of a pole of a circuit-breaker after the breaking of the current.
The value of the power frequency recovery voltage shall be equal to 110 % of the rated voltage of the circuit-breaker under test.

IEC/EN 60947-2
This part of the IEC/EN 60947 applies to circuit-breakers, the main contacts of which are intended to be connected to circuits, the rated voltage of which does not exceed 1.000 V a.c. or 1.500 V d.c..
It applies whatever the rated currents, the method of construction or the proposed applications of the circuit-breakers may be.
The circuit-breakers are designed for use by instructed people.

Rated ultimate short-circuit breaking capacity Icu
The rated ultimate short-circuit breaking capacity of a circuit-breaker is the value of ultimate short-circuit breaking capacity assigned to that circuit-breaker by the manufacturer for the corresponding rated operational voltage. It is expressed as the value of the prospective breaking current, in kA (r.m.s. value of the a.c. component in the case of a.c.).

The sequence of operations shall be: O – t – CO.*

Rated service short-circuit breaking capacity Ics
The rated service short-circuit breaking capacity of a circuit-breaker is the value of service short-circuit breaking capacity assigned to that circuit-breaker by the manufacturer for the corresponding rated operational voltage. It is expressed as a value of prospective breaking current, in kA, corresponding to one of the specified percentages of the rated ultimate short-circuit breaking capacity and rounded up to the nearest whole number. It may be expressed as a % of Icu (for example Ics = 25 % Icu).

The sequence of operations shall be: O – t – CO – t – CO.*

* The following symbols are used for defining the sequence of operatons:
O represents an opening operation.
CO represents a closing operation followed by an automatic opening.
t represents the time interval between two short-circuit operations.

Rated operational voltage (Ue)
The rated operational voltage of an equipment is a value of voltage which, combined with a rated operational current, determines the application of the equipment and to which the relevant tests and the utilization categories are referred.
For single-pole equipment it is generally stated as the voltage across the pole. For multi pole equipment it is generally stated

as the voltage between phases.
An equipment my be assigned a number of combinations of rated operational voltage and associated making and breaking capacities for different duties and utilization categories.

Max. power frequency recovery voltage (Umax)
Voltage which appears across the terminals of a pole of a switching device after the breaking of the current.

For all breaking capacities and short-circuit breaking capacity tests, the value of the power-frequency recovery voltage shall be 105 % of the value of the rated operational voltage. This value shall be within the specified tolerance (voltage 0 / + 5%).

NOTE:
The value of 1.05 times the rated operational voltage for the power frequency recovery voltage, together with the test voltage tolerance resulting in a maximum voltage of 1.1 times the rated operational voltage, is deemed to cover the effects of variations of the system voltage under normal service conditions.

UL 489
The requirements of this standard cover molded-case circuit breakers, circuit breaker and ground-fault circuit-interrupters, fused circuit breakers, and accessory high-fault protectors. These circuit breakers are specifically intended to provide service entrance, feeder, and branch circuit protection in accordance with the National Installation Codes in Annex B, Ref. No.1.
This standard also covers instantaneous-trip circuit breakers (circuit interrupters) specifically intended for use as part of a combination motor controller in accordance with the National Installation Codes in Annex B, Ref. No. 1.

UL489B
These requirements cover molded-case circuit breakers, molded-case switches, and circuit-breaker enclosures rated up to 1000 V dc, intended for use with photovoltaic (PV) systems and Article 690 of the National Electrical Code, ANSI/NFPA-70. These requirements are intended to be used in conjunction with the requirements in the Standard for Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures, UL 489.

UL 1077
These requirements apply to supplementary protectors intended for use as overcurrent, or over- or under-voltage protection within an appliance or other electrical equipment where branch circuit overcurrent protection is already provided, or is not required.
Compliance with this standard is acceptable for use as a component of an end product.

MCBs technical details
Tripping characteristics

Tripping characteristics S 200 / S 200 M / S 200 P / S 200 S / S 200 MUC / SN 201 L / SN 201 / SN 201 M

Acc. to	Tripping characteristic and rated current		Thermal release ② Current: conventional non-tripping current	Thermal release ② Current: conventional tripping current	Thermal release ② Tripping time	Electromagnetic release ① Currents: hold current surges	Electromagnetic release ① Currents: trip at least at	Electromagnetic release ① Tripping time
IEC/EN 60898-1	B	6 to 63 A	1.13 · In		> 1 h	3 · In		> 0.1 s
				1.45 · In	< 1 h		5 · In	< 0.1 s
	C	0.5 to 63 A	1.13 · In		> 1 h	5 · In		> 0.1 s
				1.45 · In	< 1 h		10 · In	< 0.1 s
	D	0.5 to 63 A	1.13 · In		> 1 h	10 · In		> 0.1 s
				1.45 · In	< 1 h		20 · In	< 0.1 s
IEC/EN 60947-2	K	0.2 to 63 A	1.05 · In		> 1 h	10 · In		> 0.2 s
				1.2 · In	< 1 h ③		14 · In	< 0.2 s
				1.5 · In	< 2 min. ③			
				6.0 · In	> 2 s (T1)			
	Z	0.5 to 63 A	1.05 · In		> 1 h	2 · In		> 0.2 s
				1.2 · In	< 1 h ③		3 · In	< 0.2 s

① The indicated electromagnetic tripping values apply to a frequency range of 16 2/3 ... 60 Hz. For different network frequencies or direct current the values change according to the multiplier in the table below
② The thermal releases are calibrated to a nominal reference ambient temperature; for Z and K, the value is 20 °C, for B and C = 30 °C. In the case of higher ambient temperatures, the current values fall by ca. 6 % for each 10 K temperature rise.
③ As from operating temperature (after I_1 > 1 h or, as applicable, 2 h).

	AC			DC
	100 Hz	200 Hz	400 Hz	
Multiplier	1.1	1.2	1.5	1.5

The thermal tripping performance is independent from the network frequency

Tripping characteristics SU200 M

Acc. to	Tripping characteristics	Rated current In	Thermal release [1] Currents: conventional non-tripping current I1	Thermal release [1] Currents: conventional tripping current I2	Thermal release [1] Tripping time	Electromagnetic release [2] Range of instantaneous tripping		Electromagnetic release [2] Tripping time
UL 489	C	0.5 to 63 A	1.03 · In		> 1 h	5 · In		> 0.2 s
				1.25 · In	< 1 h [3]		10 · In	< 0.2 s
	K	0.2 to 63 A	1.03 · In		> 1 h	10 · In		> 0.2 s
				1.25 · In	< 1 h [3]		14 · In	< 0.2 s
	Z	0.5 to 63 A	1.03 · In		> 1 h	2 · In		> 0.2 s
				1.25 · In	< 1 h [3]		3 · In	< 0.2 s

[1] The thermal releases are calibrated to a nominal reference ambient temperature e.g. for UL 489 of 40°C.
In the case of higher ambient temperatures, the current values fall by approx. 4 % for each 10 K temperature rise.
[2] The indicated tripping values of electromagnetic tripping devices apply to a frequency of 50/60 Hz. The thermal release operates independent of frequency.
[3] As from operating temperature (after I1 > 1h)

Tripping characteristics S200 80-100A

Acc. to	Tripping characteristics	Rated current	Thermal release [1]			Electromagnetic release [2]		
			Currents:		Tripping time	Range of instantaneous tripping		Tripping time
			conventional non-tripping current	conventional tripping current				
		In	I1	I2				
IEC/EN 60898-1	B	80 up to 100 A	1.13 · In		> 2 h	3 · In		0.1 ... 90 s
				1.45 · In	< 2 h		5 · In	< 0.1 s
	C	80 up to 100 A	1.13 · In		> 2 h	5 · In		0.1 ... 30 s
				1.45 · In	< 2 h		10 · In	< 0.1 s

[1] The thermal releases are calibrated to a nominal reference ambient temperature; for B and C the reference value is 30 °C.
In the case of higher ambient temperatures, the current values fall by approx. 6 % for each 10 K temperature rise.
[2] The indicated tripping values of electromagnetic tripping devices apply to a frequency of 50/60 Hz. The thermal release operates independent of frequency.

Tripping characteristics S 700

Tripping characteristic	**Rated current**	**Delayed overload tripping**			**Short-time delayed selective tripping**		
		Conventional non-tripping current	Conventional tripping current	Tripping time	Delayed tripping	Short-time delayed tripping	Tripping time
		I_{nt}	I_t	t	I_{tv}	I_{tk}	t
$E_{selective}$	10 to 100 A	1.05 x In		≥ 2 h	5 x In		0.05 s < t < 5 s (In ≤ 32 A) 0.05 s < t < 10 s (In > 32 A)
			1.2 x In	< 2 h		6.25 x In	0.01 s < t < 0.3 s
$K_{selective}$	16 to 50 A	1.05 x In		≥ 2 h	10 x In		0.05 s < t < 5 s (In ≤ 32 A) 0.05 s < t < 10 s (In > 32 A)
			1.2 x In	< 2 h		14 x In	0.01 s < t < 0.3 s
	63 to 100 A	1.05 x In		≥ 2 h	8 x In		0.05 s < t < 10 s
			1.2 x In	< 2 h		12 x In	0.01 s < t < 0.3 s

Tripping characteristics S 750 DR

Tripping characteristic	**Reference ambient temperature**	**Delayed overload tripping**			**Short-time delayed selective tripping**		
	T_{ref} [1]	Conventional non-tripping current	Conventional tripping current	Tripping time	Delayed tripping current	Short-time delayed tripping current	Tripping time
		I_{nt}	I_t	t	I_{tv}	I_{tk}	t
$E_{selective}$	30 °C	1.05 x In		≥ 2 h	5 x In		0.05 s < t < 5 s (In ≤ 32 A) 0.05 s < t < 10 s (In > 32 A)
			1.2 x In	< 2 h		6.25 x In	0.01 s < t < 0.3 s
$K_{selective}$	20 °C	1.05 x In		≥ 2 h	8 x In		0.05 s < t < 10 s
			1.2 x In	< 2 h		12 x In	0.01 s < t < 0.3 s

[1] Reference ambient temperature 30 °C (in the case of higher ambient temperatures, the current values are reduced by ca. 5 % per each 10 K)

MCBs technical details
Tripping characteristics

Tripping characteristic S800

Acc. to	Tripping characteristic and rated current		Thermal release ②			Electromagnetic release ①		
			Current		Tripping time	Current		Tripping time
			conventional non-tripping current	conventional tripping current		hold current surges	trip at least at	
IEC/EN 60898-1	B	10 to 80 A	1.13 · In		> 1 h	3 · In		> 0.1 s
				1.45 · In	< 1 h		5 · In	< 0.1 s
	C	10 to 80 A	1.13 · In		> 1 h	5 · In		> 0.1 s
				1.45 · In	< 1 h		10 · In	< 0.1 s
	D	10 to 80 A	1.13 · In		> 1 h	10 · In		> 0.1 s
				1.45 · In	< 1 h		20 · In	< 0.1 s
IEC/EN 60947-2	B	6 to 125 A	1.05 · In		> 1 h	3.2 · In		> 0.1 s
				1.3 · In	< 1 h		4.8 · In	< 0.1 s
	C	6 to 125 A	1.05 · In		> 1 h	6.4 · In		> 0.1 s
				1.3 · In	< 1 h		9.6 · In	< 0.1 s
	D	6 to 125 A	1.05 · In		> 1 h	10.4 · In		> 0.1 s
				1.3 · In	< 1 h		15.6 · In	< 0.1 s
	K	6 to 125 A	1.05 · In		> 1 h	10.4 · In		> 0.1 s
				1.2 · In	< 1 h		15.6 · In	< 0.1 s
	KM	20 to 80 A				10.4 · In		> 0.1 s
							15.6 · In	< 0.1 s
	UCB (DC only)	10 to 125 A	1.05 · In		> 1 h	4.8 · In		> 0.1 s
				1.3 · In	< 1 h		7.2 · In	< 0.1 s
	UCK (DC only)	10 to 125 A	1.05 · In		> 1 h	8.8 · In		> 0.1 s
				1.2 · In	< 1 h		13.2 · In	< 0.1 s
	PV-S (DC only)	10 to 125 A	1.05 · In		> 1 h	4.8 · In		> 0.1 s
				1.3 · In	< 1 h		6 · In	< 0.1 s
UL489	Z	10 to 100 A	1 · In		> 1 h	3.2 · In		> 0.1 s
				1.35 · In	< 1 h		4.8 · In	< 0.1 s
	K	10 to 100 A	1 · In		> 1 h	6.4 · In		> 0.1 s
				1.35 · In	< 1 h		9.6 · In	< 0.1 s
	UCZ (DC only)	10 to 80 A	1 · In		> 1 h	8.8 · In		> 0.1 s
				1.35 · In	< 1 h		13.2 · In	< 0.1 s
UL489B	PV-S (DC only)	5 A	1.13 · In		> 1 h	4.8 · In		> 0.1 s
				1.3 · In	< 1 h		6 · In	< 0.1 s

① The indicated electromagnetic tripping values apply to a frequency of 50/60 Hz.
② The thermal release are calibrated to a nominal reference ambient temperature; for B, C, D, UCB and PVS it is 30 °C, for K, UCK it is 20 °C for Z, K and UCZ it is 25 °C, for PVS acc. to UL489B it is 50 °C.

Tripping characteristic S500

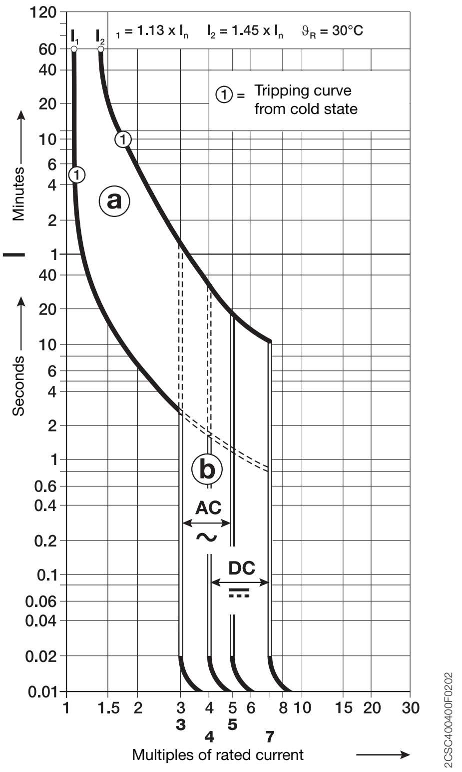
			Thermal release ②			Electromagnetic release ①			
Acc. to	Tripping characteristic and rated current		Current		Tripping time	Current			Tripping time
			conventional non-tripping current	conventional tripping current		Rated current of device	hold current surges	trip at least at	
IEC/EN 60947-2	K	0.1 to 45 A	1.05 · In		> 1 h	< 0.21 A	8 · In		> 0.1 s
				1.2 · In	< 1 h			10 · In	< 0.1 s
						< 0.42 A	10 · In		> 0.1 s
								12 · In	< 0.1 s
						> 0.38 A	12 · In		> 0.1 s
								14 · In	< 0.1 s
	UC-K (DC only)	0.1 to 45 A	1.05 · In		> 1 h	< 0.21 A	8 · In		> 0.1 s
				1.2 · In	< 1 h			10 · In	< 0.1 s
						< 0.42 A	10 · In		> 0.1 s
								12 · In	< 0.1 s
						> 0.38 A	12 · In		> 0.1 s
								14 · In	< 0.1 s
	HV-K	1 to 45 A	1.05 · In		> 1 h	-	12 · In		> 0.1 s
				1.2 · In	< 1 h			14 · In	< 0.1 s

① The indicated electromagnetic tripping values apply to a frequency of 50/60 Hz.
② The thermal release are calibrated to a nominal reference ambient temperature for K, HV-K, UC-K it is 20 °C.

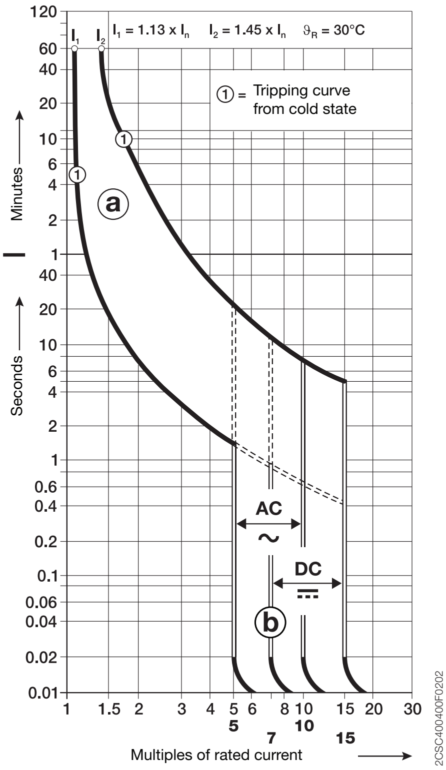
MCBs technical details
Tripping characteristics

Tripping characteristics S200 / S200M / S200P

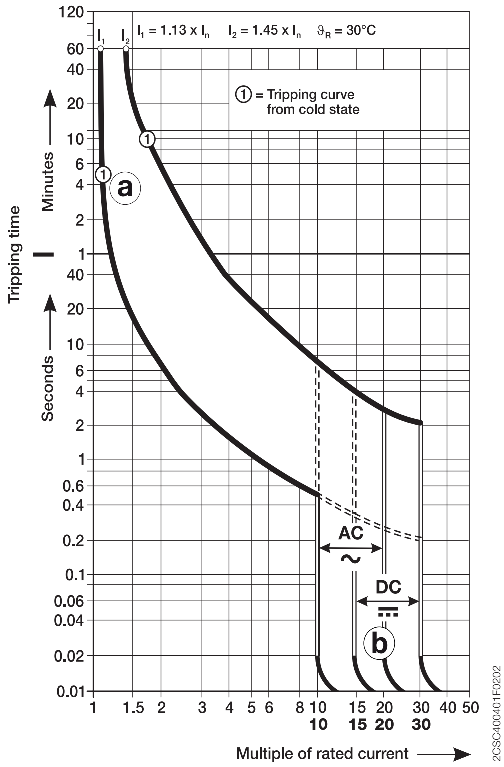
Characteristic B
IEC-EN60898



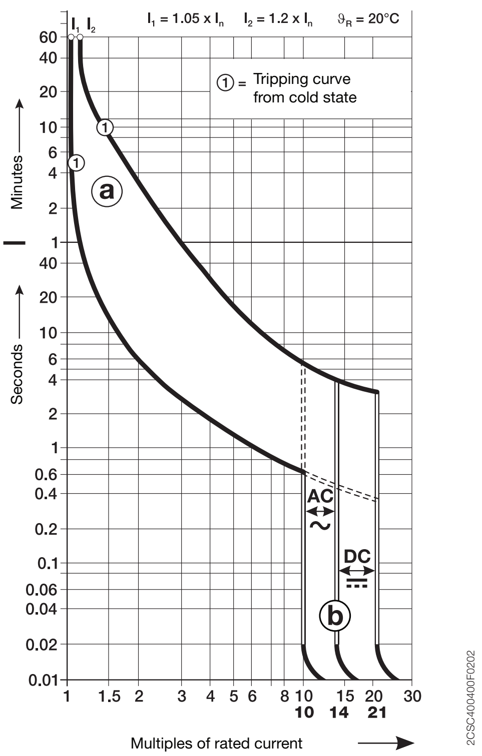
Characteristic C
IEC-EN60898



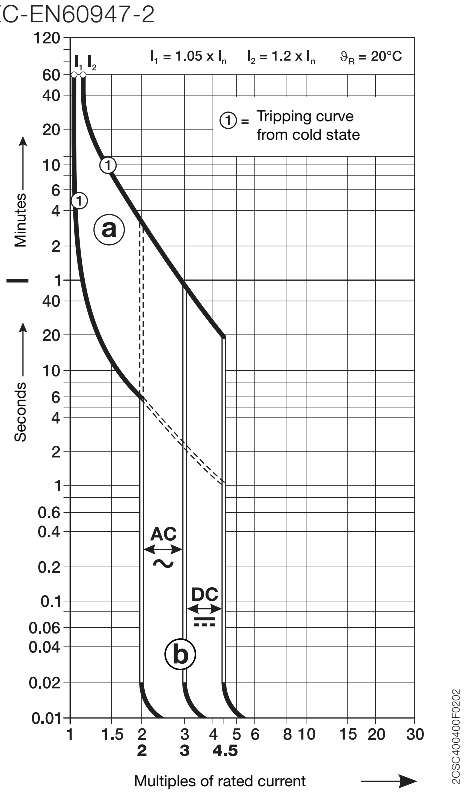
Characteristic D
IEC-EN60898



Characteristic K
IEC-EN60947-2



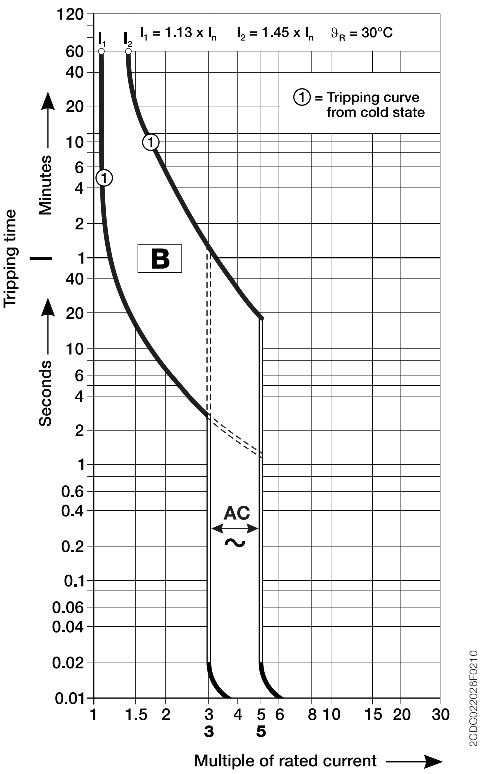
Characteristic Z
IEC-EN60947-2



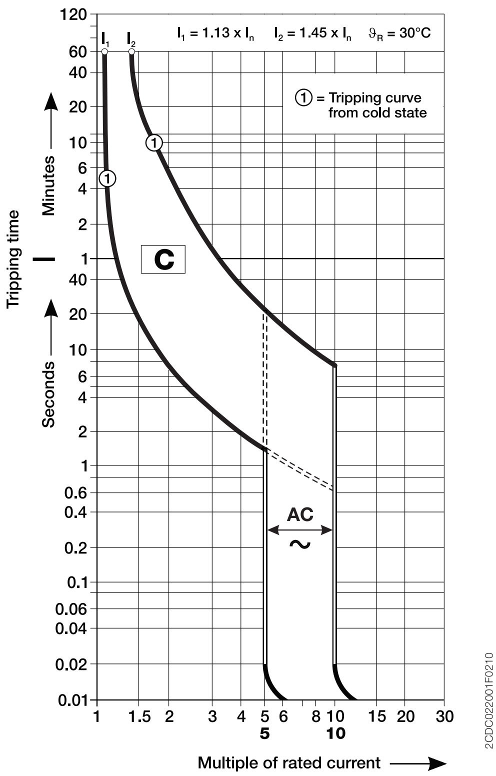
① thermal trip
② electromagnetic trip

Tripping characteristics S200S

Characteristic B



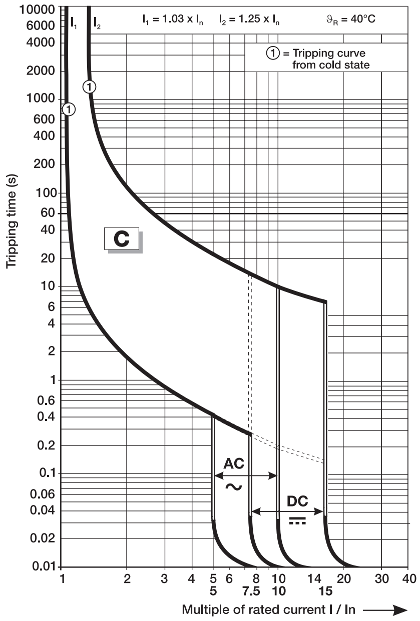
Characteristic C



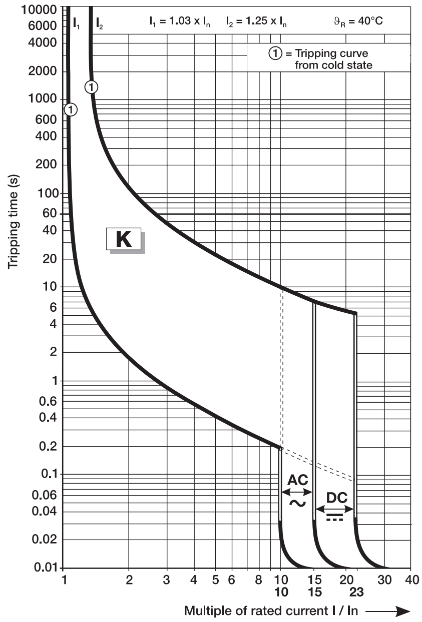
MCBs technical details
Tripping characteristics

Tripping characteristics SU200 M

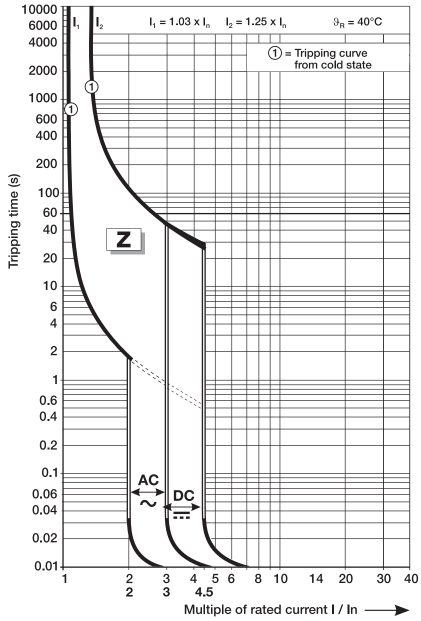
Characteristic C



Characteristic K

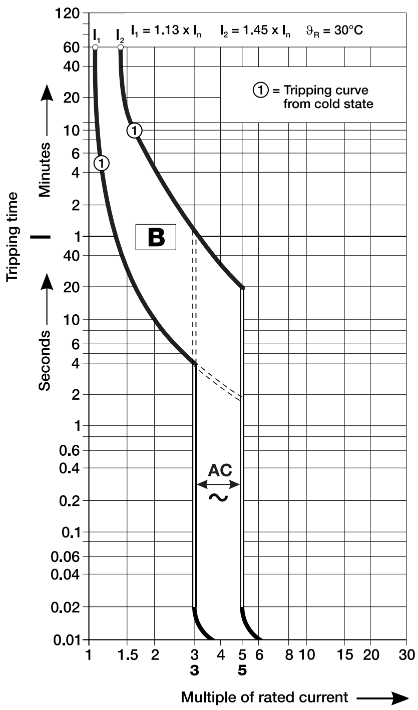


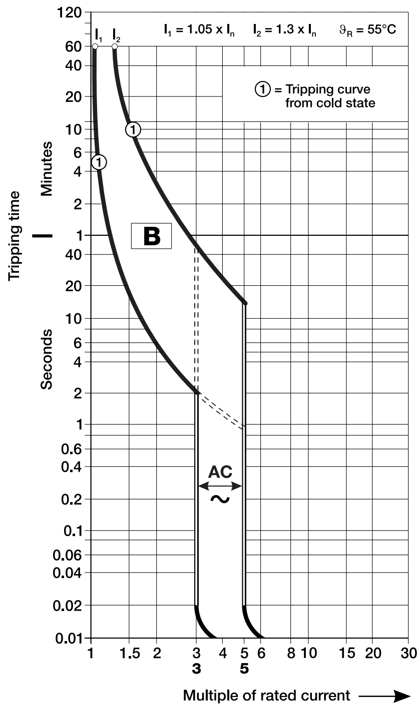
Characteristic Z



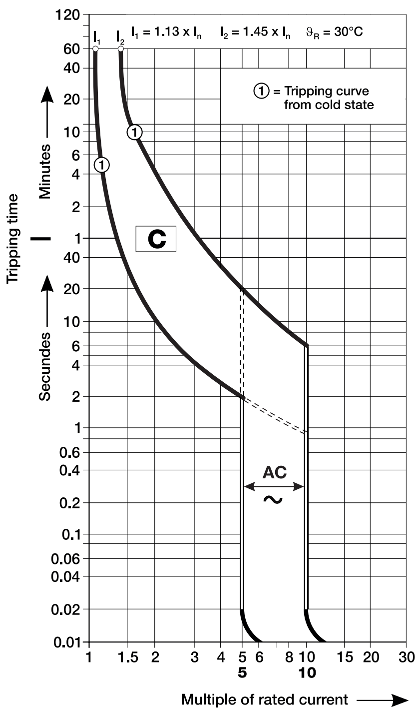
Tripping characteristics S200 80-100A

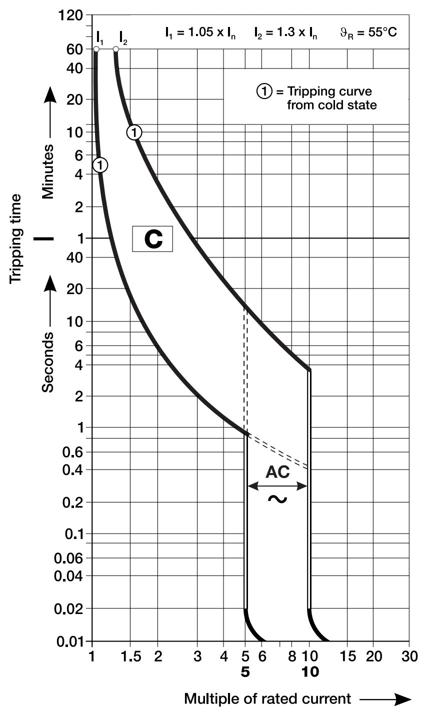
Characteristic B





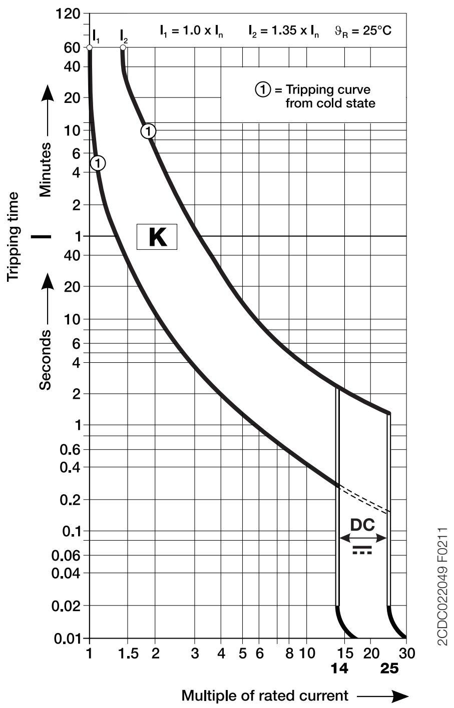
Characteristic C



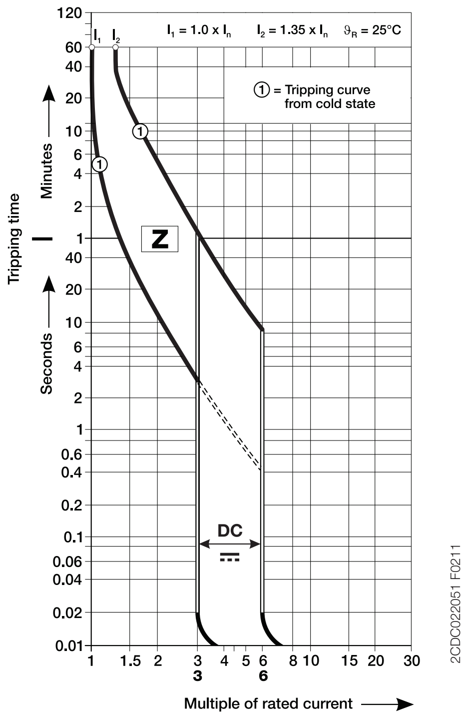


MCBs technical details
Tripping characteristics

Characteristic K
S 200 UDC

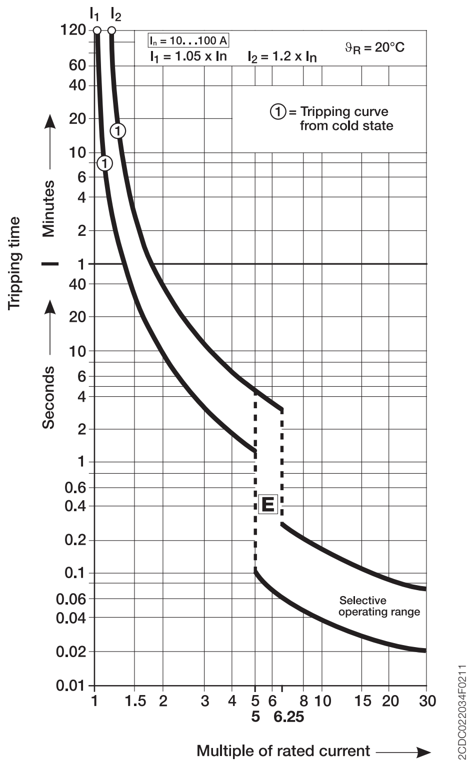


Characteristic Z
S 200 UDC

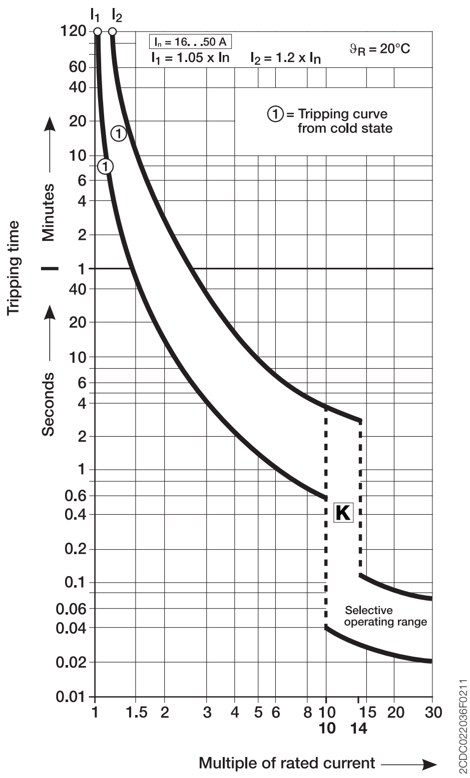


① thermal trip
② electromagnetic trip

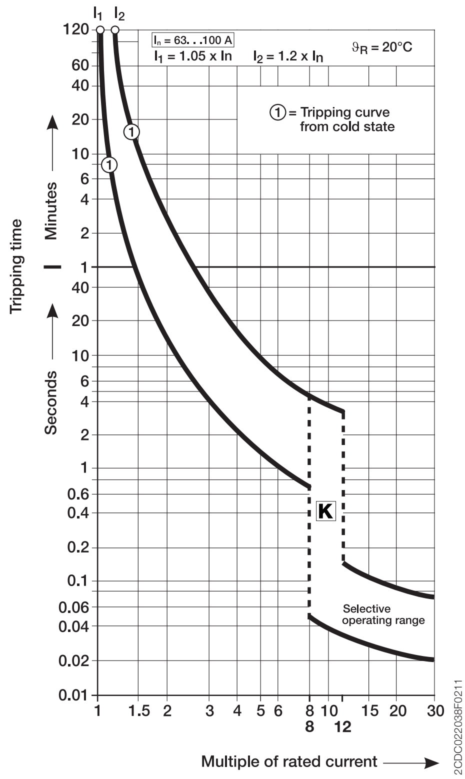
Characteristic E selective
S 700 - 10 ... 100 A



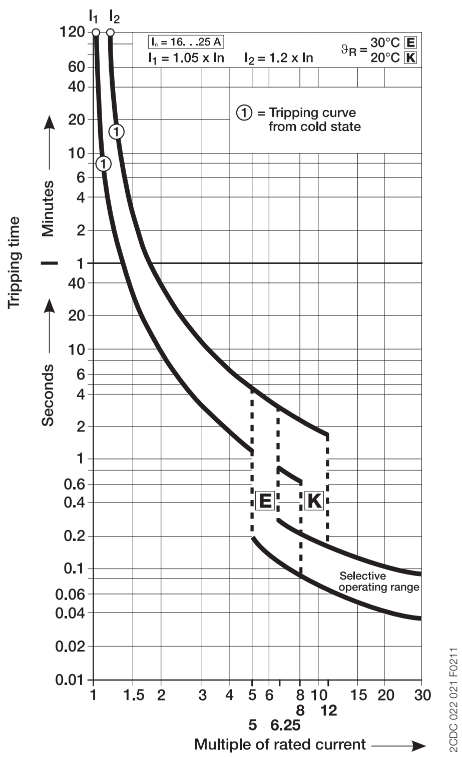
Characteristic K selective
S 700 - 16 ... 50 A



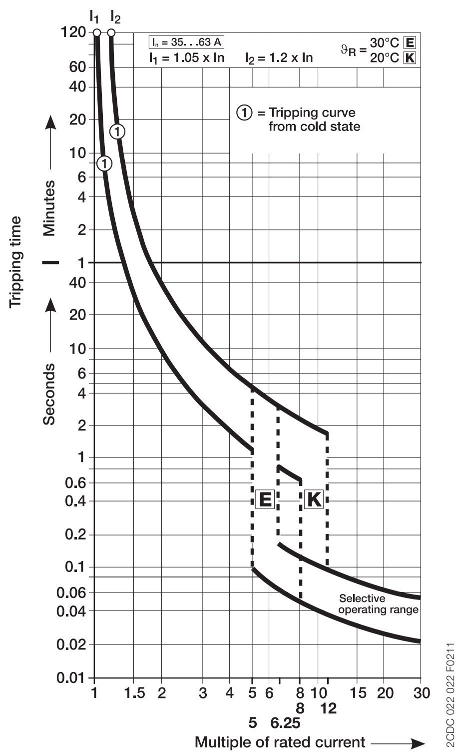
Characteristic K selective
S 700 - 63 ... 100 A



Characteristic E selective
S 750 DR - 16 ... 25 A

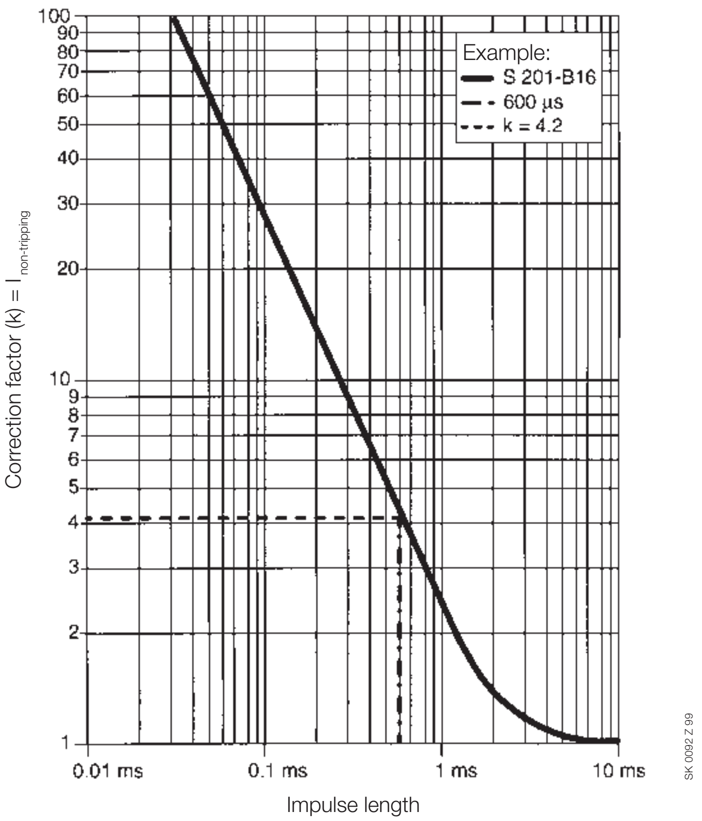


Characteristic K selective
S 750 DR - 35 ... 63 A



① thermal trip
② electromagnetic trip

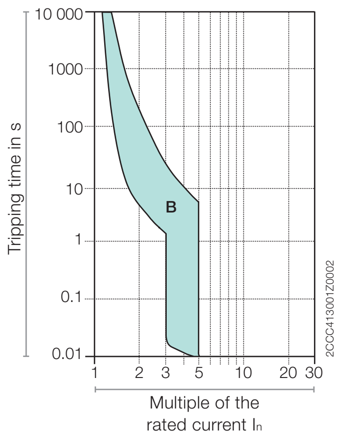
Tripping characteristics



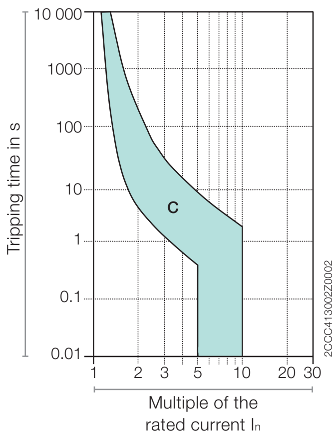
Example:	Non-tripping current (Electromagnetic release)
S 201-B16	
$I_{non\text{-}tripping}$ = k x non-tripping current	B-Characteristic = 3 x I_n
$I_{non\text{-}tripping}$ = 4,2 x 3 x 16	C-Characteristic = 5 x I_n
$I_{non\text{-}tripping}$ = 201,6 A	D-Characteristic = 10 x I_n
	K-Characteristic = 10 x I_n
	Z-Characteristic = 2 x I_n

The S 201-B16 does not trip at an impulse of 600 μs at a current up to 201,6 A.

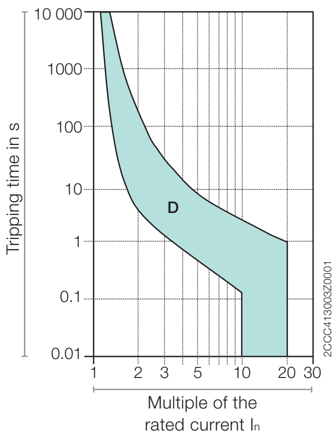
S800



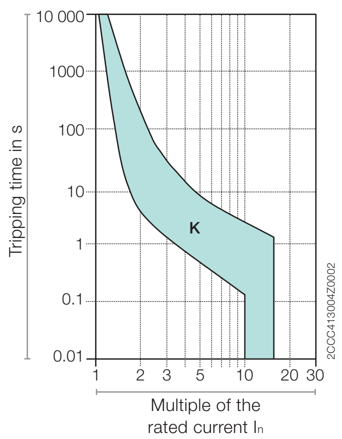
Tripping time in s
10 000
1000
100
10
1
0.1
0.01
B
1
2
3
5
10
20
30
Multiple of the rated current In
2CCC413001Z0002



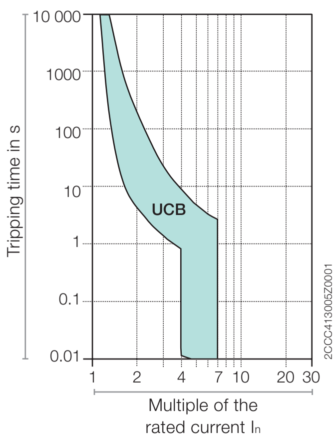
Tripping time in s
10 000
1000
100
10
1
0.1
0.01
C
1
2
3
5
10
20
30
Multiple of the rated current In
2CCC413002Z0002



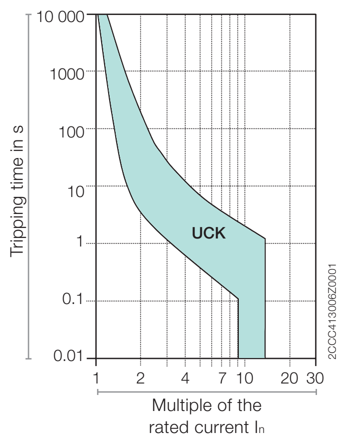
Tripping time in s
10 000
1000
100
10
1
0.1
0.01
D
1
2
3
5
10
20
30
Multiple of the rated current In
2CCC413003Z0001



Tripping time in s
10 000
1000
100
10
1
0.1
0.01
K
1
2
3
5
10
20
30
Multiple of the rated current In
2CCC413004Z0002

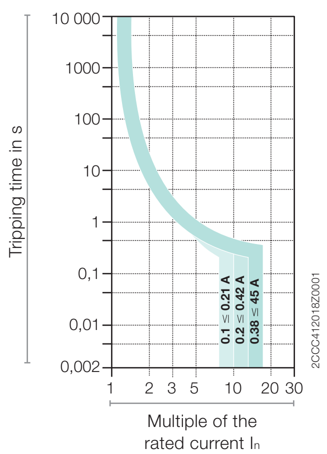


Tripping time in s
10 000
1000
100
10
1
0.1
0.01
UCB
1
2
4
7
10
20
30
Multiple of the rated current In
2CCC413005Z0001

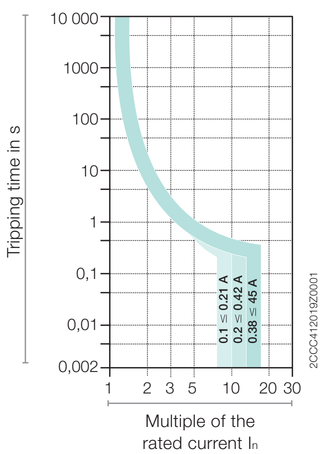


Tripping time in s
10 000
1000
100
10
1
0.1
0.01
UCK
1
2
4
7
10
20
30
Multiple of the rated current In
2CCC413006Z0001

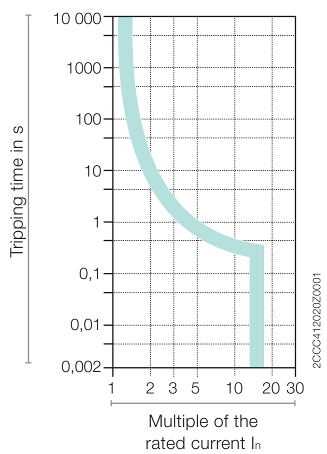
S500



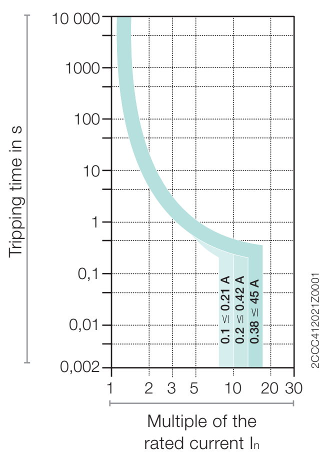
Tripping time in s
10 000
1000
100
10
1
0,1
0,01
0,002
0.1 ≤ 0.21 A
0.2 ≤ 0.42 A
0.38 ≤ 45 A
1
2
3
5
10
20
30
Multiple of the rated current In
2CCC412018Z0001



Tripping time in s
10 000
1000
100
10
1
0,1
0,01
0,002
0.1 ≤ 0.21 A
0.2 ≤ 0.42 A
0.38 ≤ 45 A
1
2
3
5
10
20
30
Multiple of the rated current In
2CCC412019Z0001



Tripping time in s
10 000
1000
100
10
1
0,1
0,01
0,002
1
2
3
5
10
20
30
Multiple of the rated current In
2CCC412020Z0001



Tripping time in s
10 000
1000
100
10
1
0,1
0,01
0,002
0.1 ≤ 0.21 A
0.2 ≤ 0.42 A
0.38 ≤ 45 A
1
2
3
5
10
20
30
Multiple of the rated current In
2CCC412021Z0001

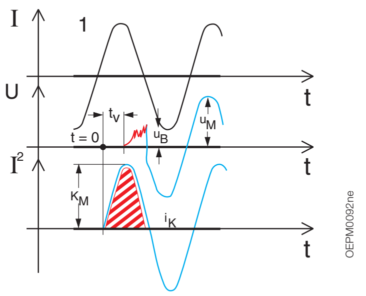
MCBs technical details
Limitation of specific let-through energy I^2t

Limitation of specific let-through energy

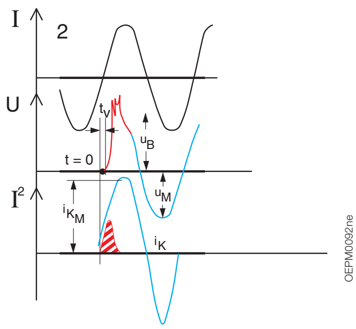
Tripping of an installation circuit by circuit-breaker when there is a short-circuit requires a certain amount of time depending on the characteristics of the circuit-breaker and the entity of the short-circuit current. During this period of time, some or all of the short-circuit current flows into the installation; the parameter I^2t defines the “specific let-through energy”, ie. the specific energy that the breaker allows through when there is a short-circuit current Icc during the tripping time t.
In this way, we can determine the capacity of a circuit-breaker to limit, ie. break high currents up to the rated breaking power of the device, by reducing the peak value of the above-mentioned currents to a value which is considerably lower than the estimated current.

This can be achieved using mechanisms which open very rapidly and have the following advantages:
- they limit the thermal and dynamic effects both on the circuit-breaker and on the protected circuit;
- they reduce the dimensions of the current-limiting circuit-breaker without reducing breaking capacity;
- they considerably reduce ionized gases and sparklers emitted during the short-circuit and therefore they avoid the danger of ignition and fires.

Irms = perspective simmetrical short-circuit current



Non-current limiting circuit-breaker



Current limiting circuit-breaker

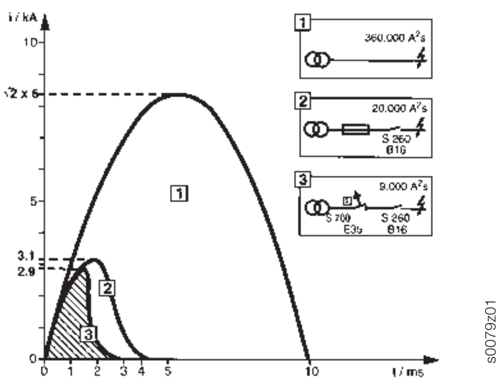
Oscillogram of short-circuit breaks on two circuit-breakers:

1 = traditional non-current limiting circuit-breaker
2 = current limiting circuit-breaker
u_B = arc voltage (red)
u_M = rest voltage (blue)

Short-circuit current
red = effective short-circuit current squared
blue = estimated short-circuit current squared (shunted circuit-breaker)
iK_M = maximum values of symmetrical component of short-circuit current squared
shaded in red = specific let-through energy in two cases

Limiting of let-through energy

Main selective circuit breakers (SMCB) like S 700 and S 750 DR support downstream mcbs in clearing short-circuit currents. They additionally reduce let-through energies without tripping. This increases the operational availability of the electrical supply and reduces drawbacks to the feeding grid and the installed equipment.



Max. withstanding specific let-through energy of cables

Section mm²	PVC	EPR	HEPR
50	33,062,500	39,062,500	51,122,500
35	16,200,625	19,140,625	25,050,025
25	8,265,625	9,765,625	12,780,625
16	3,385,600	4,000,000	5,234,944
10	1,322,500	1,562,500	2,044,900
6	476,100	562,500	736,164
4	211,600	250,000	327,184
2.5	82,656	97,656	127,806
1.5	29,756	35,156	46,010

The selection of the cables depends both from the breakers' specific let-through energy and from carrying capacity and voltage drop of the line.

Data of the previous table are referred to the following cables:

PVC	EPR	HEPR
FM9 FM9OZ1 N07V-K FROR	H07RN-F	N07G9-K FTG10OM1 RG7OR FG7OM1 FG7OR

Designation

Cable's reference to the standards	harmonized	H
	national cable recognized by CENELC	A
Rated voltage Uo/U	100/100 ≤ Uo/U < 300/300	01
	300/300 V	03
	300/500 V	05
	450/750 V	07
	750/1000 V	1
Insulating materials and non-metallic sheath	ethylene-vinylacetate	G
	mineral	M
	polyvinyl chloride	V
Conductor's shape	flexible conductor of a cable for fixed installation	K

Some cables on the market are identified with different names according with the designation UNEL 35011.

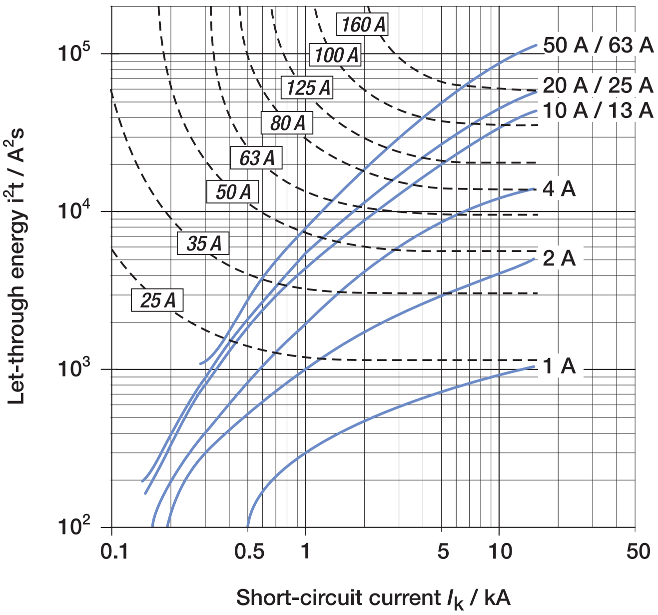
MCBs technical details
Limitation of specific let-through energy I²t

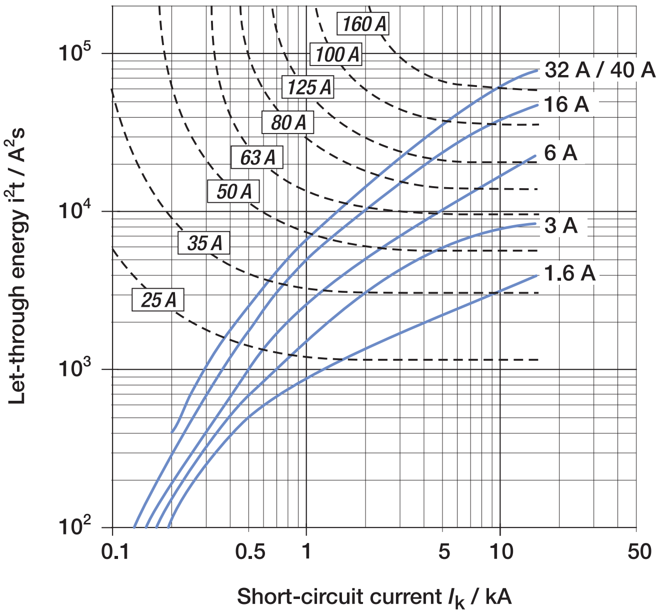
I²t diagrams - Specific let-through energy value I²t

The I²t curves give the values of the specific let-through energy expressed in A²s (A=amps; s=seconds) in relation to the perspective short-circuit current (Irms) in kA.

S 200-S 200 M-S 200 P, characteristics B and C

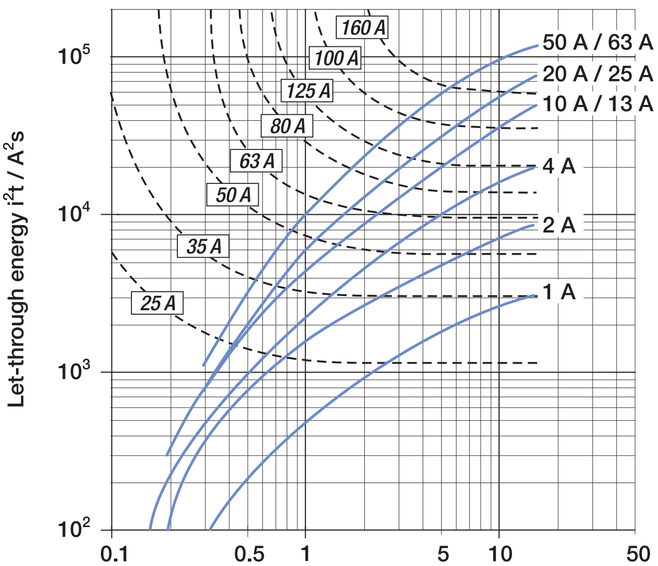
230/400 V let-through energy

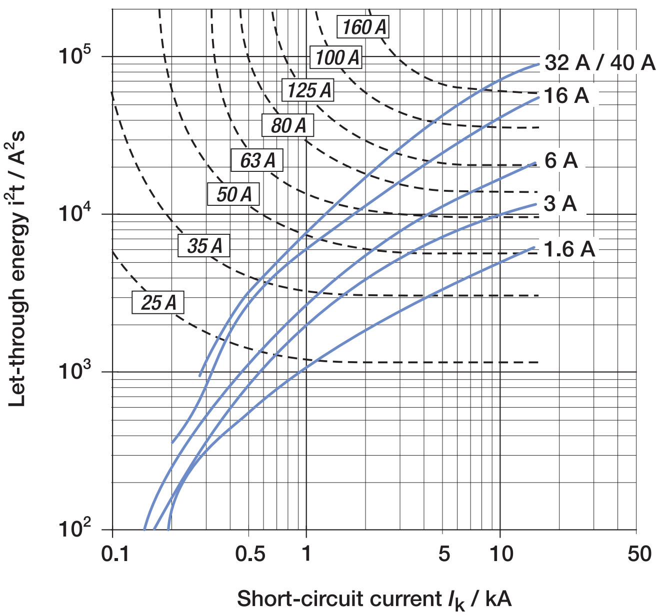




S 200-S 200 M-S 200 P, characteristics D-K

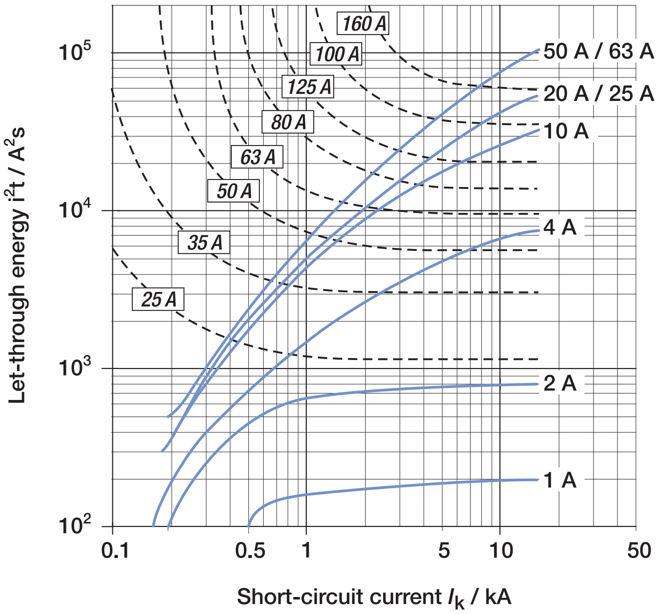
230/400 V let-through energy

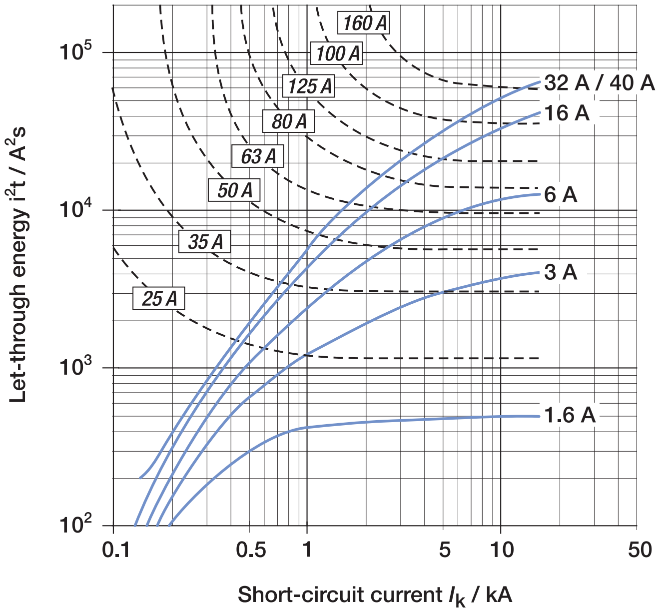




S 200-S 200 M-S 200 P, characteristic Z

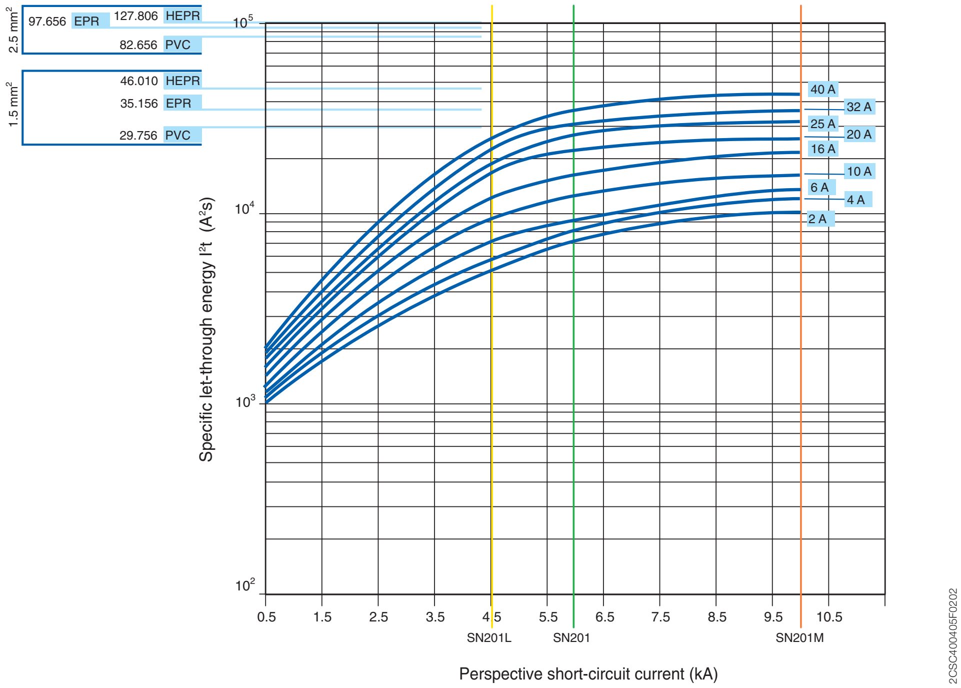
230/400 V let-through energy



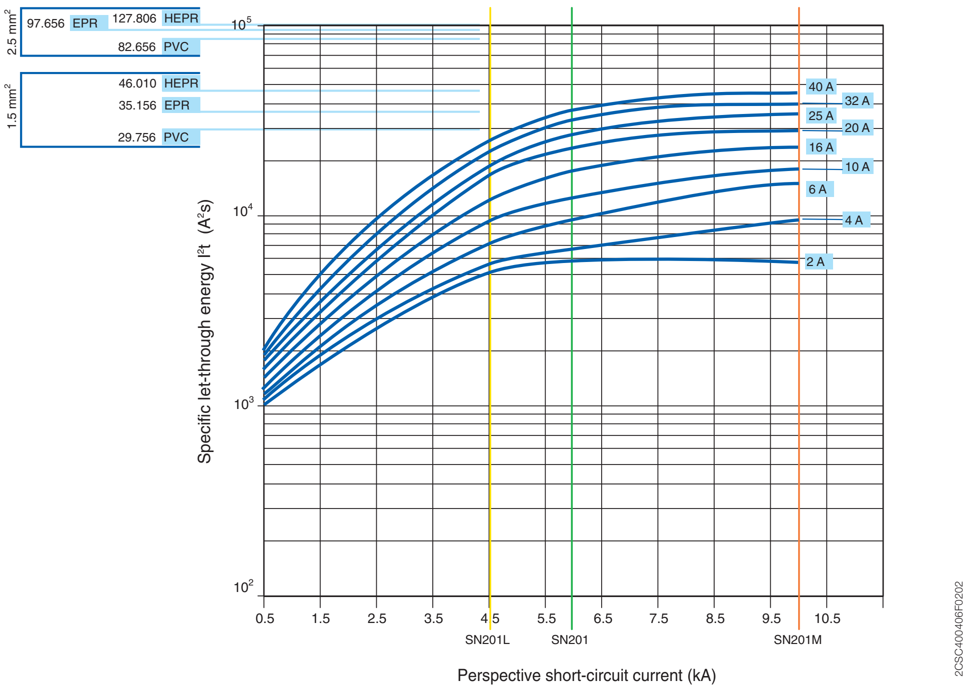


MCBs technical details
Limitation of specific let-through energy I²t

SN201 L-SN201-SN201 M, characteristics B
230 V let-through energy

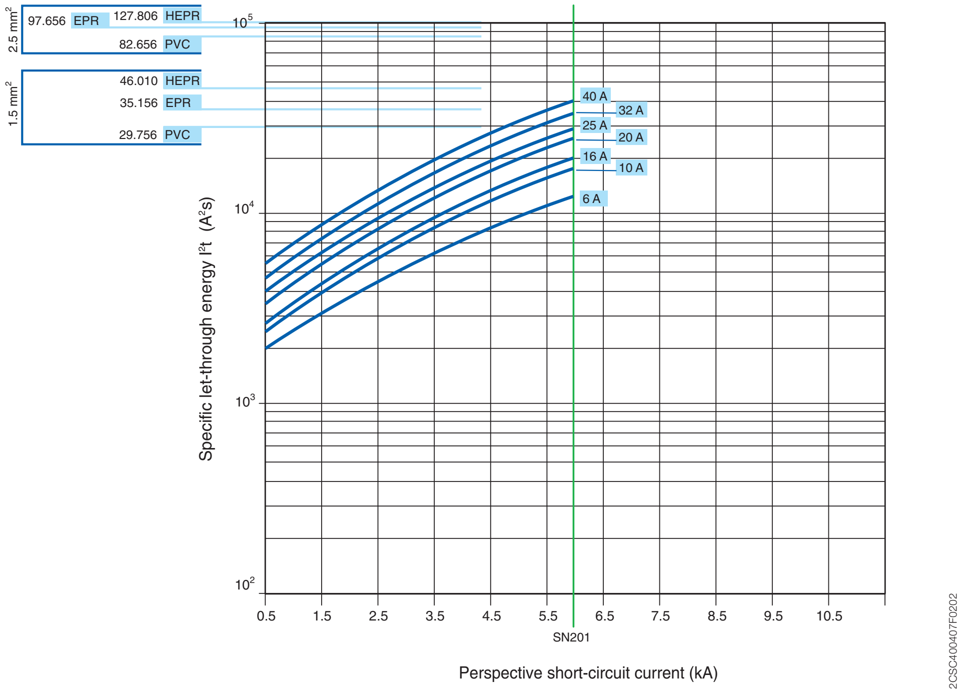


SN201 L-SN201-SN201 M, characteristics C
230 V let-through energy



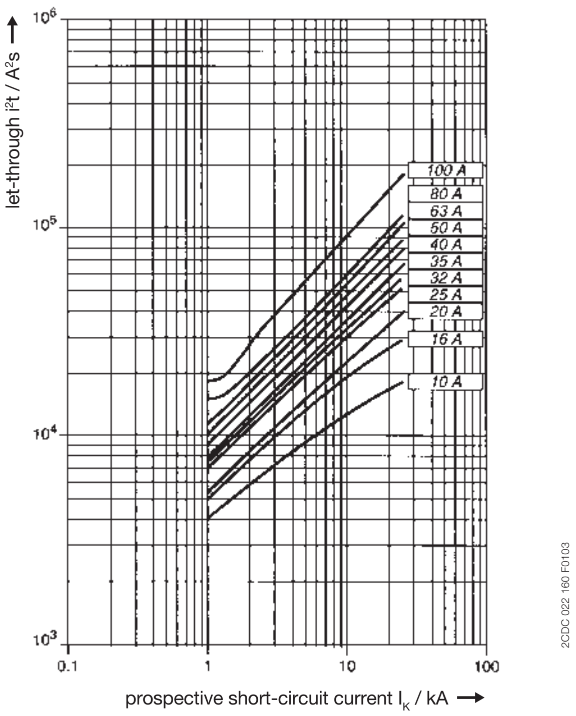
SN201, characteristics D

230 V let-through energy

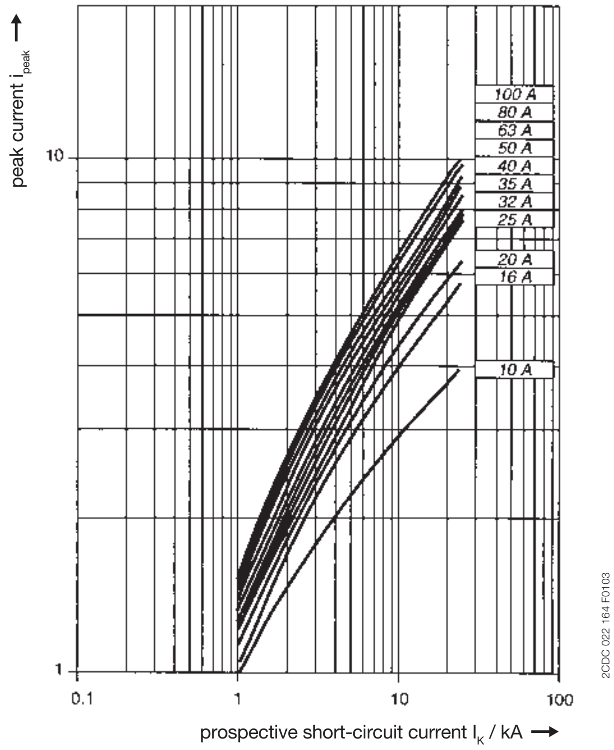


Limitation of specific let-through energy I^2t

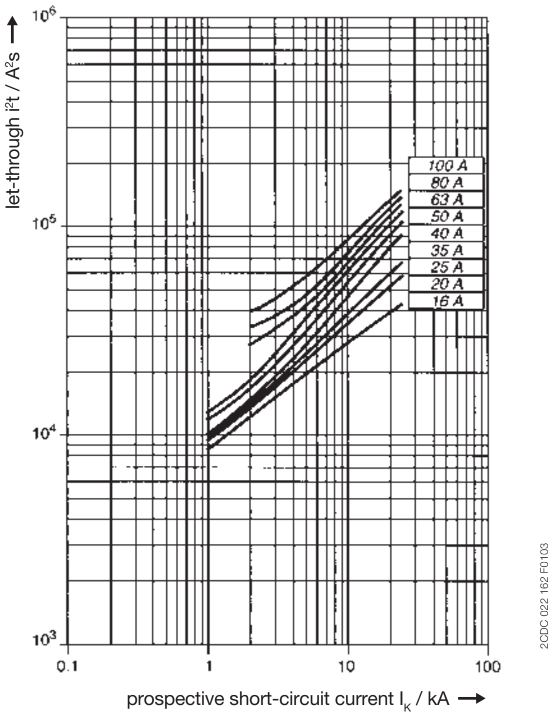
S 700 characteristic $E_{selective}$
let-through energy



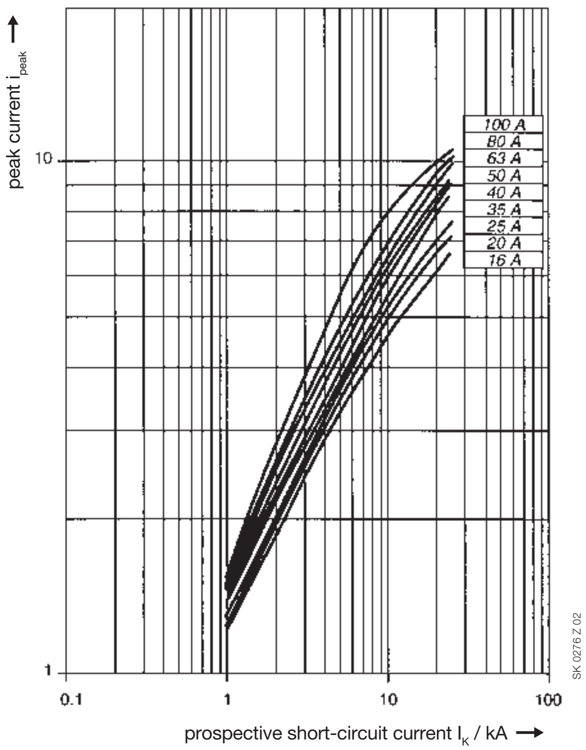
S 700 characteristic $E_{selective}$
let-through peak current (I_{peak})



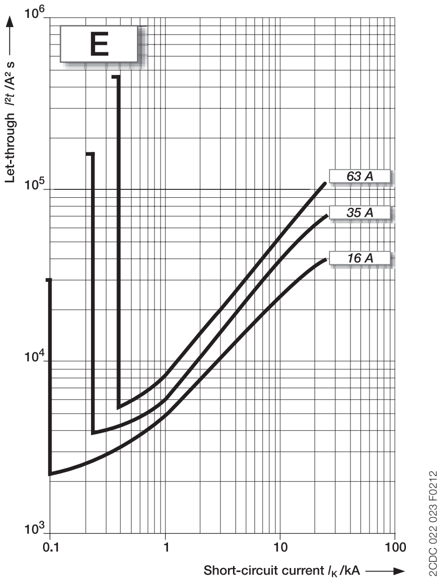
S 700 characteristic $K_{selective}$
let-through energy



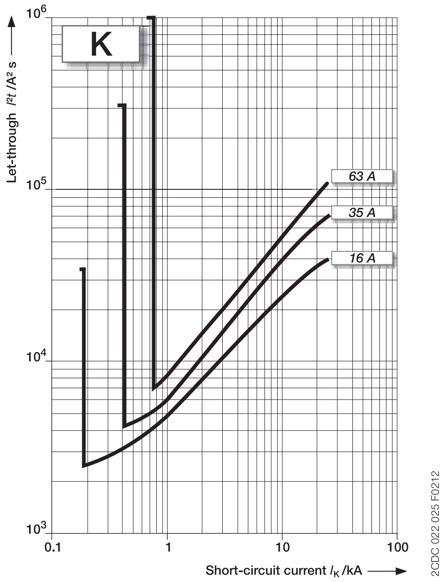
S 700 characteristic $K_{selective}$
let-through peak current (I_{peak})



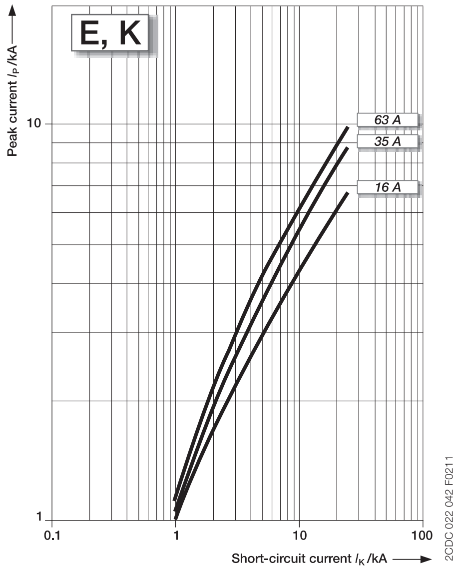
S 750 DR characteristic $E_{selective}$
diagram of let-through values
I^2t 16 ... 63 A



S 750 DR characteristic $K_{selective}$
diagram of let-through values
I^2t 16 ... 63 A



S 750 DR characteristic $E_{selective}$, $K_{selective}$
let-through peak current (I_{peak})

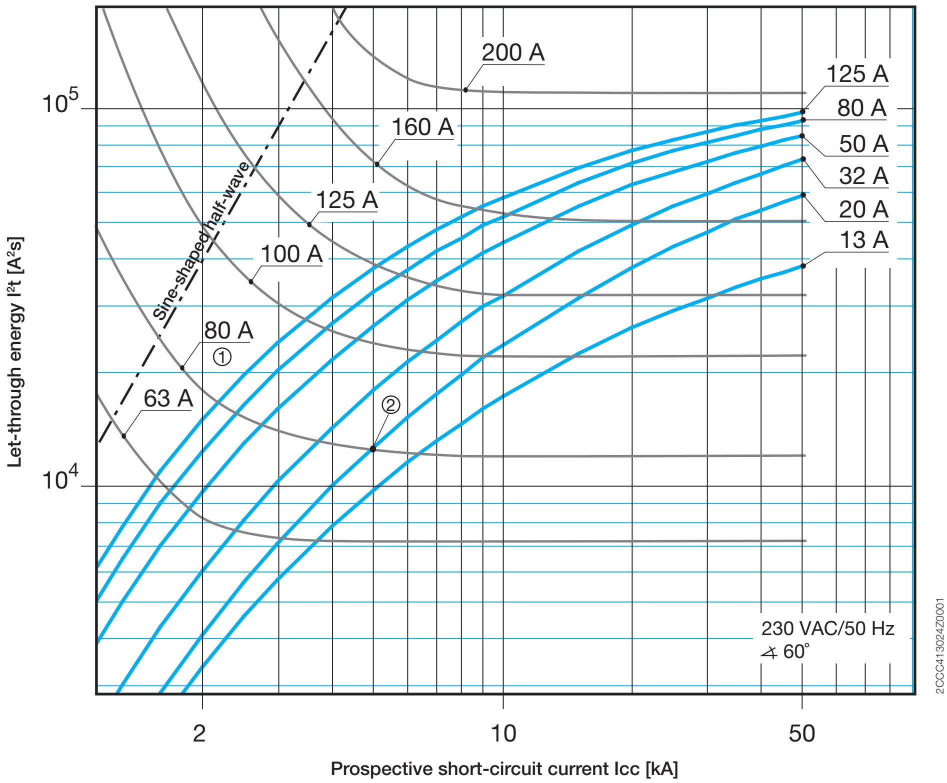


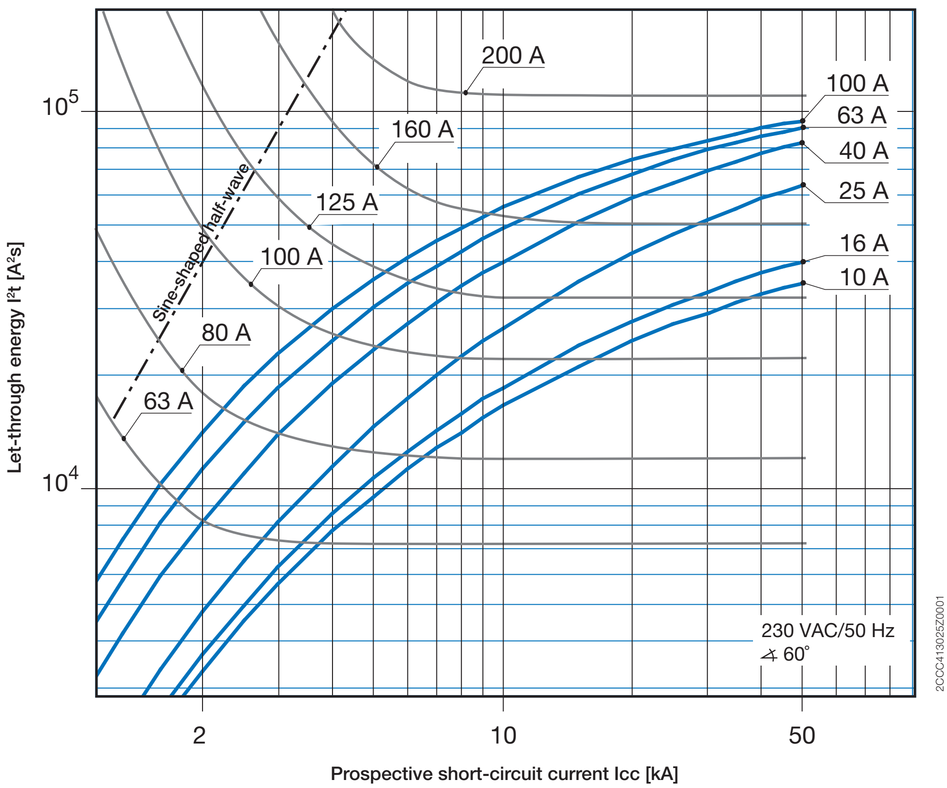
MCBs technical details
Limitation of specific let-through energy I^2t

2

S800 S characteristics B, C, D and K

230 V let-through energy



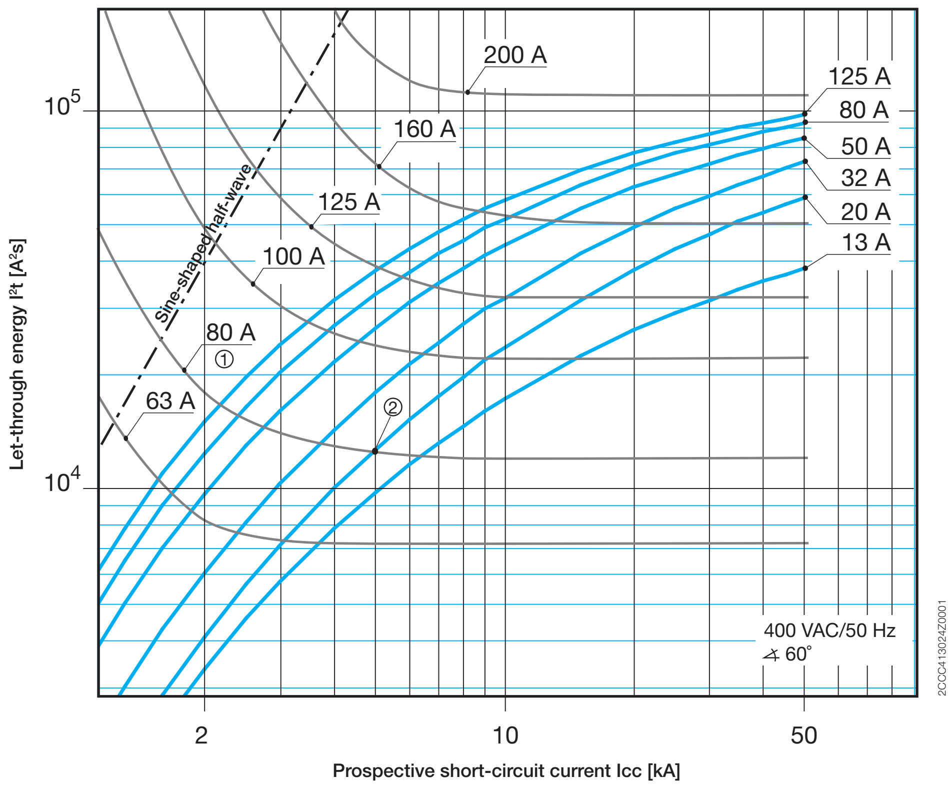


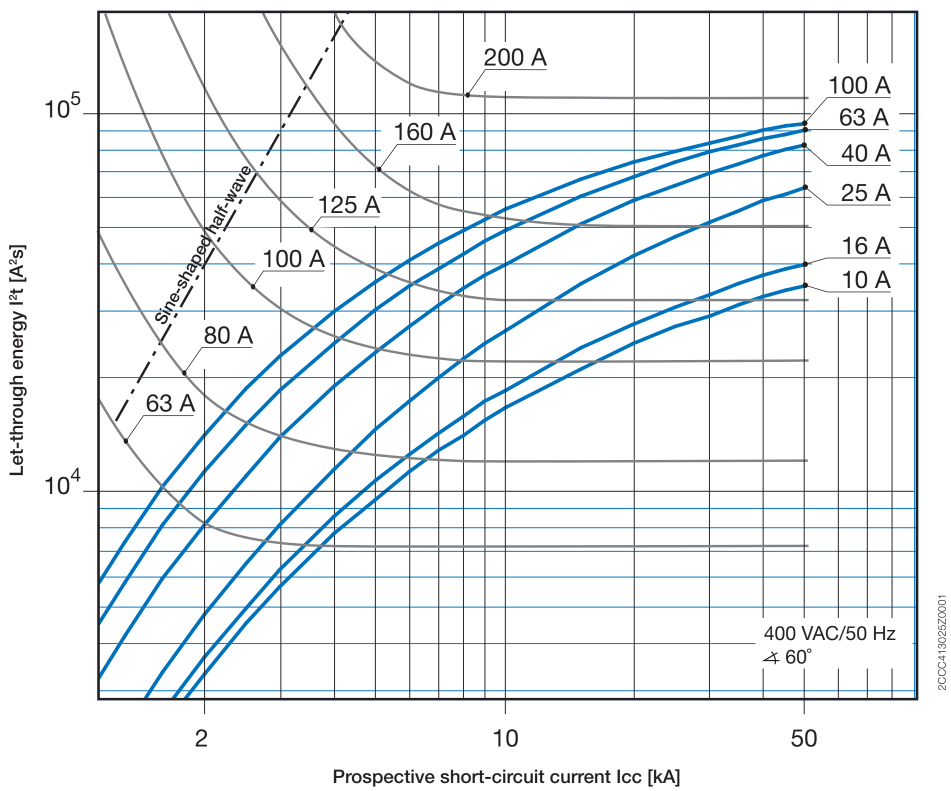
① Min. pre-arching I^2t, e.g. NH80 A gL/gG

② Max. let-through I^2t, e.g. S801S-C20

S800 S characteristics B, C, D and K

400 V let-through energy





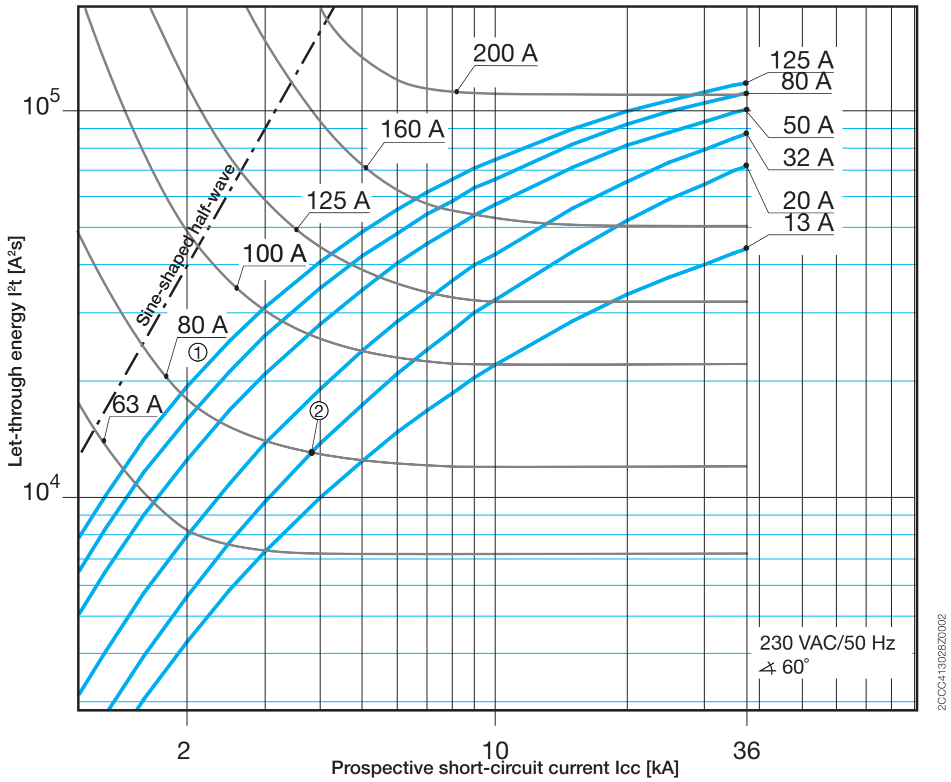
① Min. pre-arching I²t, e.g. NH80 A gL/gG
② Max. let-through I²t, e.g. S801S-C20

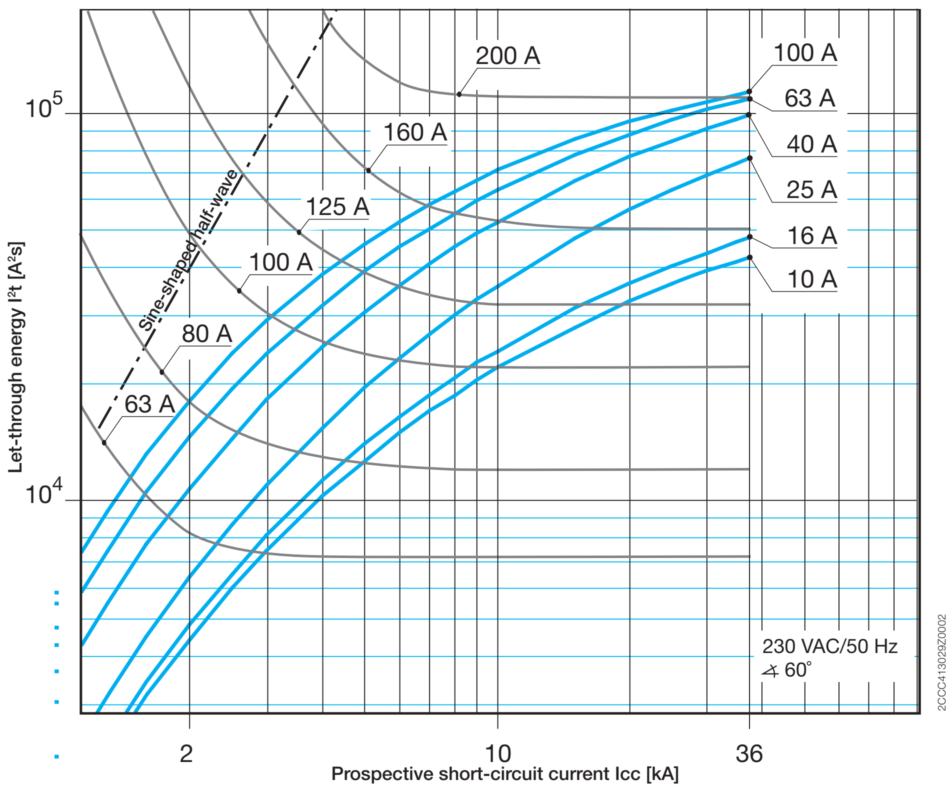
Limitation of specific let-through energy I^2t

2

S800 N characteristics B, C and D

230 V let-through energy

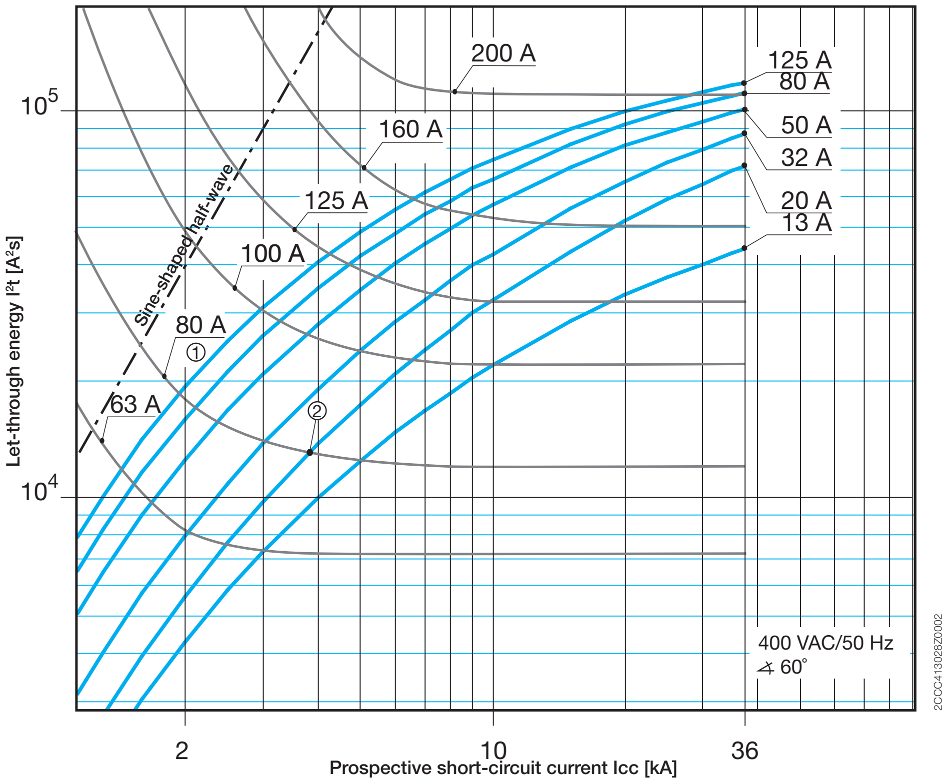


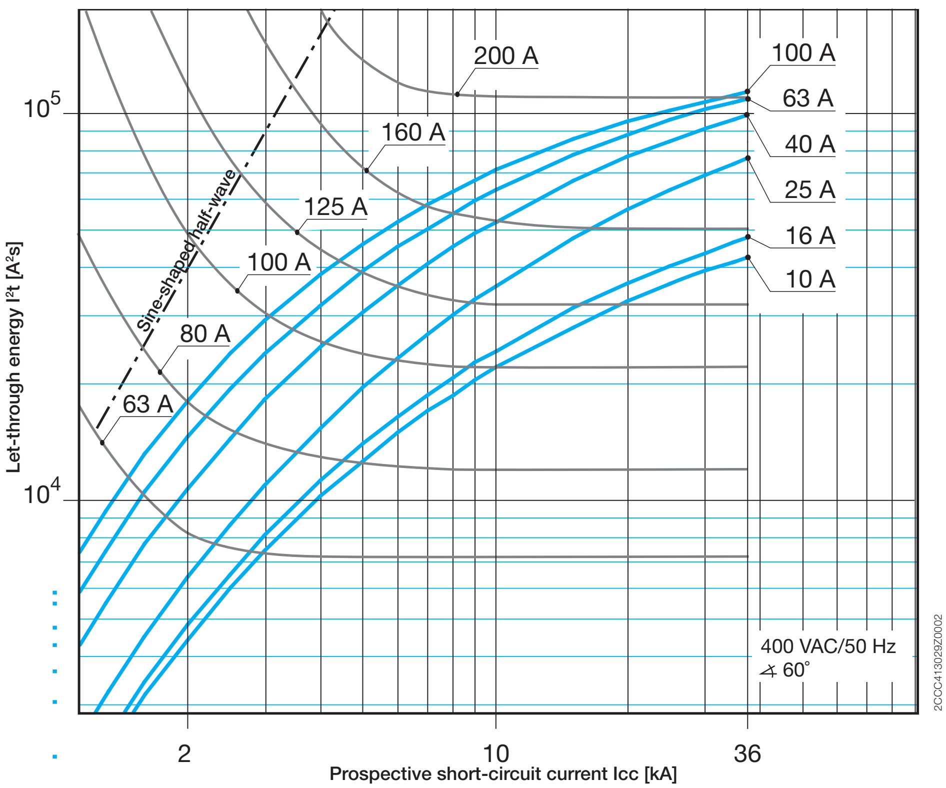


① Min. pre-arching I^2t, e.g. NH80 A gL/gG
② Max. let-through I^2t, e.g. S801S-C20

S800 N characteristics B, C and D

400 V let-through energy



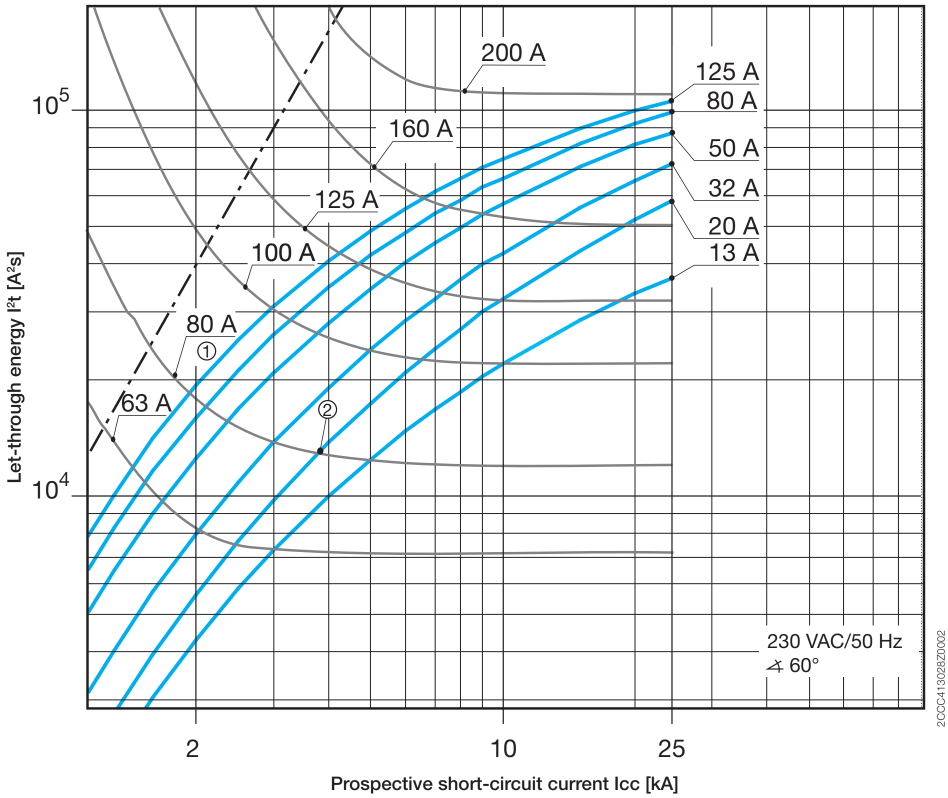


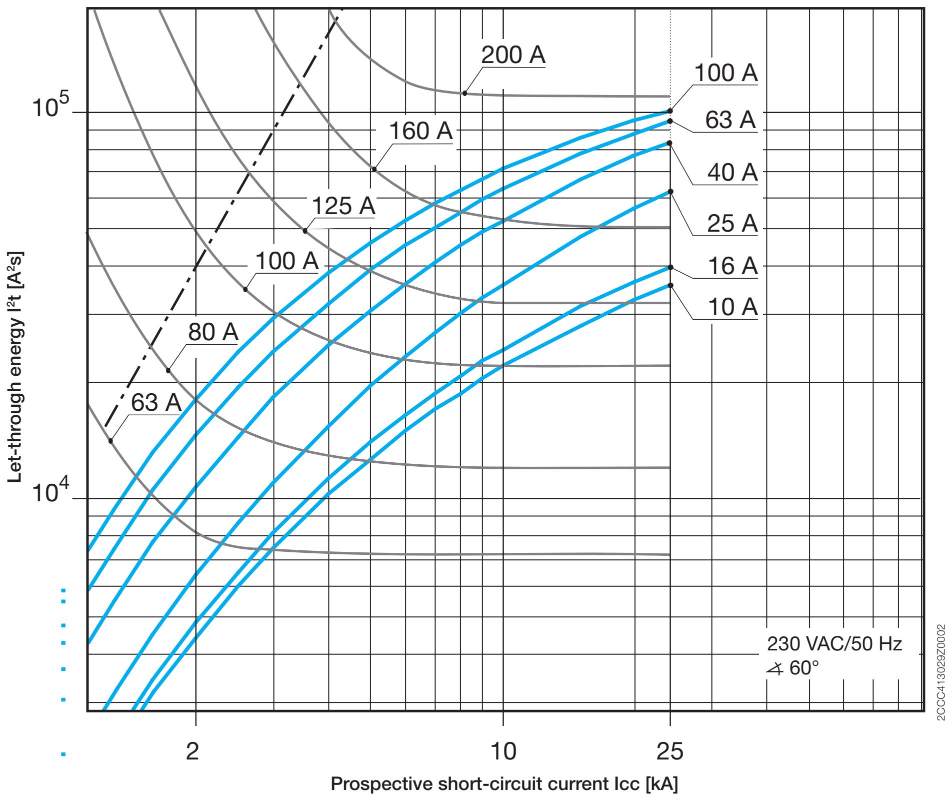
① Min. pre-arching I²t, e.g. NH80 A gL/gG
② Max. let-through I²t, e.g. S801S-C20

MCBs technical details
Limitation of specific let-through energy I^2t

S800 C characteristics B, C, D and K

230 V let-through energy



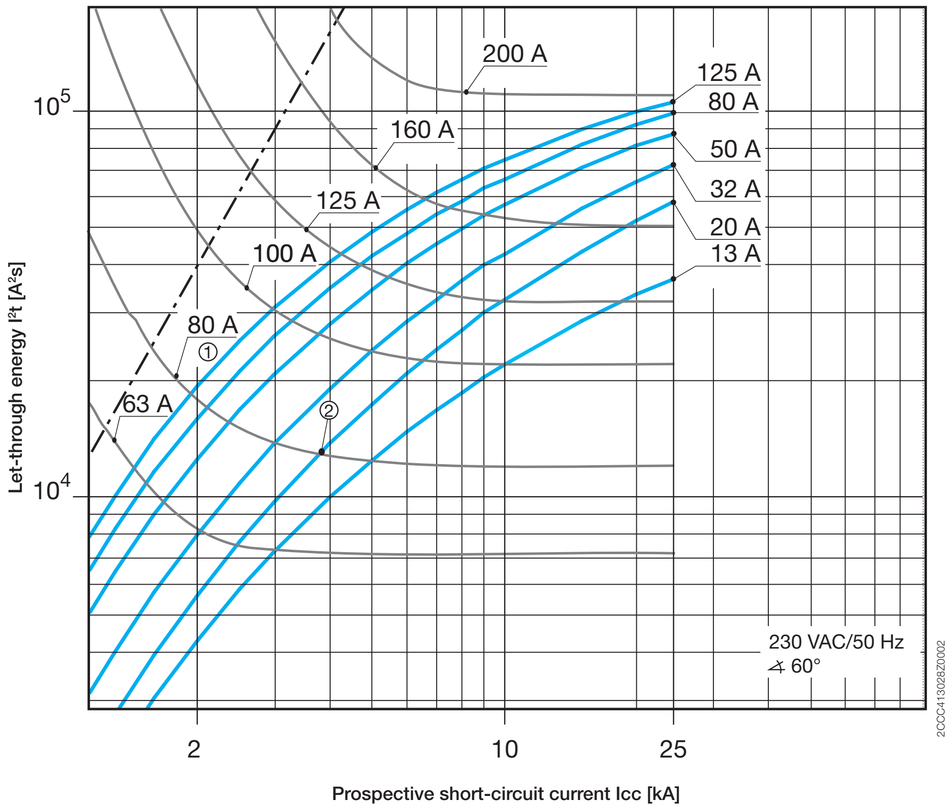


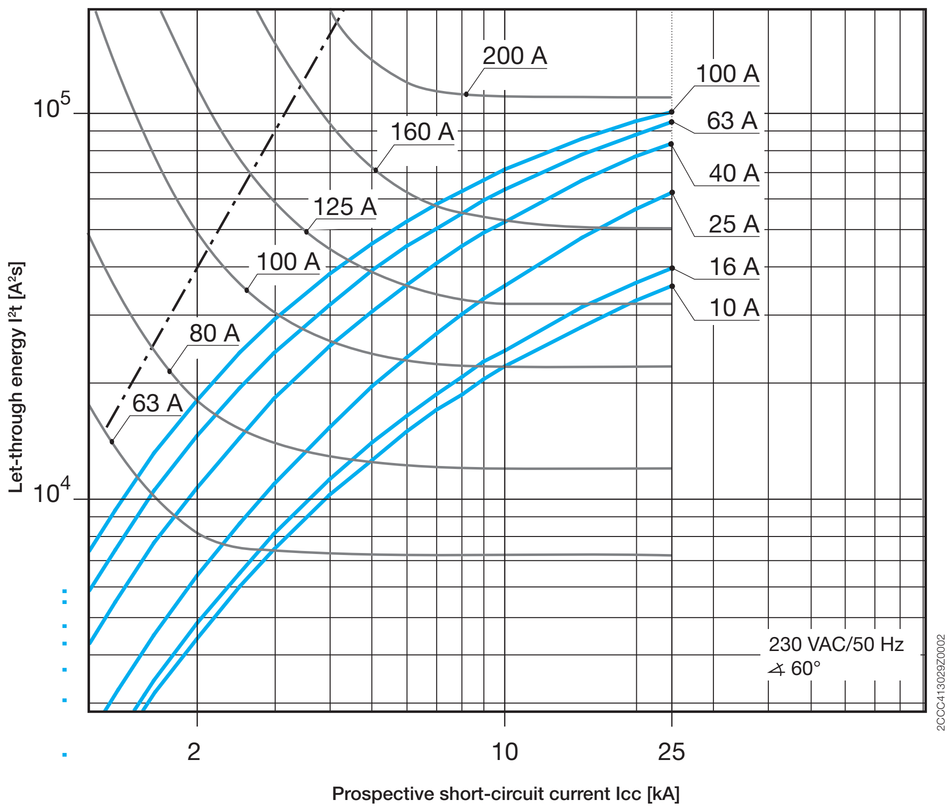
① Min. pre-arching I^2t, e.g. NH80 A gL/gG

② Max. let-through I^2t, e.g. S801S-C20

S800 C characteristics B, C, D and K

400 V let-through energy



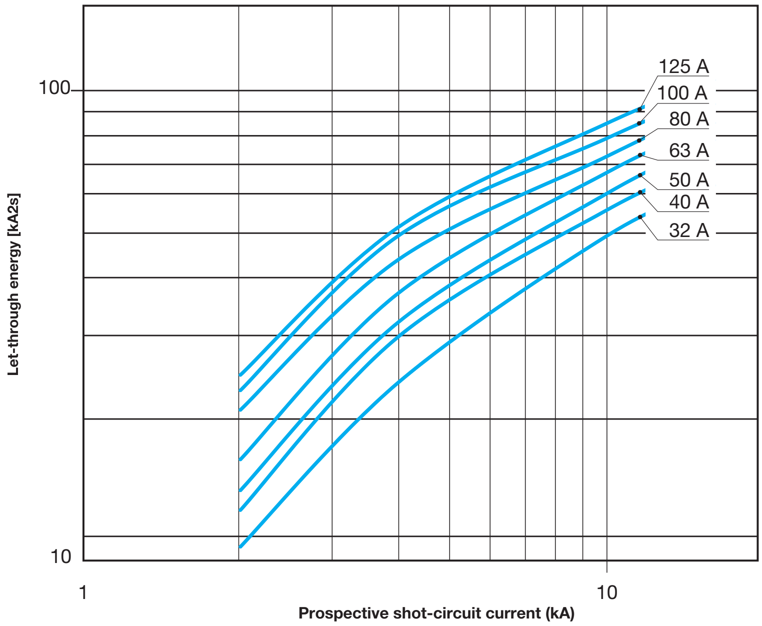


① Min. pre-arching I²t, e.g. NH80 A gL/gG
② Max. let-through I²t, e.g. S801S-C20

MCBs technical details
Limitation of specific let-through energy I^2t

S800B characteristics B, C, D and K
230/400 V let-through energy

2

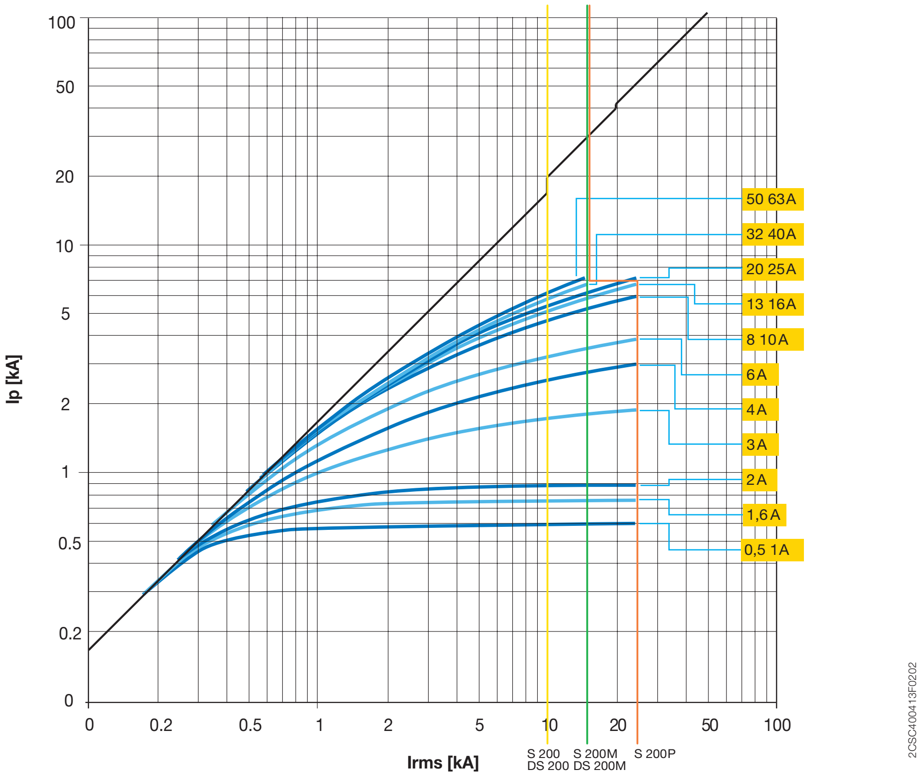


Peak current Ip

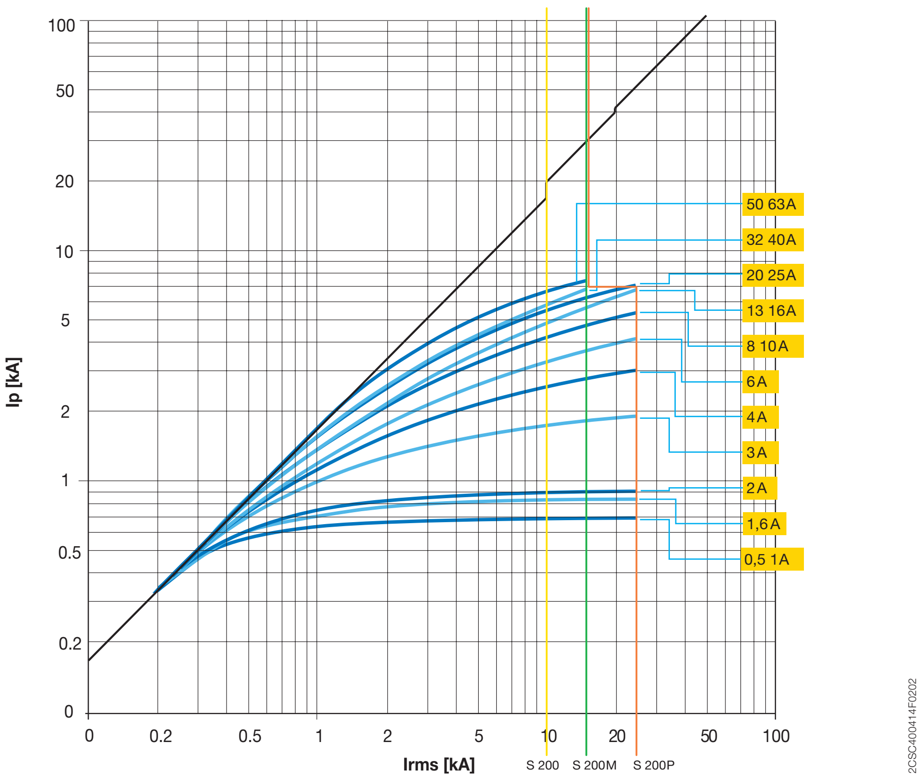
Limitation curves - Peak current values

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

S 200-S 200 M-S 200 P, characteristics B-C; DS 200-DS 200 M, characteristics B-C

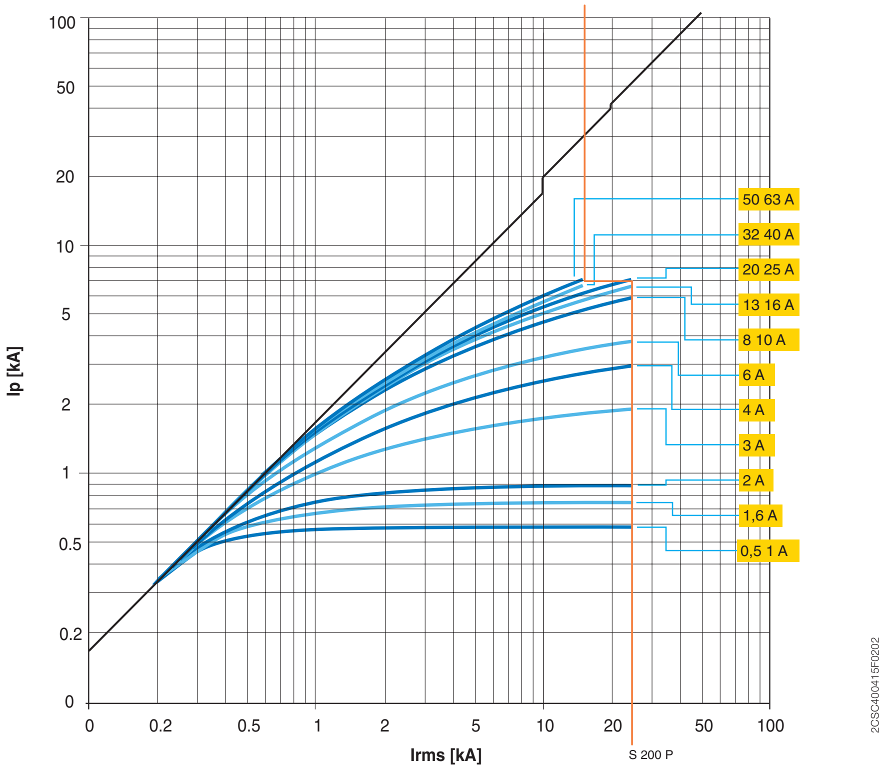


S 200-S 200 M-S 200 P, characteristics K-D

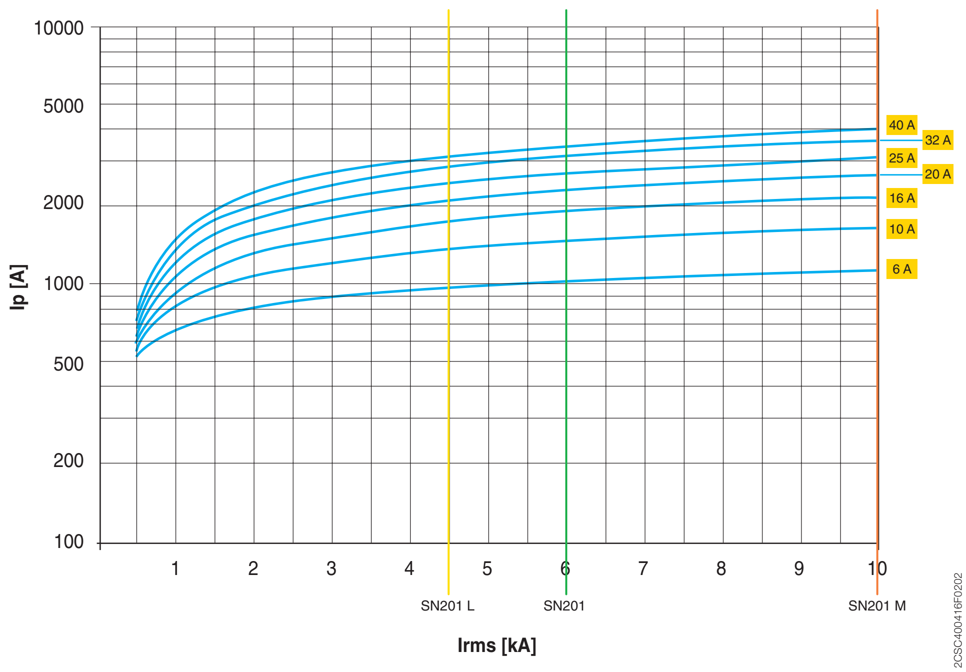


MCBs technical details
Peak current Ip

S 200-S 200 M-S 200 P, characteristic Z

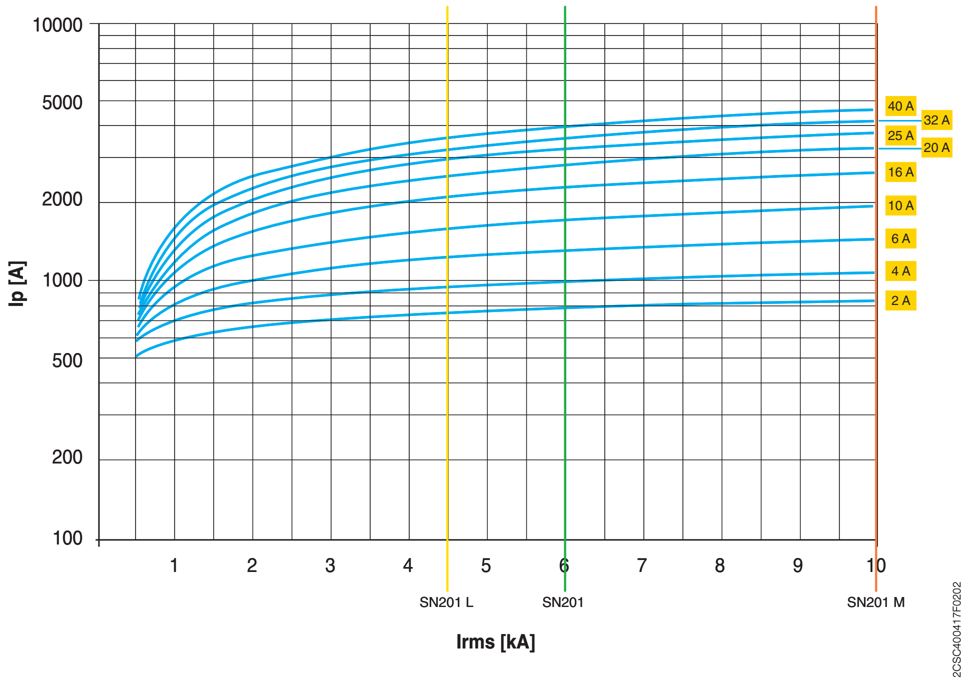


SN 201 L, SN 201, SN 201 M, characteristic B
230 V



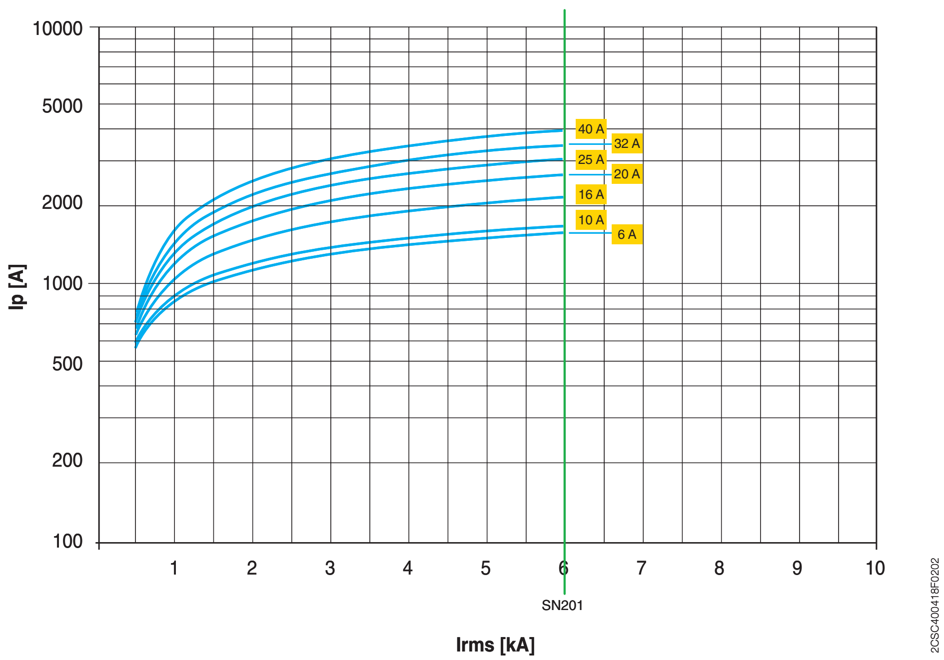
SN 201 L, SN 201, SN 201 M, characteristic C

230 V



SN 201, characteristic D

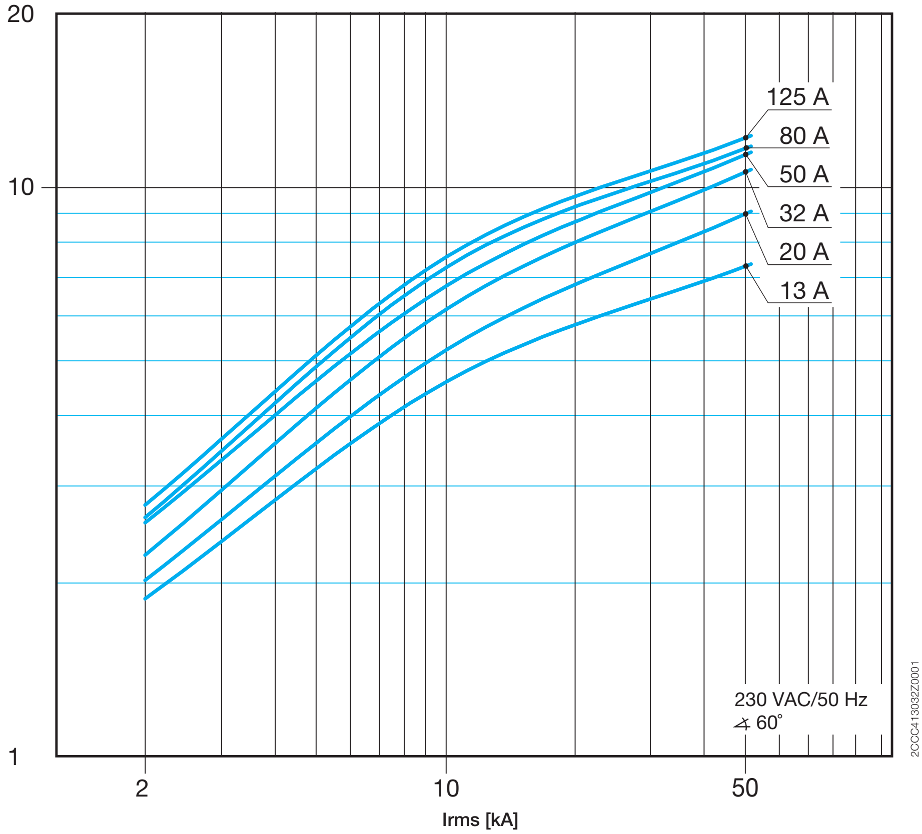
230 V

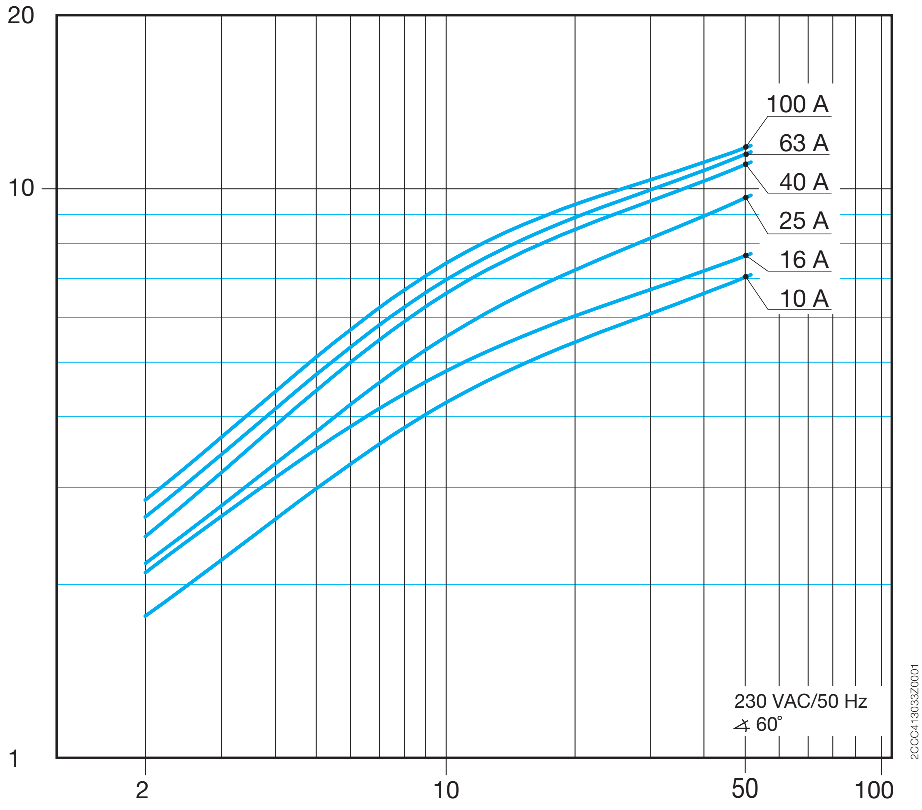


MCBs technical details
Peak current Ip

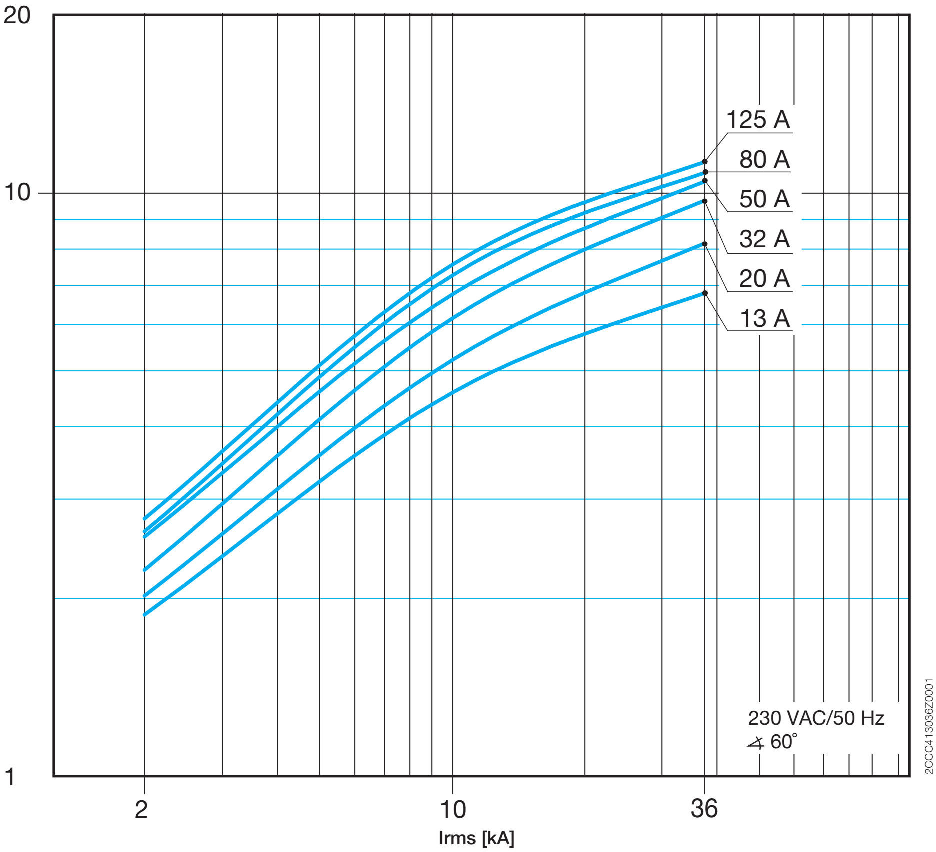
S 800 S characteristics B, C, D and K

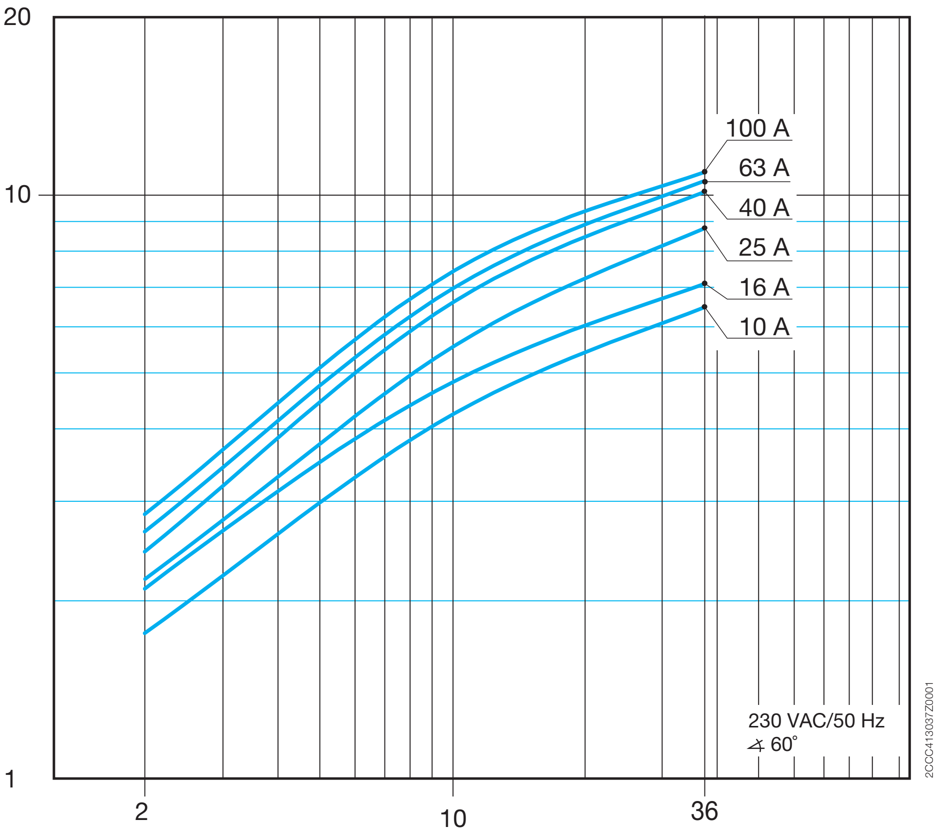
2





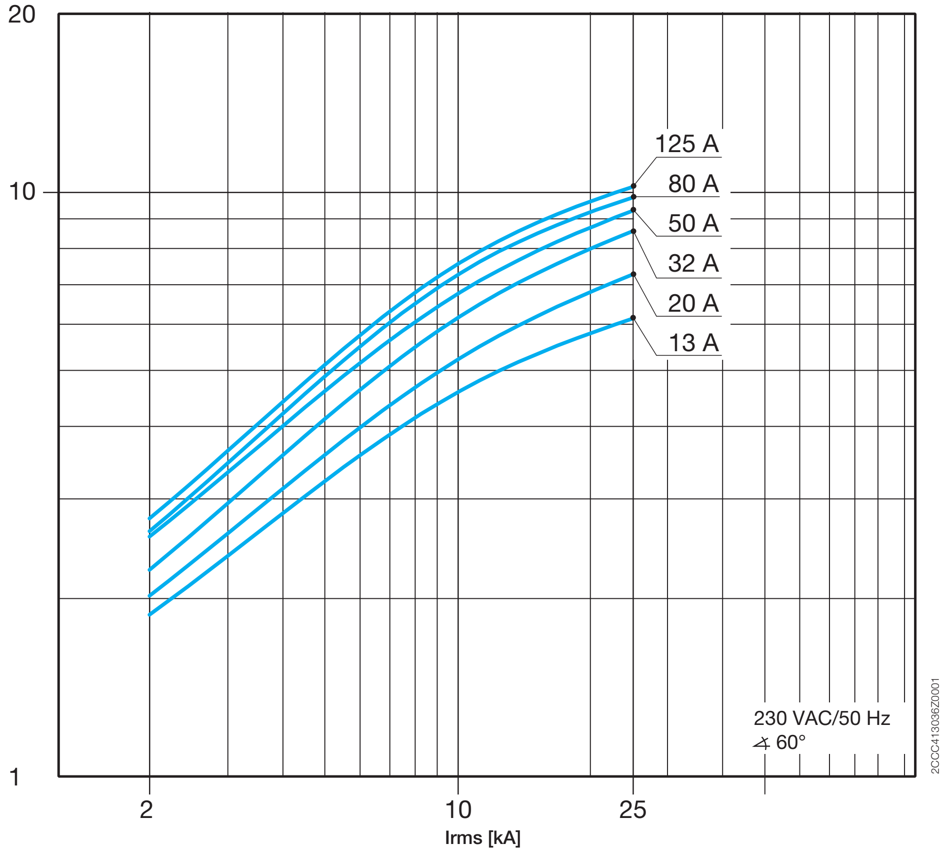
S 800 N characteristics B, C and D

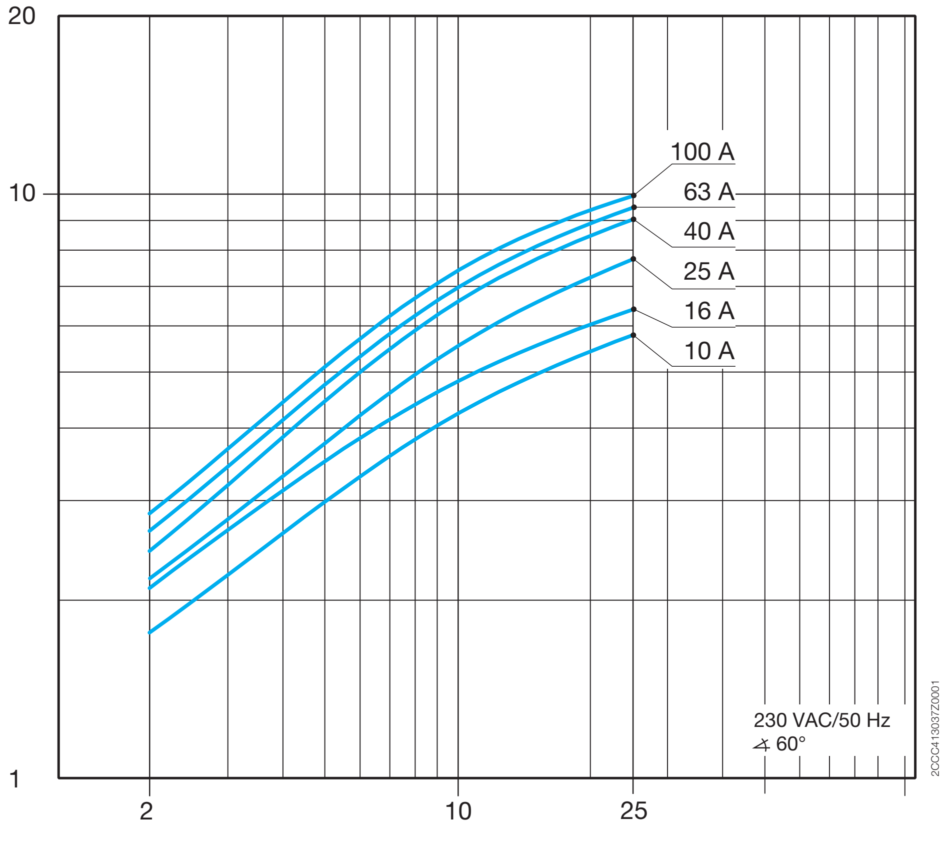




MCBs technical details
Peak current Ip

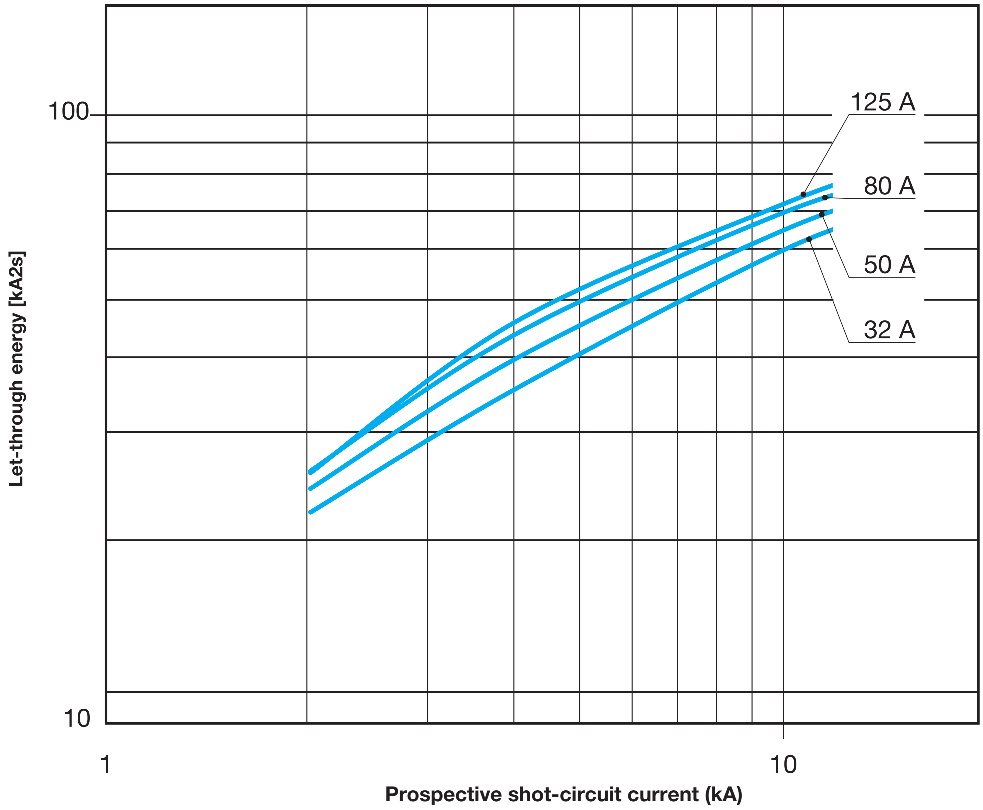
S 800 C characteristics B, C, D and K



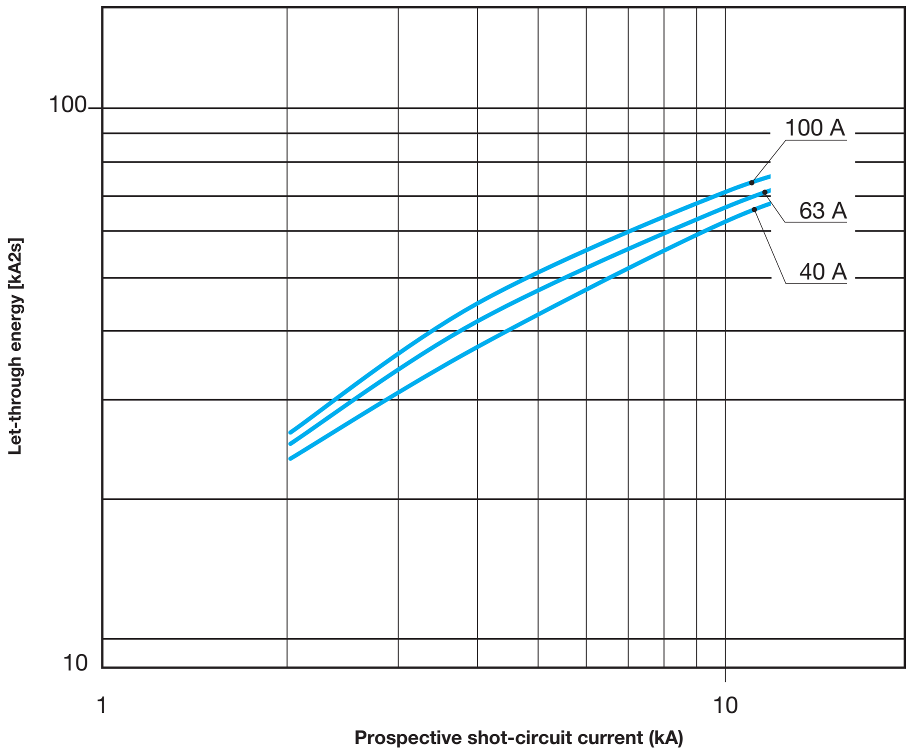


2

S 800 B characteristics B, C, D and K



S 800 B characteristics B, C, D and K



MCBs technical details
SOC - Selected Optimized Coordination

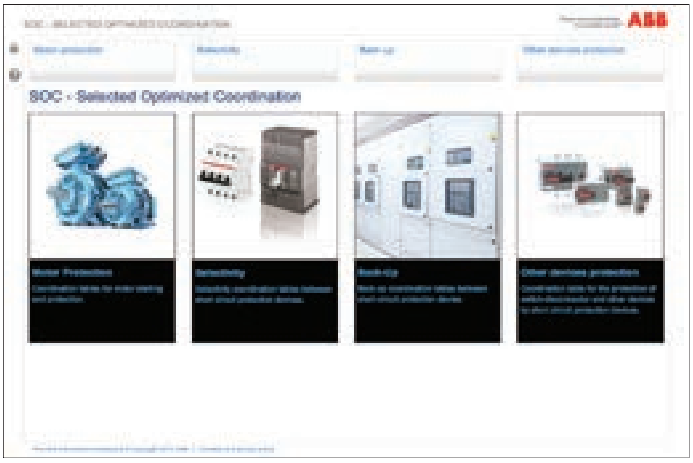


ABB is constantly improving or developing new products. Coordination between these products is therefore constantly updated.
Providing always the up-to-date version in an environmental-friendly way the World Wide Web is a perfect platform. Therefor ABB offers a new tool online, SOC – Selected Optimized Coordination.

SOC is a web tool for the selection of ABB products in these applications:
- Motor starting and protection
- Selectivity between protection devices
- Back-up protection
- Other devices protection

Please check out under:
http://applications.it.abb.com/SOC_SNB

In the on line coonfigurator you can choose among many filters, it is possible to select more than one filter at the same time.

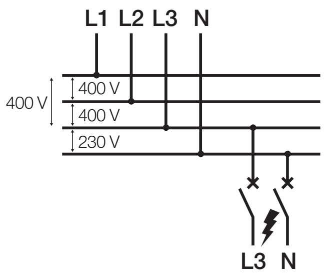
Results are shown in the bottom part of the page.
If a search does not produce any result, “Smart Search” will show the closest tables matching the search criteria.

Click on “>>” on the rightmost part of each record, to view the whole coordination table, tables can be printed or saved as PDF files.

MCBs technical details
Coordination tables

Back-up protection
The tables given provide the value (in kA, referring to the breaking capacity according to the IEC 60947-2 Standard) for which the back-up protection among the combination of selected circuit-breakers is verified. The tables cover the possible combinations between ABB SACE Tmax series of moulded-case circuit-breakers and those between the above-mentioned circuit-breakers and the ABB series of modular circuit-breakers.
The values indicated in the tables refer to the voltage:
– Vn of 230/240 V AC for coordination with modular SN 201 circuit-breakers
– Vn of 400/415 V AC for all the other coordinations.

Selective protection
The tables given provide the value (in kA, referring to the breaking capacity according to the IEC 60947-2 Standard) for which the selective protection is verified among the combination of selected circuit-breakers. The tables cover the possible combinations between ABB SACE Tmax series of moulded-case circuit-breakers, and the ABB series of modular circuit-breakers. The values in the table represent the maximum value obtainable of discrimination between supply side circuit-breaker and load side circuit-breaker referring to the voltage:
– Vn of 230/240 V AC for the SN 201 circuit-breakers and Vn of 400/415 V AC for the supply side circuit-breakers in the coordination between MCB with the modular SN 201 circuit-breakers (see picture).
– Vn of 400/415 V AC for all the other coordinations.



Note
The following tables give the breaking capacities at 415 V AC for circuit-breakers SACE Tmax.

Tmax @ 415 V AC	
Version	**Icu [kA]**
B	16
C	25
N	36
S	50
H	70
L (T2)	85
L (T4, T5)	120
V	200

Caption
MCB = miniature circuit-breakers (SN 201, S 2, S 800)
MCCB = moulded-case circuit-breakers (Tmax)

For moulded-case or air circuit-breakers:
TM = thermomagnetic release
– TMD (Tmax)
– TMA (Tmax)
M = magnetic only release
– MF (Tmax)
– MA (Tmax)
EL = electronic release
– PR221DS - PR222DS (Tmax)

For miniature circuit-breakers:
B = trip characteristic (Im=3...5In)
C = trip characteristic (Im=5...10In)
D = trip characteristic (Im=10...20In)
K = trip characteristic (Im=10...14In)
Z = trip characteristic (Im=2...3In)

For solutions not shown in these tables, please consult the website:
http://bol.it.abb.com or contact ABB SACE

For solutions not shown in these tabels referring to SMISSLINE or S800 please use: leaflet 2CCC451039L02xx

MCBs technical details
Coordination tables: back-up

2

MCB -MCB @240 V

			Supply s.	S200	S200M	S200P	S200P	25gG	40gG	50gG	63gG	80gG	100gG
	Char.			B-C	B-C	B-C	B-C						
		Icu		20	25	40	25						
Load s.		[kA]	In [A]	0,5…63	0,5…63	0,5…25	32…63						
SN201 L	B,C	6	2...40	20	25	40	25	35	25	20	15	10	10
SN201	B,C,D	10	2...40	20	25	40	25	35	25	20	15	10	10
SN201 M	B,C	10	2...40	20	25	40	25	35	25	20	15	10	10
S200	B,C, K,Z	20	0,5…63		25	40	25						
S200 M	B,C,D	25	0,5…63			40							
S200 P	B,C	40	0,5…25										
	D,K,Z	25	32…63										

MCCB @ 415 V - SN201 @ 230/240V

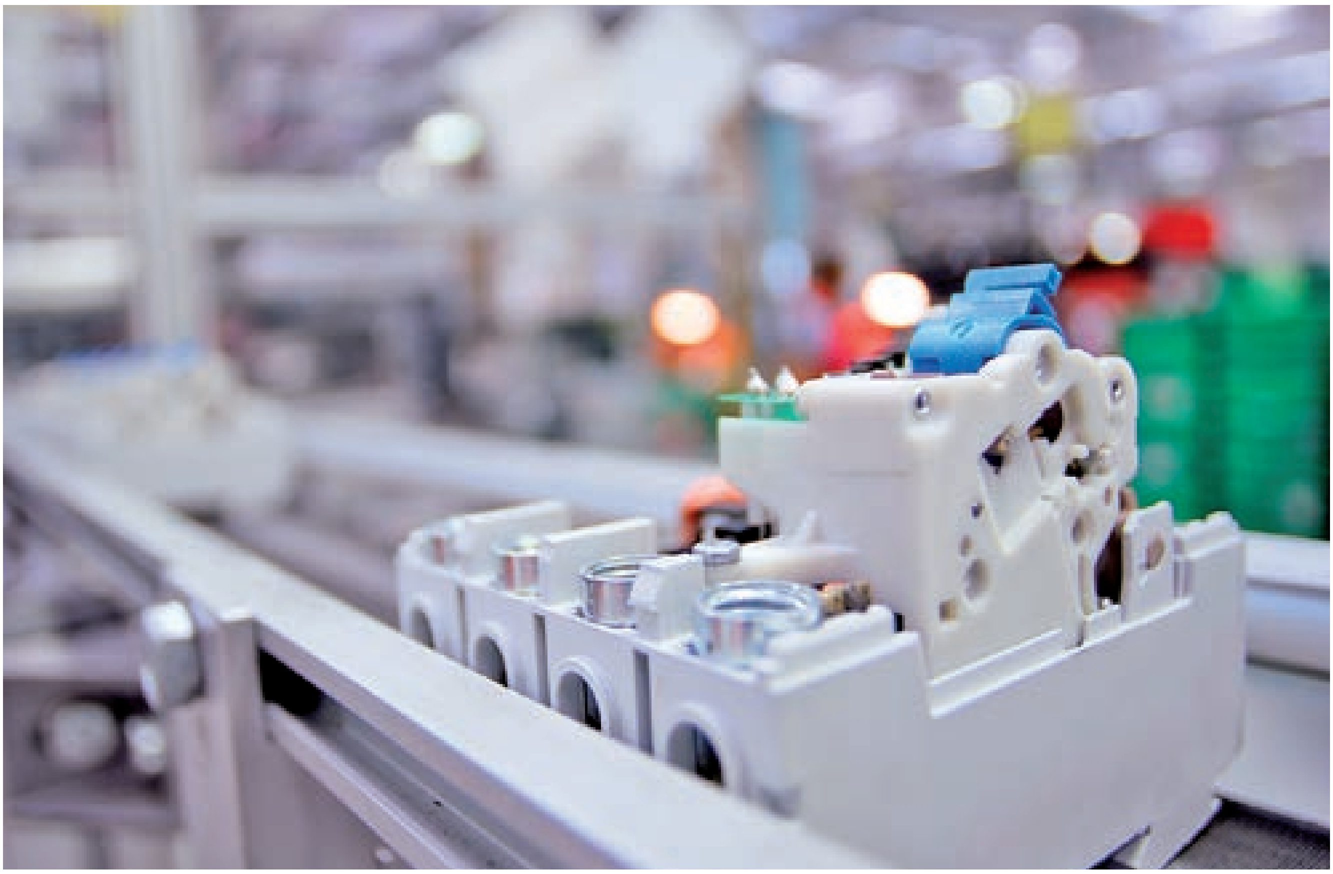
			Supply S.[1]	T1	T1	T1	T2	T3	T2	T3	T2	T2
			Version	B	C	N			S		H	L
Load S.	Char.	In [A]	Icu [kA]	16	25	36			50		70	85
SN201 L	B, C	2..25	6	16	16	16	20	10	20	10	20	20
		32, 40		10	10	10	16		16		16	16
SN201	B, C, D, K	2..25	10	16	16	16	25	16	25	16	25	25
		32, 40					16		16		16	16
SN201 M	B, C	2..25	10	16	16	16	25	16	25	16	25	25
		32, 40					16		16		16	16

[1] Supply side circuit-breaker 4P (load side circuit branched between one phase and the neutral)

System pro *M* compact®, new F200 B Series.
Built to make the difference.

2

ABB's technological excellence has created the new F200 B residual current circuit breaker: compact, safe and perfectly integrated into the range of modular products and accessories of System pro M compact. The F200 B residual current circuit breaker guarantees maximum protection and service continuity in any fault condition. Because ABB's research and technological innovation always strives for your safety. Make the right choice for your safety; choose ABB. For further information:
www.abb.com/lowvoltage



MCBs technical details
Coordination tables: back-up

2

MCB - MCB @ 415 V

			Supply S.	S200	S200M	S200P		S280
	Char.			B-C	B-C	B-C		B-C
Load S.		Icu [kA]		10	15	25	15	6
			In [A]	0.5..63	0.5..63	0.5..25	32..63	80, 100
S200	B,C,K,Z	10	0.5..63		15	25	15	
S200M	B,C	15	0.5..63			25		
S200P	B,C,	25	0.5..25					
	D,K,Z	15	32..63					

S800S – SN201 @ 230/240 V

			Supply s.	S800S							
	Char.			B, C, D, K							
Load s.		Icu [kA]		50							
			In [A]	25	32	40	50	63	80	100	125
SN201	B, D	10	6	50	50	50	50	50	50	50	50
			10	50	50	50	50	50	50	50	50
			16	50	50	50	50	50	50	50	50
			20		50	50	50	50	50	50	50
			25			50	50	50	50	50	50
			32				50	50	50	50	50
			40					50	50	50	50

S800S – SN201 @ 230/240 V

			Supply s.	S800S							
	Char.			B, C, D, K							
Load s.		Icu [kA]		50							
			In [A]	25	32	40	50	63	80	100	125
SN201	C	10	2	50	50	50	50	50	50	50	50
			4	50	50	50	50	50	50	50	50
			6	50	50	50	50	50	50	50	50
			10	50	50	50	50	50	50	50	50
			16	50	50	50	50	50	50	50	50
			20		50	50	50	50	50	50	50
			25			50	50	50	50	50	50
			32				50	50	50	50	50
			40					50	50	50	50

S800S – SN201 L @ 230/240 V

		Supply s.		S800S							
	Char.			B, C, D, K							
Load s.		Icu [kA]		50							
			In [A]	25	32	40	50	63	80	100	125
SN201 L	B, C	6	2	50	40	25	25	18	15	15	15
			4	50	40	25	25	18	15	15	15
			6	50	40	25	25	18	15	15	15
			10	50	40	25	25	18	15	15	15
			16	50	40	25	25	18	15	15	15
			20		40	25	25	18	15	15	15
			25			25	25	18	15	15	15
			32				25	18	15	15	15
			40					18	15	15	15

S800S – SN201 M @ 230/240 V

		Upstream		S800S							
	Char.			B, C, D, K							
Load s.		Icu [kA]		50							
			In [A]	25	32	40	50	63	80	100	125
SN201 M	B	10	6	50	50	50	50	50	50	50	50
			10	50	50	50	50	50	50	50	50
			16	50	50	50	50	50	50	50	50
			20		50	50	50	50	50	50	50
			25			50	50	50	50	50	50
			32				50	50	50	50	50
			40					50	50	50	50

S800S - SN201 M @ 230/240 V

		Supply s.		S800S							
	Char.			B, C, D, K							
Load s.		Icu [kA]		50							
			In [A]	25	32	40	50	63	80	100	125
SN201 M	C	10	2	50	50	50	50	50	50	50	50
			4	50	50	50	50	50	50	50	50
			6	50	50	50	50	50	50	50	50
			10	50	50	50	50	50	50	50	50
			16	50	50	50	50	50	50	50	50
			20		50	50	50	50	50	50	50
			25			50	50	50	50	50	50
			32				50	50	50	50	50

MCBs technical details
Coordination tables: back-up

S800S – S200 @230/400 V

		Supply s.		S800S							
	Char.			B, C, D, K							
Load s.		Icu [kA]		50							
			In [A]	25	32	40	50	63	80	100	125
S200	B	10	6	50	50	50	50	50	50	50	50
			10	50	50	50	50	50	50	50	50
			13	50	50	50	50	50	50	50	50
			16	50	50	50	50	50	50	50	50
			20		50	50	50	50	50	50	50
			25			50	50	50	50	50	50
			32				50	50	50	50	50
			40					50	50	50	50
			50						50	50	50
			63							50	50

		Supply s.		S800S							
	Char.			B, C, D, K							
Load s.		Icu [kA]		50							
			In [A]	25	32	40	50	63	80	100	125
S200	C	10	0.5...6	50	50	50	50	50	50	50	50
			8	50	50	50	50	50	50	50	50
			10	50	50	50	50	50	50	50	50
			13	50	50	50	50	50	50	50	50
			16	50	50	50	50	50	50	50	50
			20		50	50	50	50	50	50	50
			25			50	50	50	50	50	50
			32				50	50	50	50	50
			40					50	50	50	50
			50						50	50	50
			63							50	50

S800S – S200L @230/400 V

		Supply s.		S800S							
	Char.			B, C, D, K							
Load s.		Icu [kA]		50							
			In [A]	25	32	40	50	63	80	100	125
S200L	C	6	6...8	50	50	50	50	50	50	50	50
			10	50	50	50	50	50	50	50	50
			13	50	50	50	50	50	50	50	50
			16	50	50	50	50	50	50	50	50
			20		50	50	50	50	50	50	50
			25			50	50	50	50	50	50
			32				50	50	50	50	50
			40					50	50	50	50

S800S – S200M @230/400 V

		Supply s.		S800S							
	Char.			B, C, D, K							
Load s.		Icu [kA]		50							
			In [A]	25	32	40	50	63	80	100	125
S200M	B	15	6...16	50	50	50	50	50	50	50	50
			20		50	50	50	50	50	50	50
			25			50	50	50	50	50	50
			32				50	50	50	50	50
			40					50	50	50	50
			50						50	50	50
			63							50	50

		Supply s.		S800S							
	Char.			B, C, D, K							
Load s.		Icu [kA]		50							
			In [A]	25	32	40	50	63	80	100	125
S200M	C	15	0.5...16	50	50	50	50	50	50	50	50
			20		50	50	50	50	50	50	50
			25			50	50	50	50	50	50
			32				50	50	50	50	50
			40					50	50	50	50
			50						50	50	50
			63							50	50

S800S – S200P @230/400 V

		Supply s.		S800S							
	Char.			B, C, D, K							
Load s.		Icu [kA]		50							
			In [A]	25	32	40	50	63	80	100	125
S200P	B	25	6...16	50	50	50	50	50	50	50	50
			20		50	50	50	50	50	50	50
			25			50	50	50	50	50	50
		15	32				50	50	50	50	50
			40					50	50	50	50
			50						50	50	50
			63							50	50

		Supply s.		S800S							
	Char.			B, C, D, K							
Load s.		Icu [kA]		50							
			In [A]	25	32	40	50	63	80	100	125
S200P	C	25	0.5...16	50	50	50	50	50	50	50	50
			20		50	50	50	50	50	50	50
			25			50	50	50	50	50	50
		15	32				50	50	50	50	50
			40					50	50	50	50
			50						50	50	50
			63							50	50

MCBs technical details
Coordination tables: back-up

S800S – S400E @230/400 V

		Supply s.		S800S							
	Char.			B, C, D, K							
Load s.		Icu [kA]		50							
			In [A]	25	32	40	50	63	80	100	125
S400E	B	Icn [kA] 6	6	50	50	50	50	50	50	50	50
			10	50	50	50	50	50	50	50	50
			13	50	50	50	50	50	50	50	50
			16	50	50	50	50	50	50	50	50
			20		50	50	50	50	50	50	50
			25			50	50	50	50	50	50
			32				50	50	50	50	50
			40					50	50	50	50
			50						50	50	50
			63							50	50

		Supply s.		S800S							
	Char.			B, C, D, K							
Load s.		Icu [kA]		50							
			In [A]	25	32	40	50	63	80	100	125
S400E	C	Icn [kA] 6	0.5...6	50	50	50	50	50	50	50	50
			8	50	50	50	50	50	50	50	50
			10	50	50	50	50	50	50	50	50
			13	50	50	50	50	50	50	50	50
			16	50	50	50	50	50	50	50	50
			20		50	50	50	50	50	50	50
			25			50	50	50	50	50	50
			32				50	50	50	50	50
			40					50	50	50	50
			50						50	50	50
			63							50	50

S800S – S400M @230/400 V

		Supply s.		S800S							
	Char.			B, C, D, K							
Load s.		Icu [kA]		50							
			In [A]	25	32	40	50	63	80	100	125
S400M	B, D	Icn [kA]	4*...16	50	50	50	50	50	50	50	50
S450M		10	20		50	50	50	50	50	50	50
FS401M			25			50	50	50	50	50	50
FS403M			32				50	50	50	50	50
			40					50	50	50	50
			50						50	50	50
			63							50	50

* for B characteristic only

		Supply s.		S800S							
	Char.			B, C, D, K							
Load s.		Icu [kA]		50							
			In [A]	25	32	40	50	63	80	100	125
S400M	C, K	50	0.5...2	50	50	50	50	50	50	50	50
S450M		25	3...20	50	50	50	50	50	50	50	50
		15	25			50	50	50	50	50	50
			32				50	50	50	50	50
			40					50	50	50	50
			50						50	50	50
			63							50	50

S800S – S400M @254/440 V

		Supply s.		S800S							
	Char.			B, C, D, K							
Load s.		Icu [kA]		50							
			In [A]	25	32	40	50	63	80	100	125
S400M	C. K	15	0.5...2	30	30	30	30	30	30	30	30
S450M		10	3...10	30	30	30	30	30	30	30	30
		6	13	30	30	30	30	30	30	30	30
			16	30	30	30	30	30	30	30	30
			20		30	30	30	30	30	30	30
			25			30	30	30	30	30	30
			32				30	30	30	30	30
			40					30	30	30	30
			50						30	30	30
			63							30	30

MCBs technical details
Coordination tables: back-up

S800N – S200 @ 230/400 V

		Supply s.		S800N							
	Char.			B, C, D							
Load s.		Icu [kA]		36							
			In [A]	25	32	40	50	63	80	100	125
S200	B	10	6	36	36	36	36	36	36	36	36
			10	36	36	36	36	36	36	36	36
			13	36	36	36	36	36	36	36	36
			16	36	36	36	36	36	36	36	36
			20		36	36	36	36	36	36	36
			25			36	36	36	36	36	36
			32				36	36	36	36	36
			40					36	36	36	36
			50						36	36	36
			63							36	36

		Supply s.		S800N							
	Char.			B, C, D							
Load s.		Icu [kA]		36							
			In [A]	25	32	40	50	63	80	100	125
S200	C	10	0.5…6	36	36	36	36	36	36	36	36
			8	36	36	36	36	36	36	36	36
			10	36	36	36	36	36	36	36	36
			13	36	36	36	36	36	36	36	36
			16	36	36	36	36	36	36	36	36
			20		36	36	36	36	36	36	36
			25			36	36	36	36	36	36
			32				36	36	36	36	36
			40					36	36	36	36
			50						36	36	36
			63							36	36

S800N – S200L @ 230/400 V

		Supply s.		S800N							
	Char.			B, C, D							
Load s.		Icu [kA]		36							
			In [A]	25	32	40	50	63	80	100	125
S200L	C	6	6…8	36	36	36	36	36	36	36	36
			10	36	36	36	36	36	36	36	36
			13	36	36	36	36	36	36	36	36
			16	36	36	36	36	36	36	36	36
			20		36	36	36	36	36	36	36
			25			36	36	36	36	36	36
			32				36	36	36	36	36
			40					36	36	36	36

S800N – S200M @ 230/400 V

		Supply s.		S800N							
	Char.			B, C, D							
Load s.		Icu [kA]		36							
			In [A]	25	32	40	50	63	80	100	125
S200M	B	15	6…16	36	36	36	36	36	36	36	36
			20		36	36	36	36	36	36	36
			25			36	36	36	36	36	36
			32				36	36	36	36	36
			40					36	36	36	36
			50						36	36	36
			63							36	36

		Supply s.		S800N							
	Char.			B, C, D							
Load s.		Icu [kA]		36							
			In [A]	25	32	40	50	63	80	100	125
S200M	C	15	0.5…16	36	36	36	36	36	36	36	36
			20		36	36	36	36	36	36	36
			25			36	36	36	36	36	36
			32				36	36	36	36	36
			40					36	36	36	36
			50						36	36	36
			63							36	36

S800N – S200P @ 230/400 V

		Supply s.		S800N							
	Char.			B, C, D							
Load s.		Icu [kA]		36							
			In [A]	25	32	40	50	63	80	100	125
S200P	B	25	6…16	36	36	36	36	36	36	36	36
			20		36	36	36	36	36	36	36
			25			36	36	36	36	36	36
		15	32				36	36	36	36	36
			40					36	36	36	36
			50						36	36	36
			63							36	36

		Supply s.		S800N							
	Char.			B, C, D							
Load s.		Icu [kA]		36							
			In [A]	25	32	40	50	63	80	100	125
S200P	C	25	0.5…16	36	36	36	36	36	36	36	36
			20		36	36	36	36	36	36	36
			25			36	36	36	36	36	36
		15	32				36	36	36	36	36
			40					36	36	36	36
			50						36	36	36
			63							36	36

MCBs technical details
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S800N – S400E @230/400 V

		Supply s.		S800N							
	Char.			B, C, D							
Load s.		Icu [kA]		36							
			In [A]	25	32	40	50	63	80	100	125
S400E	B	Icn [kA] 6	6	36	36	36	36	36	36	36	36
			10	36	36	36	36	36	36	36	36
			13	36	36	36	36	36	36	36	36
			16	36	36	36	36	36	36	36	36
			20		36	36	36	36	36	36	36
			25			36	36	36	36	36	36
			32				36	36	36	36	36
			40					36	36	36	36
			50						36	36	36
			63							36	36

		Supply s.		S800N							
	Char.			B, C, D							
Load s.		Icu [kA]		36							
			In [A]	25	32	40	50	63	80	100	125
S400E	C	Icn [kA] 6	0.5...6	36	36	36	36	36	36	36	36
			8	36	36	36	36	36	36	36	36
			10	36	36	36	36	36	36	36	36
			13	36	36	36	36	36	36	36	36
			16	36	36	36	36	36	36	36	36
			20		36	36	36	36	36	36	36
			25			36	36	36	36	36	36
			32				36	36	36	36	36
			40					36	36	36	36
			50						36	36	36
			63							36	36

S800N – S400M @230/400 V

		Supply s.		S800N							
	Char.			B, C, D							
Load s.		Icu [kA]		36							
			In [A]	25	32	40	50	63	80	100	125
S400M	B, D	Icn [kA]	4*...16	36	36	36	36	36	36	36	36
S450M		10	20		36	36	36	36	36	36	36
FS401MB			25			36	36	36	36	36	36
FS403MB			32				36	36	36	36	36
			40					36	36	36	36
			50						36	36	36
			63							36	36

* for B characteristic only

		Supply s.		S800N							
	Char.			B, C, D							
Load s.		Icu [kA]		36							
			In [A]	25	32	40	50	63	80	100	125
S400M	C, K	10	0.5...2	36	36	36	36	36	36	36	36
S450M		25	3...20	36	36	36	36	36	36	36	36
FS401MC		15	25			36	36	36	36	36	36
FS403MC			32				36	36	36	36	36
			40					36	36	36	36
			50						36	36	36
			63							36	36

S800N – S400M @254/440 V

		Supply s.		S800N							
	Char.			B, C, D							
Load s.		Icu [kA]		20							
			In [A]	25	32	40	50	63	80	100	125
S400M	C, K	15	0.5...2	20	20	20	20	20	20	20	20
S450M		10	3...10	20	20	20	20	20	20	20	20
		6	13	20	20	20	20	20	20	20	20
			16	20	20	20	20	20	20	20	20
			20		20	20	20	20	20	20	20
			25			20	20	20	20	20	20
			32				20	20	20	20	20
			40					20	20	20	20
			50						20	20	20
			63							20	20

MCBs technical details
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S800N – SN201 @ 230/240 V

		Supply s.		S800N							
	Char.			B, C, D							
Load s.		Icu [kA]		36							
			In [A]	25	32	40	50	63	80	100	125
SN201	B, D	10	6	36	36	36	36	36	36	36	36
			10	36	36	36	36	36	36	36	36
			16	36	36	36	36	36	36	36	36
			20		36	36	36	36	36	36	36
			25			36	36	36	36	36	36
			32				36	36	36	36	36
			40					36	36	36	36

S800N – SN201 @ 230/240 V

		Supply s.		S800N							
	Char.			B, C, D							
Load s.		Icu [kA]		36							
			In [A]	25	32	40	50	63	80	100	125
SN201	C	10	2	36	36	36	36	36	36	36	36
			4	36	36	36	36	36	36	36	36
			6	36	36	36	36	36	36	36	36
			10	36	36	36	36	36	36	36	36
			16	36	36	36	36	36	36	36	36
			20		36	36	36	36	36	36	36
			25			36	36	36	36	36	36
			32				36	36	36	36	36
			40					36	36	36	36

S800N – SN201L @ 230/240 V

		Supply s.		S800N							
	Char.			B, C, D							
Load s.		Icu [kA]		36							
			In [A]	25	32	40	50	63	80	100	125
SN201 L	B, C	6	2	36	36	25	25	18	15	15	15
			4	36	36	25	25	18	15	15	15
			6	36	36	25	25	18	15	15	15
			10	36	36	25	25	18	15	15	15
			16	36	36	25	25	18	15	15	15
			20		36	25	25	18	15	15	15
			25			25	25	18	15	15	15
			32				25	18	15	15	15
			40					18	15	15	15

S800N – SN201 M @ 230/240 V

		Supply s.		S800N							
	Char.			B, C, D							
Load.s		Icu [kA]		36							
			In [A]	25	32	40	50	63	80	100	125
SN201 M	B	10	6	36	36	36	36	36	36	36	36
			10	36	36	36	36	36	36	36	36
			16	36	36	36	36	36	36	36	36
			20		36	36	36	36	36	36	36
			25			36	36	36	36	36	36
			32				36	36	36	36	36
			40					36	36	36	36

S800N – SN201 M @ 230/240 V

		Supply s.		S800N							
	Char.			B, C, D							
Load s.		Icu [kA]		36							
			In [A]	25	32	40	50	63	80	100	125
SN201 M	C	10	2	36	36	36	36	36	36	36	36
			4	36	36	36	36	36	36	36	36
			6	36	36	36	36	36	36	36	36
			10	36	36	36	36	36	36	36	36
			16	36	36	36	36	36	36	36	36
			20		36	36	36	36	36	36	36
			25			36	36	36	36	36	36

S800C – S200 @ 230/400 V

		Supply s.		S800C							
	Char.			B, C, D							
Load s.		Icu [kA]		25							
			In [A]	25	32	40	50	63	80	100	125
S200	B	10	6	25	25	25	25	25	25	25	25
			10	25	25	25	25	25	25	25	25
			13	25	25	25	25	25	25	25	25
			16	25	25	25	25	25	25	25	25
			20		25	25	25	25	25	25	25
			25			25	25	25	25	25	25
			32				25	25	25	25	25
			40					25	25	25	25
			50						25	25	25
			63							25	25

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		Supply s.		S800C							
	Char.			B, C, D							
Load s.		Icu [kA]		25							
			In [A]	25	32	40	50	63	80	100	125
S200	C	10	0.5…6	25	25	25	25	25	25	25	25
			8	25	25	25	25	25	25	25	25
			10	25	25	25	25	25	25	25	25
			13	25	25	25	25	25	25	25	25
			16	25	25	25	25	25	25	25	25
			20		25	25	25	25	25	25	25
			25			25	25	25	25	25	25
			32				25	25	25	25	25
			40					25	25	25	25
			50						25	25	25
			63							25	25

S800C – S200M @ 230/400 V

		Supply s.		S800C							
	Char.			B, C, D							
Load s.		Icu [kA]		25							
			In [A]	25	32	40	50	63	80	100	125
S200M	B	15	6…16	25	25	25	25	25	25	25	25
			20		25	25	25	25	25	25	25
			25			25	25	25	25	25	25
			32				25	25	25	25	25
			40					25	25	25	25
			50						25	25	25
			63							25	25

		Supply s.		S800C							
	Char.			B, C, D							
Load s.		Icu [kA]		25							
			In [A]	25	32	40	50	63	80	100	125
S200M	C	15	0.5…16	25	25	25	25	25	25	25	25
			20		25	25	25	25	25	25	25
			25			25	25	25	25	25	25
			32				25	25	25	25	25
			40					25	25	25	25
			50						25	25	25
			63							25	25

S800C – S200P @ 230/400 V

		Supply s.		S800C							
	Char.			B, C, D							
Load s.		Icu [kA]		25							
			In [A]	25	32	40	50	63	80	100	125
S200P	B	25	6…16	25	25	25	25	25	25	25	25
			20		25	25	25	25	25	25	25
			25			25	25	25	25	25	25
		15	32				25	25	25	25	25
			40					25	25	25	25
			50						25	25	25
			63							25	25

		Supply s.		S800C							
	Char.			B, C, D							
Load s.		Icu [kA]		25							
			In [A]	25	32	40	50	63	80	100	125
S200P	C	25	0.5…16	25	25	25	25	25	25	25	25
			20		25	25	25	25	25	25	25
			25			25	25	25	25	25	25
		15	32				25	25	25	25	25
			40					25	25	25	25
			50						25	25	25
			63							25	25

S800C – SN201 @ 230/240 V

		Supply s.		S800C							
	Char.			B, C, D, K							
Load s.		Icu [kA]		25							
			In [A]	25	32	40	50	63	80	100	125
SN201	B, D	10	6	25	25	25	25	25	25	25	25
			10	25	25	25	25	25	25	25	25
			16	25	25	25	25	25	25	25	25
			20		25	25	25	25	25	25	25
			25			25	25	25	25	25	25
			32				25	25	25	25	25
			40					25	25	25	25

Coordination tables: back-up

S800C – SN201 @ 230/240 V

		Supply s.		S800C							
	Char.			B, C, D, K							
Load.s.		Icu [kA]		25							
			In [A]	25	32	40	50	63	80	100	125
SN201	C	10	2	25	25	25	25	25	25	25	25
			4	25	25	25	25	25	25	25	25
			6	25	25	25	25	25	25	25	25
			10	25	25	25	25	25	25	25	25
			16	25	25	25	25	25	25	25	25
			20		25	25	25	25	25	25	25
			25			25	25	25	25	25	25
			32				25	25	25	25	25
			40					25	25	25	25

S800C – SN201L @ 230/240 V

		Supply s.		S800C							
	Char.			B, C, D, K							
Load s.		Icu [kA]		25							
			In [A]	25	32	40	50	63	80	100	125
SN201L	B, C	6	2	25	25	25	25	18	15	15	15
			4	25	25	25	25	18	15	15	15
			6	25	25	25	25	18	15	15	15
			10	25	25	25	25	18	15	15	15
			16	25	25	25	25	18	15	15	15
			20		25	25	25	18	15	15	15
			25			25	25	18	15	15	15
			32				25	18	15	15	15
			40					18	15	15	15

S800C – SN201M @ 230/240 V

		Supply s.		S800C							
	Char.			B, C, D, K							
Load s.		Icu [kA]		25							
			In [A]	25	32	40	50	63	80	100	125
SN201M	B	10	6	25	25	25	25	25	25	25	25
			10	25	25	25	25	25	25	25	25
			16	25	25	25	25	25	25	25	25
			20		25	25	25	25	25	25	25
			25			25	25	25	25	25	25
			32				25	25	25	25	25
			40					25	25	25	25

S800C – SN201M @ 230/240 V

		Supply s.		S800C							
	Char.			B, C, D, K							
Load s.		Icu [kA]		25							
			In [A]	25	32	40	50	63	80	100	125
SN201M	C	10	2	25	25	25	25	25	25	25	25
			4	25	25	25	25	25	25	25	25
			6	25	25	25	25	25	25	25	25
			10	25	25	25	25	25	25	25	25
			16	25	25	25	25	25	25	25	25
			20		25	25	25	25	25	25	25
			25			25	25	25	25	25	25
			32				25	25	25	25	25

S800C – S280 @ 230/400 V

		Supply s.		S800C							
	Char.			B, C, D							
Load s.		Icu [kA]		25							
			In [A]	25	32	40	50	63	80	100	125
S280	B	10	6	25	25	25	25	25	25	25	25
		25	10	25	25	25	25	20	16	16	16
			13	25	25	25	25	20	16	16	16
			16	25	25	25	25	20	16	16	16
			20		25	25	25	20	16	16	16
			25			25	25	20	16	16	16
		15	32				25	20	16	16	16
			40					20	16	16	16
		10	50						16	16	16
			63							16	16

		Supply s.		S800C							
	Char.			B, C, D							
Load s.		Icu [kA]		25							
			In [A]	25	32	40	50	63	80	100	125
S280	C	10	3	25	25	25	25	25	25	25	25
			4	25	25	25	25	25	25	25	25
			6	25	25	25	25	25	25	25	25
			8	25	25	25	25	20	16	16	16
		25	10	25	25	25	25	20	16	16	16
			13	25	25	25	25	20	16	16	16
			16	25	25	25	25	20	16	16	16
			20		25	25	25	20	16	16	16
			25			25	25	20	16	16	16
		15	32				25	20	16	16	16
			40					20	16	16	16
		10	50						16	16	16
			63							16	16

MCBs technical details
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		Supply s.		S800C							
	Char.			B, C, D							
Load s.		Icu [kA]		25							
			In [A]	25	32	40	50	63	80	100	125
S280	K, Z	10	3	25	25	25	25	25	25	25	25
			4	25	25	25	25	25	25	25	25
			6	25	25	25	25	25	25	25	25
			8	25	25	25	25	20	16	16	16
		25	10	25	25	25	25	20	16	16	16
			13	25	25	25	25	20	16	16	16
			16	25	25	25	25	20	16	16	16
			20		25	25	25	20	16	16	16
			25			25	25	20	16	16	16
		15	32				25	20	16	16	16
		10	40					20	16	16	16
			50						16	16	16
			63							16	16

S800C – S400E @ 230/400 V

		Supply s.		S800C							
	Char.			B, C, D							
Load s.		Icu [kA]		25							
			In [A]	25	32	40	50	63	80	100	125
S400E	B	Icn [kA]	6	25	25	25	25	25	25	25	25
		6	10	25	25	25	25	25	25	25	25
			13	25	25	25	25	25	25	25	25
			16	25	25	25	25	25	25	25	25
			20		25	25	25	25	25	25	25
			25			25	25	25	25	25	25
			32				25	25	25	25	25
			40					25	25	25	25
			50						25	25	25
			63							25	25

		Supply s.		S800C							
	Char.			B, C, D							
Load s.		Icu [kA]		25							
			In [A]	32		40	50	63	80	100	125
S400E	C	Icn [kA]	0.5...6	25	25	25	25	25	25	25	25
		6	8	25	25	25	25	25	25	25	25
			10	25	25	25	25	25	25	25	25
			13	25	25	25	25	25	25	25	25
			16	25	25	25	25	25	25	25	25
			20		25	25	25	25	25	25	25
			25			25	25	25	25	25	25
			32				25	25	25	25	25
			40					25	25	25	25
			50						25	25	25
			63							25	25

S800C – S400M @ 230/400 V

		Supply s.		S800C							
	Char.			B, C, D							
Load s.		Icu [kA]		25							
			In [A]	25	32	40	50	63	80	100	125
S400M	B, D	Icn [kA]	4*...16	25	25	25	25	25	25	25	25
S450M		10	20		25	25	25	25	25	25	25
			25			25	25	25	25	25	25
			32				25	25	25	25	25
			40					25	25	25	25
			50						25	25	25
			63							25	25

		Supply s.		S800C							
	Char.			B, C, D							
Load s.		Icu [kA]		25							
			In [A]	25	32	40	50	63	80	100	125
S400M	C	25	3...20	25	25	25	25	25	25	25	25
S450M		15	25			25	25	25	25	25	25
			32				25	25	25	25	25
			40					25	25	25	25
			50						25	25	25
			63							25	25

		Supply s.		S800C							
	Char.			B, C, D							
Load s.		Icu [kA]		25							
			In [A]	25	32	40	50	63	80	100	125
S400M	K	25	3...20	25	25	25	25	25	25	25	25
S450M		10	25			25	25	25	25	25	25
			32				25	25	25	25	25
			40					25	25	25	25
			50						25	25	25
			63							25	25

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S800B – S200 @ 230/400 V

		Supply s.		S800B						
	Char.			B, C, D, K						
Load s.		Icu [kA]								
			In [A]	32	40	50	63	80	100	125*
S200	B	10	6	16	16	16	16	16	16	16
			10	16	16	16	16	16	16	16
			13	16	16	16	16	16	16	16
			16	16	16	16	16	16	16	16
			20	16	16	16	16	16	16	16
			25		16	16	16	16	16	16
			32			16	16	16	16	16
			40				16	16	16	16
			50					16	16	16
			63					16	16	16

		Supply s.		S800B						
	Char.			B, C, D, K						
Load s.		Icu [kA]								
			In [A]	32	40	50	63	80	100	125*
S200	C, D, K, Z	10	0.5…6	16	16	16	16	16	16	16
			8	16	16	16	16	16	16	16
			10	16	16	16	16	16	16	16
			13	16	16	16	16	16	16	16
			16	16	16	16	16	16	16	16
			20	16	16	16	16	16	16	16
			25		16	16	16	16	16	16
			32			16	16	16	16	16
			40				16	16	16	16
			50					16	16	16
			63					16	16	16

* only S800B-B,C
back-up values indicated in kA

S800B – S400E @230/400 V

		Supply s.		S800B						
	Char.			B, C, D, K						
Load s.		Icu [kA]								
			In [A]	32	40	50	63	80	100	125
S400E	B, C	6	6	16	16	16	16	16	16	16
			8	16	16	16	16	16	16	16
			10	16	16	16	16	16	16	16
			13	16	16	16	16	16	16	16
			16	16	16	16	16	16	16	16
			20	16	16	16	16	16	16	16
			25		16	16	16	16	16	16
			32			16	16	16	16	16
			40				16	16	16	16
			50					16	16	16
			63					16	16	16

S800B – S400M @230/400 V

		Supply s.		S800B						
	Char.			B, C, D, K						
Load s.		Icu [kA]								
			In [A]	32	40	50	63	80	100	125*
S400M	B, D	10	6**	16	16	16	16	16	16	16
			8**	16	16	16	16	16	16	16
			10	16	16	16	16	16	16	16
			13	16	16	16	16	16	16	16
			16	16	16	16	16	16	16	16
			20	16	16	16	16	16	16	16
			25		16	16	16	16	16	16
			32			16	16	16	16	16
			40				16	16	16	16
			50					16	16	16
			63					16	16	16

* only S800B-B, C

** only S400M-B

MCBs technical details
Coordination tables: back-up

		Supply s.		S800B						
	Char.			B, C, D, K						
Load s.		Icu [kA]								
			In [A]	32	40	50	63	80	100	125
S400M	C	10	2	16	16	16	16	16	16	16
			3	16	16	16	16	16	16	16
			4	16	16	16	16	16	16	16
			6	16	16	16	16	16	16	16
			8	16	16	16	16	16	16	16
			10	16	16	16	16	16	16	16
			13	16	16	16	16	16	16	16
			16	16	16	16	16	16	16	16
			20	16	16	16	16	16	16	16
			25		16	16	16	16	16	16
			32			16	16	16	16	16
			40				16	16	16	16
			50					16	16	16
			63					16	16	16

		Supply s.		S800B						
	Char.			B, C, D, K						
Load s.		Icu [kA]								
			In [A]	32	40	50	63	80	100	125
S400M	K	10	0.5...6	16	16	16	16	16	16	16
			8	16	16	16	16	16	16	16
			10	16	16	16	16	16	16	16
			13	16	16	16	16	16	16	16
			16	16	16	16	16	16	16	16
			20	16	16	16	16	16	16	16
			25		16	16	16	16	16	16
			32			16	16	16	16	16
			40				16	16	16	16
			50					16	16	16
			63					16	16	16

S800B – S200M @ 230/400 V

		Supply s.		S800B						
	Char.			B, C, D, K						
Load s.		Icu [kA]								
			In [A]	32	40	50	63	80	100	125*
S200M	B	15	6	16	16	16	16	16	16	16
			10	16	16	16	16	16	16	16
			13	16	16	16	16	16	16	16
			16	16	16	16	16	16	16	16
			20	16	16	16	16	16	16	16
			25		16	16	16	16	16	16
			32			16	16	16	16	16
			40				16	16	16	16
		10	50					16	16	16
			63					16	16	16

		Supply s.		S800B						
	Char.			B, C, D, K						
Load s.		Icu [kA]								
			In [A]	32	40	50	63	80	100	125*
S200	C, D K, Z	15	0.5…6	16	16	16	16	16	16	16
			8	16	16	16	16	16	16	16
			10	16	16	16	16	16	16	16
			13	16	16	16	16	16	16	16
			16	16	16	16	16	16	16	16
			20	16	16	16	16	16	16	16
			25		16	16	16	16	16	16
			32			16	16	16	16	16
			40				16	16	16	16
		10	50					16	16	16
			63					16	16	16

* only S800B-B,C

S800B – SN201 @ 230/240 V

		Supply s.		S800B						
	Char.			B, C, D, K						
Load s.		Icu [kA]								
			In [A]	32	40	50	63	80	100	125*
SN201	B, D	10	6	16	16	16	16	16	16	16
			10	16	16	16	16	16	16	16
			16	16	16	16	16	16	16	16
			20	16	16	16	16	16	16	16
			25		16	16	16	16	16	16
			32			16	16	16	16	16
			40				16	16	16	16

MCBs technical details
Coordination tables: back-up

		Supply s.		S800B						
	Char.			B, C, D, K						
Load s.		Icu [kA]								
			In [A]	32	40	50	63	80	100	125*
SN201	C	10	2	16	16	16	16	16	16	16
			4	16	16	16	16	16	16	16
			6	16	16	16	16	16	16	16
			10	16	16	16	16	16	16	16
			13	16	16	16	16	16	16	16
			16	16	16	16	16	16	16	16
			20	16	16	16	16	16	16	16
			25		16	16	16	16	16	16
			32			16	16	16	16	16
			40				16	16	16	16

		Supply s.		S800B						
	Char.			B, C, D, K						
Load s.		Icu [kA]								
			In [A]	32	40	50	63	80	100	125*
SN201 L	B, C	6	2	16	16	16	16	15	15	15
			4	16	16	16	16	15	15	15
			6	16	16	16	16	15	15	15
			10	16	16	16	16	15	15	15
			16	16	16	16	16	15	15	15
			20	16	16	16	16	15	15	15
			25		16	16	16	15	15	15
			32			16	16	15	15	15
			40				16	15	15	15

		Supply s.		S800B						
	Char.			B, C, D, K						
Load s.		Icu [kA]								
			In [A]	32	40	50	63	80	100	125*
SN201 M	B	10	6	16	16	16	16	16	16	16
			10	16	16	16	16	16	16	16
			16	16	16	16	16	16	16	16
			20	16	16	16	16	16	16	16
			25		16	16	16	16	16	16
			32			16	16	16	16	16
			40				16	16	16	16

		Supply s.		S800B						
	Char.			B, C, D, K						
Load s.		Icu [kA]								
			In [A]	32	40	50	63	80	100	125
SN201 M	C	10	2	16	16	16	16	16	16	16
			4	16	16	16	16	16	16	16
			6	16	16	16	16	16	16	16
			10	16	16	16	16	16	16	16
			16	16	16	16	16	16	16	16
			20	16	16	16	16	16	16	16
			25		16	16	16	16	16	16
			32			16	16	16	16	16
			40				16	16	16	16

* only S800B-B,C
back-up values indicated in kA

S800U – S200 @ 230/400 V

		Supply s.		S800U							
	Char.			K, Z							
Load s.		Icu [kA]		50							
			In [A]	25	32	40	50	63	80	100	125
S200	B	10	6	50	50	50	50	50	50	50	50
			10	50	50	50	50	50	50	50	50
			13	50	50	50	50	50	50	50	50
			16	50	50	50	50	50	50	50	50
			20		50	50	50	50	50	50	50
			25			50	50	50	50	50	50
			32				50	50	50	50	50
			40					50	50	50	50
			50						50	50	50
			63							50	50

		Supply s.		S800U							
	Char.			K, Z							
Load s.		Icu [kA]		50							
			In [A]	25	32	40	50	63	80	100	125
S200	B	10	0.5...6	50	50	50	50	50	50	50	50
			8	50	50	50	50	50	50	50	50
			10	50	50	50	50	50	50	50	50
			13	50	50	50	50	50	50	50	50
			16	50	50	50	50	50	50	50	50
			20		50	50	50	50	50	50	50
			25			50	50	50	50	50	50
			32				50	50	50	50	50
			40					50	50	50	50
			50						50	50	50
			63							50	50

MCBs technical details
Coordination tables: back-up

S800U – S200M @ 230/400 V

		Supply s.		S800U							
	Char.			K, Z							
Load s.		Icu [kA]		50							
			In [A]	25	32	40	50	63	80	100	125
S200M	B	15	6...16	50	50	50	50	50	50	50	50
			20		50	50	50	50	50	50	50
			25			50	50	50	50	50	50
			32				50	50	50	50	50
			40					50	50	50	50
			50						50	50	50
			63							50	50

		Supply s.		S800U							
	Char.			K, Z							
Load s.		Icu [kA]		50							
			In [A]	25	32	40	50	63	80	100	125
S200M	C	15	0.5...16	50	50	50	50	50	50	50	50
			20		50	50	50	50	50	50	50
			25			50	50	50	50	50	50
			32				50	50	50	50	50
			40					50	50	50	50
			50						50	50	50
			63							50	50

S800U – S200P @ 230/400 V

		Supply s.		S800U							
	Char.			K, Z							
Load s.		Icu [kA]		50							
			In [A]	25	32	40	50	63	80	100	125
S200P	B	25	6...16	50	50	50	50	50	50	50	50
			20		50	50	50	50	50	50	50
			25			50	50	50	50	50	50
		15	32				50	50	50	50	50
			40					50	50	50	50
			50						50	50	50
			63							50	50

		Supply s.		S800U							
	Char.			K, Z							
Load s.		Icu [kA]		50							
			In [A]	25	32	40	50	63	80	100	125
S200P	C	25	0.5...16	50	50	50	50	50	50	50	50
			20		50	50	50	50	50	50	50
			25			50	50	50	50	50	50
		15	32				50	50	50	50	50
			40					50	50	50	50
			50						50	50	50
			63							50	50

S800U – S400E @230/400 V

		Supply s.		S800U							
	Char.			K, Z							
Load s.		Icu [kA]		50							
			In [A]	25	32	40	50	63	80	100	125
S400E	B	Icn [kA] 6	6	50	50	50	50	50	50	50	50
			10	50	50	50	50	50	50	50	50
			13	50	50	50	50	50	50	50	50
			16	50	50	50	50	50	50	50	50
			20		50	50	50	50	50	50	50
			25			50	50	50	50	50	50
			32				50	50	50	50	50
			40					50	50	50	50
			50						50	50	50
			63							50	50

		Supply s.		S800U							
	Char.			K, Z							
Load s.		Icu [kA]		50							
			In [A]	25	32	40	50	63	80	100	125
S400E	C	Icn [kA] 6	0.5...6	50	50	50	50	50	50	50	50
			10	50	50	50	50	50	50	50	50
			13	50	50	50	50	50	50	50	50
			16	50	50	50	50	50	50	50	50
			20		50	50	50	50	50	50	50
			25			50	50	50	50	50	50
			32				50	50	50	50	50
			40					50	50	50	50
			50						50	50	50
			63							50	50

MCBs technical details
Coordination tables: back-up

S800U – S400M @230/400 V

		Supply s.		S800U							
	Char.			K, Z							
Load s.		Icu [kA]		50							
			In [A]	25	32	40	50	63	80	100	125
S400M	B, D	Icn [kA]	4*...16	50	50	50	50	50	50	50	50
S450M		10	20		50	50	50	50	50	50	50
			25			50	50	50	50	50	50
			32				50	50	50	50	50
			40					50	50	50	50
			50						50	50	50
			63							50	50

		Supply s.		S800U							
	Char.			K, Z							
Load s.		Icu [kA]		50							
			In [A]	25	32	40	50	63	80	100	125
S400M	C	25	3...20	50	50	50	50	50	50	50	50
S450M		15	25			50	50	50	50	50	50
			32				50	50	50	50	50
			40					50	50	50	50
			50						50	50	50
			63							50	50

		Supply s.		S800U							
	Char.			K, Z							
Load s.		Icu [kA]		50							
			In [A]	25	32	40	50	63	80	100	125
S400M	K	25	3...20	50	50	50	50	50	50	50	50
S450M		10	25			50	50	50	50	50	50
			32				50	50	50	50	50
			40					50	50	50	50
			50						50	50	50
			63							50	50

Class J fuse – S800U (1 pole) @240 V AC

		Supply s.		FUSE	
	Char.				
Load s.		Icu [kA]			
			In [A]	max. 250	max. 250
S800U	K, Z	30	10...80	30	30
			10...100	30	30

Class J fuse – S800U (multipole) @240 V AC

		Supply s.		FUSE	
	Char.				
Load s.		Icu [kA]			
			In [A]	max. 250	max. 250
S800U	K, Z	50	10...80	50	50
			10...100	50	50

Sace Tmax – S800U (1 pole) @240V AC

		Supply s.		T4					T5				
	Char.			N	S	H	L	V	N	S	H	L	V
Load s.		Icu [kA]		65	100	150	200	200	65	100	150	200	200
			In [A]	20...250	20...250	20...250	20...250	20...250	max. 600	max. 600	max. 600	max. 600	max. 600
S800U	K, Z	30	10...80	30	30	30	30	30	30	30	30	30	30
			90...100	30	30	30	30	30	30	30	30	30	30

Sace Tmax – S800U (multipole) @240V AC

		Supply s.		T4					T5				
	Char.			N	S	H	L	V	N	S	H	L	V
Load s.		Icu [kA]		65	100	150	200	200	65	100	150	200	200
			In [A]	20...250	20...250	20...250	20...250	20...250	max. 600	max. 600	max. 600	max. 600	max. 600
S800U	K, Z	50	10...80	50	50	50	50	50	50	50	50	50	50
			90...100	50	50	50	50	50	50	50	50	50	50

MCBs technical details
Coordination tables: back-up

MCCB - MCB @ 415 V

			Supply S.	T1	T1	T1	T2	T3	T4	T2	T3	T4	T2	T4	T2	T4	T4
			Version	B	C	N				S			H		L	L	V
Load S.	Char.	In [A]	Icu [kA]	16	25	36				50			70		85	120	200
S200	B,C,K,Z	0.5..10 13..63	10	16	25	30	36	36 16	36	36	40 16	40	40	40	40	40	40
S200M	B,C	0.5..10 13..63	15	16	25	30	36	36 25	36	50	40 25	40	70 60	40	85 60	40	40
S200P	B,C, D,K,Z	0.5..10	25			30	36	36	36	50	40	40	70	40	85	40	40
		13..25				30	36	30	36	50	30	40	60	40	60	40	40
		32..63	15	16	25	30	36	25	36	50	25	40	60	40	60	40	40
S800N	B,C,D	10..125	36							50	50	50	70	70	85	120	200
S800S	B,C,D,K	10..125	50										70	70	85	120	200
S800C	B,C,D,K	10..125				36	36	36	36	50	50	50	70	70	85	120	200

* only for D characteristic

MCCB - MCB @ 415 V

			Supply s.	XT1			XT2	XT3	XT4	XT1	XT2	XT3	XT4	XT1	XT2	XT4	XT2	XT4	XT2	XT4
			Version	B	C	N				S				H			L		V	
Load s.	Carat.	In [A]	Icu [kA]	18	25	36				50				70			120		150	
S200	B,C,K,Z	0,5..10 13..63	10	18	25	30	36	36 16	36	30	36	40 16	40	30	40	40	40	30	40	30
S200M	B,C,D,K,Z	0,5..10 13..63	15	18	25	30	36	36 25	36	30	40	40 25	40	30	40	40	40 40	30	40 40	30
S200P	B,C,D,K,Z	0,5..10	25			30	36	36	36	30	50	40	40	30	60	40	60	30	60	30
		13..25				30	36	30	36	30	40	30	40	30	40	40	40	30	40	30
		32..63	15	18	25	30	36	25	36	30	40	25	40	30	40	40	40	30	40	30
S800N	B,C,D	6..125	36							50	50	50	50	70	70	70	120	120	150	150
S800S	B,C,D,K	6..125	50											70	70	70	120	120	150	150
S800C	B,C,D,K	10..125				36	36	36	36	50	50	50	50	70	70	70	120	120	150	150

Tmax – S800B @ 230/400 V

			Supply s.	T1	T1	T1	T2	T3	T4	T2	T3	T4	T2	T4	T2	T4	T4
			Version	B	C	N				S			H		L	L	V
Load s.	Char.	In [A]	Icu [kA]	16	25	36				50			70		85	120	200
S800B	B, C	32...100	16		25	36	36	36	36	50	50	50	70	70	85	120	200
	D, K	125*			25	36	36	36	36	50	50	50	70	70	85	120	200

XT – S800B @ 230/400 V

			Supply s.	XT1	XT1	XT1	XT2	XT3	XT4	XT1	XT2	XT3	XT4	XT1	XT2	XT4	XT2	XT4	XT2	XT4
			Version	B	C	N				S				H			L		V	
Load s.	Char.	In [A]	Icu [kA]	18	25	36				50				70			120		150	
S800B	B, C	32...100	16	18	25	36	36	36	36	50	50	50	50	70	70	70	120	120	150	150
	D, K	125*		18	25	36	36	36	36	50	50	50	50	70	70	70	120	120	150	150

Breaking capacities

Definition: B and C acc. to IEC EN 60 898, Icn
K and Z acc. to IEC EN 60 947-2, Icu

Type Tripping characteristic Nominal current		AC				DC	Back up protection up to ultimate short-circuit capacity of short-circuit protective device.	
		1 phase		2/3 phases		1phase		
		133 V~	230 V~	230 V~ 133/230 V~	400 V~ 230/400 V~	60 V⎓	Fuse	Selective MCB
	A	kA/cosφ	kA/cosφ	kA/cosφ	kA/cosφ	kA/T ≤ ms	gG	S700
S 200-B S 200 M-B	6	10/0,5	6/0,7 10/0,5 (S 200 M-B)	10/0,5	6/0,7 10/0,5 (S 200 M-B)	10/4,0	63 A	100 A
	10 ... 20						100 A	100 A
	25 ... 32						100 A	100 A
	40						125 A	100 A
	50 ... 63						160 A	100 A
S 200-C S 200 M-C	0,5 ... 2	50 kA					not required	
	3 ... 4	10/0,5	6/0,7 10/0,5 (S 200 M-C)	10/0,5	6/0,7 10/0,5 (S 200 M-C)	10/4,0	20 A	–
	6						40 A	100 A
	8						63 A	100 A
	10 ... 20						100 A	100 A
	25 ... 32						100 A	100 A
	40						125 A	100 A
	50 ... 63						160 A	100 A
S 200-K S 200 M-K	0,5 ... 2	50 kA					not required	
	3	10/0,5	6/0,7 10/0,5 (S 200 M-K)	10/0,5	6/0,7 10/0,5 (S 200 M-K)	10/4,0	20 A	–
	4						25 A	–
	6 ... 10						63 A	100 A
	16 ... 20						80 A	100 A
	25 ... 32						100 A	100 A
	40						125 A	100 A
	50 ... 63						160 A	100 A
S 200-Z S 200 M-Z	0,5 ... 2	50 kA					not required	
	3 ... 4	10/0,5	6/0,7 10/0,5 (S 200 M-Z)	10/0,5	6/0,7 10/0,5 (S 200 M-Z)	10/4,0	20 A	–
	6						35 A	100 A
	8						40 A	100 A
	10 ... 16						63 A	100 A
	20 ... 25						80 A	100 A
	32 ... 40						100 A	100 A
	50 ... 63						125 A	100 A

1. In symmetrically eathed DC networks 2 pole MCBs can be applied at up to 125 V DC (series connection). In this case the breaking capactiy is one level higher compared to an equivalent 1 pole installation. Polarity does not have to be considered. Thus any connection mode is permitted.
2. Back up protection is only required when the prospective short circuit current exceeds the rated breaking capacity.

MCBs technical details
Coordination tables: back-up

Breaking capacities

Definition: B and C acc. to IEC EN 60 898, Icn
K and Z acc. to IEC EN 60 947-2, Icu

Type Tripping characteristic Nominal current		AC				DC	Back up protection up to ultimate short-circuit capacity of short-circuit protective device.	
		1 phase		2/3 phases		1phase		
		133 V~	230 V~	230 V~ 133/230 V~	400 V~ 230/400 V~	60 V⎓	Fuse	Selective MCB
	A	kA/cosj	kA/cosj	kA/cosj	kA/cosj	kA/T ≤ ms	gG	S700
S 200 P-B	6					10/4,0	63 A	100 A
	10, 13	25/0,25	25/0,25	25/0,25	25/0,25		80 A	100 A
	16 ... 25					15/4,0	100 A	100 A
	32 ... 40	15/0,25	15/0,25	15/0,25	15/0,25		125 A	100 A
	50 ... 63					10/4,0	160 A	100 A
S 200 P-C	0,5 ... 2	50 kA					not required	
	3, 4						32 A	100 A
	6, 8	25/0,25	25/0,25	25/0,25	25/0,25	10/4,0	63 A	100 A
	10 ... 13						80 A	100 A
	16 ... 25					15/4,0	100 A	100 A
	32 ... 40	15/0,25	15/0,25	15/0,25	15/0,25		125 A	100 A
	50 ... 63					10/4,0	160 A	100 A
S 200 P-K, Z	0,5 ... 2	50 kA					not required	
	3						25 A	–
	4					10/4,0	35 A	–
	6	25/0,25	25/0,25	25/0,25	25/0,25		63 A	100 A
	8						80 A	100 A
	10 ... 20					15/4,0	100 A	100 A
	25					15/4,0	125 A	100 A
	32 ... 63	15/0,25	15/0,25	15/0,25	15/0,25	10/4,0	160 A	100 A

1. In symmetrically eathed DC networks 2 pole MCBs can be applied at up to 125 V DC (series connection). Polarity does not have to be considered. Thus any connection mode is permitted.
2. Back up protection is only required when the prospective short circuit current exceeds the rated breaking capacity.

Fuse gG - MCB S 200, S 200 M

240 V	Supply s.		Fuse gG	S 700
	Characteristic			
Load s.		In [A]	In [A]	In [A]
S200 S200 M	B	6	63	100
		10...20	100	100
		25...32	100	100
		40	125	100
		50...63	160	100
S200 S200 M	C	3...4	20	—
		6	40	100
		8	63	100
		10...20	100	100
		25...32	100	100
		40	125	100
		50...63	160	100
S200	K	3	20	—
		4	25	—
		6...10	63	100
		16...20	80	100
		25...32	100	100
		40	125	100
		50...63	160	100
S200	Z	3...4	20	—
		6	35	100
		8	40	100
		10...16	63	100
		20...25	80	100
		32...40	100	100
		50...63	125	100

This table shows coordination between an MCB and the upstream fuse maximum current value. Combination of the two protections allows the breaking capacity to be elevated up to that of the combined fuse.
I.e. downstream MCB breaker S 201-C16, upstream fuse with In up to 100 A (breaking capacity: 100 kA). MCB breaker protection up to 100 kA.

MCBs technical details
Coordination tables: back-up

2

Fuse gG - MCB S 200 P

240 V	Supply s.		Fuse gG	S 700
Load s.	Characteristic	In [A]	In [A]	In [A]
S200 P	B	6	63	100
		10, 13	80	100
		16...25	100	100
		32...40	125	100
		50...63	160	100
S200 P	C	3, 4	40	100
		6, 8	63	100
		10, 13	100	100
		16...25	100	100
		32...40	125	100
		50...63	160	100
S200 P	K, Z	3	25	—
		4	35	—
		6	63	100
		8	80	100
		10...20	100	100
		25	125	100
		32...63	160	100

This table shows coordination between an MCB and the upstream fuse maximum current value. Combination of the two protections allows the breaking capacity to be elevated up to that of the combined fuse.
I.e. downstream MCB breaker S 201-C16, upstream fuse with In up to 100 A (breaking capacity: 100 kA). MCB breaker protection up to 100 kA.

Short circuit breaking capacity, S 280 UC

Operating sequence for B according to IEC/EN 60 898-2 for K according to IEC/EN 60 947-2.
For the short circuit capacity indicated, in the case of DC, a time constant T = L/R ≤ 4 ms applies, in the case of AC for 10 kA: cos φ 0.6 for 6 kA: cos φ 0.7 – for 4.5 kA and for 3 kA: cos φ 0.8 – for < 3 kA: cos φ 0.9.

2

S 280 UC		1-pole			2-pole				max. backup protect. ⑤ for backup protect.; utilization category gG according IEC/EN 60 269-1
DC		up to 60 V ...	110 V ...	220 V ...	up to 60 V ...	110 V ...	220 V ...	440 V ...	
B	6 ... 25 A	14 kA	10 kA	6 kA	25 kA	20 kA	10 kA	6 kA	100 A
Z, K	0.2 ... 2 A f	unlimited	unlimited	unlimited	unlimited	unlimited	unlimited	unlimited	not required
Z, K	3 ... 4 A	14 kA	10 kA	6 kA	25 kA	20 kA	10 kA	6 kA	35 A
Z, K	6 ... 8 A	14 kA	10 kA	6 kA	25 kA	20 kA	10 kA	6 kA	63 A
Z, K	10 ... 40 A	14 kA	10 kA	6 kA	25 kA	20 kA	10 kA	6 kA	100 A
Z, K	50 ... 63 A	10 kA	6 kA	4.5 kA	20 kA	14 kA	6 kA	4,5 kA	125 A

AC		up to 60 V p	133 V p	230 V p	up to 60 V p	133 V p	230 V p	400 V p	
B	6 ... 25 A	10 kA	10 kA	6 kA	10 kA	10 kA	10 kA	6 kA	100 A
Z, K	0.2 ... 2 A f	unlimited	unlimited	unlimited	unlimited	unlimited	unlimited	unlimited	not required
Z, K	3 ... 4 A	10 kA	10 kA	6 kA	10 kA	10 kA	10 kA	6 kA	35 A
Z, K	6 ... 8 A	10 kA	10 kA	6 kA	10 kA	10 kA	10 kA	6 kA	63 A
Z, K	10 ... 40 A	10 kA	10 kA	6 kA	10 kA	10 kA	10 kA	6 kA	100 A
Z, K	50 ... 63 A	6 kA	6 kA	4,5 kA	10 kA	6 kA	6 kA	4,5 kA	125 A

⑤ Back-up protection is necessary only if the solid short-circuit current to be expected at the place of installation may exceed the short circuit rupturing indicated.
⑥ Z as of 0.5 A

MCBs technical details
Coordination tables: selectivity

Selective protection
Selectivity between SN 201 and S 200 upstream and downstream modular circuit-breakers
In the case, selectivity is amperometric and so the selectivity limit is given simply by the magnetic threshold of the upstream breaker, which is fixed. The selectivity value is obtained if a minimum ratio of 1.3 (In upstream/In downstream > 1.3) is observed between the rated currents of the two breakers.

MCB - SN201 @ 230/240 V

	Supply S.2			S800 N-S							
Load S.1	Char.			B							
		Icu [kA]		36-50							
			In [A]	25	32	40	50	63	80	100	125
			2		0.433	0.6	1.3	4	T	T	T
			4			0.45	0.8	1.5	2.5	4	T
			6				0.6	1.2	1.6	2.6	3.8
			10				0.5	1.1	1.4	2	3
SN201 L	B, C	6	16					0.8	1.2	1.7	2.5
			20						1	1.5	2.1
			25							1.3	1.8
			32							1.1	1.7
			40								1.6
			2		0.433	0.6	1.3	4	9	T	T
			4			0.45	0.8	1.5	2.5	4	7.3
			6				0.6	1.2	1.6	2.6	3.8
			10				0.5	1.1	1.4	2	3
SN201	B, C, D	10	16					0.8	1.2	1.7	2.5
			20						1	1.5	2.1
			25							1.3	1.8
			32							1.1	1.7
			40								1.6
			2		0.433	0.6	1.3	4	9	T	T
			4			0.45	0.8	1.5	2.5	4	7.3
			6				0.6	1.2	1.6	2.6	3.8
			10				0.5	1.1	1.4	2	3
SN201 M	B, C	10	16					0.8	1.2	1.7	2.5
			20						1	1.5	2.1
			25							1.3	1.8
			32							1.1	1.7
			40								1.6

[1] Load side circuit-breaker 1P+N (230/240 V)
[2] For networks with 230/240 V AC two-pole circuit-breaker (phase + neutral)
for networks at 400/415 V AC four-pole circuit-breaker (load side circuit branched between one phase and the neutral)
[3] Only for curve B

Example

Upstream circuit-breaker	S 200 P, curve D 50 A
Downstream circuit-breaker	SN 201 L, curve B 10 A
Selectivity limit	10 In=500 A

2

S800 N-S								S800 N-S							
C								D							
36-50								36-50							
25	32	40	50	63	80	100	125	25	32	40	50	63	80	100	125
0.43	0.55	1.2	3	T	T	T	T	1.3	4.1	T	T	T	T	T	T
	0.43	0.75	1.3	2.1	3.9	T	T	0.8	1.6	3	5.4	T	T	T	T
		0.55	1.1	1.5	2.5	3.6	5.5	0.6	1.3	2	3.2	3.9	T	T	T
		0.45	1	1.3	1.9	2.8	4.2	0.5	1.2	1.65	2.6	3.1	T	T	T
			0.75	1.1	1.6	2.3	3.6		0.9	1.4	1.8	2.6	5	T	T
				0.9	1.4	1.9	3.3			1.3	1.6	2.2	4.2	5.4	T
					1.2	1.6	2.7				1.5	1.9	3.5	4.5	T
					1	1.5	2.5					1.8	2.8	4.2	5.5
						1.4	2.1					1.7	2.7	4	5
0.43	0.55	1.2	3	6.6	T	T	T	1.3	4.1	T	T	T	T	T	T
	0.43	0.75	1.3	2.1	3.9	6.6	T	0.8	1.6	3	5.4	7.6	T	T	T
		0.55	1.1	1.5	2.5	3.6	5.5	0.6	1.3	2	3.2	3.9	8	T	T
		0.45	1	1.3	1.9	2.8	4.2	0.5	1.2	1.65	2.6	3.1	6.2	8.6	T
			0.75	1.1	1.6	2.3	3.6		0.9	1.4	1.8	2.6	5	6.3	8.8
				0.9	1.4	1.9	3.3			1.3	1.6	2.2	4.2	5.4	7.6
					1.2	1.6	2.7				1.5	1.9	3.5	4.5	6.6
					1	1.5	2.5					1.8	2.8	4.2	5.5
						1.4	2.1					1.7	2.7	4	5
0.43	0.55	1.2	3	6.6	T	T	T	1.3	4.1	T	T	T	T	T	T
	0.43	0.75	1.3	2.1	3.9	6.6	T	0.8	1.6	3	5.4	7.6	T	T	T
		0.55	1.1	1.5	2.5	3.6	5.5	0.6	1.3	2	3.2	3.9	8	T	T
		0.45	1	1.3	1.9	2.8	4.2	0.5	1.2	1.65	2.6	3.1	6.2	8.6	T
			0.75	1.1	1.6	2.3	3.6		0.9	1.4	1.8	2.6	5	6.3	8.8
				0.9	1.4	1.9	3.3			1.3	1.6	2.2	4.2	5.4	7.6
					1.2	1.6	2.7				1.5	1.9	3.5	4.5	6.6
					1	1.5	2.5					1.8	2.8	4.2	5.5
						1.4	2.1					1.7	2.7	4	5

MCBs technical details
Coordination tables: selectivity

Fuse - SN201 @ 230/240 V

	Im	Icu [kA]	In [A]	25	32	40	50	63	80	100	125
SN201 L	B-C	6	2	1.5	2.5	T	T	T	T	T	T
		6	4	1	2	4.5	T	T	T	T	T
		6	6	1	1.5	4	4.5	T	T	T	T
		6	10		1.2	3.5	4	T	T	T	T
		6	16		1	3	3.5	5	T	T	T
		6	20		1	3	3.5	5	T	T	T
		6	25		1	2	3	4.5	T	T	T
		6	32		1	2	3	4.5	5	T	T
		6	40			1.5	2.5	4	5	T	T
SN201	B-C-D	10	2	1.5	2.5	5	T	T	T	T	T
		10	4	1	2	4.5	5	T	T	T	T
		10	6	1	1.5	4	4.5	7	T	T	T
		10	10		1.2	3.5	4	6	T	T	T
		10	16		1	3	3.5	5	T	T	T
		10	20		1	3	3.5	5	8	T	T
		10	25		1	2	3	4.5	6.5	T	T
		10	32		1	2	3	4.5	5	8	T
		10	40			1.5	2.5	4	5	6.5	T
SN201 M	B-C	10	2	1.5	2.5	5	7	T	T	T	T
		10	4	1	2	4.5	5	8	T	T	T
		10	6	1	1.5	4	4.5	7	T	T	T
		10	10		1.2	3.5	4	6	T	T	T
		10	16		1	3	3.5	5	9	T	T
		10	20		1	3	3.5	5	8	T	T
		10	25		1	2	3	4.5	6.5	9	T
		10	32		1	2	3	4.5	5	8	T
		10	40			1.5	2.5	4	5	6.5	9

MCB S700 - SN201 @ 230/240 V

	Im			E	E	E	E	E	E	E	E
		Icu [kA]		25	25	25	25	25	25	25	25
			In [A]	20	25	35	40	50	63	80	100
		6	2	T	T	T	T	T	T	T	T
		6	4	T	T	T	T	T	T	T	T
		6	6	T	T	T	T	T	T	T	T
		6	10	T	T	T	T	T	T	T	T
SN201 L	B-C	6	16		T	T	T	T	T	T	T
		6	20			T	T	T	T	T	T
		6	25			T	T	T	T	T	T
		6	32					T	T	T	T
		6	40						T	T	T
		10	2	T	T	T	T	T	T	T	T
		10	4	T	T	T	T	T	T	T	T
		10	6	T	T	T	T	T	T	T	T
		10	10	T	T	T	T	T	T	T	T
SN201	B-C-D	10	16		T	T	T	T	T	T	T
		10	20			T	T	T	T	T	T
		10	25			T	T	T	T	T	T
		10	32					T	T	T	T
		10	40						T	T	T
		10	2	T	T	T	T	T	T	T	T
		10	4	T	T	T	T	T	T	T	T
		10	6	T	T	T	T	T	T	T	T
		10	10	T	T	T	T	T	T	T	T
SN201 M	B-C	10	16		T	T	T	T	T	T	T
		10	20			T	T	T	T	T	T
		10	25			T	T	T	T	T	T
		10	32					T	T	T	T
		10	40						T	T	T

MCBs technical details
Coordination tables: selectivity

MCCB @ 415 V - SN201 @ 230/240 V

			Supply S.	T1												T2					
			Version	B, C, N												N, S, H, L					
			Release	TMD												TMD, MA					
			Iu [A]	160												160					
Load S.	Char.	Icu [kA]	In [A]	16	20	25	32	40	50	63	80	100	125	160[2]	160	16	20	25	32	40	50
SN201 L	B, C	6	≤4	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	B, C		6	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	B, C		10			3	3	3	4.5	T	T	T	T	T	T		31	3	3	3	4.5
	B, C		16					3	4.5	5	T	T	T	T	T				31	3	4.5
	B, C		20						3	5	T	T	T	T	T				31		3
	B, C		25							5	T	T	T	T	T						31
	B, C		32							T	T	T	T	T	T						31
	B, C		40									T	T	T	T						
SN201	B, C, D, K	10	≤4	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	B, C, D, K		6	6	6	6	6	6	6	T	T	T	T	T	T	T	T	T	T	T	T
	B, C, D, K		8			3	3	3	4.5	7.5	8.5	T	T	T	T		31	3	3	3	4.5
	B, C, D, K		10			3	3	3	4.5	7.5	8.5	T	T	T	T		31	3	3	3	4.5
	B, C, D, K		13					3	4.5	5	7.5	T	T	T	T				31	3	4.5
	B, C, D, K		16					3	4.5	5	7.5	T	T	T	T				31	3	4.5
	B, C, D, K		20						3	5	6	T	T	T	T				31		3
	B, C, D, K		25							5	6	T	T	T	T						31
	B, C, D, K		32								6	7.5	T	T	T						31
	B, C, D, K		40									7.5	T	T	T						
SN201 M	B, C	10	≤4	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	B, C		6	6	6	6	6	6	6	12	T	T	T	T	T	T	T	T	T	T	T
	B, C		10			3	3	3	4.5	7.5	8.5	T	T	T	T		31	3	3	3	4.5
	B, C		13					3	4.5	5	7.5	T	T	T	T				31	3	4.5
	B, C		16					3	4.5	5	7.5	T	T	T	T				31	3	4.5
	B, C		20						3	5	6	T	T	T	T				31		3
	B, C		25							5	6	T	T	T	T						31
	B, C		32								6	7.5	T	T	T						31
	B, C		40									7.5	T	T	T						

Supply side circuit-breaker 4P (load side circuit branched between one phase and the neutral)
Load side circuit-breaker 1P+N (230/240 V)

													T3										
													N, S										
								EL					TMD, MA										
													250										
	63	80	100	125[2]	125	160[2]	160	10	25	63	100	160	63	80	100	125[2]	125	160[2]	160	200[2]	200	250[2]	250
	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	T	T	T	T	T	T	T		T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	T	T	T	T	T	T	T		T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	5	T	T	T	T	T	T			T	T	T	5	T	T	T	T	T	T	T	T	T	T
	5	T	T	T	T	T	T			T	T	T	5	T	T	T	T	T	T	T	T	T	T
	5	T	T	T	T	T	T			T	T	T	5	T	T	T	T	T	T	T	T	T	T
		T	T	T	T	T	T			T	T	T		T	T	T	T	T	T	T	T	T	T
		T	T		T	T	T				T	T		T	T		T	T	T	T	T	T	T
	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	T	T	T	T	T	T	T		T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	7.5	8.5	T	T	T	T	T		T	T	T	T	7.5	8.5	T	T	T	T	T	T	T	T	T
	7.5	8.5	T	T	T	T	T		T	T	T	T	7.5	8.5	T	T	T	T	T	T	T	T	T
	5	7.5	T	7.5	T	T	T			T	T	T	5	7.5	T	7.5	T	T	T	T	T	T	T
	5	7.5	T	7.5	T	T	T			T	T	T	5	7.5	T	7.5	T	T	T	T	T	T	T
	5	6	T	6	T	T	T			T	T	T	5	6	T	6	T	T	T	T	T	T	T
	5	6	T	6	T	T	T			T	T	T	5	6	T	6	T	T	T	T	T	T	T
		6	7.5	6	T	T	T			T	T	T		6	7.5	6	T	T	T	T	T	T	T
		6[1]	7.5	6	T	T	T	T			T	T		6[1]	7.5		T	T	T	T	T	T	T
	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	T	T	T	T	T	T	T		T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	7.5	8.5	T	T	T	T	T		T	T	T	T	7.5	8.5	T	T	T	T	T	T	T	T	T
	5	7.5	T	7.5	T	T	T			T	T	T	5	7.5	T	7.5	T	T	T	T	T	T	T
	5	7.5	T	7.5	T	T	T			T	T	T	5	7.5	T	7.5	T	T	T	T	T	T	T
	5	6	T	6	T	T	T			T	T	T	5	6	T	6	T	T	T	T	T	T	T
	5	6	T	6	T	T	T			T	T	T	5	6	T	6	T	T	T	T	T	T	T
		6	7.5	6	T	T	T			T	T	T		6	7.5	6	T	T	T	T	T	T	T
		6[1]	7.5	6	T	T	T				T	T		6[1]	7.5		T	T	T	T	T	T	T

1 Value valid for magnetic only supply side circuit-breaker
2 Neutral at 50%

MCBs technical details
Coordination tables: selectivity

MCCB XT1@415V - SN201 @230/240V

			Supply S.	XT1										
			Version	B,C,N,S,H										
			Release	TM										
Load S.	Char	Icu [kA]	In[A]	16	20	25	32	40	50	63	80	100	125	160
SN201 L	B,C	6	≤ 4	T	T	T	T	T	T	T	T	T	T	T
			6	T	T	T	T	T	T	T	T	T	T	T
			10			3	3	3	4,5	T	T	T	T	T
			16					3	4,5	5	T	T	T	T
			20						3	5	T	T	T	T
			25							5	T	T	T	T
			32								T	T	T	T
			40									T	T	T
SN201	B,C,D,K	10	≤ 4	T	T	T	T	T	T	T	T	T	T	T
			6	6	6	6	6	6	6	T	T	T	T	T
			8			3	3	3	4,5	7,5	8,5	T	T	T
			10			3	3	3	4,5	7,5	8,5	T	T	T
			13					3	4,5	5	7,5	T	T	T
			16					3	4,5	5	7,5	T	T	T
			20						3	5	6	T	T	T
			25							5	6	T	T	T
			32								6	7,5	T	T
			40									7,5	T	T
SN201 M	B,C	10	≤ 4	T	T	T	T	T	T	T	T	T	T	T
			6	6	6	6	6	6	6	T	T	T	T	T
			10			3	3	3	4,5	7,5	8,5	T	T	T
			13					3	4,5	5	7,5	T	T	T
			16					3	4,5	5	7,5	T	T	T
			20						3	5	6	T	T	T
			25							5	6	T	T	T
			32								6	7,5	T	T
			40									7,5	T	T

MCCB XT2@415V - SN201 @230/240V

			Supply S.	XT2															
			Version	N,S,H,L,V															
			Release	TM											EL				
Load S.	Char	Icu [kA]	In[A]	16	20	25	32	40	50	63	80	100	125	160	10	25	63	100	160
SN201 L	B,C	6	≤ 4	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
			6	T	T	T	T	T	T	T	T	T	T	T		T	T	T	T
			10		3 ①	3	3	3	4,5	T	T	T	T	T		T	T	T	T
			16				3 ①	3	4,5	5	T	T	T	T			T	T	T
			20				3 ①		3	5	T	T	T	T			T	T	T
			25						3 ①	5	T	T	T	T			T	T	T
			32						3 ①		T	T	T	T			T	T	T
			40								T	T	T	T				T	T
SN201	B,C,D,K	10	≤ 4	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
			6	T	T	T	T	T	T	T	T	T	T	T		T	T	T	T
			8		3 ①	3	3	3	4,5	7,5	8,5	T	T	T		T	T	T	T
			10		3 ①	3	3	3	4,5	7,5	8,5	T	T	T		T	T	T	T
			13				3 ①	3	4,5	5	7,5	T	T	T			T	T	T
			16				3 ①	3	4,5	5	7,5	T	T	T			T	T	T
			20				3 ①		3	5	6	T	T	T			T	T	T
			25						3 ①	5	6	T	T	T			T	T	T
			32						3 ①		6	7,5	T	T			T	T	T
			40								6 1	7,5	T	T				T	T
SN201 M	B,C	10	≤ 4	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
			6	T	T	T	T	T	T	T	T	T	T	T		T	T	T	T
			10		3 ①	3	3	3	4,5	7,5	8,5	T	T	T		T	T	T	T
			13				3 ①	3	4,5	5	7,5	T	T	T			T	T	T
			16				3 ①	3	4,5	5	7,5	T	T	T			T	T	T
			20				3 ①		3	5	6	T	T	T			T	T	T
			25						3 ①	5	6	T	T	T			T	T	T
			32						3 ①		6	7,5	T	T			T	T	T
			40								6 1	7,5	T	T				T	T

① Value valid in case of Supply S. breaker only magnetic

MCBs technical details
Coordination tables: selectivity

MCCB XT3@415V - SN201 @230/240V

			Supply S.	XT3						
			Version	N,S						
			Release	TM						
Load S.	Char	Icu [kA]	In[A]	63	80	100	125	160	200	250
SN201 L	B,C	6	≤ 4	T	T	T	T	T	T	T
			6	T	T	T	T	T	T	T
			10	T	T	T	T	T	T	T
			16	5	T	T	T	T	T	T
			20	5	T	T	T	T	T	T
			25	5	T	T	T	T	T	T
			32		T	T	T	T	T	T
			40		T	T	T	T	T	T
SN201	B,C,D,K	10	≤ 4	T	T	T	T	T	T	T
			6	T	T	T	T	T	T	T
			8	7,5	8,5	T	T	T	T	T
			10	7,5	8,5	T	T	T	T	T
			13	5	7,5	T	T	T	T	T
			16	5	7,5	T	T	T	T	T
			20	5	6	T	T	T	T	T
			25	5	6	T	T	T	T	T
			32		6	7,5	T	T	T	T
			40		6 ①	7,5	T	T	T	T
SN201 M	B,C	10	≤ 4	T	T	T	T	T	T	T
			6	T	T	T	T	T	T	T
			10	7,5	8,5	T	T	T	T	T
			13	5	7,5	T	T	T	T	T
			16	5	7,5	T	T	T	T	T
			20	5	6	T	T	T	T	T
			25	5	6	T	T	T	T	T
			32		6	7,5	T	T	T	T
			40		6 ①	7,5	T	T	T	T

① Value valid in case of Supply S. breaker only magnetic

Tmax T1 – S800S @400/415 V

		Supply s.		T1										
	Char.			B, C, N										
		Trigger		TM										
Load s.		Icu [kA]	Iu [A]	160										
			In [A]	16	20	25	32	40	50	63	80	100	125	160
S800S	B , C, D, K	50	10			4.5	4.5	4.5	4.5	8	10	20*	25*	36*
			13				4.5	4.5	4.5	7.5	10	15	25*	36*
			16					4.5	4.5	7.5	10	15	25*	36*
			20						4.5	7.5	10	15	25*	36*
			25							6	10	15	20*	36*
			32								7.5	10	20*	36*
			40									10	20*	36*
			50										15	36*
			63											36*
			80											36*
			100											36*
			125											

MCCB XT4@415V - SN201 @230/240V

			Supply S.	XT4																	
			Version	N,S,H,L,V																	
			Release	TM													EL				
Load S.	Char	Icu [kA]	In[A]	20	25	32	40	50	63	80	100	125	160	200	225	250	40	63	100	160	250
SN201 L	B,C	6	≤ 4	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
			6	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
			10	3 ①	3	3	3	4,5	T	T	T	T	T	T	T	T	3	T	T	T	T
			16			3 ①	3	4,5	5	T	T	T	T	T	T	T	3	T	T	T	T
			20			3 ①		3	5	T	T	T	T	T	T	T		T	T	T	T
			25					3 ①	5	T	T	T	T	T	T	T		T	T	T	T
			32					3 ①		T	T	T	T	T	T	T		T	T	T	T
			40							T	T	T	T	T	T	T			T	T	T
SN201	B,C,D,K	10	≤ 4	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
			6	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
			8	3 1	3	3	3	4,5	7,5	8,5	T	T	T	T	T	T	3	T	T	T	T
			10	3 ①	3	3	3	4,5	7,5	8,5	T	T	T	T	T	T	3	T	T	T	T
			13			3 ①	3	4,5	5	7,5	T	T	T	T	T	T	3	T	T	T	T
			16			3 ①	3	4,5	5	7,5	T	T	T	T	T	T	3	T	T	T	T
			20			3 ①		3	5	6	T	T	T	T	T	T		T	T	T	T
			25					3 ①	5	6	T	T	T	T	T	T		T	T	T	T
			32					3 ①		6	7,5	T	T	T	T	T		T	T	T	T
			40							6 ①	7,5	T	T	T	T	T			T	T	T
SN201 M	B,C	10	≤ 4	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
			6	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
			10	3 ①	3	3	3	4,5	7,5	8,5	T	T	T	T	T	T	3	T	T	T	T
			13			3 ①	3	4,5	5	7,5	T	T	T	T	T	T	3	T	T	T	T
			16			3 ①	3	4,5	5	7,5	T	T	T	T	T	T	3	T	T	T	T
			20			3 ①		3	5	6	T	T	T	T	T	T		T	T	T	T
			25					3 ①	5	6	T	T	T	T	T	T		T	T	T	T
			32					3 ①		6	7,5	T	T	T	T	T		T	T	T	T
			40							6 ①	7,5	T	T	T	T	T			T	T	T

① Value valid in case of Supply S. breaker only magnetic

Tmax T3 – S800S @400/415 V

		Supply s.		T3						
	Char.			N, S						
		Trigger		TM						
Load s.		Icu [kA]	Iu [A]	250						
			In [A]	63	80	100	125	160	200	250
S800S	B , C, D, K	50	10	8	10	20	25	36	36	50*
			13	7.5	10	15	25	36	36	50*
			16	7.5	10	15	25	36	36	50*
			20	7.5	10	15	25	36	36	50*
			25	6	10	15	20	36	36	50*
			32		7.5	10	20	36	36	50*
			40			10	20	36	36	50*
			50				15	36	36	50*
			63					36	36	50*
			80						36	50*
			100							50*
			125							50*

MCBs technical details
Coordination tables: selectivity

S800S - S200 @ 230/400 V

			E.	S800S							
	Char.			B							
L.		Icu [kA]		50							
			In [A]	25	32	40	50	63	80	100	125
S200	B	10	6			0.4	0.5	0.7	1	1.5	2.6
			10				0.4	0.6	0.7	1	1.4
			13					0.5	0.7	0.9	1.3
			16						0.7	0.9	1.3
			20							0.9	1.3
			25							0.9	1.3
			32							0.8	1.1
			40							0.8	1.1
			50								1
			63								0.9

			E.	S800S							
	Char.			B							
L.		Icu [kA]		50							
			In [A]	25	32	40	50	63	80	100	125
S200	C	10	0.5	T	T	T	T	T	T	T	T
			1	3.3	T	T	T	T	T	T	T
			1.6	0.6	1.3	T	T	T	T	T	T
			2	0.4	0.7	1.3	T	T	T	T	T
			3		0.4	0.6	0.7	1.1	2.6	T	T
			4		0.4	0.6	0.7	1	1.7	3.1	T
			6			0.4	0.5	0.7	1	1.5	2.6
			8				0.4	0.6	0.7	1	1.4
			10				0.4	0.6	0.7	1	1.4
			13					0.5	0.7	0.9	1.3
			16						0.7	0.9	1.3
			20							0.9	1.3
			25							0.9	1.3
			32							0.8	1.1
			40							0.8	1.1
			50								1
			63								0.9

E. = feed side
L. = load side
T = Total selectivity up to breaking capacity of the switch on load side
Selectivity limit values indicated in kA

			E.	S800S							
	Char.			B							
L.		Icu [kA]		50							
			In [A]	25	32	40	50	63	80	100	125
S200	D	10	0.5	T	T	T	T	T	T	T	T
			1	0.8	4.5	T	T	T	T	T	T
			1.6	0.5	1	2.3	T	T	T	T	T
			2	0.3	0.5	0.7	2.3	T	T	T	T
			3		0.4	0.5	0.7	1.2	2.5	T	T
			4		0.4	0.4	0.7	1	1.7	3	T
			6				0.6	0.8	1.2	2	3.6
			8					0.7	0.9	1.3	2
			10						0.9	1.3	2
			13							1	1.5
			16								1.5
			20								
			25								
			32								
			40								
			50								
			63								

			E.	S800S							
	Char.			B							
L.		Icu [kA]		50							
			In [A]	25	32	40	50	63	80	100	125
S200	K	10	0.5	T	T	T	T	T	T	T	T
			1	0.8	5	T	T	T	T	T	T
			1.6	0.5	1	2.1	T	T	T	T	T
			2	0.3	0.5	0.7	2.1	T	T	T	T
			3		0.4	0.5	0.7	1.2	2.5	T	T
			4		0.4	0.4	0.7	1	1.7	3	T
			6				0.6	0.8	1.2	2	3.6
			8					0.7	0.9	1.3	2
			10						0.9	1.3	2
			13							1	1.5
			16								1.5
			20								
			25								
			32								
			40								
			50								
			63								

E. = feed side
L. = load side
T = Total selectivity up to breaking capacity of the switch on load side
Selectivity limit values indicated in kA

MCBs technical details
Coordination tables: selectivity

2

			E.	S800S							
	Char.			C							
L.		Icu [kA]		50							
			In [A]	25	32	40	50	63	80	100	125
S200	B	10	6		0.4	0.5	0.7	0.9	1.4	2.4	4.8
			10		0.3	0.4	0.5	0.7	0.9	1.3	2
			13		0.3	0.4	0.5	0.7	0.9	1.3	1.9
			16		0.3	0.4	0.5	0.7	0.9	1.3	1.9
			20			0.4	0.5	0.7	0.9	1.2	1.8
			25			0.4	0.5	0.7	0.9	1.2	1.8
			32				0.5	0.6	0.8	1	1.4
			40					0.6	0.8	1	1.4
			50						0.7	0.9	1.3
			63							0.9	1.2

			E.	S800S							
	Char.			C							
L.		Icu [kA]		50							
			In [A]	25	32	40	50	63	80	100	125
S200	C	10	0.5	T	T	T	T	T	T	T	T
			1	T	T	T	T	T	T	T	T
			1.6	0.6	T	T	T	T	T	T	T
			2	0.5	1	T	T	T	T	T	T
			3	0.3	0.5	0.7	1.2	2.1	T	T	T
			4	0.3	0.4	0.7	1	1.5	2.6	T	T
			6		0.4	0.5	0.7	0.9	1.4	2.4	4.8
			8		0.3	0.4	0.5	0.7	0.9	1.3	2
			10		0.3	0.4	0.5	0.7	0.9	1.3	2
			13		0.3	0.4	0.5	0.7	0.9	1.3	1.9
			16		0.3	0.4	0.5	0.7	0.9	1.3	1.9
			20			0.4	0.5	0.7	0.9	1.2	1.8
			25			0.4	0.5	0.7	0.9	1.2	1.8
			32				0.5	0.6	0.8	1	1.4
			40					0.6	0.8	1	1.4
			50						0.7	0.9	1.3
			63							0.9	1.2

E. = feed side
L. = load side
T = Total selectivity up to breaking capacity of the switch on load side
Selectivity limit values indicated in kA

			E.	S800S							
	Char.			C							
L.		Icu [kA]		50							
			In [A]	25	32	40	50	63	80	100	125
S200	D	10	0.5	T	T	T	T	T	T	T	T
			1	2.1	T	T	T	T	T	T	T
			1.6	0.8	2.3	T	T	T	T	T	T
			2	0.4	0.7	2.3	T	T	T	T	T
			3	0.3	0.5	0.7	1.2	2.2	T	T	T
			4	0.3	0.4	0.7	1	1.4	2.6	T	T
			6		0.4	0.6	0.8	1.1	1.8	3.2	T
			8			0.5	0.7	0.9	1.2	1.8	2.8
			10				0.7	0.9	1.2	1.8	2.8
			13					0.7	1	1.4	2
			16						1	1.4	2
			20							1	1.4
			25								1.4
			32								
			40								
			50								
			63								

			E.	S800S							
	Char.			C							
L.		Icu [kA]		50							
			In [A]	25	32	40	50	63	80	100	125
S200	K	10	0.5	T	T	T	T	T	T	T	T
			1	2.1	T	T	T	T	T	T	T
			1.6	0.8	2.3	T	T	T	T	T	T
			2	0.4	0.7	2.3	T	T	T	T	T
			3	0.3	0.5	0.7	1.2	2.2	T	T	T
			4	0.3	0.4	0.7	1	1.4	2.6	T	T
			6		0.4	0.6	0.8	1.1	1.8	3.2	T
			8			0.5	0.7	0.9	1.2	1.8	2.8
			10				0.7	0.9	1.2	1.8	2.8
			13					0.7	1	1.4	2
			16						1	1.4	2
			20							1	1.4
			25								1.4
			32								
			40								
			50								
			63								

E. = feed side
L. = load side
T = Total selectivity up to breaking capacity of the switch on load side
Selectivity limit values indicated in kA

MCBs technical details
Coordination tables: selectivity

			E.	S800S							
	Char:			D							
L.		Icu [kA]		50							
			In [A]	25	32	40	50	63	80	100	125
S200	B	10	6	0.5	1	1.2	2	2.8	T	T	T
			10	0.4	0.6	0.8	1.1	1.4	2.8	3.9	T
			13	0.4	0.6	0.8	1.1	1.4	2.5	3.3	T
			16		0.6	0.8	1.1	1.4	2.5	3.3	5.6
			20			0.8	1.1	1.3	2.3	3	4.7
			25			0.8	1.1	1.3	2.3	3	4.7
			32				0.9	1.1	1.9	2.4	3.7
			40					1.1	1.9	2.4	3.7
			50						1.5	1.9	2.3
			63							1.7	2.3

			E.	S800S							
	Char:			D							
L.		Icu [kA]		50							
			In [A]	25	32	40	50	63	80	100	125
S200	C	10	0.5	T	T	T	T	T	T	T	T
			1	T	T	T	T	T	T	T	T
			1.6	T	T	T	T	T	T	T	T
			2	T	T	T	T	T	T	T	T
			3	0.7	2.2	4.4	T	T	T	T	T
			4	0.7	1.3	2.2	4.4	T	T	T	T
			6	0.5	1	1.2	2	2.8	T	T	T
			8	0.4	0.6	0.8	1.1	1.4	2.8	3.9	T
			10	0.4	0.6	0.8	1.1	1.4	2.8	3.9	T
			13	0.4	0.6	0.8	1.1	1.4	2.5	3.3	5.6
			16		0.6	0.8	1.1	1.4	2.5	3.3	5.6
			20			0.8	1.1	1.3	2.3	3	4.7
			25			0.8	1.1	1.3	2.3	3	4.7
			32				0.9	1.1	1.9	2.4	3.7
			40					1.1	1.9	2.4	3.7
			50						1.5	1.9	2.3
			63							1.7	2.3

E. = feed side
L. = load side
T = Total selectivity up to breaking capacity of the switch on load side
Selectivity limit values indicated in kA

			E.	S800S							
	Char:			D							
L.		Icu [kA]		50							
			In [A]	25	32	40	50	63	80	100	125
			0.5	T	T	T	T	T	T	T	T
			1	T	T	T	T	T	T	T	T
			1.6	T	T	T	T	T	T	T	T
			2	2.3	T	T	T	T	T	T	T
			3	0.7	1.3	4.4	T	T	T	T	T
			4	0.7	1	2.2	4.4	T	T	T	T
			6	0.6	0.8	1.5	2.5	3.6	T	T	T
			8	0.5	0.7	1.1	1.5	2	4	5.5	T
S200	D	10	10	0.5	0.7	1.1	1.5	2	4	5.5	T
			13		0.6	0.9	1.2	1.5	2.6	3.4	5.2
			16			0.9	1.2	1.5	2.6	3.4	5.2
			20				0.9	1.1	1.8	2.2	3.2
			25					1.1	1.8	2.2	3.2
			32						1.7	2	2.9
			40							1.9	2.6
			50								2.2
			63								

			E.	S800S							
	Char:			D							
L.		Icu [kA]		50							
			In [A]	25	32	40	50	63	80	100	125
			0.5	T	T	T	T	T	T	T	T
			1	T	T	T	T	T	T	T	T
			1.6	T	T	T	T	T	T	T	T
			2	2.3	T	T	T	T	T	T	T
			3	0.7	1.3	4.4	T	T	T	T	T
			4	0.7	1	2.2	4.4	T	T	T	T
			6	0.6	0.8	1.5	2.5	3.6	T	T	T
			8	0.5	0.7	1.1	1.5	2	4	5.5	T
S200	K	10	10	0.5	0.7	1.1	1.5	2	4	5.5	T
			13		0.6	0.9	1.2	1.5	2.6	3.4	5.2
			16			0.9	1.2	1.5	2.6	3.4	5.2
			20				0.9	1.1	1.8	2.2	3.2
			25					1.1	1.8	2.2	3.2
			32						1.7	2	2.9
			40							1.9	2.6
			50								2.2
			63								

E. = feed side
L. = load side
T = Total selectivity up to breaking capacity of the switch on load side
Selectivity limit values indicated in kA

MCBs technical details
Coordination tables: selectivity

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S800S - S200 M @ 230/400 V

			E.	S800S							
	Char.			B							
L.		Icu [kA]		50							
			In [A]	25	32	40	50	63	80	100	125
S200M	B	15	6			0.4	0.5	0.7	1	1.5	2.6
			10				0.4	0.6	0.7	1	1.4
			13					0.5	0.7	0.9	1.3
			16						0.7	0.9	1.3
			20							0.9	1.3
			25							0.9	1.3
			32							0.8	1.1
			40							0.8	1.1
			50								1
			63								0.9

			E.	S800S							
	Char.			B							
L.		Icu [kA]		50							
			In [A]	25	32	40	50	63	80	100	125
S200M	C	15	0.5	T	T	T	T	T	T	T	T
			1	3.3	T	T	T	T	T	T	T
			1.6	0.6	1.3	T	T	T	T	T	T
			2	0.4	0.7	1.3	T	T	T	T	T
			3		0.4	0.6	0.7	1.1	2.6	8.8	T
			4		0.4	0.6	0.7	1	1.7	3.1	7
			6			0.4	0.5	0.7	1	1.5	2.6
			8				0.4	0.6	0.7	1	1.4
			10				0.4	0.6	0.7	1	1.4
			13					0.5	0.7	0.9	1.3
			16						0.7	0.9	1.3
			20							0.9	1.3
			25							0.9	1.3
			32							0.8	1.1
			40							0.8	1.1
			50								1
			63								0.9

E. = feed side
L. = load side
T = Total selectivity up to breaking capacity of the switch on load side
Selectivity limit values indicated in kA

			E.	S800S							
	Char.			B							
L.		Icu [kA]		50							
			In [A]	25	32	40	50	63	80	100	125
			0.5	T	T	T	T	T	T	T	T
			1	0.8	5	T	T	T	T	T	T
			1.6	0.5	1	2.3	T	T	T	T	T
			2	0.3	0.5	0.7	2.3	T	T	T	T
			3		0.4	0.5	0.7	1.2	2.5	8.6	T
			4		0.4	0.4	0.7	1	1.7	3	7.7
			6				0.6	0.8	1.2	2	3.6
			8					0.7	0.9	1.3	2
S200M	D	15	10						0.9	1.3	2
			13							1	1.5
			16								1.5
			20								
			25								
			32								
			40								
			50								
			63								

			E.	S800S							
	Char.			B							
L.		Icu [kA]		50							
			In [A]	25	32	40	50	63	80	100	125
			0.5	T	T	T	T	T	T	T	T
			1	0.8	5	T	T	T	T	T	T
			1.6	0.5	1	2.3	T	T	T	T	T
			2	0.3	0.5	0.7	2.3	T	T	T	T
			3		0.4	0.5	0.7	1.2	2.5	8.6	T
			4		0.4	0.4	0.7	1	1.7	3	7.7
			6				0.6	0.8	1.2	2	3.6
			8					0.7	0.9	1.3	2
S200M	K	15	10						0.9	1.3	2
			13							1	1.5
			16								1.5
			20								
			25								
			32								
			40								
			50								
			63								

E. = feed side
L. = load side
T = Total selectivity up to breaking capacity of the switch on load side
Selectivity limit values indicated in kA

MCBs technical details
Coordination tables: selectivity

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			E.	S800S							
	Char.			C							
L.		Icu [kA]		50							
			In [A]	25	32	40	50	63	80	100	125
S200M	B	15	6		0.4	0.5	0.7	0.9	1.4	2.4	4.8
			10		0.3	0.4	0.5	0.7	0.9	1.3	2
			13		0.3	0.4	0.5	0.7	0.9	1.3	1.9
			16		0.3	0.4	0.5	0.7	0.9	1.3	1.9
			20			0.4	0.5	0.7	0.9	1.2	1.8
			25			0.4	0.5	0.7	0.9	1.2	1.8
			32				0.5	0.6	0.8	1	1.4
			40					0.6	0.8	1	1.4
			50						0.7	0.9	1.3
			63							0.9	1.2

			E.	S800S							
	Char.			C							
L.		Icu [kA]		50							
			In [A]	25	32	40	50	63	80	100	125
S200M	C	15	0.5	T	T	T	T	T	T	T	T
			1	T	T	T	T	T	T	T	T
			1.6	0.6	T	T	T	T	T	T	T
			2	0.5	1	T	T	T	T	T	T
			3	0.3	0.5	0.7	1.2	2.1	6.4	T	T
			4	0.3	0.4	0.7	1	1.5	2.6	6.1	T
			6		0.4	0.5	0.7	0.9	1.4	2.4	4.8
			8		0.3	0.4	0.5	0.7	0.9	1.3	2
			10		0.3	0.4	0.5	0.7	0.9	1.3	2
			13		0.3	0.4	0.5	0.7	0.9	1.3	1.9
			16		0.3	0.4	0.5	0.7	0.9	1.3	1.9
			20			0.4	0.5	0.7	0.9	1.2	1.8
			25			0.4	0.5	0.7	0.9	1.2	1.8
			32				0.5	0.6	0.8	1	1.4
			40					0.6	0.8	1	1.4
			50						0.7	0.9	1.3
			63							0.9	1.2

E. = feed side
L. = load side
T = Total selectivity up to breaking capacity of the switch on load side
Selectivity limit values indicated in kA

			E.	S800S							
	Char.			C							
L.		Icu [kA]		50							
			In [A]	25	32	40	50	63	80	100	125
			0.5	T	T	T	T	T	T	T	T
			1	2.1	T	T	T	T	T	T	T
			1.6	0.8	2.3	T	T	T	T	T	T
			2	0.4	0.7	2.3	T	T	T	T	T
			3	0.3	0.5	0.7	1.2	2.2	6.4	T	T
			4	0.3	0.4	0.7	1	1.4	2.6	6.2	T
			6		0.4	0.6	0.8	1.1	1.8	3.2	6.4
			8			0.5	0.7	0.9	1.2	1.8	2.8
S200M	D	15	10				0.7	0.9	1.2	1.8	2.8
			13					0.7	1	1.4	2
			16						1	1.4	2
			20							1	1.4
			25								1.4
			32								
			40								
			50								
			63								

			E.	S800S							
	Char.			C							
L.		I_{cu} [kA]		50							
			I_n [A]	25	32	40	50	63	80	100	125
			0.5	T	T	T	T	T	T	T	T
			1	2.1	T	T	T	T	T	T	T
			1.6	0.8	2.3	T	T	T	T	T	T
			2	0.4	0.7	2.3	T	T	T	T	T
			3	0.3	0.5	0.7	1.2	2.2	6.4	T	T
			4	0.3	0.4	0.7	1	1.4	2.6	6.2	T
			6		0.4	0.6	0.8	1.1	1.8	3.2	6.4
			8			0.5	0.7	0.9	1.2	1.8	2.8
S200M	K	15	10				0.7	0.9	1.2	1.8	2.8
			13					0.7	1	1.4	2
			16						1	1.4	2
			20							1	1.4
			25								1.4
			32								
			40								
			50								
			63								

E. = feed side
L. = load side
T = Total selectivity up to breaking capacity of the switch on load side
Selectivity limit values indicated in kA

MCBs technical details
Coordination tables: selectivity

			E.	S800S							
	Char.			D							
L.		Icu [kA]		50							
			In [A]	25	32	40	50	63	80	100	125
S200M	B	15	6	0.5	1	1.2	2	2.8	T	T	T
			10	0.4	0.6	0.8	1.1	1.4	2.8	3.9	7.4
			13	0.4	0.6	0.8	1.1	1.4	2.5	3.3	5.6
			16		0.6	0.8	1.1	1.4	2.5	3.3	5.6
			20			0.8	1.1	1.3	2.3	3	4.7
			25			0.8	1.1	1.3	2.3	3	4.7
			32				0.9	1.1	1.9	2.4	3.7
			40					1.1	1.9	2.4	3.7
			50						1.5	1.9	2.3
			63							1.7	2.3

			E.	S800S							
	Char.			D							
L.		Icu [kA]		50							
			In [A]	25	32	40	50	63	80	100	125
S200M	C	15	0.5	T	T	T	T	T	T	T	T
			1	T	T	T	T	T	T	T	T
			1.6	T	T	T	T	T	T	T	T
			2	T	T	T	T	T	T	T	T
			3	0.7	2.2	4.4	T	T	T	T	T
			4	0.7	1.3	2.2	4.4	7.7	T	T	T
			6	0.5	1	1.2	2	2.8	9.9	T	T
			8	0.4	0.6	0.8	1.1	1.4	2.8	3.9	7.4
			10	0.4	0.6	0.8	1.1	1.4	2.8	3.9	7.4
			13	0.4	0.6	0.8	1.1	1.4	2.5	3.3	5.6
			16		0.6	0.8	1.1	1.4	2.5	3.3	5.6
			20			0.8	1.1	1.3	2.3	3	4.7
			25			0.8	1.1	1.3	2.3	3	4.7
			32				0.9	1.1	1.9	2.4	3.7
			40					1.1	1.9	2.4	3.7
			50						1.5	1.9	2.3
			63							1.7	2.3

E. = feed side
L. = load side
T = Total selectivity up to breaking capacity of the switch on load side
Selectivity limit values indicated in kA

			E.	S800S							
	Char.			D							
L.		Icu [kA]		50							
			In [A]	25	32	40	50	63	80	100	125
S200M	D	15	0.5	T	T	T	T	T	T	T	T
			1	T	T	T	T	T	T	T	T
			1.6	T	T	T	T	T	T	T	T
			2	2.3	T	T	T	T	T	T	T
			3	0.7	1.3	4.4	T	T	T	T	T
			4	0.7	1	2.2	4.4	7.7	T	T	T
			6	0.6	0.8	1.5	2.5	3.6	T	T	T
			8	0.5	0.7	1.1	1.5	2	4	5.5	T
			10	0.5	0.7	1.1	1.5	2	4	5.5	T
			13		0.6	0.9	1.2	1.5	2.6	3.4	5.2
			16			0.9	1.2	1.5	2.6	3.4	5.2
			20				0.9	1.1	1.8	2.2	3.2
			25					1.1	1.8	2.2	3.2
			32						1.7	2	2.9
			40							1.9	2.6
			50								2.2
			63								

			E.	S800S							
	Char.			D							
L.		Icu [kA]		50							
			In [A]	25	32	40	50	63	80	100	125
S200M	K	15	0.5	T	T	T	T	T	T	T	T
			1	T	T	T	T	T	T	T	T
			1.6	T	T	T	T	T	T	T	T
			2	2.3	T	T	T	T	T	T	T
			3	0.7	1.3	4.4	T	T	T	T	T
			4	0.7	1	2.2	4.4	7.7	T	T	T
			6	0.6	0.8	1.5	2.5	3.6	T	T	T
			8	0.5	0.7	1.1	1.5	2	4	5.5	T
			10	0.5	0.7	1.1	1.5	2	4	5.5	T
			13		0.6	0.9	1.2	1.5	2.6	3.4	5.2
			16			0.9	1.2	1.5	2.6	3.4	5.2
			20				0.9	1.1	1.8	2.2	3.2
			25					1.1	1.8	2.2	3.2
			32						1.7	2	2.9
			40							1.9	2.6
			50								2.2
			63								

E. = feed side
L. = load side
T = Total selectivity up to breaking capacity of the switch on load side
Selectivity limit values indicated in kA

2

S800S - S200 P @ 230/400 V

			E.	S800S							
	Char.			B							
L.		Icu [kA]		50							
			In [A]	25	32	40	50	63	80	100	125
S200P	B	25	6			0.4	0.5	0.7	1	1.5	2.6
			10				0.4	0.6	0.7	1	1.4
			13					0.5	0.7	0.9	1.3
			16						0.7	0.9	1.3
			20							0.9	1.3
			25							0.9	1.3
		15	32							0.8	1.1
			40							0.8	1.1
			50								1
			63								0.9

			E.	S800S							
	Char.			B							
L.		Icu [kA]		50							
			In [A]	25	32	40	50	63	80	100	125
S200P	C	25	0.5	T	T	T	T	T	T	T	T
			1	3.3	T	T	T	T	T	T	T
			1.6	0.6	1.3	T	T	T	T	T	T
			2	0.4	0.7	1.2	T	T	T	T	T
			3		0.4	0.6	0.7	1.1	2.6	8.8	T
			4		0.4	0.6	0.7	1	1.7	3.1	7
			6			0.4	0.5	0.7	1	1.5	2.6
			8				0.4	0.6	0.7	1	1.4
			10				0.4	0.6	0.7	1	1.4
			13					0.5	0.7	0.9	1.3
			16						0.7	0.9	1.3
			20							0.9	1.3
			25							0.9	1.3
		15	32							0.8	1.1
			40							0.8	1.1
			50								1
			63								0.9

E. = feed side
L. = load side
T = Total selectivity up to breaking capacity of the switch on load side
Selectivity limit values indicated in kA

			E.	S800S							
	Char.			B							
L.		Icu [kA]		50							
			In [A]	25	32	40	50	63	80	100	125
S200P	K	25	0.2	T	T	T	T	T	T	T	T
			0.3	T	T	T	T	T	T	T	T
			0.5	T	T	T	T	T	T	T	T
			0.75	T	T	T	T	T	T	T	T
			1	0.8	5	T	T	T	T	T	T
			1.6	0.5	1	2.3	T	T	T	T	T
			2	0.3	0.5	0.7	2.1	T	T	T	T
			3		0.4	0.5	0.7	1.2	2.5	8.6	T
			4		0.4	0.4	0.7	1	1.7	3	7.7
			6				0.6	0.8	1.2	2	3.6
			8					0.7	0.9	1.3	2
			10						0.9	1.3	2
			13							1	1.5
			16								1.5
			20								
			25								
		15	32								
			40								
			50								
			63								

			E.	S800S							
	Char.			C							
L.		Icu [kA]		50							
			In [A]	25	32	40	50	63	80	100	125
S200P	B	25	6			0.4	0.5	0.7	1	1.5	2.6
			10				0.4	0.6	0.7	1	1.4
			13					0.5	0.7	0.9	1.3
			16						0.7	0.9	1.3
			20							0.9	1.3
			25							0.9	1.3
		15	32							0.8	1.1
			40							0.8	1.1
			50								1
			63								0.9

E. = feed side
L. = load side
T = Total selectivity up to breaking capacity of the switch on load side
Selectivity limit values indicated in kA

MCBs technical details
Coordination tables: selectivity

			E.	S800S							
	Char.			C							
L.		I_{cu} [kA]		50							
			I_n [A]	25	32	40	50	63	80	100	125
S200P	C	25	0.5	T	T	T	T	T	T	T	T
			1	3.3	T	T	T	T	T	T	T
			1.6	0.6	1.3	T	T	T	T	T	T
			2	0.4	0.7	1.3	T	T	T	T	T
			3		0.4	0.6	0.7	1.1	2.6	8.8	T
			4		0.4	0.6	0.7	1	1.7	3.1	7
			6			0.4	0.5	0.7	1	1.5	2.6
			8				0.4	0.6	0.7	1	1.4
			10				0.4	0.6	0.7	1	1.4
			13					0.5	0.7	0.9	1.3
			16						0.7	0.9	1.3
			20							0.9	1.3
			25							0.9	1.3
		15	32							0.8	1.1
			40							0.8	1.1
			50								1
			63								0.9

			E.	S800S							
	Char.			C							
L.		Icu [kA]		50							
			In [A]	25	32	40	50	63	80	100	125
S200P	K	25	0.2	T	T	T	T	T	T	T	T
			0.3	T	T	T	T	T	T	T	T
			0.5	T	T	T	T	T	T	T	T
			0.75	T	T	T	T	T	T	T	T
			1	0.8	5	T	T	T	T	T	T
			1.6	0.5	1	2.3	T	T	T	T	T
			2	0.3	0.5	0.7	2.3	T	T	T	T
			3		0.4	0.5	0.7	1.2	2.5	8.6	T
			4		0.4	0.4	0.7	1	1.7	3	7.7
			6				0.6	0.8	1.2	2	3.6
			8					0.7	0.9	1.3	2
			10						0.9	1.3	2
			13							1	1.5
			16								1.5
			20								
			25								
		15	32								
			40								
			50								
			63								

E. = feed side
L. = load side
T = Total selectivity up to breaking capacity of the switch on load side
Selectivity limit values indicated in kA

			E.	S800S							
	Char.			D							
L.		Icu [kA]		50							
			In [A]	25	32	40	50	63	80	100	125
S200P	B	25	6	0.5	1	1.2	2	2.8	9.9	21.3	T
			10	0.4	0.6	0.8	1.1	1.4	2.8	3.9	7.4
			13	0.4	0.6	0.8	1.1	1.4	2.5	3.3	5.6
			16		0.6	0.8	1.1	1.4	2.5	3.3	5.6
			20			0.8	1.1	1.3	2.3	3	4.7
			25			0.8	1.1	1.3	2.3	3	4.7
		15	32				0.9	1.1	1.9	2.4	3.7
			40					1.1	1.9	2.4	3.7
			50						1.5	1.9	2.3
			63							1.7	2.3

			E.	S800S							
	Char.			D							
L.		Icu [kA]		50							
			In [A]	25	32	40	50	63	80	100	125
S200P	C	25	0.5	T	T	T	T	T	T	T	T
			1	T	T	T	T	T	T	T	T
			1.6	T	T	T	T	T	T	T	T
			2	T	T	T	T	T	T	T	T
			3	0.7	2.2	4.4	T	T	T	T	T
			4	0.7	1.3	2.2	4.4	7.7	T	T	T
			6	0.5	1	1.2	2	2.8	9.9	22	T
			8	0.4	0.6	0.8	1.1	1.4	2.8	3.9	7.4
			10	0.4	0.6	0.8	1.1	1.4	2.8	3.9	7.4
			13	0.4	0.6	0.8	1.1	1.4	2.5	3.3	5.6
			16		0.6	0.8	1.1	1.4	2.5	3.3	5.6
			20			0.8	1.1	1.3	2.3	3	4.7
			25			0.8	1.1	1.3	2.3	3	4.7
		15	32				0.9	1.1	1.9	2.4	3.7
			40					1.1	1.9	2.4	3.7
			50						1.5	1.9	2.3
			63							1.7	2.3

E. = feed side
L. = load side
T = Total selectivity up to breaking capacity of the switch on load side
Selectivity limit values indicated in kA

MCBs technical details
Coordination tables: selectivity

			E.	S800S							
	Char.			D							
L.		Icu [kA]		50							
			In [A]	25	32	40	50	63	80	100	125
S200P	K	25	0.2	T	T	T	T	T	T	T	T
			0.3	T	T	T	T	T	T	T	T
			0.5	T	T	T	T	T	T	T	T
			0.75	T	T	T	T	T	T	T	T
			1	T	T	T	T	T	T	T	T
			1.6	T	T	T	T	T	T	T	T
			2	2.3	T	T	T	T	T	T	T
			3	0.7	1.3	4.4	T	T	T	T	T
			4	0.7	1	2.2	4.4	7.7	T	T	T
			6	0.6	0.8	1.5	2.5	3.6	12	24.2	T
			8	0.5	0.7	1.1	1.5	2	4	5.5	9.9
			10	0.5	0.7	1.1	1.5	2	4	5.5	9.9
			13		0.6	0.9	1.2	1.5	2.6	3.4	5.2
			16			0.9	1.2	1.5	2.6	3.4	5.2
			20				0.9	1.1	1.8	2.2	3.2
			25						1.8	2.2	3.2
		15	32						1.7	2	2.9
			40							1.9	2.6
			50								2.2
			63								

E. = feed side
L. = load side
T = Total selectivity up to breaking capacity of the switch on load side
Selectivity limit values indicated in kA

S800S – S400E/S450E @230/400 V

Load s.	Char.	Supply s.		S800S							
	Char.			B							
		Icu [kA]		50							
			In [A]	25	32	40	50	63	80	100	125
S400E	B, C	Icn [kA]	6			0.4	0.5	0.6	0.9	1.4	2.4
S450E		6	10				0.4	0.5	0.7	0.9	1.3
FS401E			13					0.5	0.7	0.9	1.2
FS451E			16						0.7	0.9	1.2
FS403E			20							0.9	1.2
FS453E			25							0.9	1.2
			32							0.7	1
			40							0.7	1
			50								0.9
			63								0.9

Load s.	Char.	Supply s.		S800S							
	Char.			C							
		Icu [kA]		50							
			In [A]	25	32	40	50	63	80	100	125
S400E	B, C	Icn [kA]	6		0.4	0.5	0.6	0.9	1.3	2.2	4.4
S450E		6	10		0.3	0.4	0.5	0.6	0.8	1.2	1.8
FS401E			13		0.3	0.4	0.5	0.6	0.8	1.2	1.7
FS451E			16		0.3	0.4	0.5	0.6	0.8	1.2	1.7
FS403E			20			0.4	0.5	0.6	0.8	1.1	1.6
FS453E			25			0.4	0.5	0.6	0.8	1.1	1.6
			32				0.4	0.5	0.7	0.9	1.3
			40					0.5	0.7	0.9	1.3
			50						0.7	0.9	1.2
			63							0.8	1.1

Load s.	Char.	Supply s.		S800S							
	Char.			D, K							
		Icu [kA]		50							
			In [A]	25	32	40	50	63	80	100	125
S400E	B, C	Icn [kA]	6	0.5	0.9	1.1	1.8	2.5	T	T	T
S450E		6	10	0.4	0.5	0.8	1	1.3	2.5	3.5	T
FS401E			13	0.4	0.5	0.8	1	1.3	2.3	3	5.1
FS451E			16		0.5	0.8	1	1.3	2.3	3	5.1
FS403E			20			0.7	1	1.2	2.1	2.7	4.3
FS453E			25			0.7	1	1.2	2.1	2.7	4.3
			32				0.9	1	1.7	2.2	3.4
			40					1	1.7	2.2	3.4
			50						1.4	1.7	2.1
			63							1.6	2.1

MCBs technical details
Coordination tables: selectivity

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S800S – S400M @230/400 V

		Supply s.		S800S							
	Char.			B							
Load s.		Icu [kA]		50							
			In [A]	25	32	40	50	63	80	100	125
S400M	B	Icn [kA]	6			0.4	0.5	0.6	0.9	1.4	2.4
S450M		10	10				0.4	0.5	0.7	0.9	1.3
FS401M			13					0.5	0.7	0.9	1.2
FS451M			16						0.7	0.9	1.2
FS403M			20							0.9	1.2
FS453M			25							0.9	1.2
			32							0.7	1
			40							0.7	1
			50								0.9
			63								0.9

		Supply s.		S800S							
	Char.			B							
Load s.		Icu [kA]		50							
			In [A]	25	32	40	50	63	80	100	125
S400M	C	50	0.5	T	T	T	T	T	T	T	T
S450M			1	3	T	T	T	T	T	T	T
FS401M			1.6	1	1	T	T	T	T	T	T
FS451M			2	0	1	1.2	T	T	T	T	T
FS403M		25	3		0	0.6	0.7	1	2.4	T	T
FS453M			4		0	0.5	0.6	0.9	1.5	2.8	T
			6			0.4	0.5	0.6	0.9	1.4	2.4
			8				0.4	0.5	0.7	0.9	1.3
			10				0.4	0.5	0.7	0.9	1.3
			13					0.5	0.7	0.9	1.2
			16						0.7	0.9	1.2
			20							0.9	1.2
		15	25							0.9	1.2
			32							0.7	1
			40							0.7	1
			50								0.9
			63								0.9

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		Supply s.		S800S							
	Char.			B							
Load s.		Icu [kA]		50							
			In [A]	25	32	40	50	63	80	100	125
S400M S450M	D	Icn [kA] 10	6				0.5	0.7	1.1	1.8	3.3
			10					0.6	0.9	1.2	1.8
			13						0.9	1.2	1.8
			16							1	1.4
			20								1.4
			25								
			32								
			40								
			50								
			63								

		Supply s.		S800S							
	Char.			B							
Load s.		Icu [kA]		50							
			In [A]	25	32	40	50	63	80	100	125
S400M S450M	K	50	0.5	T	T	T	T	T	T	T	T
			1	1	5	T	T	T	T	T	T
			1.6	0	1	2.1	T	T	T	T	T
			2	0	1	0.7	2.1	T	T	T	T
		25	3		0	0.4	0.7	1.1	2.3	7.8	T
			4		0	0.4	0.6	0.9	1.5	2.8	7
			6				0.5	0. 7	1.1	1.8	3.3
			8					0.6	0.9	1.2	1.8
			10						0.9	1.2	1.8
			13							1	1.4
			16								1.4
			20								
		10	25								
			32								
			40								
			50								
			63								

MCBs technical details
Coordination tables: selectivity

S800S – S400M @230/400 V

		Supply s.		S800S							
	Char.			C							
Load s.		Icu [kA]		50							
			In [A]	25	32	40	50	63	80	100	125
S400M	B	Icn [kA]	6		0.4	0.5	0.6	0.9	1.3	2.2	4.4
S450M		10	10		0.3	0.4	0.5	0.6	0.8	1.2	1.8
FS401M			13		0.3	0.4	0.5	0.6	0.8	1.2	1.7
FS451M			16		0.3	0.4	0.5	0.6	0.8	1.2	1.7
FS403M			20			0.4	0.5	0.6	0.8	1.1	1.6
FS453M			25			0.4	0.5	0.6	0.8	1.1	1.6
			32				0.4	0.5	0.7	0.9	1.3
			40					0.5	0.7	0.9	1.3
			50						0.7	0.9	1.2
			63							0.9	1.1

		Supply s.		S800S							
	Char.			C							
Load s.		Icu [kA]		50							
			In [A]	25	32	40	50	63	80	100	125
S400M	C	50	0.5	T	T	T	T	T	T	T	T
S450M			1	T	T	T	T	T	T	T	T
FS401M			1.6	1	T	T	T	T	T	T	T
FS451M			2	0	0.9	T	T	T	T	T	T
FS403M		25	3	0	0.4	0.7	1.1	1.9	5.8	T	T
FS453M			4	0	0.4	0.6	0.9	1.3	2.4	5.5	T
			6		0.4	0.5	0.6	0.9	1.3	2.2	4.4
			8		0.3	0.4	0.5	0.6	0.8	1.2	1.8
			10		0.3	0.4	0.5	0.6	0.8	1.2	1.8
			13		0.3	0.4	0.5	0.6	0.8	1.2	1.7
			16		0.3	0.4	0.5	0.6	0.8	1.2	1.7
			20			0.4	0.5	0.6	0.8	1.1	1.6
		15	25			0.4	0.5	0.6	0.8	1.1	1.6
			32				0.4	0.5	0.7	0.9	1.3
			40					0.5	0.7	0.9	1.3
			50						0.7	0.9	1.2
			63							0.8	1.1

		Supply s.		S800S							
	Char.			C							
Load s.		Icu [kA]		50							
			In [A]	25	32	40	50	63	80	100	125
S400M S450M	D	Icn [kA] 10	6		0.4	0.5	0.7	1	1.6	2.9	5.8
			10			0.5	0.6	0.8	1.1	1.6	2.2
			13				0.6	0.8	1.1	1.6	2.5
			16					0.7	0.9	1.3	1.8
			20						0.9	1.3	1.8
			25							0.9	1.3
			32								1.3
			40								
			50								
			63								

		Supply s.		S800S							
	Char.			C							
Load s.		Icu [kA]		50							
			In [A]	25	32	40	50	63	80	100	125
S400M S450M	K	50	0.5	T	T	T	T	T	T	T	T
			1	2	T	T	T	T	T	T	T
			1.6	1	2.1	T	T	T	T	T	T
			2	0	0.7	2.1	T	T	T	T	T
		25	3	0	0.4	0.7	1.1	2	5.8	T	T
			4	0	0.4	0.6	0.9	1.3	2.4	5.6	T
			6		0.4	0.5	0.7	1	1.6	2.9	5.8
			8			0.5	0.6	0.8	1.1	1.6	2.5
			10				0.6	0.8	1.1	1.6	2.5
			13					0.7	0.9	1.3	1.8
			16						0.9	1.3	1.8
			20							0.9	1.3
		10	25								1.3
			32								
			40								
			50								
			63								

MCBs technical details
Coordination tables: selectivity

S800S – S400M @230/400 V

		Supply s.		S800S							
	Char.			D, K							
Load s.		Icu [kA]		50							
			In [A]	25	32	40	50	63	80	100	125
S400M	B	Icn [kA]	6	0.5	0.9	1.1	1.8	2.5	9	T	T
S450M		10	10	0.4	0.5	0.8	1	1.3	2.5	3.5	6.7
FS401M			13	0.4	0.5	0.8	1	1.3	2.3	3	5.5
FS451M			16		0.5	0.8	1	1.3	2.3	3	5.1
FS403M			20			0.7	1	1.2	2.1	2.7	4.3
FS453M			25			0.7	1	1.2	2.1	2.7	4.3
			32				0.9	1	1.7	2.2	3.4
			40					1	1.7	2.2	3.4
			50						1.4	1.7	2.1
			63							1.6	2.1

		Supply s.		S800S							
	Char.			D, K							
Load s.		Icu [kA]		50							
			In [A]	25	32	40	50	63	80	100	125
S400M	C	50	0.5	T	T	T	T	T	T	T	T
S450M			1	T	T	T	T	T	T	T	T
FS401M			1.6	T	T	T	T	T	T	T	T
FS451M			2	T	T	T	T	T	T	T	T
FS403M		25	3	0.7	2	4	T	T	T	T	T
FS453M			4	0.6	1.2	2	4	7	T	T	T
			6	0.5	0.9	1.1	1.8	2.5	9	T	T
			8	0.4	0.5	0.8	1	1.3	2.5	3.5	6.7
			10	0.4	0.5	0.8	1	1.3	2.5	3.5	6.7
			13	0.4	0.5	0.8	1	1.3	2.3	3	2.1
			16		0.5	0.8	1	1.3	2.3	3	5.1
			20			0.7	1	1.2	2.1	2.7	4.3
		15	25			0.7	1	1.2	2.1	2.7	4.3
			32				0.9	1	1.7	2.2	3.4
			40					1	1.7	2.2	3.4
			50						1.4	1.7	2.1
			63							1.6	2.1

		Supply s.		S800S							
	Char.			D, K							
Load s.		Icu [kA]		50							
			In [A]	25	32	40	50	63	80	100	125
S400M S450M	D	Icn [kA] 10	6	0.5	0.8	1.4	2.3	3.3	T	T	T
			8	0.5	0.6	1	1.4	1.8	3.6	5	9
			10	0.5	0.6	1	1.4	1.8	3.6	5	9
			13		0.5	0.8	1.1	1.4	2.4	3.1	4.7
			16			0.8	1.1	1.4	2.4	3.1	4.7
			20				0.8	1	1.6	2	2.9
			25					1	1.6	2	2.9
			32						1.5	1.8	2.6
			40							1.7	2.4
			50								2
			63								

		Supply s.		S800S							
	Char.			D, K							
Load s.		Icu [kA]		50							
			In [A]	25	32	40	50	63	80	100	125
S400M S450M	K	50	0.5	T	T	T	T	T	T	T	T
			1	T	T	T	T	T	T	T	T
			1.6	T	T	T	T	T	T	T	T
			2	2.1	T	T	T	T	T	T	T
		25	3	0.7	1.2	4	T	T	T	T	T
			4	0.6	0.9	2	4	7	T	T	T
			6	0.5	0.8	1.4	2.3	3.3	T	T	T
			8	0.5	0.6	1	1.4	1.8	3.6	5	T
			10	0.5	0.6	1	1. 4	1.8	3.6	5	T
			13		0.5	0.8	1.1	1.4	2.4	3.1	4.7
			16			0.8	1.1	1.4	2.4	3.1	4.7
			20				0.8	1	1.6	2	2.9
		10	25					1	1.6	2	2.9
			32						1.5	1.8	2.8
			40							1.7	2.4
			50								2
			63								

MCBs technical details
Coordination tables: selectivity

S800N - S200 @ 230/400 V

			E.	S800N							
	Char.			B							
L.		Icu		36							
		[kA]	In [A]	25	32	40	50	63	80	100	125
S200	B	10	6			0.4	0.5	0.7	1	1.5	2.6
			10				0.4	0.6	0.7	1	1.4
			13					0.5	0.7	0.9	1.3
			16						0.7	0.9	1.3
			20							0.9	1.3
			25							0.9	1.3
			32							0.8	1.1
			40							0.8	1.1
			50								1
			63								0.9

			E.	S800N							
	Char.			B							
L.		Icu		36							
		[kA]	In [A]	25	32	40	50	63	80	100	125
S200	C	10	0.5	T	T	T	T	T	T	T	T
			1	3.3	T	T	T	T	T	T	T
			1.6	0.6	1.3	T	T	T	T	T	T
			2	0.4	0.7	1.2	T	T	T	T	T
			3		0.4	0.6	0.7	1.1	2.6	T	T
			4		0.4	0.6	0.7	1	1.7	3.1	T
			6			0.4	0.5	0.7	1	1.5	2.6
			8				0.4	0.6	0.7	1	1.4
			10				0.4	0.6	0.7	1	1.4
			13					0.5	0.7	0.9	1.3
			16						0.7	0.9	1.3
			20							0.9	1.3
			25							0.9	1.3
			32							0.8	1.1
			40							0.8	1.1
			50								1
			63								0.9

E. = feed side
L. = load side
T = Total selectivity up to breaking capacity of the switch on load side
Selectivity limit values indicated in kA

			E.	S800N							
	Char.			B							
L.		Icu		36							
		[kA]	In [A]	25	32	40	50	63	80	100	125
S200	D	10	0.5	T	T	T	T	T	T	T	T
			1	0.8	5	T	T	T	T	T	T
			1.6	0.5	1	2.3	T	T	T	T	T
			2	0.3	0.5	0.7	2.3	T	T	T	T
			3		0.4	0.5	0.7	1.2	2.5	T	T
			4		0.4	0.4	0.7	1	1.7	3	T
			6				0.6	0.8	1.2	2	3.6
			8					0.7	0.9	1.3	2
			10						0.9	1.3	2
			13							1	1.5
			16								1.5
			20								
			25								
			32								
			40								
			50								
			63								

			E.	S800N							
	Char.			B							
L.		Icu		36							
		[kA]	In [A]	25	32	40	50	63	80	100	125
S200	K	10	0.5	T	T	T	T	T	T	T	T
			1	0.8	5	T	T	T	T	T	T
			1.6	0.5	1	2.3	T	T	T	T	T
			2	0.3	0.5	0.7	2.3	T	T	T	T
			3		0.4	0.5	0.7	1.2	2.5	T	T
			4		0.4	0.4	0.7	1	1.7	3	T
			6				0.6	0.8	1.2	2	3.6
			8					0.7	0.9	1.3	2
			10						0.9	1.3	2
			13							1	1.5
			16								1.5
			20								
			25								
			32								
			40								
			50								
			63								

E. = feed side
L. = load side
T = Total selectivity up to breaking capacity of the switch on load side
Selectivity limit values indicated in kA

MCBs technical details
Coordination tables: selectivity

			E.	S800N							
	Char.			C							
L.		Icu		36							
		[kA]	In [A]	25	32	40	50	63	80	100	125
S200	B	10	6		0.4	0.5	0.7	0.9	1.4	2.4	4.8
			10		0.3	0.4	0.5	0.7	0.9	1.3	2
			13		0.3	0.4	0.5	0.7	0.9	1.3	1.9
			16		0.3	0.4	0.5	0.7	0.9	1.3	1.9
			20			0.4	0.5	0.7	0.9	1.2	1.8
			25			0.4	0.5	0.7	0.9	1.2	1.8
			32				0.5	0.6	0.8	1	1.4
			40					0.6	0.8	1	1.4
			50						0.7	0.9	1.3
			63							0.9	1.2

			E.	S800N							
	Char.			C							
L.		Icu		36							
		[kA]	In [A]	25	32	40	50	63	80	100	125
S200	C	10	0.5	T	T	T	T	T	T	T	T
			1	T	T	T	T	T	T	T	T
			1.6	0.6	T	T	T	T	T	T	T
			2	0.5	1	T	T	T	T	T	T
			3	0.3	0.5	0.7	1.2	2.1	T	T	T
			4	0.3	0.4	0.7	1	1.5	2.6	T	T
			6		0.4	0.5	0.7	0.9	1.4	2.4	4.8
			8		0.3	0.4	0.5	0.7	0.9	1.3	2
			10		0.3	0.4	0.5	0.7	0.9	1.3	2
			13		0.3	0.4	0.5	0.7	0.9	1.3	1.9
			16		0.3	0.4	0.5	0.7	0.9	1.3	1.9
			20			0.4	0.5	0.7	0.9	1.2	1.8
			25			0.4	0.5	0.7	0.9	1.2	1.8
			32				0.5	0.6	0.8	1	1.4
			40					0.6	0.8	1	1.4
			50						0.7	0.9	1.3
			63							0.9	1.2

E. = feed side
L. = load side
T = Total selectivity up to breaking capacity of the switch on load side
Selectivity limit values indicated in kA

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			E.	S800N							
	Char.			C							
L.		Icu		36							
		[kA]	In [A]	25	32	40	50	63	80	100	125
S200	D	10	0.5	T	T	T	T	T	T	T	T
			1	2.1	T	T	T	T	T	T	T
			1.6	0.8	2.3	T	T	T	T	T	T
			2	0.4	0.7	2.3	T	T	T	T	T
			3	0.3	0.5	0.7	1.2	2.2	T	T	T
			4	0.3	0.4	0.7	1	1.4	2.6	T	T
			6		0.4	0.6	0.8	1.1	1.8	3.2	T
			8			0.5	0.7	0.9	1.2	1.8	2.8
			10				0.7	0.9	1.2	1.8	2.8
			13					0.7	1	1.4	2
			16						1	1.4	2
			20							1	1.4
			25								1.4
			32								
			40								
			50								
			63								

			E.	S800N							
	Char.			C							
L.		Icu		36							
		[kA]	In [A]	25	32	40	50	63	80	100	125
S200	K	10	0.5	T	T	T	T	T	T	T	T
			1	2.1	T	T	T	T	T	T	T
			1.6	0.8	2.3	T	T	T	T	T	T
			2	0.4	0.7	2.3	T	T	T	T	T
			3	0.3	0.5	0.7	1.2	2.2	T	T	T
			4	0.3	0.4	0.7	1	1.4	2.6	T	T
			6		0.4	0.6	0.8	1.1	1.8	3.2	T
			8			0.5	0.7	0.9	1.2	1.8	2.8
			10				0.7	0.9	1.2	1.8	2.8
			13					0.7	1	1.4	2
			16						1	1.4	2
			20							1	1.4
			25								1.4
			32								
			40								
			50								
			63								

E. = feed side
L. = load side
T = Total selectivity up to breaking capacity of the switch on load side
Selectivity limit values indicated in kA

MCBs technical details
Coordination tables: selectivity

			E.	S800N							
	Char.			D							
L.		Icu		36							
		[kA]	In [A]	25	32	40	50	63	80	100	125
S200	B	10	6	0.5	1	1.2	2	2.8	T	T	T
			10	0.4	0.6	0.8	1.1	1.4	2.8	3.9	T
			13	0.4	0.6	0.8	1.1	1.4	2.5	3.3	5.6
			16		0.6	0.8	1.1	1.4	2.5	3.3	5.6
			20			0.8	1.1	1.3	2.3	3	4.7
			25			0.8	1.1	1.3	2.3	3	4.7
			32				0.9	1.1	1.9	2.4	3.7
			40					1.1	1.9	2.4	3.7
			50						1.5	1.9	2.3
			63							1.7	2.3

			E.	S800N							
	Char.			D							
L.		Icu		36							
		[kA]	In [A]	25	32	40	50	63	80	100	125
S200	C	10	0.5	T	T	T	T	T	T	T	T
			1	T	T	T	T	T	T	T	T
			1.6	T	T	T	T	T	T	T	T
			2	T	T	T	T	T	T	T	T
			3	0.7	2.2	4.4	T	T	T	T	T
			4	0.7	1.3	2.2	4.4	T	T	T	T
			6	0.5	1	1.2	2	2.8	T	T	T
			8	0.4	0.6	0.8	1.1	1.4	2.8	3.9	T
			10	0.4	0.6	0.8	1.1	1.4	2.8	3.9	T
			13	0.4	0.6	0.8	1.1	1.4	2.5	3.3	5.6
			16		0.6	0.8	1.1	1.4	2.5	3.3	5.6
			20			0.8	1.1	1.3	2.3	3	4.7
			25			0.8	1.1	1.3	2.3	3	4.7
			32				0.9	1.1	1.9	2.4	3.7
			40					1.1	1.9	2.4	3.7
			50						1.5	1.9	2.3
			63							1.7	2.3

E. = feed side
L. = load side
T = Total selectivity up to breaking capacity of the switch on load side
Selectivity limit values indicated in kA

			E.	S800N							
	Char.			D							
L.		Icu		36							
		[kA]	In [A]	25	32	40	50	63	80	100	125
			0.5	T	T	T	T	T	T	T	T
			1	T	T	T	T	T	T	T	T
			1.6	T	T	T	T	T	T	T	T
			2	2.3	T	T	T	T	T	T	T
			3	0.7	1.3	4.4	T	T	T	T	T
			4	0.7	1	2.2	4.4	T	T	T	T
			6	0.6	0.8	1.5	2.5	3.6	T	T	T
			8	0.5	0.7	1.1	1.5	2	4	5.5	T
S200	D	10	10	0.5	0.7	1.1	1.5	2	4	5.5	T
			13		0.6	0.9	1.2	1.5	2.6	3.4	5.2
			16			0.9	1.2	1.5	2.6	3.4	5.2
			20				0.9	1.1	1.8	2.2	3.2
			25					1.1	1.8	2.2	3.2
			32						1.7	2	2.9
			40							1.9	2.6
			50								2.2
			63								

			E.	S800N							
	Char.			D							
L.		Icu		36							
		[kA]	In [A]	25	32	40	50	63	80	100	125
			0.5	T	T	T	T	T	T	T	T
			1	T	T	T	T	T	T	T	T
			1.6	T	T	T	T	T	T	T	T
			2	2.3	T	T	T	T	T	T	T
			3	0.7	1.3	4.4	T	T	T	T	T
			4	0.7	1	2.2	4.4	T	T	T	T
			6	0.6	0.8	1.5	2.5	3.6	T	T	T
			8	0.5	0.7	1.1	1.5	2	4	5.5	T
S200	K	10	10	0.5	0.7	1.1	1.5	2	4	5.5	T
			13		0.6	0.9	1.2	1.5	2.6	3.4	5.2
			16			0.9	1.2	1.5	2.6	3.4	5.2
			20				0.9	1.1	1.8	2.2	3.2
			25					1.1	1.8	2.2	3.2
			32						1.7	2	2.9
			40							1.9	2.6
			50								2.2
			63								

E. = feed side
L. = load side
T = Total selectivity up to breaking capacity of the switch on load side
Selectivity limit values indicated in kA

MCBs technical details
Coordination tables: selectivity

S800N - S200M @ 230/400 V

			E.	S800N							
	Char.			B							
L.		Icu		36							
		[kA]	In [A]	25	32	40	50	63	80	100	125
S200M	B	15	6			0.4	0.5	0.7	1	1.5	2.6
			10				0.4	0.6	0.7	1	1.4
			13					0.5	0.7	0.9	1.3
			16						0.7	0.9	1.3
			20							0.9	1.3
			25							0.9	1.3
			32							0.8	1.1
			40							0.8	1.1
			50								1
			63								0.9

			E.	S800N							
	Char.			B							
L.		Icu		36							
		[kA]	In [A]	25	32	40	50	63	80	100	125
S200M	C	15	0.5	T	T	T	T	T	T	T	T
			1	3.3	T	T	T	T	T	T	T
			1.6	0.6	1.3	T	T	T	T	T	T
			2	0.4	0.7	1.3	T	T	T	T	T
			3		0.4	0.6	0.7	1.1	2.6	8.8	T
			4		0.4	0.6	0.7	1	1.7	3.1	7
			6			0.4	0.5	0.7	1	1.5	2.6
			8				0.4	0.6	0.7	1	1.4
			10				0.4	0.6	0.7	1	1.4
			13					0.5	0.7	0.9	1.3
			16						0.7	0.9	1.3
			20							0.9	1.3
			25							0.9	1.3
			32							0.8	1.1
			40							0.8	1.1
			50								1
			63								0.9

E. = feed side
L. = load side
T = Total selectivity up to breaking capacity of the switch on load side
Selectivity limit values indicated in kA

			E.	S800N							
	Char.			B							
L.		Icu		36							
		[kA]	In [A]	25	32	40	50	63	80	100	125
			0.5	T	T	T	T	T	T	T	T
			1	0.8	5	T	T	T	T	T	T
			1.6	0.5	1	2.3	T	T	T	T	T
			2	0.3	0.5	0.7	2.3	T	T	T	T
			3		0.4	0.5	0.7	1.2	2.5	8.6	T
			4		0.4	0.4	0.7	1	1.7	3	7.7
			6				0.6	0.8	1.2	2	3.6
			8					0.7	0.9	1.3	2
S200M	D	15	10						0.9	1.3	2
			13							1	1.5
			16								1.5
			20								
			25								
			32								
			40								
			50								
			63								

			E.	S800N							
	Char.			B							
L.		Icu		36							
		[kA]	In [A]	25	32	40	50	63	80	100	125
			0.5	T	T	T	T	T	T	T	T
			1	0.8	5	T	T	T	T	T	T
			1.6	0.5	1	2.3	T	T	T	T	T
			2	0.3	0.5	0.7	2.3	T	T	T	T
			3		0.4	0.5	0.7	1.2	2.5	8.6	T
			4		0.4	0.4	0.7	1	1.7	3	7.7
			6				0.6	0.8	1.2	2	3.6
			8					0.7	0.9	1.3	2
S200M	K	15	10						0.9	1.3	2
			13							1	1.5
			16								1.5
			20								
			25								
			32								
			40								
			50								
			63								

E. = feed side
L. = load side
T = Total selectivity up to breaking capacity of the switch on load side
Selectivity limit values indicated in kA

MCBs technical details
Coordination tables: selectivity

			E.	S800N							
	Char.			C							
L.		Icu		36							
		[kA]	In [A]	25	32	40	50	63	80	100	125
S200M	B	15	6		0.4	0.5	0.7	0.9	1.4	2.4	4.8
			10		0.3	0.4	0.5	0.7	0.9	1.3	2
			13		0.3	0.4	0.5	0.7	0.9	1.3	1.9
			16		0.3	0.4	0.5	0.7	0.9	1.3	1.9
			20			0.4	0.5	0.7	0.9	1.2	1.8
			25			0.4	0.5	0.7	0.9	1.2	1.8
			32				0.5	0.6	0.8	1	1.4
			40					0.6	0.8	1	1.4
			50						0.7	0.9	1.3
			63							0.9	1.2

			E.	S800N							
	Char.			C							
L.		Icu		36							
		[kA]	In [A]	25	32	40	50	63	80	100	125
S200M	C	15	0.5	T	T	T	T	T	T	T	T
			1	T	T	T	T	T	T	T	T
			1.6	0.6	T	T	T	T	T	T	T
			2	0.5	1	T	T	T	T	T	T
			3	0.3	0.5	0.7	1.2	2.1	6.4	T	T
			4	0.3	0.4	0.7	1	1.5	2.6	6.1	T
			6		0.4	0.5	0.7	0.9	1.4	2.4	4.8
			8		0.3	0.4	0.5	0.7	0.9	1.3	2
			10		0.3	0.4	0.5	0.7	0.9	1.3	2
			13		0.3	0.4	0.5	0.7	0.9	1.3	1.9
			16		0.3	0.4	0.5	0.7	0.9	1.3	1.9
			20			0.4	0.5	0.7	0.9	1.2	1.8
			25			0.4	0.5	0.7	0.9	1.2	1.8
			32				0.5	0.6	0.8	1	1.4
			40					0.6	0.8	1	1.4
			50						0.7	0.9	1.3
			63							0.9	1.2

E. = feed side
L. = load side
T = Total selectivity up to breaking capacity of the switch on load side
Selectivity limit values indicated in kA

			E.	S800N							
	Char.			C							
L.		Icu		36							
		[kA]	In [A]	25	32	40	50	63	80	100	125
S200M	D	15	0.5	T	T	T	T	T	T	T	T
			1	2.1	T	T	T	T	T	T	T
			1.6	0.8	2.3	T	T	T	T	T	T
			2	0.4	0.7	2.3	T	T	T	T	T
			3	0.3	0.5	0.7	1.2	2.2	6.4	T	T
			4	0.3	0.4	0.7	1	1.4	2.6	6.2	T
			6		0.4	0.6	0.8	1.1	1.8	3.2	6.4
			8			0.5	0.7	0.9	1.2	1.8	2.8
			10				0.7	0.9	1.2	1.8	2.8
			13					0.7	1	1.4	2
			16						1	1.4	2
			20							1	1.4
			25								1.4
			32								
			40								
			50								
			63								

			E.	S800N							
	Char.			C							
L.		Icu		36							
		[kA]	In [A]	25	32	40	50	63	80	100	125
S200M	K	15	0.5	T	T	T	T	T	T	T	T
			1	2.1	T	T	T	T	T	T	T
			1.6	0.8	2.3	T	T	T	T	T	T
			2	0.4	0.7	2.3	T	T	T	T	T
			3	0.3	0.5	0.7	1.2	2.2	6.4	T	T
			4	0.3	0.4	0.7	1	1.4	2.6	6.2	T
			6		0.4	0.6	0.8	1.1	1.8	3.2	6.4
			8			0.5	0.7	0.9	1.2	1.8	2.8
			10				0.7	0.9	1.2	1.8	2.8
			13					0.7	1	1.4	2
			16						1	1.4	2
			20							1	1.4
			25								1.4
			32								
			40								
			50								
			63								

E. = feed side
L. = load side
T = Total selectivity up to breaking capacity of the switch on load side
Selectivity limit values indicated in kA

MCBs technical details
Coordination tables: selectivity

		E.		S800N							
	Char.			D							
L.		Icu		36							
		[kA]	In [A]	25	32	40	50	63	80	100	125
S200M	B	15	6	0.5	1	1.2	2	2.8	T	T	T
			10	0.4	0.6	0.8	1.1	1.4	2.8	3.9	7.4
			13	0.4	0.6	0.8	1.1	1.4	2.5	3.3	5.6
			16		0.6	0.8	1.1	1.4	2.5	3.3	5.6
			20			0.8	1.1	1.3	2.3	3	4.7
			25			0.8	1.1	1.3	2.3	3	4.7
			32				0.9	1.1	1.9	2.4	3.7
			40					1.1	1.9	2.4	3.7
			50						1.5	1.9	2.3
			63							1.7	2.3

		E.		S800N							
	Char.			D							
L.		Icu		36							
		[kA]	In [A]	25	32	40	50	63	80	100	125
S200M	C	15	0.5	T	T	T	T	T	T	T	T
			1	T	T	T	T	T	T	T	T
			1.6	T	T	T	T	T	T	T	T
			2	T	T	T	T	T	T	T	T
			3	0.7	2.2	4.4	T	T	T	T	T
			4	0.7	1.3	2.2	4.4	7.7	T	T	T
			6	0.5	1	1.2	2	2.8	T	T	T
			8	0.4	0.6	0.8	1.1	1.4	2.8	3.9	7.4
			10	0.4	0.6	0.8	1.1	1.4	2.8	3.9	7.4
			13	0.4	0.6	0.8	1.1	1.4	2.5	3.3	5.6
			16		0.6	0.8	1.1	1.4	2.5	3.3	5.6
			20			0.8	1.1	1.3	2.3	3	4.7
			25			0.8	1.1	1.3	2.3	3	4.7
			32				0.9	1.1	1.9	2.4	3.7
			40					1.1	1.9	2.4	3.7
			50						1.5	1.9	2.3
			63							1.7	2.3

E. = feed side
L. = load side
T = Total selectivity up to breaking capacity of the switch on load side
Selectivity limit values indicated in kA

			E.	S800N							
	Char.			D							
L.		Icu		36							
		[kA]	In [A]	25	32	40	50	63	80	100	125
S200M	D	15	0.5	T	T	T	T	T	T	T	T
			1	T	T	T	T	T	T	T	T
			1.6	T	T	T	T	T	T	T	T
			2	2.3	T	T	T	T	T	T	T
			3	0.7	1.3	4.4	T	T	T	T	T
			4	0.7	1	2.2	4.4	7.7	T	T	T
			6	0.6	0.8	1.5	2.5	3.6	T	T	T
			8	0.5	0.7	1.1	1.5	2	4	5.5	T
			10	0.5	0.7	1.1	1.5	2	4	5.5	T
			13		0.6	0.9	1.2	1.5	2.6	3.4	5.2
			16			0.9	1.2	1.5	2.6	3.4	5.2
			20				0.9	1.1	1.8	2.2	3.2
			25					1.1	1.8	2.2	3.2
			32						1.7	2	2.9
			40							1.9	2.6
			50								2.2
			63								

			E.	S800N							
	Char.			D							
L.		Icu		36							
		[kA]	In [A]	25	32	40	50	63	80	100	125
S200M	K	15	0.5	T	T	T	T	T	T	T	T
			1	T	T	T	T	T	T	T	T
			1.6	T	T	T	T	T	T	T	T
			2	2.3	T	T	T	T	T	T	T
			3	0.7	1.3	4.4	T	T	T	T	T
			4	0.7	1	2.2	4.4	7.7	T	T	T
			6	0.6	0.8	1.5	2.5	3.6	T	T	T
			8	0.5	0.7	1.1	1.5	2	4	5.5	T
			10	0.5	0.7	1.1	1.5	2	4	5.5	T
			13		0.6	0.9	1.2	1.5	2.6	3.4	5.2
			16			0.9	1.2	1.5	2.6	3.4	5.2
			20				0.9	1.1	1.8	2.2	3.2
			25					1.1	1.8	2.2	3.2
			32						1.7	2	2.9
			40							1.9	2.6
			50								2.2
			63								

E. = feed side
L. = load side
T = Total selectivity up to breaking capacity of the switch on load side
Selectivity limit values indicated in kA

MCBs technical details
Coordination tables: selectivity

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S800N - S200P @ 230/400 V

			E.	S800N							
	Char.			B							
L.		Icu		36							
		[kA]	In [A]	25	32	40	50	63	80	100	125
S200P	C	25	0.5	T	T	T	T	T	T	T	T
			1	3.3	T	T	T	T	T	T	T
			1.6	0.6	1.3	T	T	T	T	T	T
			2	0.4	0.7	1.3	T	T	T	T	T
			3		0.4	0.6	0.7	1.1	2.6	8.8	T
			4		0.4	0.6	0.7	1	1.7	3.1	7
			6			0.4	0.5	0.7	1	1.5	2.6
			8				0.4	0.6	0.7	1	1.4
			10				0.4	0.6	0.7	1	1.4
			13					0.5	0.7	0.9	1.3
			16						0.7	0.9	1.3
			20							0.9	1.3
			25							0.9	1.3
		15	32							0.8	1.1
			40							0.8	1.1
			50								1
			63								0.9

E. = feed side
L. = load side
T = Total selectivity up to breaking capacity of the switch on load side
Selectivity limit values indicated in kA

			E.	S800N							
	Char.			B							
L.		Icu		36							
		[kA]	In [A]	25	32	40	50	63	80	100	125
S200P	K	25	0.2	T	T	T	T	T	T	T	T
			0.3	T	T	T	T	T	T	T	T
			0.5	T	T	T	T	T	T	T	T
			0.75	T	T	T	T	T	T	T	T
			1	0.8	5	T	T	T	T	T	T
			1.6	0.5	1	2.3	T	T	T	T	T
			2	0.3	0.5	0.7	2.1	T	T	T	T
			3		0.4	0.5	0.7	1.2	2.5	8.6	T
			4		0.4	0.4	0.7	1	1.7	3	7.7
			6				0.6	0.8	1.2	2	3.6
			8					0.7	0.9	1.3	2
			10						0.9	1.3	2
			13							1	1.5
			16								1.5
			20								
			25								
		15	32								
			40								
			50								
			63								

			E.	S800N							
	Char.			C							
L.		Icu		36							
		[kA]	In [A]	25	32	40	50	63	80	100	125
S200P	B	25	6			0.4	0.5	0.7	1	1.5	2.6
			10				0.4	0.6	0.7	1	1.4
			13					0.5	0.7	0.9	1.3
			16						0.7	0.9	1.3
			20							0.9	1.3
			25							0.9	1.3
		15	32							0.8	1.1
			40							0.8	1.1
			50								1
			63								0.9

E. = feed side
L. = load side
T = Total selectivity up to breaking capacity of the switch on load side
Selectivity limit values indicated in kA

MCBs technical details
Coordination tables: selectivity

			E.	S800N							
	Char.			C							
L.		Icu [kA]		36							
			In [A]	25	32	40	50	63	80	100	125
S200P	C	25	0.5	T	T	T	T	T	T	T	T
			1	3.3	T	T	T	T	T	T	T
			1.6	0.6	1.3	T	T	T	T	T	T
			2	0.4	0.7	1.3	T	T	T	T	T
			3		0.4	0.6	0.7	1.1	2.6	8.8	T
			4		0.4	0.6	0.7	1	1.7	3.1	7
			6			0.4	0.5	0.7	1	1.5	2.6
			8				0.4	0.6	0.7	1	1.4
			10				0.4	0.6	0.7	1	1.4
			13					0.5	0.7	0.9	1.3
			16						0.7	0.9	1.3
			20							0.9	1.3
			25							0.9	1.3
		15	32							0.8	1.1
			40							0.8	1.1
			50								1
			63								0.9

			E.	S800N							
	Char.			C							
L.		Icu [kA]		36							
			In [A]	25	32	40	50	63	80	100	125
S200P	K	25	0.2	T	T	T	T	T	T	T	T
			0.3	T	T	T	T	T	T	T	T
			0.5	T	T	T	T	T	T	T	T
			0.75	T	T	T	T	T	T	T	T
			1	0.8	5	T	T	T	T	T	T
			1.6	0.5	1	2.3	T	T	T	T	T
			2	0.3	0.5	0.7	2.3	T	T	T	T
			3		0.4	0.5	0.7	1.2	2.5	8.6	T
			4		0.4	0.4	0.7	1	1.7	3	7.7
			6				0.6	0.8	1.2	2	3.6
			8					0.7	0.9	1.3	2
			10						0.9	1.3	2
			13							1	1.5
			16								1.5
			20								
			25								
		15	32								
			40								
			50								
			63								

E. = feed side
L. = load side
T = Total selectivity up to breaking capacity of the switch on load side
Selectivity limit values indicated in kA

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			E.	S800N							
	Char.			D							
L.		Icu		36							
		[kA]	In [A]	25	32	40	50	63	80	100	125
S200P	B	25	6	0.5	1	1.2	2	2.8	9.9	21.3	T
			10	0.4	0.6	0.8	1.1	1.4	2.8	3.9	7.4
			13	0.4	0.6	0.8	1.1	1.4	2.5	3.3	5.6
			16		0.6	0.8	1.1	1.4	2.5	3.3	5.6
			20			0.8	1.1	1.3	2.3	3	4.7
			25			0.8	1.1	1.3	2.3	3	4.7
		15	32				0.9	1.1	1.9	2.4	3.7
			40					1.1	1.9	2.4	3.7
			50						1.5	1.9	2.3
			63							1.7	2.3

			E.	S800N							
	Char.			D							
L.		Icu		36							
		[kA]	In [A]	25	32	40	50	63	80	100	125
S200P	C	25	0.5	T	T	T	T	T	T	T	T
			1	T	T	T	T	T	T	T	T
			1.6	T	T	T	T	T	T	T	T
			2	T	T	T	T	T	T	T	T
			3	0.7	2.2	4.4	T	T	T	T	T
			4	0.7	1.3	2.2	4.4	7.7	T	T	T
			6	0.5	1	1.2	2	2.8	9.9	22	T
			8	0.4	0.6	0.8	1.1	1.4	2.8	3.9	7.4
			10	0.4	0.6	0.8	1.1	1.4	2.8	3.9	7.4
			13	0.4	0.6	0.8	1.1	1.4	2.5	3.3	5.6
			16		0.6	0.8	1.1	1.4	2.5	3.3	5.6
			20			0.8	1.1	1.3	2.3	3	4.7
			25			0.8	1.1	1.3	2.3	3	4.7
		15	32				0.9	1.1	1.9	2.4	3.7
			40					1.1	1.9	2.4	3.7
			50						1.5	1.9	2.3
			63							1.7	2.3

E. = feed side
L. = load side
T = Total selectivity up to breaking capacity of the switch on load side
Selectivity limit values indicated in kA

MCBs technical details
Coordination tables: selectivity

			E.	S800N							
	Char.			D							
L.		Icu		36							
		[kA]	In [A]	25	32	40	50	63	80	100	125
S200P	K	25	0.2	T	T	T	T	T	T	T	T
			0.3	T	T	T	T	T	T	T	T
			0.5	T	T	T	T	T	T	T	T
			0.75	T	T	T	T	T	T	T	T
			1	T	T	T	T	T	T	T	T
			1.6	T	T	T	T	T	T	T	T
			2	2.3	T	T	T	T	T	T	T
			3	0.7	1.3	4.4	T	T	T	T	T
			4	0.7	1	2.2	4.4	7.7	T	T	T
			6	0.6	0.8	1.5	2.5	3.6	12	24.2	T
			8	0.5	0.7	1.1	1.5	2	4	5.5	9.9
			10	0.5	0.7	1.1	1.5	2	4	5.5	9.9
			13		0.6	0.9	1.2	1.5	2.6	3.4	5.2
			16			0.9	1.2	1.5	2.6	3.4	5.2
			20				0.9	1.1	1.8	2.2	3.2
			25					1.1	1.8	2.2	3.2
		15	32						1.7	2	2.9
			40							1.9	2.6
			50								2.2
			63								

E. = feed side
L. = load side
T = Total selectivity up to breaking capacity of the switch on load side
Selectivity limit values indicated in kA

S800N – S400E/S450E @230/400 V

		Supply s.		S800N							
	Char.			B							
Load s.		Icu [kA]		36							
			In [A]	25	32	40	50	63	80	100	125
S400E	B, C	Icn [kA]	6			0.4	0.5	0.6	0.9	1.4	2.4
S450E		6	10				0.4	0.5	0.7	0.9	1.3
FS401E			13					0.5	0.7	0.9	1.2
FS451E			16						0.7	0.9	1.2
			20							0.9	1.2
			25							0.9	1.2
			32							0.7	1
			40							0.7	1
			50								0.9
			63								0.9

		Supply s.		S800N							
	Char.			C							
Load s.		Icu [kA]		36							
			In [A]	25	32	40	50	63	80	100	125
S400E	B, C	Icn [kA]	6		0.4	0.5	0.6	0.9	1.3	2.2	4.4
S450E		6	10		0.3	0.4	0.5	0.6	0.8	1.2	1.8
FS401E			13		0.3	0.4	0.5	0.6	0.8	1.2	1.7
FS451E			16		0.3	0.4	0.5	0.6	0.8	1.2	1.7
			20			0.4	0.5	0.6	0.8	1.1	1.6
			25			0.4	0.5	0.6	0.8	1.1	1.6
			32				0.4	0.5	0.7	0.9	1.3
			40					0.5	0.7	0.9	1.3
			50						0.7	0.9	1.2
			63							0.8	1.1

		Supply s.		S800N							
	Char.			D							
Load s.		Icu [kA]		36							
			In [A]	25	32	40	50	63	80	100	125
S400E	B, C	Icn [kA]	6	0.5	0.9	1.1	1.8	2.5	T	T	T
S450E		6	10	0.4	0.5	0.8	1	1.3	2.5	3.5	T
FS401E			13	0.4	0.5	0.8	1	1.3	2.3	3	5.1
FS451E			16		0.5	0.8	1	1.3	2.3	3	5.1
FS403E			20			0.7	1	1.2	2.1	2.7	4.3
FS453E			25			0.7	1	1.2	2.1	2.7	4.3
			32				0.9	1	1.7	2.2	3.4
			40					1	1.7	2.2	3.4
			50						1.4	1.7	2.1
			63							1.6	2.1

MCBs technical details
Coordination tables: selectivity

S800N – S400M @230/400 V

		Supply s.		S800N							
	Char.			B							
Load s.		Icu [kA]		36							
			In [A]	25	32	40	50	63	80	100	125
S400M	B	Icn [kA]	6			0.4	0.5	0.6	0.9	1.4	2.4
S450M		10	10				0.4	0.5	0.7	0.9	1.3
FS401M			13					0.5	0.7	0.9	1.2
FS451M			16						0.7	0.9	1.2
FS403M			20							0.9	1.2
FS453M			25							0.9	1.2
			32							0.7	1
			40							0.7	1
			50								0.9
			63								0.9

		Supply s.		S800N							
	Char.			B							
Load s.		Icu [kA]		36							
			In [A]	25	32	40	50	63	80	100	125
S400M	C	50	0.5	T	T	T	T	T	T	T	T
S450M			1	3	T	T	T	T	T	T	T
FS401M			1.6	1	1	T	T	T	T	T	T
FS451M			2	0	1	1.2	T	T	T	T	T
FS403M		25	3		0	0.6	0.7	1	2.4	T	T
FS453M			4		0	0.5	0.6	0.9	1.5	2.8	T
			6			0.4	0.5	0.6	0.9	1.4	2.4
			8				0.4	0.5	0.7	0.9	1.3
			10				0.4	0.5	0.7	0.9	1.3
			13					0.5	0.7	0.9	1.2
			16						0.7	0.9	1.2
			20							0.9	1.2
		15	25							0.9	1.2
			32							0.7	1
			40							0.7	1
			50								0.9
			63								0.9

		Supply s.		S800N							
	Char.			B							
Load s.		Icu [kA]		36							
			In [A]	25	32	40	50	63	80	100	125
S400M	D	Icn [kA]	6				0.5	0.7	1.1	1.8	3.3
S450M		10	10					0.6	0.9	1.2	1.8
			13						0.9	1.2	1.8
			16							1	1.4
			20								1.4
			25								
			32								
			40								
			50								
			63								

		Supply s.		S800N							
	Char.			B							
Load s.		Icu [kA]		36							
			In [A]	25	32	40	50	63	80	100	125
S400M	K	50	0.5	T	T	T	T	T	T	T	T
S450M			1	1	5	T	T	T	T	T	T
			1.6	0	1	2.1	T	T	T	T	T
			2	0	1	0.7	2.1	T	T	T	T
		25	3		0	0.4	0.7	1.1	2.3	7.8	T
			4		0	0.4	0.6	0.9	1.5	2.8	7
			6				0.5	0. 7	1.1	1.8	3.3
			8					0.6	0.9	1.2	1.8
			10						0.9	1.2	1.8
			13							1	1.4
			16								1.4
			20								
		10	25								
			32								
			40								
			50								
			63								

MCBs technical details
Coordination tables: selectivity

S800N – S400M @230/400 V

Load s.	Char.	Supply s.		S800N							
		Char.		C							
		Icu [kA]		36							
			In [A]	25	32	40	50	63	80	100	125
S400M	B	Icn [kA]	6		0.4	0.5	0.6	0.9	1.3	2.2	4.4
S450M		10	10		0.3	0.4	0.5	0.6	0.8	1.2	1.8
FS401M			13		0.3	0.4	0.5	0.6	0.8	1.2	1.7
FS451M			16		0.3	0.4	0.5	0.6	0.8	1.2	1.7
FS403M			20			0.4	0.5	0.6	0.8	1.1	1.6
FS453M			25			0.4	0.5	0.6	0.8	1.1	1.6
			32				0.4	0.5	0.7	0.9	1.3
			40					0.5	0.7	0.9	1.3
			50						0.7	0.9	1.2
			63							0.8	1.1

Load s.	Char.	Supply s.		S800S							
		Char.		C							
		Icu [kA]		50							
			In [A]	25	32	40	50	63	80	100	125
S400M	C	50	0.5	T	T	T	T	T	T	T	T
S450M			1	T	T	T	T	T	T	T	T
FS401M			1.6	1	T	T	T	T	T	T	T
FS451M			2	0	0.9	T	T	T	T	T	T
FS403M		25	3	0	0.4	0.7	1.1	1.9	5.8	T	T
FS453M			4	0	0.4	0.6	0.9	1.3	2.4	5.5	T
			6		0.4	0.5	0.6	0.9	1.3	2.2	4.4
			8		0.3	0.4	0.5	0.6	0.8	1.2	1.8
			10		0.3	0.4	0.5	0.6	0.8	1.2	1.8
			13		0.3	0.4	0.5	0.6	0.8	1.2	1.7
			16		0.3	0.4	0.5	0.6	0.8	1.2	1.7
			20			0.4	0.5	0.6	0.8	1.1	1.6
		15	25			0.4	0.5	0.6	0.8	1.1	1.6
			32				0.4	0.5	0.7	0.9	1.3
			40					0.5	0.7	0.9	1.3
			50						0.7	0.9	1.2
			63							0.8	1.1

		Supply s.		S800N							
	Char.			C							
Load s.		Icu [kA]		36							
			In [A]	25	32	40	50	63	80	100	125
S400M S450M	D	Icn [kA] 10	6		0.4	0.5	0.7	1	1.6	2.9	5.8
			10			0.5	0.6	0.8	1.1	1.6	2.2
			13				0.6	0.8	1.1	1.6	2.5
			16					0.7	0.9	1.3	1.8
			20						0.9	1.3	1.8
			25							0.9	1.3
			32								1.3
			40								
			50								
			63								

		Supply s.		S800N							
	Char.			C							
Load s.		Icu [kA]		36							
			In [A]	25	32	40	50	63	80	100	125
S400M S450M	K	50	0.5	T	T	T	T	T	T	T	T
			1	2	T	T	T	T	T	T	T
			1.6	1	2.1	T	T	T	T	T	T
			2	0	0.7	2.1	T	T	T	T	T
		25	3	0	0.4	0.7	1.1	2	5.8	T	T
			4	0	0.4	0.6	0.9	1.3	2.4	5.6	T
			6		0.4	0.5	0.7	1	1.6	2.9	5.8
			8			0.5	0.6	0.8	1.1	1.6	2.5
			10				0.6	0.8	1.1	1.6	2.5
			13					0.7	0.9	1.3	1.8
			16						0.9	1.3	1.8
			20							0.9	1.3
		10	25								1.3
			32								
			40								
			50								
			63								

MCBs technical details
Coordination tables: selectivity

S800N – S400M @230/400 V

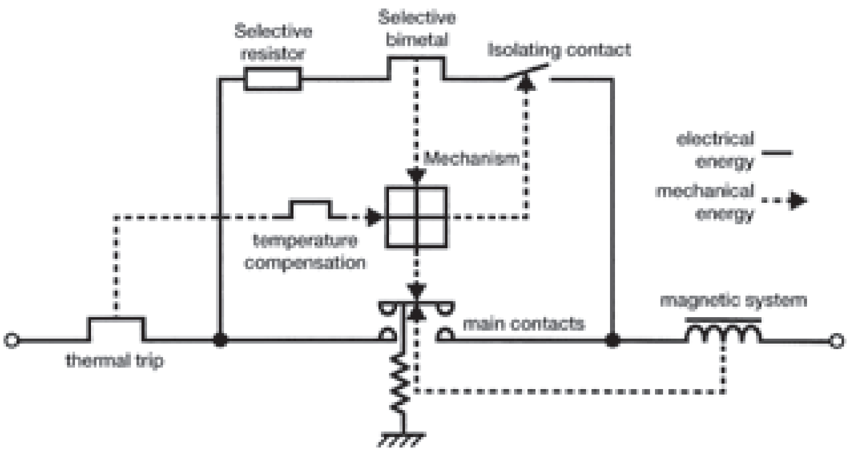
		Supply s.		S800N							
	Char.			D							
Load s.		Icu [kA]		36							
			In [A]	25	32	40	50	63	80	100	125
S400M S450M FS401M FS451M FS403M FS453M	B	Icn [kA] 10	6	0.5	0.9	1.1	1.8	2.5	9	T	T
			10	0.4	0.5	0.8	1	1.3	2.5	3.5	6.7
			13	0.4	0.5	0.8	1	1.3	2.3	3	5.5
			16		0.5	0.8	1	1.3	2.3	3	5.1
			20			0.7	1	1.2	2.1	2.7	4.3
			25			0.7	1	1.2	2.1	2.7	4.3
			32				0.9	1	1.7	2.2	3.4
			40					1	1.7	2.2	3.4
			50						1.4	1.7	2.1
			63							1.6	2.1

		Supply s.		S800N							
	Char.			D							
Load s.		Icu [kA]		36							
			In [A]	25	32	40	50	63	80	100	125
S400M S450M FS401M FS451M FS403M FS453M	C	50	0.5	T	T	T	T	T	T	T	T
			1	T	T	T	T	T	T	T	T
			1.6	T	T	T	T	T	T	T	T
			2	T	T	T	T	T	T	T	T
		25	3	0.7	2	4	T	T	T	T	T
			4	0.6	1.2	2	4	7	T	T	T
			6	0.5	0.9	1.1	1.8	2.5	9	T	T
			8	0.4	0.5	0.8	1	1.3	2.5	3.5	6.7
			10	0.4	0.5	0.8	1	1.3	2.5	3.5	6.7
			13	0.4	0.5	0.8	1	1.3	2.3	3	2.1
			16		0.5	0.8	1	1.3	2.3	3	5.1
			20			0.7	1	1.2	2.1	2.7	4.3
		15	25			0.7	1	1.2	2.1	2.7	4.3
			32				0.9	1	1.7	2.2	3.4
			40					1	1.7	2.2	3.4
			50						1.4	1.7	2.1
			63							1.6	2.1

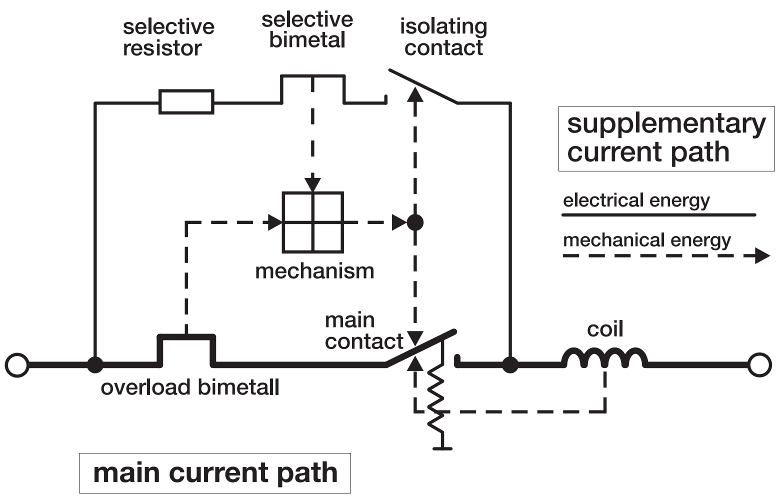
		Supply s.		S800N							
	Char.			D							
Load s.		Icu [kA]		36							
			In [A]	25	32	40	50	63	80	100	125
S400M S450M	D	Icn [kA] 10	6	0.5	0.8	1.4	2.3	3.3	T	T	T
			8	0.5	0.6	1	1.4	1.8	3.6	5	9
			10	0.5	0.6	1	1.4	1.8	3.6	5	9
			13		0.5	0.8	1.1	1.4	2.4	3.1	4.7
			16			0.8	1.1	1.4	2.4	3.1	4.7
			20				0.8	1	1.6	2	2.9
			25					1	1.6	2	2.9
			32						1.5	1.8	2.6
			40							1.7	2.4
			50								2
			63								

		Supply s.		S800N							
	Char.			D							
Load s.		Icu [kA]		36							
			In [A]	25	32	40	50	63	80	100	125
S400M S450M	K	50	0.5	T	T	T	T	T	T	T	T
			1	T	T	T	T	T	T	T	T
			1.6	T	T	T	T	T	T	T	T
			2	2.1	T	T	T	T	T	T	T
		25	3	0.7	1.2	4	T	T	T	T	T
			4	0.6	0.9	2	4	7	T	T	T
			6	0.5	0.8	1.4	2.3	3.3	T	T	T
			8	0.5	0.6	1	1.4	1.8	3.6	5	T
			10	0.5	0.6	1	1. 4	1.8	3.6	5	T
			13		0.5	0.8	1.1	1.4	2.4	3.1	4.7
			16			0.8	1.1	1.4	2.4	3.1	4.7
			20				0.8	1	1.6	2	2.9
		10	25					1	1.6	2	2.9
			32						1.5	1.8	2.6
			40							1.7	2.4
			50								2
			63								

Functional diagram of selective main circuit breakers S 700



Functional diagram of selective main circuit breakers S 750 (DR)



Back-up protection

Selective main circuit breakers of the S 700 and S 750 DR series are capable of switching off short-circuit currents of up to 25 kA automatically in networks with a rated voltage of 230/400 V.
Back-up protection is necessary only when the prospective short-circuit current may exceed 25 kA prosp. at the installation point. Further information on back-up protection on request.

Short circuit discrimination

When ABB miniature circuit-breaker are used in combination with the S 700 or S 750 DR, higher short-circuit currents can be disconnected than are indicated as permissible rated switching capacity of device. Considering the values given in the table, the S 700 and S 750 DR operates selectively with respect to the combination with the final device. If other mcbs are used selectivity for 6 kA and 10 kA devices is available up to the rated switching capacity of the final device.

MCB

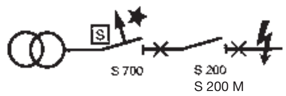
	Supply side			S 700									fuse							
Load side	Char.			E/K									gG							
		Icu [kA]		25																
			In [A]	16	20	25	35	40	50	63	80	100	16	20	25	35	50	63	80	100
S 200	C	6	≤ 2	>15	>15	>15	>15	>15	>15	>15	>15	>15	1	1.2	4	>15	>15	>15	>15	>15
			3	10	10	10	10	10	10	10	8	8	0.3	0.7	1.2	4.6	6	6	6	6
			4	10	10	10	10	10	10	10	8	8	0.3	0.6	0.9	2.8	6	6	6	6
	B, C		6	10	10	10	10	10	10	10	8	8	0.2	0.5	0.8	2	3.3	5.5	6	6
	C		8	10	10	10	10	10	10	10	8	8	0.2	0.4	0.7	1.7	2.8	4.5	6	6
	B, C		10	10	10	10	10	10	10	10	8	8	0.2	0.4	0.7	1.5	2.5	3.5	5	6
			13	10	10	10	10	10	10	10	8	8			0.7	1.5	2.5	3.5	5	6
			16		10	10	10	10	10	10	8	8				1.3	2	2.9	4.1	6
			20			10	10	10	10	10	8	8					1.8	2.6	3.5	5
			25				10	10	10	10	8	8					1.8	2.6	3.5	5
			32					10	10	10	8	8						2.2	3	4
			40						10	10	8	8							2.5	4
			50/63								8	8								3.5
S 200 M	C	6	≤ 2	>15	>15	>15	>15	>15	>15	>15	>15	>15	1	1.2	4	>15	>15	>15	>15	>15
			3	15	15	15	15	15	15	15	10	10	0.3	0.7	1.2	4.6	10	10	10	10
			4	15	15	15	15	15	15	15	10	10	0.3	0.6	0.9	2.8	10	10	10	10
	B, C		6	15	15	15	15	15	15	15	10	10	0.2	0.5	0.8	1.7	3.1	7	10	10
	C		8	15	15	15	15	15	15	15	10	10	0.2	0.4	0.7	1.4	2.3	3.4	4.8	7.5
	B, C		10	15	15	15	15	15	15	15	10	10	0.2	0.4	0.7	1.4	2.3	3.4	4.8	7.5
			13	15	15	15	15	15	15	15	10	10			0.7	1.4	2.3	3.4	4.8	7.5
			16		15	15	15	15	15	15	10	10				1.3	2	2.9	4.2	6
			20			15	15	15	15	15	10	10					1.9	2.7	3.8	5.6
			25				15	15	15	15	10	10					1.9	2.6	3.6	5.4
			32					15	15	15	10	10						2.4	3.2	4.2
			40						15	15	10	10							3.2	4.2
			50/63								10	10								3.8

Limited overload selectivity

MCBs technical details
Coordination tables: selectivity

MCB																				
	Supply side			S 700									fuse							
Load side	Char.			E/K									gG							
		Icu [kA]		25																
			In [A]	16	20	25	35	40	50	63	80	100	16	20	25	35	50	63	80	100
S 200 S 200 M	K	6	≤ 2	>15	>15	>15	>15	>15	>15	>15	>15	>15	0.3	1.2	4	>15	>15	>15	>15	>15
			3	10	10	10	10	10	10	10	10	10	0.3	0.7	1.2	4.6	6	6	6	6
			4	10	10	10	10	10	10	10	10	10	0.3	0.6	0.9	2.8	6	6	6	6
			6	10	10	10	10	10	10	10	10	10			0.7	1.7	3	5.9	6	6
			8	10	10	10	10	10	10	10	10	10				1.3	2.2	3.6	6	6
			10	10	10	10	10	10	10	10	10	10					1.7	2.5	4	6
			16		10	10	10	10	10	10	10	10						2.2	3.1	4.6
			20			10	10	10	10	10	10	10							3.1	4.6
			25				10	10	10	10	10	10							2.6	3.5
			32					10	10	10	10	10								3.5
			40						10	10	10	10								
			50/63								10	10								
S 200 S 200 M	Z	6	≤ 2	>15	>15	>15	>15	>15	>15	>15	>15	>15	0.5	2	>15	>15	>15	>15	>15	>15
			3	10	10	10	10	10	10	10	10	10	0.3	0.7	1.8	6	6	6	6	6
			4	10	10	10	10	10	10	10	10	10	0.3	0.6	1.3	7	6	6	6	6
			6	10	10	10	10	10	10	10	10	10	0.2	0.5	0.9	2.7	6	6	6	6
			8	10	10	10	10	10	10	10	10	10	0.2	0.5	0.6	1.7	3.8	6	6	6
			10	10	10	10	10	10	10	10	10	10		0.4	0.6	1.3	2.4	4	6	6
			16		10	10	10	10	10	10	10	10			0.5	1.1	1.7	3	4.5	6
			20			10	10	10	10	10	10	10				0.9	1.5	2.3	3.5	5.2
			25				10	10	10	10	10	10					1.4	2	3	4
			32					10	10	10	10	10					1.4	2	3	4
			40						10	10	10	10						2	3	4
			50/63								10	10							2.2	3.5

Limited overload selectivity

MCB																				
	Supply side			S 700									fuse							
Load side	Char.			E/K									gG							
		Icu [kA]		25																
			In [A]	16	20	25	35	40	50	63	80	100	16	20	25	35	50	63	80	100
			6	25	25	25	25	25	25	25	25	25	0.2	0.4	0.6	1.2	2.2	3.7	6	10
			10	25	25	25	25	25	25	25	25	25	0.2	0.4	0.6	1.1	1.8	2.7	4	6
			13	25	25	25	25	25	25	25	25	25			0.6	1	1.7	2.5	3.7	5.5
			16		25	25	25	25	25	25	25	25				1	1.6	2.4	3.5	5.3
S 200 P	B	6	20			25	25	25	25	25	25	25				1	1.6	2.2	3.3	4.7
			25				25	25	25	25	25	25					1.5	2	3	4
			32					25	25	25	25	25					1.3	2	2.8	3.6
			40						25	25	25	25						1.9	2.7	3.4
			50/63								10	10							2.7	3.4
			≤ 2	>25	>25	>25	>25	>25	>25	>25	>25	>25	1	2	>25	>25	>25	>25	>25	>25
			3	25	25	25	25	25	25	25	25	25	0.3	0.8	1.5	6	10	10	10	10
			4	25	25	25	25	25	25	25	25	25	0.3	0.6	1	3.3	6	10	10	10
			6	25	25	25	25	25	25	25	25	25			0.6	1.3	3	5.5	10	10
			8	25	25	25	25	25	25	25	25	25				1.1	2.9	3.5	6	10
			10	25	25	25	25	25	25	25	25	25				1	1.7	2.5	4	6
S 200 P	C	6	13	25	25	25	25	25	25	25	25	25					1.8	2.2	3	5.5
			16		25	25	25	25	25	25	25	25					1.6	2	3	5
			20			25	25	25	25	25	25	25						1.6	2.8	3.6
			25				25	25	25	25	25	25							2.4	3.5
			32					25	25	25	25	25								3.1
			40						25	25	25	25								
			50/63								10	10								
			≤ 2	>15	>15	>15	>15	>15	>15	>15	>15	>15	0.3	1	>15	>15	>15	>15	>15	>15
			3	15	15	15	15	15	15	15	15	15	0.3	0.8	1.5	6	6	6	10	10
			4	15	15	15	15	15	15	15	15	15	0.3	0.6	1	3.3	6	6	6	10
			6	15	15	15	15	15	15	15	15	15			0.6	1.3	3	5.5	6	9.5
			8	15	15	15	15	15	15	15	15	15				1.1	2.5	3.5	6	6
			10	25	25	25	25	25	25	25	25	25				1	1.7	2.5	4	6
S 200 P	K	6	13	25	25	25	25	25	25	25	25	25					1.6	2.2	3	5.5
			16		25	25	25	25	25	25	25	25					1.5	2	3	5
			20			25	25	25	25	25	25	25						1.6	2.6	3.6
			25				15	15	15	15	15	15							2.4	3.3
			32					15	15	15	15	15								3.1
			40						15	15	15	15								
			50/63								10	10								

Limited overload selectivity

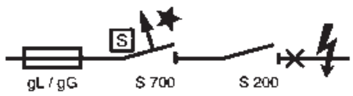
MCBs technical details
Coordination tables: selectivity

MCB																				
	Supply side			S 700									fuse							
Load side	Char.			E/K									gG							
		Icu [kA]		25																
			In [A]	16	20	25	35	40	50	63	80	100	16	20	25	35	50	63	80	100
S 200 P	Z	6	≤ 2	>15	>15	>15	>15	>15	>15	>15	>15	>15	0.3	1	>15	>15	>15	>15	>15	>15
			3	15	15	15	15	15	15	15	15	15	0.3	0.6	1.8	10	10	10	10	10
			4	15	15	15	15	15	15	15	15	15	0.3	0.6	0.6	1.3	6	10	10	10
			6	15	15	15	15	15	15	15	15	15				0.8	2.6	6	10	10
			8	15	15	15	15	15	15	15	15	15					1.7	3.4	7	10
			10	25	25	25	25	25	25	25	25	25					1.3	2.2	3.7	6
			16		25	25	25	25	25	25	25	25						1.7	2.8	4.1
			20			25	25	25	25	25	25	25							2.1	3.1
			25				15	15	15	15	15	15								2.6
			32					15	15	15	15	15								
			40						15	15	15	15								
			50/63								10	10								

Limited overload selectivity

Limit of selectivity

For the coordination of MCB, S 700 and upstream fuses the following selectivity limits can be assumed:



Upstream				fuse 63 A gG						fuse 80 A gG					
	Supply side			S 700						S 700					
Load side	Char.			E/K						E/K					
		Icu [kA]		25						25					
			In [A]	35	40	50	63	80	100	35	40	50	63	80	100
S 200	C	6	≤ 2	>15	>15	>15	>15			>15	>15	>15	>15	>15	
	C		3	10	10	10	10			10	10	10	10	8	
	C		4	10	10	10	10			10	10	10	10	8	
	B, C		6	10	10	10	10			10	10	10	10	8	
	C		8	7.5	7	7	6			10	10	10	8	8	
	B, C		10	7.5	7	7	6			10	10	10	8	6	
	B, C		13	6	6	6	6			10	10	9	7.5	6	
	B, C		16	6	6	6	6			10	10	9	7.5	6	
	B, C		20	6	6	5	5			9	8	8	6	6	
	B, C		25		4.5	4.5	4.5				7.5	7.5	6	6	
	B, C		32			4.5	4.5					6	6	6	
	B, C		40				4						6	6	
	B, C		50											4.5	
	B, C		50/63												

Values for < 6 A and 8 A are only valid for C characteristic.

Upstream				fuse 100 A gG						fuse M 125 A gG					
	Supply side			S 700						S 700					
Load side	Char.			E/K						E/K					
		Icu [kA]		25						25					
			In [A]	35	40	50	63	80	100	35	40	50	63	80	100
S 200	C	6	≤ 2	>15	>15	>15	>15	>15	>15	>15	>15	>15	>15	>15	>15
			3	10	10	10	10	8	8	10	10	10	10	8	8
			4	10	10	10	10	8	8	10	10	10	10	8	8
	B, C		6	10	10	10	10	8	8	10	10	10	10	8	8
	C		8	10	10	10	10	8	8	10	10	10	10	8	8
	B, C		10	10	10	10	10	8	8	10	10	10	10	8	8
			13	10	10	10	10	8	8	10	10	10	10	8	8
			16	10	10	10	10	8	8	10	10	10	10	8	8
			20	10	10	10	10	8	8	10	10	10	10	8	8
			25		10	10	10	8	8		10	10	10	8	8
			32			10	10	8	7.5			10	10	8	8
			40				10	8	7				10	8	8
			50					7	6					8	8
			63						5						8

Upstream				fuse 63 A gG						fuse 80 A gG					
	Supply side			S 700						S 700					
Load side	Char.			E/K						E/K					
		Icu [kA]		25						25					
			In [A]	35	40	50	63	80	100	35	40	50	63	80	100
S 200 M	C	10	≤ 2	>15	>15	>15	>15			>15	>15	>15	>15	>15	
			3	15	15	15	15			15	15	15	15	10	
			4	15	15	15	15			15	15	15	15	10	
	B, C		6	15	15	15	15			15	15	15	15	10	
	C		8	7.5	7	7	6			12.5	10	10	10	6	
	B, C		10	7.5	7	7	6			12.5	10	10	10	6	
			13	6	6	6	5			10	10	9	7.5	6	
			16	6	6	6	5			10	10	9	7.5	6	
			20	6	6	5	5			9	8	8	6	6	
			25		4.5	4.5	4.5				7.5	7.5	6	6	
			32			4.5	4.5					6	6	6	
			40				4						6	6	
			50											4.5	
			63												

Values for < 6 A and 8 A are only valid for C characteristic.

MCBs technical details
Coordination tables: selectivity

Upstream				fuse 100 A gG						fuse M 125 A gG					
	Supply side			S 700						S 700					
Load side	Char.			E/K						E/K					
		Icu [kA]		25						25					
			In [A]	35	40	50	63	80	100	35	40	50	63	80	100
S 200 M	C	10	≤ 2	>15	>15	>15	>15	>15	>15	>15	>15	>15	>15	>15	>15
			3	15	15	15	15	10	10	15	15	15	15	10	10
			4	15	15	15	15	10	10	15	15	15	15	10	10
	B, C		6	15	15	15	15	10	10	15	15	15	15	10	10
	C		8	15	15	15	15	10	10	15	15	15	15	10	10
	B, C		10	15	15	15	15	10	10	15	15	15	15	10	10
			13	15	12.5	12.5	12.5	10	10	15	15	15	15	10	10
			16	15	12.5	12.5	12.5	10	10	15	15	15	15	10	10
			20	12.5	10	12.5	10	10	10	15	15	15	15	10	10
			25		10	10	10	10	9		15	15	15	10	10
			32			10	10	10	7.5			15	15	10	10
			40				10	9	7				15	10	10
			50					7	6					10	10
			63						5						10

Upstream				fuse 63 A gG						fuse 80 A gG					
	Supply side			S 700						S 700					
Load side	Char.			E/K						E/K					
		Icu [kA]		25						25					
			In [A]	35	40	50	63	80	100	35	40	50	63	80	100
S 200 P	C	25	≤ 2	>25	>25	>15	>15			>25	>25	>25	>25	>25	
			3	15	15	15	15			25	25	15	15	15	
			4	15	15	15	15			25	25	15	15	15	
	B, C		6	15	15	15	15			25	25	15	15	15	
	C		8	7.5	7	7	6			12.5	10	12.5	10	10	
	B, C		10	7.5	7	7	6			12.5	10	12.5	10	6	
			13	6	6	6	5			10	10	10	8	6	
			16	6	6	6	5			10	10	10	8	6	
			20	6	6	5	5			9	8	8	7	6	
			25		4.5	4.5	4.5				7.5	7.5	6	6	
		15	32			4.5	4.5					6	6	6	
			40				4						6	6	
			50											4.5	
			63												

Values for < 6 A and 8 A are only valid for C characteristic.

Upstream				fuse 100 A gG						fuse 125 A gG					
	Supply side			S 700						S 700					
Load side	Char.			E/K						E/K					
		Icu [kA]		25						25					
			In [A]	35	40	50	63	80	100	35	40	50	63	80	100
S 200 P	C	25	≤ 2	>25	>25	>25	>25	>25	>25	>25	>25	>25	>25	>25	>25
			3	25	25	25	25	25	25	25	25	25	25	25	25
			4	25	25	25	25	25	25	25	25	25	25	25	25
	B, C		6	25	25	25	25	25	25	25	25	25	25	25	25
	C		8	20	17	15	15	13	10	25	25	25	25	15	15
	B, C		10	20	17	15	15	13	10	25	25	25	25	25	25
			13	19	17	15	12.5	10	10	25	25	25	25	25	25
			16	19	17	15	12.5	10	10	25	25	25	25	25	25
			20	17	17	15	10	10	10	25	25	25	25	25	25
			25		15	15	10	10	9		25	22	20	20	20
		15	32			15	10	10	9			20	20	15	20
			40				10	9	9				15	15	15
			50					7	7					10	10
			63						6						10

Upstream				fuse 160 A gG						fuse 200 A gG					
	Supply side			S 700						S 700					
Load side	Char.			E/K						E/K					
		Icu [kA]		25						25					
			In [A]	35	40	50	63	80	100	35	40	50	63	80	100
S 200 P	C	25	≤ 2	>25	>25	>25	>25	>25	>25	>25	>25	>25	>25	>25	>25
			3	25	25	25	25	25	25	25	25	25	25	25	25
			4	25	25	25	25	25	25	25	25	25	25	25	25
	B, C		6	25	25	25	25	25	25	25	25	25	25	25	25
	C		8	25	25	25	25	15	15	25	25	25	25	15	15
	B, C		10	25	25	25	25	25	25	25	25	25	25	25	25
			13	25	25	25	25	25	25	25	25	25	25	25	25
			16	25	25	25	25	25	25	25	25	25	25	25	25
			20	25	25	25	25	25	25	25	25	25	25	25	25
			25		25	25	25	25	25		25	25	25	25	25
		15	32			25	25	25	25			25	25	25	25
			40				25	25	25				25	25	25
			50					15	10					25	10
			63						10						10

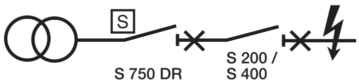
Values for < 6 A and 8 A are only valid for C characteristic.

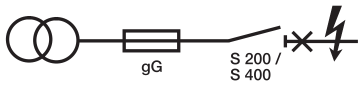
MCBs technical details
Coordination tables: selectivity

2

Short-circuit discrimination of S 750 DR with respect to downstream MCB S 200 / S 400 compared to fuse protection[1)]

MCBs





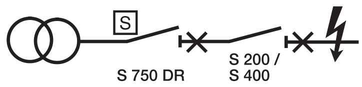
final circuit:	supply side:			S750DR							fuse					
	Char.			E/K							gG					
		I_{cu} [kA]		25												
			I_n [A]	16	20	25	35	40	50	63	16	20	25	35	50	63
S 200 / S 400 E	C	6	≤2	10	10	10	10	10	10	10	1	1.2	4	6	6	6
	C		3	10	10	10	10	10	10	10	0.3	0.7	1.2	4.6	6	6
	C		4	10	10	10	10	10	10	10	0.3	0.6	0.9	2.8	6	6
	B, C		6	10	10	10	10	10	10	10	0.2	0.4	0.7	1.5	3	5.5
	C		8	10	10	10	10	10	10	10	0.2	0.4	0.7	1.4	2.8	4.5
	B, C		10	10	10	10	10	10	10	10	0.2	0.4	0.6	1.2	2	3.3
	B, C		13	10	10	10	10	10	10	10			0.6	1.2	2	3.3
	B, C		16		10	10	10	10	10	10			0.6	1.1	1.8	2.8
	B, C		20			10	10	10	10	10				1	1.6	2.4
	B, C		25				10	10	10	10					1.6	2.4
	B, C		32					10	10	10					1.3	2.2
	B, C		40						10	10						2.2

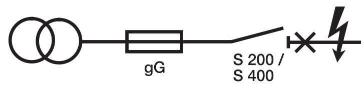
final circuit:	supply side:			S750DR							fuse					
	Char.			E/K							gG					
		I_{cu} [kA]		25												
			I_n [A]	16	20	25	35	40	50	63	16	20	25	35	50	63
S 200	K	6	≤2	10	10	10	10	10	10	10	0.3	1.2	4	6	6	6
			3	10	10	10	10	10	10	10	0.3	0.7	1	3.2	6	6
			4	10	10	10	10	10	10	10	0.3	0.6	0.8	2.1	5.3	6
			6	10	10	10	10	10	10	10	0.2	0.4	0.7	1.3	2.8	6
			8	10	10	10	10	10	10	10	0.2	0.4	0.6	1.1	2	3.5
			10	10	10	10	10	10	10	10	0.2	0.3	0.5	0.9	1.5	2.3
			16		10	10	10	10	10	10			0.4	0.8	1.3	2.1
			20			10	10	10	10	10				0.8	1.3	2.1
			25				10	10	10	10					1.1	1.7
			32					10	10	10					1.1	1.7
			40						10	10						1.3

[1)] The selectivity limit current I_{s1} results from the let-through I^2t-value of S 200 / S 400 and the pre-arcing (melting) I^2t-value of a fuse acc. to IEC / EN 60269

Short-circuit discrimination of S 750 DR with respect to downstream MCB S 200 / S 400 compared to fuse protection[1)]

MCBs





final circuit:	supply side:			S 750 DR							fuse					
	Char.			E/K							gG					
		I_{cu} [kA]		25												
			I_n [A]	16	20	25	35	40	50	63	16	20	25	35	50	63
S 200	Z	6	≤2	10	10	10	10	10	10	10	0.5	2	6	6	6	6
			3	10	10	10	10	10	10	10	0.3	0.7	1.2	6	6	6
			4	10	10	10	10	10	10	10	0.3	0.6	1.1	4.2	6	6
			6	10	10	10	10	10	10	10	0.2	0.4	0.8	2	5.2	6
			8	10	10	10	10	10	10	10	0.2	0.4	0.6	1.3	3.1	6
			10	10	10	10	10	10	10	10		0.3	0.5	1	2	3.6
			16		10	10	10	10	10	10			0.5	0.9	1.5	2.8
			20			10	10	10	10	10				0.7	1.2	2.1
			25				10	10	10	10					1.1	1.8
			32					10	10	10					1.1	1.8
			40						10	10						1.8

final circuit:	supply side:			S 750 DR							fuse					
	Char.			E/K							gG					
		I_{cu} [kA]		25												
			I_n [A]	16	20	25	35	40	50	63	16	20	25	35	50	63
S 200 M S 400 M	C	10	≤2	15	15	15	15	15	15	15	1	1.2	4	10	10	10
	C		3	15	15	15	15	15	15	15	0.3	0.7	1.2	4.6	10	10
	C		4	15	15	15	15	15	15	15	0.3	0.6	0.9	2.8	10	10
	B, C		6	15	15	15	15	15	15	15	0.2	0.5	0.8	1.5	3	7
	C		8	15	15	15	15	15	15	15	0.2	0.4	0.7	1.4	2.8	4.5
	B, C		10	15	15	15	15	15	15	15	0.2	0.4	0.6	1.2	2	3.3
	B, C		13	15	15	15	15	15	15	15			0.6	1.2	2	3.3
	B, C		16		15	15	15	15	15	15			0.6	1.1	1.8	2.8
	B, C		20			15	15	15	15	15				1	1.6	2.4
	B, C		25				15	15	15	15					1.6	2.4
	B, C		32					15	15	15					1.3	2.2
	B, C		40						15	15						2.2

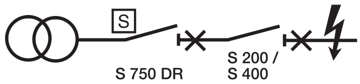
final circuit:	supply side:			S 750 DR							fuse					
	Char.			E/K							gG					
		I_{cu} [kA]		25												
			I_n [A]	16	20	25	35	40	50	63	16	20	25	35	50	63
S 200 M S 400 M	K	10	≤2	10	10	10	10	10	10	10	0.3	1.2	4	10	10	10
			3	10	10	10	10	10	10	10	0.3	0.7	1	3.2	10	10
			4	10	10	10	10	10	10	10	0.3	0.6	0.8	2.1	5.3	10
			6	10	10	10	10	10	10	10	0.2	0.4	0.7	1.3	2.8	6
			8	10	10	10	10	10	10	10	0.2	0.4	0.6	1.1	2	3.5
			10	10	10	10	10	10	10	10	0.2	0.3	0.5	0.9	1.5	2.3
			16		10	10	10	10	10	10			0.4	0.8	1.3	2.1
			20			10	10	10	10	10				0.8	1.3	2.1
			25				10	10	10	10					1.1	1.7
			32					10	10	10					1.1	1.7
			40						10	10						1.3

[1)] The selectivity limit current I_{s1} results from the let-through I^2t-value of S 200 / S 400 and the pre-arcing (melting) I^2t-value of a fuse acc. to IEC / EN 60269

MCBs technical details
Coordination tables: selectivity

Short-circuit discrimination of S 750 DR with respect to downstream MCB S 200 / S 400 compared to fuse protection[1)]

MCBs



final circuit:	supply side:			S 750 DR							fuse					
	Char.			E/K							gG					
		I_{cu} [kA]		25												
			I_n [A]	16	20	25	35	40	50	63	16	20	25	35	50	63
S 200 M	Z	10	≤2	10	10	10	10	10	10	10	0.5	2	10	10	10	10
			3	10	10	10	10	10	10	10	0.3	0.7	1.2	7	10	10
			4	10	10	10	10	10	10	10	0.3	0.6	1.1	4.2	10	10
			6	10	10	10	10	10	10	10	0.2	0.4	0.8	2	5.2	10
			8	10	10	10	10	10	10	10	0.2	0.4	0.6	1.3	3.1	8
			10	10	10	10	10	10	10	10		0.3	0.5	1	2	3.6
			16		10	10	10	10	10	10			0.5	0.9	1.5	2.8
			20			10	10	10	10	10				0.7	1.2	2.1
			25				10	10	10	10					1.1	1.8
			32					10	10	10					1.1	1.8
			40						10	10						1.8

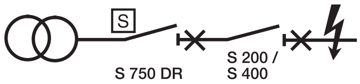
final circuit:	supply side:			S 750 DR							fuse					
	Char.			E/K							gG					
		I_{cu} [kA]		25												
			I_n [A]	16	20	25	35	40	50	63	16	20	25	35	50	63
S 200 P	B	25	6	25	25	25	25	25	25	25	0.2	0.4	0.6	1.2	2.6	6
			10	25	25	25	25	25	25	25	0.2	0.3	0.5	1	1.8	3.1
			13	25	25	25	25	25	25	25			0.5	1	1.7	3
			16		25	25	25	25	25	25			0.5	0.9	1.6	3
			20			25	25	25	25	25				0.9	1.4	2.3
			25				25	25	25	25					1.4	2.3
		15	32					15	15	15					1.2	2.1
			40						15	15						2.1

final circuit:	supply side:			S 750 DR							fuse					
	Char.			E/K							gG					
		I_{cu} [kA]		25												
			I_n [A]	16	20	25	35	40	50	63	16	20	25	35	50	63
S 200 P	C	25	≤2	25	25	25	25	25	25	25	1	2	25	25	25	25
			3	25	25	25	25	25	25	25	0.3	0.8	1.5	6	10	10
			4	25	25	25	25	25	25	25	0.3	0.6	1	3.3	6	10
			6	25	25	25	25	25	25	25	0.2	0.4	0.6	1.2	2.6	6
			8	25	25	25	25	25	25	25	0.2	0.4	0.6	1.1	2.4	4
			10	25	25	25	25	25	25	25	0.2	0.3	0.5	1	1.8	3.1
			13	25	25	25	25	25	25	25			0.5	1	1.7	3
			16		25	25	25	25	25	25			0.5	0.9	1.6	3
			20			25	25	25	25	25				0.9	1.4	2.3
			25				25	25	25	25					1.4	2.3
		15	32					15	15	15					1.2	2.1
			40						15	15						2.1

[1)] The selectivity limit current I_{s1} results from the let-through I^2t-value of S 200 / S 400 and the pre-arcing (melting) I^2t-value of a fuse acc. to IEC / EN 60269

Short-circuit discrimination of S 750 DR with respect to downstream MCB S 200 / S 400 compared to fuse protection[1)]

MCBs



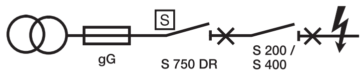
final circuit:	supply side:			S 750 DR							fuse					
	Char.			E/K							gG					
		I_{cu} [kA]		25												
			I_n [A]	16	20	25	35	40	50	63	16	20	25	35	50	63
S 200 P	K	25	≤ 2	25	25	25	25	25	25	25	0.4	0.7	3	25	25	25
			3	25	25	25	25	25	25	25	0.4	0.6	1	3.5	10	10
			4	25	25	25	25	25	25	25	0.3	0.5	0.9	2.1	7	10
			6	25	25	25	25	25	25	25	0.3	0.4	0.6	1.2	2.8	5.5
			8	25	25	25	25	25	25	25	0.3	0.4	0.5	1.2	2.5	4
			10	25	25	25	25	25	25	25	0.2	0.3	0.4	0.9	1.7	3.1
			13	25	25	25	25	25	25	25		0.3	0.4	0.8	1.3	2.2
			16		25	25	25	25	25	25			0.4	0.8	1.2	2
			20			25	25	25	25	25				0.7	1.1	1.8
			25				25	25	25	25					1	1.5
		15	32					15	15	15					1	1.5
			40						15	15						1.3

final circuit:	supply side:			S 750 DR							fuse					
	Char.			E/K							gG					
		I_{cu} [kA]		25												
			I_n [A]	16	20	25	35	40	50	63	16	20	25	35	50	63
S 200 P	Z	25	≤ 2	25	25	25	25	25	25	25	0.6	1.2	25	25	25	25
			3	25	25	25	25	25	25	25	0.4	0.6	1	3.5	10	10
			4	25	25	25	25	25	25	25	0.3	0.5	0.9	2.1	7	10
			6	25	25	25	25	25	25	25	0.3	0.4	0.6	1.2	2.8	6
			8	25	25	25	25	25	25	25	0.3	0.4	0.5	1.1	2.5	3.5
			10	25	25	25	25	25	25	25	0.2	0.3	0.4	1	1.9	3.3
			16		25	25	25	25	25	25			0.4	0.9	1.6	3
			20			25	25	25	25	25				0.9	1.3	2.3
			25				25	25	25	25					1.3	2.2
		15	32					15	15	15					1.2	2.1
			40						15	15						2.1

[1)] The selectivity limit current I_{s1} results from the let-through I^2t-value of S 200 / S 400 and the pre-arcing (melting) I^2t-value of a fuse acc. to IEC / EN 60269

MCBs technical details
Coordination tables: selectivity

Short-circuit discrimination (in kA) apply for combinations[1]: fuse gL / gG – S 750 DR – S 200 / S 400

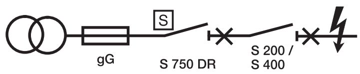


final circuit:			fuse:	63 A gG				80 A gG				100 A gG				≥ 125 A gG			
			supply side:	S 750 DR															
	Char.			E / K															
		I_{cu} [kA]		25															
			I_n [A]	35	40	50	63	35	40	50	63	35	40	50	63	35	40	50	63
S 200 S 400 E	C	6	≤ 2	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
	C	6	3	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
	C	6	4	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
	B, C	6	6	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
	C	6	8	7	6	6	5	10	10	10	8	10	10	10	10	10	10	10	10
	B, C	6	10	7	6	6	5	10	10	10	8	10	10	10	10	10	10	10	10
	B, C	6	13	6	6	6	5	9	8	8	7	10	10	10	10	10	10	10	10
	B, C	6	16	6	6	6	5	9	8	8	7	10	10	10	10	10	10	10	10
	B, C	6	20	5	5	4.5	4.5	6	7	7	6.5	10	10	10	10	10	10	10	10
	B, C	6	25		4.5	4.5	4		7	6	6		10	10	10	10	10	10	10
	B, C	6	32			4	3.5			6	5.5			9	9			10	10
	B, C	6	40				3				5				8				10

final circuit:			fuse:	63 A gG				80 A gG				100 A gG				≥ 125 A gG			
			supply side:	S 750 DR															
	Char.			E / K															
		I_{cu} [kA]		25															
			I_n [A]	35	40	50	63	35	40	50	63	35	40	50	63	35	40	50	63
S 200 S 400 E	K, Z	6	≤ 2	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
	K, Z	6	3	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
	K, Z	6	4	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
	K, Z	6	6	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
	K, Z	6	8	7	6	6	5	10	10	10	8	10	10	10	10	10	10	10	10
	K, Z	6	10	7	6	6	5	10	10	10	8	10	10	10	10	10	10	10	10
	K, Z	6	13	6	6	6	5	9	8	8	7	10	10	10	10	10	10	10	10
	K, Z	6	16	6	6	6	5	9	8	8	7	10	10	10	10	10	10	10	10
	K, Z	6	20	5	5	4.5	4.5	8	7	7	6.5	10	10	10	10	10	10	10	10
	K, Z	6	25		4.5	4.5	4		7	6	6		10	10	10		10	10	10
	K, Z	6	32			4	3.5			6	5.5			9	9			10	10
	K, Z	6	40				3				5				8				10

[1] The selectivity limit current I_{s1} results from the let-through I^2t-value of S 750 DR plus S 200 / S 400 and the pre-arcing (melting) I^2t-value of a fuse acc. to IEC / EN 60269

Short-circuit discrimination (in kA) apply for combinations[1]: fuse gL/gG – S 750 DR – S 200/S 400



	fuse:			63 A gG				80 A gG				100 A gG				≥ 125 A gG			
	supply side:			S 750 DR															
final circuit:	Char.			E/K															
		I_{cu} [kA]		25															
			I_n [A]	35	40	50	63	35	40	50	63	35	40	50	63	35	40	50	63
S 200 M S 400 M	C	10	≤ 2	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
	C		3	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
	C		4	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
	B, C		6	10	10	10	10	15	15	15	10	15	15	15	15	15	15	15	15
	C		8	7	6	6	5	10	10	10	8	15	15	15	15	15	15	15	15
	B, C		10	7	6	6	5	10	10	10	8	15	15	15	15	15	15	15	15
	B, C		13	6	6	6	5	9	8	8	7	10	10	10	10	15	15	15	15
	B, C		16	6	6	6	5	9	8	8	7	10	10	10	10	15	15	15	15
	B, C		20	5	5	4.5	4.5	8	7	7	6.5	10	10	10	10	15	15	15	15
	B, C		25		4.5	4.5	4		7	6	6		10	10	10		15	15	15
	B, C		32			4	3.5			6	5.5			9	9			15	15
	B, C		40				3				5				8				14

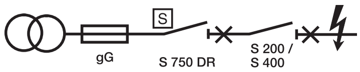
	fuse:			63 A gG				80 A gG				100 A gG				≥ 125 A gG			
	supply side:			S 750 DR															
final circuit:	Char.			E/K															
		I_{cu} [kA]		25															
			I_n [A]	35	40	50	63	35	40	50	63	35	40	50	63	35	40	50	63
S 200 M S 400 M	K, Z	10	≤ 2	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
			3	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
			4	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
			6	10	10	10	10	15	15	15	10	15	15	15	15	15	15	15	15
			8	7	6	6	5	10	10	10	8	15	15	15	15	15	15	15	15
			10	7	6	6	5	10	10	10	8	15	15	15	15	15	15	15	15
			13	6	6	6	5	9	8	8	7	10	10	10	10	15	15	15	15
			16	6	6	6	5	9	8	8	7	10	10	10	10	15	15	15	15
			20	5	5	4.5	4.5	8	7	7	6.5	10	10	10	10	15	15	15	15
			25		4.5	4.5	4		7	6	6		10	10	10		15	15	15
			32			4	3.5			6	5.5			9	9			15	15
			40				3				5				8				14

[1] The selectivity limit current I_{s1} results from the let-through I^2t-value of S 750 DR plus S 200/S 400 and the pre-arcing (melting) I^2t-value of a fuse acc. to IEC/EN 60269

MCBs technical details
Coordination tables: selectivity

2

Short-circuit discrimination (in kA) apply for combinations[1]: fuse gL/gG – S750DR – S200/S400



final circuit:			fuse:	63A gG				80A gG				100A gG				≥125A gG			
			supply side:	S750DR															
	Char.			E/K															
		I_{cu} [kA]		25															
			I_n [A]	35	40	50	63	35	40	50	63	35	40	50	63	35	40	50	63
S200P	C	25	≤2	15	15	15	15	25	25	25	25	25	25	25	25	25	25	25	25
	C	25	3	15	15	15	15	25	25	15	15	25	25	25	25	25	25	25	25
	C	25	4	15	15	15	15	20	20	15	15	25	25	25	25	25	25	25	25
	B, C	25	6	10	10	10	10	17	16	15	14	25	25	20	20	25	25	25	25
	C	25	8	7	6	6	5	10	10	10	8	20	20	15	15	25	25	25	25
	B, C	25	10	7	6	6	5	10	10	10	8	20	15	15	15	25	25	25	25
	B, C	25	13	6	6	6	5	9	8	8	7	15	15	15	15	22	22	20	20
	B, C	25	16	6	6	6	5	9	8	8	7	12	12	10	10	22	22	20	18
	B, C	25	20	5	5	4.5	4.5	8	7	7	6.5	12	12	10	10	20	20	20	18
	B, C	15	25		4.5	4.5	4		7	6	6		10	10	10		15	15	15
	B, C	15	32			4	3.5			6	5.5			10	10			15	15
	B, C	15	40				3				5				9				15

final circuit:			fuse:	63A gG				80A gG				100A gG				≥125A gG			
			supply side:	S750DR															
	Char.			E/K															
		I_{cu} [kA]		25															
			I_n [A]	35	40	50	63	35	40	50	63	35	40	50	63	35	40	50	63
S200P	K, Z	50	≤2	15	15	15	15	25	25	25	25	25	25	25	25	25	25	25	25
	K, Z	25	3	15	15	15	15	25	25	15	15	25	25	25	25	25	25	25	25
	K, Z	25	4	15	15	15	15	20	20	15	15	25	25	25	25	25	25	25	25
	K, Z	25	6	10	10	10	10	17	16	15	14	25	25	20	20	25	25	25	25
	K, Z	25	8	7	6	6	5	10	10	10	8	20	20	15	15	25	25	25	25
	K, Z	25	10	7	6	6	5	10	10	10	8	20	15	15	15	25	25	25	25
	K, Z	25	13	6	6	6	5	9	8	8	7	15	15	15	15	22	22	20	20
	K, Z	25	16	6	6	6	5	9	8	8	7	12	12	10	10	22	22	20	18
	K, Z	25	20	5	5	4.5	4.5	8	7	7	6.5	12	12	10	10	20	20	20	18
	K, Z	15	25		4.5	4.5	4		7	6	6		10	10	10		15	15	15
	K, Z	15	32			4	3.5			6	5.5			10	10			15	15
	K, Z	15	40				3				5				9				15

[1] The selectivity limit current I_{s1} results from the let-through I²t-value of S750DR plus S200/S400 and the pre-arcing (melting) I²t-value of a fuse acc. to IEC/EN 60269

Taking sub-metering to the next level? Absolutely.

ABB's MID-approved EQ meters offer the same quality as revenue meters, approved meters and verified meters. EQ meters are certified and have verified meter accuracy, which is a critical factor in establishing fairness in cost allocation and distribution among tenants. Many EQ meters are also delivered directly from our factory with first time verification. ABB's EQ meters are high-performance, modular DIN rail-mounted electricity meters that are safe, easy to install and can be integrated with existing and future electrical installations. EQ meters are designed to fulfill any type of sub-metering requirement.
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MCBs technical details
Coordination tables: selectivity

MCCB - S2.. B @ 415 V

					Supply S.	T2	T1 - T2						T1 - T2 - T3					
					Version	B, C, N, S, H, L							B, C, N, S, H, L, V					
	Char.	Icu [kA]			Release	TM												
		10	15	25	In [A]	12.5	16	20	25	32	40	50	63	80	100	125	160
		-	-	-	≤2												
		-	-	-	3												
		-	-	-	4												
		S200	S200M	S200P	6	5.5[1]	5.5	5.5	5.5	5.5	5.5	5.5	10.5	T	T	T	T
		S200	S200M	S200P	8			5.5	5.5	5.5	5.5	5.5	10.5	T	T	T	T
		S200	S200M	S200P	10			3[1]	3	3	3	4.5	7.5	8.5	17	T	T
		S200	S200M	S200P	13			3[1]		3	3	4.5	7.5	7.5	12	20	T
		S200	S200M	S200P	16					3[1]	3	4.5	5	7.5	12	20	T
Load S.	B	S200	S200M	S200P	20					3[1]		3	5	6	10	15	T
		S200	S200M	S200P	25							3[1]	5	6	10	15	T
		S200	S200M-S200P	-	32							3[1]		6	7.5	12	T
		S200	S200M-S200P	-	40									5.5[1]	7.5	12	T
		S200	S200M-S200P	-	50									3[1]	5[2]	7.5	10.5
		S200	S200M-S200P	-	63										5[2]	6[3]	10.5
		-	-	-	80												
		-	-	-	100												
		-	-	-	125												

1 Value valid only for T2 magnetic only supply side circuit-breaker
2 Value valid only for T2-T3 magnetic only supply side circuit-breaker
3 Value valid only for T3 magnetic only supply side circuit-breaker
4 Value valid only for T4 magnetic only supply side circuit-breaker

MCCB - S2.. C @ 415 V

					Supply S.	T2	T1 - T2						T1 - T2 - T3				
					Version	B, C, N, S, H, L							B, C, N, S, H, L, V				
	Char.	Icu [kA]			Release	TM											
		10	15	25	In [A]	12.5	16	20	25	32	40	50	63	80	100	125	160
		S200	S200M	S200P	≤2	T	T	T	T	T	T	T	T	T	T	T	T
		S200	S200M	S200P	3	T	T	T	T	T	T	T	T	T	T	T	T
		S200	S200M	S200P	4	T	T	T	T	T	T	T	T	T	T	T	T
		S200	S200M	S200P	6	5.5[1]	5.5	5.5	5.5	5.5	5.5	5.5	10.5	T	T	T	T
		S200	S200M	S200P	8			5.5	5.5	5.5	5.5	5.5	10.5	T	T	T	T
		S200	S200M	S200P	10			3[1]	3	3	3	4.5	7.5	8.5	17	T	T
Load S.	C	S200	S200M	S200P	13			3[1]		3	3	4.5	7.5	7.5	12	20	T
		S200	S200M	S200P	16					3[1]	3	4.5	5	7.5	12	20	T
		S200	S200M	S200P	20					3[1]		3	5	6	10	15	T
		S200	S200M	S200P	25							3[1]	5	6	10	15	T
		S200	S200M-S200P	-	32							3[1]		6	7.5	12	T
		S200	S200M-S200P	-	40									5.5[1]	7.5	12	T
		S200	S200M-S200P	-	50									3[1]	5[2]	7.5	10.5
		S200	S200M-S200P	-	63										5[2]	6[3]	10.5

1 Value valid only for T2 magnetic only supply side circuit-breaker
2 Value valid only for T2-T3 magnetic only supply side circuit-breaker
3 Value valid only for T3 magnetic only supply side circuit-breaker
4 Value valid only for T4 magnetic only supply side circuit-breaker
5 Value valid only for T4 In 160 magnetic only supply side circuit-breaker

T3		T4										T5	T2					T4		T5
TM													EL							
200	250	20	25	32	50	80	100	125	160	200	250	320÷500	10	25	63	100	160	100, 160	250, 320	320÷630
T	T	7.5	7.5[4]	7.5	7.5	T	T	T	T	T	T	T		T	T	T	T	T	T	T
T	T	7.5	7.5[4]	7.5	7.5	T	T	T	T	T	T	T		T	T	T	T	T	T	T
T	T	5	5[4]	5	6.5	9	T	T	T	T	T	T		T	T	T	T	T	T	T
T	T		5[4]	5	6.5	8	T	T	T	T	T	T		T	T	T	T	T	T	T
T	T		3[4]	5	6.5	8	T	T	T	T	T	T			T	T	T	T	T	T
T	T				5	7.5	T	T	T	T	T	T			T	T	T	T	T	T
T	T				5	7.5	T	T	T	T	T	T			T	T	T	T	T	T
T	T				5[4]	7.5	T	T	T	T	T	T			T	T	T	T	T	T
T	T					6.5	T	T	T	T	T	T				T	T	T	T	T
T	T					5[4]	T	T	T	T	T	T				10.5	10.5	T	T	T
T	T						T[4]	T[4]	T	T	T	T					10.5	T	T	T

T3		T4										T5	T2					T4		T5
TM													EL							
200	250	20	25	32	50	80	100	125	160	200	250	320÷500	10	25	63	100	160	100, 160	250, 320	320÷630
T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
T	T	7.5	7.5[4]	7.5	7.5	T	T	T	T	T	T	T		T	T	T	T	T	T	T
T	T	7.5	7.5[4]	7.5	7.5	T	T	T	T	T	T	T		T	T	T	T	T	T	T
T	T	5	5[4]	5	6.5	9	T	T	T	T	T	T		T	T	T	T	T	T	T
T	T		5[4]	5	6.5	8	T	T	T	T	T	T		T	T	T	T	T	T	T
T	T		3[4]	5	6.5	8	T	T	T	T	T	T			T	T	T	T	T	T
T	T				5	7.5	T	T	T	T	T	T			T	T	T	T	T	T
T	T				5	7.5	T	T	T	T	T	T			T	T	T	T	T	T
T	T				5[4]	7.5	T	T	T	T	T	T			T	T	T	T	T	T
T	T					6.5	T	T	T	T	T	T				T	T	T	T	T
T	T					5[4]	T	T	T	T	T	T				10.5	10.5	T	T	T
T	T						T	T	T	T	T	T					10.5	T	T	T

MCBs technical details
Coordination tables: selectivity

MCCB - S2.. D @ 415 V

					Supply S.	T2	T1 - T2						T1 - T2 - T3				
					Version	B, C, N, S, H, L							B, C, N, S, H, L, V				
	Char.	Icu [kA]			Release	TM											
		10	15	25	In [A]	12.5	16	20	25	32	40	50	63	80	100	125	160
Load S.	D	S200	S200M	S200P	≤2	T	T	T	T	T	T	T	T	T	T	T	T
		S200	S200M	S200P	3	T	T	T	T	T	T	T	T	T	T	T	T
		S200	S200M	S200P	4	T	T	T	T	T	T	T	T	T	T	T	T
		S200	S200M	S200P	6	5.5[1]	5.5	5.5	5.5	5.5	5.5	5.5	10.5	T	T	T	T
		S200	S200M	S200P	8			5.5	5.5	5.5	5.5	5.5	10.5	12	T	T	T
		S200	S200M	S200P	10			3[1]	3	3	3	3	5	8.5	17	T	T
		S200	-	S200P	13					2[1]	2	2	3	5	8	13.5	T
		S200	S200M	S200P	16					2[1]	2	2	3	5	8	13.5	T
		S200	S200M	S200P	20					2[1]		2	3	4.5	6.5	11	T
		S200	S200M	S200P	25							2[1]	2.5	4	6	9.5	T
		S200	S200M-S200P	-	32									4	6	9.5	T
		S200	S200M-S200P	-	40									3[1]	5	8	T
		S200	S200M-S200P	-	50									2[1]	3[2]	5	9.5
		S200	S200M-S200P	-	63										3[2]	5[3]	9.5

1 Value valid only for T2 magnetic only supply side circuit-breaker
2 Value valid only for T2-T3 magnetic only supply side circuit-breaker
3 Value valid only for T3 magnetic only supply side circuit-breaker
4 Value valid only for T4 magnetic only supply side circuit-breaker
5 Value valid only for T4 In 160 magnetic only supply side circuit-breaker

MCCB - S2.. K @ 415 V

					Supply S.	T2	T1 - T2						T1 - T2 - T3				
					Version	B, C, N, S, H, L							B, C, N, S, H, L, V				
	Char.	Icu [kA]			Release	TM											
		10	15	25	In [A]	12.5	16	20	25	32	40	50	63	80	100	125	160
Load S.	K	S200	S200M	S200P	≤2	T	T	T	T	T	T	T	T	T	T	T	T
		S200	S200M	S200P	3	T	T	T	T	T	T	T	T	T	T	T	T
		S200	S200M	S200P	4	T	T	T	T	T	T	T	T	T	T	T	T
		S200	S200M	S200P	6	5.5[1]	5.5	5.5	5.5	5.5	5.5	5.5	10.5	T	T	T	T
		S200	S200M	S200P	8			5.5	5.5	5.5	5.5	5.5	10.5	12	T	T	T
		S200	S200M	S200P	10			3[1]	3	3	3	3	6	8.5	17	T	T
		-	-	S200P	13					2[1]	3	3	5	7.5	10	13.5	T
		S200	S200M	S200P	16					2[1]	3	3	4.5	7.5	10	13.5	T
		S200	S200M	S200P	20					2[1]		3	3.5	5.5	6.5	11	T
		S200	S200M	S200P	25							2[1]	3.5	5.5	6	9.5	T
		S200	S200M-S200P	-	32									4.5	6	9.5	T
		S200	S200M-S200P	-	40									3[1]	5	8	T
		S200	S200M-S200P	-	50									2[1]	3[2]	6	9.5
		S200	S200M-S200P	-	63										3[2]	5.5[3]	9.5

1 Value valid only for T2 magnetic only supply side circuit-breaker
2 Value valid only for T2-T3 magnetic only supply side circuit-breaker
3 Value valid only for T3 magnetic only supply side circuit-breaker
4 Value valid only for T4 magnetic only supply side circuit-breaker
5 Value valid only for T4 In 160 magnetic only supply side circuit-breaker

	T3		T4										T5	T2					T4		T5
	TM													EL							
	200	250	20	25	32	50	80	100	125	160	200	250	320÷500	10	25	63	100	160	100, 160	250, 320	320÷630
	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	T	T	7.5	7.5[4]	7.5	7.5	T	T	T	T	T	T	T		T	T	T	T	T	T	T
	T	T	7.5	7.5[4]	7.5	7.5	T	T	T	T	T	T	T		T	T	T	T	T	T	T
	T	T	5	5[4]	5	5	9	T	T	T	T	T	T		T	T	T	T	T	T	T
	T	T		5[4]		4	5.5	T	T	T	T	T	T			T	T	T	T	T	T
	T	T				4	5.5	T	T	T	T	T	T			T	T	T	T	T	T
	T	T				4[4]	5	T	T	T	T	T	T			T	T	T	T	T	T
	T	T				4[4]	4.5	T	T	T	T	T	T			T	T	T	T	T	T
	T	T					4.5[4]	T	T	T	T	T	T			T	T	T	T	T	T
	T	T					4.5[4]	T	T	T	T	T	T				T	T	T	T	T
	T	T						T	T	T	T	T	T				9.5	9.5	T	T	T
	T	T							T	T	T	T	T					9.5	T	T	T

	T3		T4										T5	T2					T4		T5
	TM													EL							
	200	250	20	25	32	50	80	100	125	160	200	250	320÷500	10	25	63	100	160	100, 160	250, 320	320÷630
	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	T	T	7.5	7.5[4]	7.5	7.5	T	T	T	T	T	T	T		T	T	T	T	T	T	T
	T	T	7.5	7.5[4]	7.5	7.5	T	T	T	T	T	T	T		T	T	T	T	T	T	T
	T	T		5[4]	5	5	9	T	T	T	T	T	T		T	T	T	T	T	T	T
	T	T		5[4]	5	5	8	T	T	T	T	T	T		T	T	T	T	T	T	T
	T	T		5[4]		5	8	T	T	T	T	T	T			T	T	T	T	T	T
	T	T				5	6	T	T	T	T	T	T			T	T	T	T	T	T
	T	T				5[4]	6[4]	T	T	T	T	T	T			T	T	T	T	T	T
	T	T				5[4]	6[4]	T	T	T	T	T	T			T	T	T	T	T	T
	T	T					5.5[4]	T	T	T	T	T	T				T	T	T	T	T
	T	T					5[4]	T	T	T	T	T	T				9.5	9.5	T	T	T
	T	T						T	T	T	T	T	T					9.5	T	T	T

MCBs technical details
Coordination tables: selectivity

MCCB - S2.. Z @ 415 V

					Supply S.	T2	T1 - T2						T1 - T2 - T3				
					Version	B, C, N, S, H, L							B, C, N, S, H, L, V				
	Char.	Icu [kA]			Release	TM											
		10	15	25	In [A]	12.5	16	20	25	32	40	50	63	80	100	125	160
Load S.	Z	S200	-	S200P	≤2	T	T	T	T	T	T	T	T	T	T	T	T
		S200	-	S200P	3	T	T	T	T	T	T	T	T	T	T	T	T
		S200	-	S200P	4	T	T	T	T	T	T	T	T	T	T	T	T
		S200	-	S200P	6	5.5[1]	5.5	5.5	5.5	5.5	5.5	5.5	10.5	T	T	T	T
		S200	-	S200P	8			5.5	5.5	5.5	5.5	5.5	10.5	T	T	T	T
		S200	-	S200P	10			3[1]	3	3	3	4.5	8	8.5	17	T	T
		-	-	S200P	13			3[1]		3	3	4.5	7.5	7.5	12	20	T
		S200	-	S200P	16					3[1]	3	4.5	5	7.5	12	20	T
		S200	-	S200P	20					3[1]		3	5	6	10	15	T
		S200	-	S200P	25							3[1]	5	6	10	15	T
		S200	S200P	-	32							3[1]		6	7.5	12	T
		S200	S200P	-	40									5.5[1]	7.5	12	T
		S200	S200P	-	50									4[1]	5[2]	7.5	10.5
		S200	S200P	-	63										5[2]	6[3]	10.5

1 Value valid only for T2 magnetic only supply side circuit-breaker
2 Value valid only for T2-T3 magnetic only supply side circuit-breaker
3 Value valid only for T3 magnetic only supply side circuit-breaker
4 Value valid only for T4 magnetic only supply side circuit-breaker

	T3		T4										T5	T2					T4		T5
	TM													EL							
	200	250	20	25	32	50	80	100	125	160	200	250	320÷500	10	25	63	100	160	100, 160	250, 320	320÷630
	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	T	T	7.5	7.5[4]	7.5	7.5	T	T	T	T	T	T	T		T	T	T	T	T	T	T
	T	T	7.5	7.5[4]	7.5	7.5	T	T	T	T	T	T	T		T	T	T	T	T	T	T
	T	T	5	5[4]	5	6.5	9	T	T	T	T	T	T		T	T	T	T	T	T	T
	T	T		5[4]	5	6.5	8	T	T	T	T	T	T		T	T	T	T	T	T	T
	T	T		5[4]	4.5	6.5	8	T	T	T	T	T	T			T	T	T	T	T	T
	T	T				5	6.5	T	T	T	T	T	T			T	T	T	T	T	T
	T	T				5	6.5	T	T	T	T	T	T			T	T	T	T	T	T
	T	T				5[4]	6.5	T	T	T	T	T	T			T	T	T	T	T	T
	T	T					5	T	T	T	T	T	T				T	T	T	T	T
	T	T					3.5[4]	T	T	T	T	T	T				10.5	10.5	T	T	T
	T	T						T	T	T	T	T	T					10.5	T	T	T

MCCB - S800 @ 415 V

			Supply S.	T1						T1 - T3				T1	T3		
			Version	B, C, N, S, H, L, V													
			Release	TM													
Load S.	Char.	Icu [kA]	In [A]	16	20	25	32	40	50	63	80	100	125	160	160	200	250
S800N	B C D	36	10			4.5	4.5	4.5	4.5	8	10	201	251	T	T	T	T
			13				4.5	4.5	4.5	7.5	10	15	251	T	T	T	T
			16					4.5	4.5	7.5	10	15	251	T	T	T	T
			20						4.5	7.5	10	15	251	T	T	T	T
			25							6	10	15	201	T	T	T	T
			32								7.5	10	201	T	T	T	T
			40									10	201	T	T	T	T
			50										15	T	T	T	T
			63											T	T	T	T
			80											T		T	T
			100											T			T
			125														T
S800S	B C D K	50	10			4.5	4.5	4.5	4.5	8	10	201	251	361	361	361	T
			13				4.5	4.5	4.5	7.5	10	15	251	361	361	361	T
			16					4.5	4.5	7.5	10	15	251	361	361	361	T
			20						4.5	7.5	10	15	251	361	361	361	T
			25							6	10	15	201	361	361	361	T
			32								7.5	10	201	361	361	361	T
			40									10	201	361	361	361	T
			50										15	361	361	361	T
			63											361	361	361	T
			80											361		361	T
			100											361			T
			125														T

1Select the lowest value between what is indicated and the breaking capacity of the supply side circuit-breaker

MCBs technical details
Coordination tables: selectivity

MCCB-S800 @ 415 V

			Supply S.	T4									T4 - T5
			Version	N, S, H, L, V									
			Release	TM									EL
Load S.	Char.	Icu [kA]	In [A]	20	25	32	50	80	100	125	160	200÷250	100÷630
S800N/S	B	36-50	10	6.5	6.5[1]	6.5	6.5	11	T	T	T	T	T
			13	6.5	5[1]	6.5	6.5	11	T	T	T	T	T
			16		5[1]	6.5	6.5	11	T	T	T	T	T
			20		4[1]	6.5	6.5	11	T	T	T	T	T
			25				6.5	11	T	T	T	T	T
			32				6.5	8	T	T	T	T	T
			40				5[1]	6.5	T	T	T	T	T
			50					5[1]	7.5	T	T	T	T
			63						5[1]	7	T	T	T
			80								T	T	T
			100									T	T
			125										T
	C	36-50	10	6.5	6.5[1]	6.5	6.5	11	T	T	T	T	T
			13	6.5	5[1]	6.5	6.5	11	T	T	T	T	T
			16		5[1]	6.5	6.5	11	T	T	T	T	T
			20		4[1]	6.5	6.5	11	T	T	T	T	T
			25		4[1]		6.5	11	T	T	T	T	T
			32				6.5	8	T	T	T	T	T
			40				5[1]	6.5	T	T	T	T	T
			50				4[1]	5[1]	7.5	T	T	T	T
			63					4[1]	6.5[1]	7	T	T	T
			80					4[1]	5[1]	6.5[1]	6.5	T	T
			100						4[1]	5[1]	5[1]	6.5	T
			125							4[1]	4[1]	5[1]	T
	D	36-50	10	6.5	6.5[1]	6.5	6.5	11	T	T	T	T	T
			13		5[1]		6.5	11	T	T	T	T	T
			16				6.5	11	T	T	T	T	T
			20				6.5[1]	11	T	T	T	T	T
			25				6.5[1]	11	T	T	T	T	T
			32					8[1]	T	T	T	T	T
			40					6.5[1]	T	T	T	T	T
			50						7.5[1]	T	T	T	T
			63							7[1]	T	T	T
			80								5[1]	T	T
			100									5[1]	T
			125										T
	K	36-50	10		6.5[1]	6.5	6.5	11	T	T	T	T	T
			13		5[1]	5	6.5	11	T	T	T	T	T
			16		5[1]		6.5	11	T	T	T	T	T
			20		4[1]		6.5	11	T	T	T	T	T
			25				6.5[1]	11[1]	T	T	T	T	T
			32				5[1]	8[1]	T	T	T	T	T
			40					6.5[1]	T	T	T	T	T
			50					5[1]	7.5[1]	T	T	T	T
			63					4[1]	6.5[1]	7[1]	T	T	T
			80						5[1]	6.5[1]	7[1]	T	T
			100							5[1]	6.5[1]	7[1]	T
			125								5[1]	6.5[1]	T

1 Value valid only for magnetic only supply side circuit-breaker (with In = 50 A, please consider MA52 circuit-breakers)
2 For T4 In = 100 A, value valid only for magnetic only supply side circuit-breaker
3 For T4 In = 160 A, value valid only for magnetic only supply side circuit-breaker

MCBs technical details

MCBs internal resistance, power loss and max. permissible earth-fault loop impedance

Internal resistance and power loss of the miniature circuit-breakers
Internal resistance per pole in mΩ, power loss per pole in W

2

Type	Rated current	Device series B, C, D *	
	In A	mW	W
SN201 L SN201 SN201 M	2	520	2.1
	4	147.5	2.4
	6	64	2.3
	10	19	1.9
	16	14	3.6
	20	12	4.8
	25	7,1	4.4
	32	6,5	6.7
	40	4,7	7.5

* Total power loss

Type	Rated current	Device series							
		B, C ①		D		K		Z	
	In A	mΩ	W	mΩ	W	mΩ	W	mΩ	W
S 200 and S 200 M	0.5	5500	1.4	4300	1.1	4300	1.1	8100	2.4
	1	1440	1.4	1250	1.25	1250	1.25	2100	2.3
	1.6	630	1.6	600	1.5	600	1.5	1000	2.8
	2	460	1.8	410	1.65	410	1.65	619	2.5
	3	150	1.3	130	1.2	130	1.2	235	2.4
	4	110	1.8	105	1.7	105	1.7	149	2.4
	6	55	2.0	52	1.9	52	1.9	75	3.2
	8	23	1.5	24	1.5	24	1.5	27	2.0
	10	19	2.1	16	1.6	13.5	1.4	24	2.7
	13	14	2.3	14	2.2	13.5	1.4	–	–
	16	8.5	2.5	8.5	2.5	7.7	2.0	10.9	2.8
	20	6.25	2.5	6.1	2.3	6.7	2.7	6.0	2.4
	25	5.0	3.2	4.3	3.1	4.6	2.9	4.5	3.3
	32	3.6	3.7	3.5	3.6	3.5	3.6	3.5	3.6
	40	3.0	4.8	2.2	4.2	2.8	4.5	2.5	4.1
	50	1.3	3.25	1.25	2.9	1.25	3.1	1.5	4.1
	63	1.2	4.8	1.2	4.8	1.0	4.4	1.3	5.2

① Current intensities 0.5 – 4 apply exclusively to C-type trip characteristics.

MCBs technical details

MCBs internal resistance, power loss and max. permissible earth-fault loop impedance

Internal resistance and power loss per pole

Internal resistance in mΩ per pole in cold state, power loss in W per pole at rated current

2

Type	Tripping characeristics	Rated current	Ri	Pvmax
		A	mΩ	W
S 200 S	**B, C**	**6**	**52.1**	**2.16**
	C	**8**	**22.9**	**1.65**
	B, C	**10**	**19.0**	**2.20**
	B, C	**13**	**13.7**	**2.62**
	B, C	**16**	**9.1**	**3.28**
	B, C	**20**	**6.2**	**3.14**

SU200 M

	C, K characteristics		Z characteristics	
Rated current	Internal resistance per pole	Power loss	Internal resistance per pole	Power loss
In	Ri	Pv	Ri	Pv
A	mΩ	W	mΩ	W
0.2	42500	1.7	-	-
0.3	18889	1.7	-	-
0.5	5600	1.4	9000	2.3
0.75	2489	1.4	-	-
1	1400	1.4	2200	2.2
1.6	703	1.8	1000	2.6
2	450	1.8	650	2.6
3	178	1.6	250	2.3
4	113	1.8	140	2.2
5	50	1.3	100	2.5
6	56	2.0	70	2.5
8	23	1.5	28	1.8
10	21	2.1	21	2.1
13	14	2.3	17	2.9
15	11	2.4	13	2.9
16	9.8	2.5	10	2.6
20	6.3	2.5	6.5	2.6
25	5.1	3.2	5.1	3.2
30	3.9	3.5	3.9	3.5
32	3.6	3.7	3.6	3.7
35	3.3	4.1	3.3	4.1
40	2.8	4.5	2.8	4.5
50	1.8	4.5	1.8	4.5
60	1.4	4.9	1.4	4.9
63	1.4	5.4	1.4	5.4

S200 80-100A

Tripping characteristic	Rated current	Internal resistance	Power loss
	In	Ri	Pv
	A	mΩ	W
B, C	80	0.9	8.1
B, C	100	0.8	9.8

Type	Rated current	Ri	Pvmax	Type	Ri	Pvmax
	A	mΩ	W		mΩ	W
S 700-E	10	38.0	4.9	S 700-K		
	16	15.5	5.2		10.5	3.1
	20	12.5	6.5		7.5	3.8
	25	7.4	6.5		5.7	3.9
	32	5.3	7.2			
	35	4.0	7.6		4.7	7.8
	40	4.0	8.0		3.8	6.8
	50	2.9	9.5		3.0	10.0
	63	2.0	9.9		2.0	9.6
	80	1.5	13.5		1.3	10.1
	100	1.0	14.4		1.1	12.3

	S 750 DR E		S 750 DR K	
Rated current I_n/A	Internal resistance[1] R_i/mΩ	Power loss[2] P_V/W	Internal resistance[1] R_i/mΩ	Power loss[2] P_V/W
16	15.3	4.1	14.5	3.9
20	11.3	5.4	10.7	5.1
25	8.7	5.9	8.3	5.5
35	4.5	6.3	4.3	6.2
40	3.4	6.1	3.2	5.8
50	2.9	7.6	2.8	7.2
63	2.1	8.7	2.1	8.7

[1] in cold state [2] at rated current

S800PV-S and S800PV-M

Typical internal resistances and power losses at 25 °C ambient temperature (per pole)

Rated current In [A]	Internal resistance R_i [mΩ]			Power loss P_v [W]		
	PV-S	PV-M	PV-M-H	PV-S	PV-M	PV-M-H
10	15.2			1.5		
13	12.1			2.0		
16	12.1			3.1		
20	8.7			3.5		
25	6.8			4.3		
32	3.1	1.8	1.8	3.2	1.8	1.8
40	2.3			3.7		
50	1.7			4.3		
63	1.6	0.9	0.9	6.4	3.6	3.6
80	1.0			6.4		
100	0.8			8.0		
125	0.6	0.5	0.6	9.4	7.8	6.0

MCBs technical details

MCBs internal resistance, power loss and max. permissible earth-fault loop impedance

S800S - S800N - S800C

Typical internal resistances and power losses at 25 °C ambient temperature (per pole)

Rated current In	Internal resistance Ri			Power loss Pv		
	[mΩ]			[W]		
[A]	B, C, D, K ①	KM ②	UCB, UCK ②	B, C, D, K	KM ②	UCB, UCK ②
6	51.7	–	–	1.8	–	–
8	27.2	–	–	1.7	–	–
10	15.2	–	15.2	1.5	–	1.5
13	12.1	–	12.1	2.0	–	2.0
16	12.1	–	12.1	3.1	–	3.1
20	8.7	2.7	8.7	3.5	1.1	3.5
25	6.8	3.0	6.8	4.3	1.9	4.3
32	3.1	1.7	3.1	3.2	1.7	3.2
40	2.3	1.6	2.3	3.7	2.6	3.7
50	1.7	1.1	1.7	4.3	2.8	4.3
63	1.6	1.0	1.6	6.4	4.0	6.4
80	1.0	0.75	1.0	6.4	5.0	6.4
100	0.8	–	0.8	8.0	–	8.0
125	0.6	–	0.6	9.4	–	9.4

① K Applicable only for S800S-S800C ② KM, UCB, UCK Applicable only for S800S

S800B

Typical internal resistances and power losses at 25 °C ambient temperature (per pole)

Rated current In	Internal resistance Ri		Power loss Pv	
	[mΩ]		[W]	
[A]	B, C	D, K	B, C	D, K
32	3.1	3.1	3.2	3.2
40	2.3	2.3	3.7	3.7
50	1.7	1.7	4.3	4.3
63	1.6	1.6	6.4	6.4
80	1.0	1.0	6.4	6.4
100	0.8	0.8	8.0	8.0
125	0.7	–	10.9	–

S800U

Typical internal resistances and power losses at 25 °C ambient temperature (per pole)

Rated current In [A]	Internal resistance R_i [mΩ]	Power loss P_v [W]
	K, Z	K, Z
10	15.2	1.5
15	12.1	2.7
20	8.7	3.5
25	6.8	4.2
30	3.1	2.8
40	2.3	3.7
50	1.7	4.3
60	1.6	5.8
70	1.0	4.9
80	1.0	6.4
90	0.8	6.5
100	0.8	8.3

Maximum permissible earth-fault loop impedance ZS at U0 = 230 V~ b to ensure compliance with the operation conditions pursuant to IEC 60364-4.
Operating time < 0.4 s; at 400 V~ < 0.2 s and at > 400 V~ < 0.1 s
The instantaneous release of the MCB ensures an operating time of ≤ 0.1 s (TN system).

Determined according to DIN VDE 0100-520 sheet 2:2002-11(source impedance = 300 mΩ, c = 0.95 and conductor temperature 70 °C = factor 0.8). The internal resistance of the MCB is already included.

S 200 and S 200 M

Rated current In A	B	C	D	K	Z
	max. ZS	max. ZS	max. ZS	max. ZS	max. ZS
	q	q	q	q	q
0.5	–	46	33.0	33.0	153.3
1	–	23	16.5	16.5	76.7
1.6	–	14.4	10.3	10.3	47.9
2	–	11.5	8.2	8.2	38.3
3	–	7.7	5.5	5.5	25.6
4	–	5.8	4.1	4.1	19.2
6	7.7	3.8	2.7	2.7	12.8
8	–	2.8	2.1	2.1	9.5
10	4.6	2.2	1.6	1.6	7.7
13	3.5	1.7	1.2	1.2	–
16	2.9	1.4	1.0	1.0	4.8
20	2.3	1.2	0.8	0.8	3.8
25	1.8	0.9	0.7	0.7	3.1
32	1.4	0.7	0.5	0.5	2.4
40	1.1	0.6	0.4	0.4	1.9
50	0.9	0.5	0.3	0.3	1.5
63	0.7	0.4	0.3	0.3	1.2

b U0 = rated voltage against earthed conductor; for U0 = 240 V~ is ZS · 1.04; for U0 = 127 V~ is ZS · 0.55

MCBs technical details
Performances at different ambient temperatures, altitudes and frequencies

2

S 200 P

Rated current In A	B	C	D	K	Z
	max. ZS	max. ZS	max. ZS	max. ZS	max. ZS
	q	q	q	q	q
0.2	–	–		39.5	–
0.3	–	–		34.8	–
0.5	–	46	27.4	26.5	143
0.75	–	–		19.4	–
1	–	23	15	15	74.4
1.6	–	14.4	9.6	9.6	47.9
2	–	11.5	7.8	7.8	38.3
3	–	7.7	11.8	5.3	25.3
4	–	5.8	8.8	3.9	19.1
6	7.6	3.8	5.9	2.6	12.7
8	–	2.8	5.7	2.0	9.5
10	4.6	2.3	3.5	1.6	7.6
13	3.5	1.7	2.7	1.3	–
16	2.9	1.4	2.2	1.0	4.7
20	2.3	1.1	1.7	0.8	3.8
25	1.8	0.9	1.4	0.6	3.0
32	1.4	0.7	1.1	0.5	2.4
40	1.1	0.6	0.9	0.4	1.9
50	0.9	0.5	0.7	0.3	1.5
63	0.7	0.4	0.6	0.25	1.1

b U0 = rated voltage against earthed conductor; for U0 = 240 V~ is ZS · 1.04; for U0 = 127 V~ is ZS · 0.55

Take into account the voltage drop:
e.g. in the case of a 1.5 mm^2 conductor, protected by a B 16 circuit-breaker, the maximum cable length is 82 m. If the voltage drop is below 3%, this would result in a maximum cable length (2-strand) of 17 m. For more details on this topic, get your own copy of the technical information leaflet “Maximum cable lengths”.

Maximum cable lengths in the case of different voltages and cross sections on request.

Derating of load capability of MCBs

Derating of MCBs load capability takes in consideration 2 factors: ambient temperature and influence of adjacent devices. The rules to obtain the effective value of I_n are the following:

1. Deviating ambient temperature:

The rated value of the current of a miniature circuit-breaker refers to a temperature of 20 °C for circuit-breakers with characteristics K and Z and 30 °C for characteristics B, C and D. The following tables contain the derating of load capability of S 200/S 200 M/S 200 P/S 200 S MCBs* with temperature from -40 °C to 70 °C for the curves B, C, D and K, Z.

S200 (B, C, and D characteristics)

Max. operating current depending on the ambient temperature of a circuit-breaker in load circuit of characteristics type B, C, D.

B, C and D	Ambient temperature T (°C)											
In(A)	-40	-30	-20	-10	0	10	20	30	40	50	60	70
0,5	0,61	0,59	0,58	0,56	0,55	0,53	0,52	0,5	0,49	0,47	0,46	0,44
1	1,21	1,18	1,15	1,12	1,09	1,06	1,03	1	0,97	0,94	0,91	0,88
1,6	1,94	1,89	1,84	1,79	1,74	1,7	1,65	1,6	1,55	1,5	1,46	1,41
2	2,42	2,36	2,3	2,24	2,18	2,12	2,06	2	1,94	1,88	1,82	1,76
3	3,63	3,54	3,45	3,36	3,27	3,18	3,09	3	2,91	2,82	2,73	2,64
4	4,84	4,72	4,6	4,48	4,36	4,24	4,12	4	3,88	3,76	3,64	3,52
6	7,26	7,08	6,9	6,72	6,54	6,36	6,18	6	5,82	5,64	5,46	5,28
8	9,68	9,44	9,2	8,96	8,72	8,48	8,24	8	7,76	7,52	7,28	7,04
10	12,1	11,8	11,5	11,2	10,9	10,6	10,3	10	9,7	9,4	9,1	8,8
13	15,7	15,3	15	14,6	14,2	13,8	13,4	13	12,6	12,2	11,8	11,4
16	19,4	18,9	18,4	17,9	17,4	17	16,5	16	15,5	15	14,6	14,1
20	24,2	23,6	23	22,4	21,8	21,2	20,6	20	19,4	18,8	18,2	17,6
25	30,3	29,5	28,8	28	27,3	26,5	25,8	25	24,3	23,5	22,8	22
32	38,7	37,8	36,8	35,8	34,9	33,9	33	32	31	30,1	29,1	28,2
40	48,4	47,2	46	44,8	43,6	42,4	41,2	40	38,8	37,6	36,4	35,2
50	60,5	59	57,5	56	54,5	53	51,5	50	48,5	47	45,5	44
63	76,2	74,3	72,5	70,6	68,7	66,8	64,9	63	61,1	59,2	57,3	55,4

S200 (K and Z characteristics)

Max. operating current depending on the ambient temperature of a circuit-breaker in load circuit of characteristics type K and Z

K and Z	Ambient temperature T (°C)												
In (A)	- 40	- 30	- 25	- 20	- 10	0	10	20	30	40	50	55	60	70
0.5	0.66	0.64	0,63	0.61	0.59	0.56	0.53	0.50	0.47	0.43	0.40	0,38	0.35	0.31
1.0	1.32	1.27	1,25	1.22	1.17	1.12	1.06	1.00	0.94	0.87	0.79	0,75	0.71	0.61
1.6	2.12	2.04	2,00	1.96	1.88	1.79	1.70	1.60	1.50	1.39	1.26	1,20	1.13	0.98
2.0	2.65	2.55	2,50	2.45	2.35	2.24	2.12	2.00	1.87	1.73	1.58	1,50	1.41	1.22
3.0	4.0	3.8	3,75	3.7	3.5	3.4	3.2	3.0	2.8	2.6	2.4	2,30	2.1	1.8
4.0	5.3	5.1	5,00	4.9	4.7	4.5	4.2	4.0	3.7	3.5	3.2	3,00	2.8	2.4
6.0	7.9	7.6	7,5	7.3	7.0	6.7	6.4	6.0	5.6	5.2	4.7	4,5	4.2	3.7
8.0	10.8	10.2	10,0	9.8	9.4	8.9	8.5	8.0	7.5	6.9	6.3	6,0	5.7	4.9
10.0	13.2	12.7	12,5	12.2	11.7	11.2	10.6	10.0	9.4	8.7	7.9	7,5	7.1	6.1
13.0	17.2	16.6	16,3	15.9	15.2	14.5	13.8	13.0	12.2	11.3	10.3	9,8	9.2	8.0
16.0	21.2	20.4	20,0	19.6	18.8	17.9	17.0	16.0	15.0	13.9	12.6	12,0	11.3	9.8
20.0	26.5	25.5	25,0	24.5	23.5	22.4	21.2	20.0	18.7	17.3	15.8	15,0	14.1	12.2
25.0	33.1	31.9	31,3	30.6	29.3	28.0	26.5	25.0	23.4	21.7	19.8	18,8	17.7	15.3
32.0	42.3	40.8	40,0	39.2	37.5	35.8	33.9	32.0	29.9	27.7	25.3	24,0	22.6	19.6
40.0	52.9	51.0	50,0	49.0	46.9	44.7	42.4	40.0	37.4	34.6	31.6	30,0	28.3	24.5
50.0	66.1	63.7	62,5	61.2	58.6	55.9	53.0	50.0	46.8	43.3	39.5	37,5	35.4	30.6
63.0	83.3	80.3	78,8	77.2	73.9	70.4	66.8	63.0	58.9	54.6	49.8	47,2	44.5	38.6

MCBs technical details
Performances at different ambient temperatures, altitudes and frequencies

SU200 M - IEC/EN 60947-2

	Ambient temperature T (°C)											
In (A)	-40	-30	-20	-10	0	10	25	30	40	50	60	70
0.2 [1]	0.26	0.25	0.24	0.23	0.22	0.22	0.21	0.20	0.19	0.19	0.18	0.17
0.3 [1]	0.39	0.37	0.36	0.35	0.33	0.32	0.31	0.30	0.29	0.28	0.27	0.26
0.5	0.64	0.62	0.60	0.58	0.56	0.54	0.52	0.5	0.48	0.46	0.45	0.43
0.75 [1]	0.97	0.93	0.90	0.87	0.84	0.81	0.78	0.75	0.72	0.70	0.67	0.65
1	1.29	1.24	1.20	1.16	1.12	1.08	1.04	1	0.96	0.93	0.89	0.86
1.6	2.06	1.99	1.92	1.85	1.78	1.72	1.66	1.6	1.54	1.48	1.43	1.38
2	2.58	2.49	2.40	2.31	2.23	2.15	2.07	2	1.93	1.85	1.79	1.72
3	3.87	3.73	3.60	3.47	3.35	3.23	3.11	3	2.89	2.78	2.68	2.58
4	5.16	4.97	4.80	4.63	4.46	4.30	4.15	4	3.85	3.71	3.57	3.44
5	6.45	6.22	6.00	5.78	5.58	5.38	5.19	5	4.82	4.64	4.47	4.30
6	7.74	7.46	7.20	6.94	6.69	6.45	6.22	6	5.78	5.56	5.36	5.16
8	10.32	9.95	9.59	9.25	8.92	8.60	8.30	8	7.70	7.42	7.14	6.88
10	12.90	12.44	11.99	11.56	11.15	10.75	10.37	10	9.63	9.27	8.93	8.60
13	16.76	16.17	15.59	15.03	14.50	13.98	13.48	13	12.52	12.06	11.61	11.18
15	19.34	18.65	17.99	17.35	16.73	16.13	15.56	15	14.45	13.91	13.40	12.90
16	20.63	19.90	19.19	18.50	17.84	17.21	16.59	16	15.41	14.84	14.29	13.76
20	25.79	24.87	23.98	23.13	22.30	21.51	20.74	20	19.26	18.55	17.86	17.20
25	32.24	31.09	29.98	28.91	27.88	26.88	25.93	25	24.08	23.18	22.33	21.50
30	38.69	37.31	35.98	34.69	33.45	32.26	31.11	30	28.89	27.82	26.79	25.80
32	41.27	39.79	38.37	37.01	35.69	34.41	33.18	32	30.82	29.68	28.58	27.52
35	45.14	43.53	41.97	40.47	39.03	37.64	36.30	35	33.71	32.46	31.26	30.10
40	51.58	49.74	47.97	46.26	44.61	43.01	41.48	40	38.52	37.09	35.72	34.40
50	64.48	62.18	59.96	57.82	55.76	53.77	51.85	50	48.15	46.37	44.65	43.00
60	77.38	74.61	71.95	69.39	66.91	64.52	62.22	60	57.78	55.64	53.58	51.60
63	81.24	78.35	75.55	72.85	70.25	67.75	65.33	63	61	58	56	54

1) Current ratings 0.2, 0.3 and 0.75 A available with K characteristic only

SU200 M - UL 489

	Ambient temperature T (°C)											
In (A)	-40	-30	-20	-10	0	10	25	30	40	50	60	70
0.2 [1]	0.27	0.26	0.25	0.24	0.23	0.22	0.22	0.21	0.20	0.19	0.19	0.18
0.3 [1]	0.40	0.39	0.37	0.36	0.35	0.33	0.32	0.31	0.30	0.29	0.28	0.27
0.5	0.67	0.64	0.62	0.60	0.58	0.56	0.54	0.52	0.5	0.48	0.46	0.45
0.75 [1]	1.00	0.97	0.93	0.90	0.87	0.84	0.81	0.78	0.75	0.72	0.70	0.67
1	1.34	1.29	1.24	1.20	1.16	1.12	1.08	1.04	1	0.96	0.93	0.89
1.6	2.14	2.06	1.99	1.92	1.85	1.78	1.72	1.66	1.6	1.54	1.48	1.43
2	2.67	2.58	2.49	2.40	2.31	2.23	2.15	2.07	2	1.93	1.85	1.79
3	4.01	3.87	3.73	3.60	3.47	3.35	3.23	3.11	3	2.89	2.78	2.68
4	5.35	5.16	4.97	4.80	4.63	4.46	4.30	4.15	4	3.85	3.71	3.57
5	6.69	6.45	6.22	6.00	5.78	5.58	5.38	5.19	5	4.82	4.64	4.47
6	8.02	7.74	7.46	7.20	6.94	6.69	6.45	6.22	6	5.78	5.56	5.36
8	10.70	10.32	9.95	9.59	9.25	8.92	8.60	8.30	8	7.70	7.42	7.14
10	13.37	12.90	12.44	11.99	11.56	11.15	10.75	10.37	10	9.63	9.27	8.93
13	17.38	16.76	16.17	15.59	15.03	14.50	13.98	13.48	13	12.52	12.06	11.61
15	20.06	19.34	18.65	17.99	17.35	16.73	16.13	15.56	15	14.45	13.91	13.40
16	21.40	20.63	19.90	19.19	18.50	17.84	17.21	16.59	16	15.41	14.84	14.29
20	26.75	25.79	24.87	23.98	23.13	22.30	21.51	20.74	20	19.26	18.55	17.86
25	33.43	32.24	31.09	29.98	28.91	27.88	26.88	25.93	25	24.08	23.18	22.33
30	40.12	38.69	37.31	35.98	34.69	33.45	32.26	31.11	30	28.89	27.82	26.79
32	42.79	41.27	39.79	38.37	37.01	35.69	34.41	33.18	32	30.82	29.68	28.58
35	46.81	45.14	43.53	41.97	40.47	39.03	37.64	36.30	35	33.71	32.46	31.26
40	53.49	51.58	49.74	47.97	46.26	44.61	43.01	41.48	40	38.52	37.09	35.72
50	66.87	64.48	62.18	59.96	57.82	55.76	53.77	51.85	50	48.15	46.37	44.65
60	80.24	77.38	74.61	71.95	69.39	66.91	64.52	62.22	60	57.78	55.64	53.58
63	84.25	81.24	78.35	75.55	72.85	70.25	67.75	65.33	63	60.67	58.42	56.26

1) Current ratings 0.2, 0.3 and 0.75 A available with K characteristic only

S200 80-100A

B and C	Ambient temperature T (°C)											
In (A)	-40	-30	-20	-10	0	10	25	30	40	50	60	70
80	96.8	94.4	92.0	89.6	87.2	84.8	82.4	80.0	77.6	75.2	72.8	70.4
100	121.0	118.0	115.0	112.0	109.0	106.0	103.0	100.0	97.0	94.0	91.0	88.0

SN201

B, C and D										
In (A)	-25	-20	-10	0	10	20	30	40	50	55
2	2,37	2,32	2,26	2,18	2,12	2,06	2	1,95	1,91	1,89
4	4,74	4,60	4,53	4,37	4,24	4,12	4	3,90	3,85	3,79
6	7,2	7,0	6,8	6,4	6,3	6,2	6	5,9	5,8	5,7
10	11,8	11,6	11,3	10,9	10,6	10,3	10	9,8	9,7	9,5
16	18,1	17,7	17,4	46,9	16,6	16,3	16	15,8	15,7	15,5
20	23,7	23,2	22,6	21,8	21,2	20,6	20	19,6	19,1	18,9
25	29,4	29,0	28,2	27,4	26,7	26,0	25	24,2	23,5	23,1
32	38,7	38,1	37,2	36,2	34,6	33,0	32	31,3	30,5	30,0
40	48,3	47,5	45,8	44,4	42,7	41,0	40	39,5	38,6	38,2

MCBs technical details
Performances at different ambient temperatures, altitudes and frequencies

S 750 DR

E	Ambient temperature T (°C)							
In (A)	-20	-10	0	10	20	30	40	50
16	19.8	19.1	18.4	17.6	16.8	16.0	15.1	14.2
20	24.7	23.8	22.9	22.0	21.0	20.0	18.9	17.8
25	30.9	29.8	28.7	27.5	26.3	25.0	23.6	22.2
35	43.2	41.7	40.1	38.5	36.8	35.0	33.1	31.1
40	49.4	47.7	45.9	44.0	42.1	40.0	37.8	35.5
50	61.8	59.6	57.4	55.0	52.6	50.0	47.3	44.4
63	77.8	75.1	72.3	69.3	66.2	63.0	59.6	56.0

K	Ambient temperature T (°C)							
In (A)	-20	-10	0	10	20	30	40	50
16	19.1	18.4	17.6	16.8	16.0	16.0	15.1	14.2
20	23.8	22.9	22.0	21.0	20.0	20.0	18.9	17.8
25	29.8	28.7	27.5	26.3	25.0	25.0	23.6	22.2
35	41.7	40.1	38.5	36.8	35.0	35.0	33.1	31.1
40	47.7	45.9	44.0	42.1	40.0	40.0	37.8	35.5
50	59.6	57.4	55.0	52.6	50.0	50.0	47.3	44.4
63	75.1	72.3	69.3	66.2	63.0	63.0	59.6	56.0

DS271 (B and C characteristics, for available values of rated current)
DDA200 + S200, DS200 with B, C and D characteristics

Max. operating current depending on the ambient temperature of a circuit-breaker in load circuit.

B and C	Ambient temperature T (°C)									
In (A)	-25	-20	-10	0	10	20	30	40	50	55
0.5	0.64	0.62	0.60	0.58	0.55	0.53	0.50	0.47	0.44	0.43
1	1.27	1.25	1.20	1.15	1.11	1.05	1.00	0.94	0.88	0.85
1.6	2.04	2.00	1.92	1.85	1.77	1.69	1.60	1.51	1.41	1.36
2	2.54	2.49	2.40	2.31	2.21	2.11	2.00	1.89	1.76	1.70
3	3.80	3.70	3.60	3.50	3.30	3.20	3.00	2.80	2.60	2.50
4	5.10	5.00	4.80	4.60	4.40	4.20	4.00	3.80	3.50	3.40
6	7.60	7.50	7.20	6.90	6.60	6.30	6.00	5.70	5.30	5.10
8	10.15	10.00	9.60	9.20	8.80	8.40	8.00	7.50	7.10	6.80
10	12.70	12.50	12.00	11.50	11.10	10.50	10.00	9.40	8.80	8.50
13	16.50	16.20	15.60	15.00	14.40	13.70	13.00	12.30	11.50	11.10
16	20.40	20.00	19.20	18.50	17.70	16.90	16.00	15.10	14.10	13.60
20	25.40	24.90	24.00	23.10	22.10	21.10	20.00	18.90	17.60	17.00
25	31.80	31.20	30.00	28.90	27.60	26.40	25.00	23.60	22.00	21.20
32	40.60	39.90	38.50	37.00	35.40	33.70	32.00	30.20	28.20	27.20
40	50.80	49.90	48.10	46.20	44.20	42.20	40.00	37.70	35.30	34.00
50	63.50	62.40	60.10	57.70	55.30	52.70	50.00	47.10	44.10	42.50
63	80.00	78.60	75.70	72.70	69.60	66.40	63.00	59.40	55.60	53.50

DDA200 + S200, DS200 (K and Z characteristics)

Max. operating current depending on the ambient temperature of a circuit-breaker in load circuit.

K and Z	Ambient temperature T (°C)									
In (A)	-25	-20	-10	0	10	20	30	40	50	55
0,5	0,63	0,61	0,59	0,56	0,53	0,50	0,47	0,43	0,40	0,38
1	1,25	1,22	1,17	1,12	1,06	1,00	0,94	0,87	0,79	0,75
1,6	2,00	1,96	1,88	1,79	1,70	1,60	1,50	1,39	1,26	1,20
2	2,50	2,45	2,35	2,24	2,12	2,00	1,87	1,73	1,58	1,50
3	3,75	3,70	3,50	3,40	3,20	3,00	2,80	2,60	2,40	2,30
4	5,00	4,90	4,70	4,50	4,20	4,00	3,70	3,50	3,20	3,00
6	7,5	7,30	7,00	6,70	6,40	6,00	5,60	5,20	4,70	4,5
8	10,0	9,80	9,40	8,90	8,50	8,00	7,50	6,90	6,30	6,0
10	12,5	12,20	11,70	11,20	10,60	10,00	9,40	8,70	7,90	7,5
13	16,3	15,90	15,20	14,50	13,80	13,00	12,20	11,30	10,30	9,8
16	20,0	19,60	18,80	17,90	17,00	16,00	15,00	13,90	12,60	12,0
20	25,0	24,50	23,50	22,40	21,20	20,00	18,70	17,30	15,80	15,0
25	31,3	30,60	29,30	28,00	26,50	25,00	23,40	21,70	19,80	18,8
32	40,0	39,20	37,50	35,80	33,90	32,00	29,90	27,70	25,30	24,0
40	50,0	49,00	46,90	44,70	42,40	40,00	37,40	34,60	31,60	30,0
50	62,5	61,20	58,60	55,90	53,00	50,00	46,80	43,30	39,50	37,5
63	78,8	77,20	73,90	70,40	66,80	63,00	58,90	54,60	49,80	47,2

DS201 and DS202C

Max. operating current depending on the ambient temperature of a circuit-breaker in load circuit of characteristics type B, C and K

B, C and K	Ambient temperature T (°C)									
In (A)	-25	-20	-10	0	10	20	30	40	50	55
2	2.6	2.5	2.4	2.3	2.2	2.1	2.0	1.9	1.8	1.7
4	4.9	4.8	4.6	4.5	4.3	4.2	4	3.8	3.7	3.6
6	7.95	7.8	7.4	7.1	6.7	6.4	6	5.6	5.3	5.1
8	10.3	10.1	9.7	9.3	8.8	8.4	8	7.6	7.2	6.95
10	11.8	11.6	11.3	11.0	10.7	10.3	10	9.7	9.3	9.15
13	15.65	15.4	14.9	14.4	14.0	13.5	13	12.5	12.0	11.8
16	18.65	18.4	17.9	17.4	17.0	16.5	16	15.5	15.0	14.8
20	23.1	22.8	22.2	21.7	21.1	20.6	20	19.4	18.9	18.6
25	30.8	30.3	29.2	28.2	27.1	26.1	25	23.9	22.9	22.35
32	39.3	38.6	37.3	36.0	34.7	33.3	32	30.7	29.3	28.65
40	50.7	49.7	47.8	45.8	43.9	41.9	40	38.1	36.1	35.15

MCBs technical details
Performances at different ambient temperatures, altitudes and frequencies

Derating of load capacity of S800

The table refers to the product standard IEC 60947-2. These values are only valid if the mounting conditions are similar to the IEC 60947-2.

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The rated value of the current of the S800 refers to a calibration temperature of 30°C for characteristics B, C and D.
For characteristics K and UCK it refers to 40°C and the UL-version (S800U) refers to calibration temperature od 25°C.
Max. operating current depending on the ambient temperature of S800 with characteristics B, C, D, PV-S, UCB.

B, C, D, PV-S, UCB	Ambient temperature T (°C)																				
In (A)	–25	–20	–15	–10	–5	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75
6	7.2	7.1	7.0	6.9	6.8	6.7	6.6	6.4	6.3	6.2	6.1	6.0	5.9	5.8	5.7	5.6	5.4	5.3	5.2	5.1	5.0
8	9.6	9.5	9.3	9.2	9.0	8.9	8.7	8.6	8.4	8.3	8.1	8.0	7.9	7.7	7.6	7.4	7.3	7.1	7.0	6.8	6.7
10	12.0	11.8	11.7	11.5	11.3	11.1	10.9	10.7	10.6	10.4	10.2	10.0	9.8	9.6	9.4	9.3	9.1	8.9	8.7	8.5	8.3
13	15.6	15.4	15.1	14.9	14.7	14.4	14.2	14.0	13.7	13.5	13.2	13.0	12.8	12.5	12.3	12.0	11.8	11.6	11.3	11.1	10.9
16	19.2	18.9	18.6	18.3	18.1	17.8	17.5	17.2	16.9	16.6	16.3	16.0	15.7	15.4	15.1	14.8	14.5	14.2	13.9	13.7	13.4
20	24.0	23.7	23.3	22.9	22.6	22.2	21.8	21.5	21.1	20.7	20.4	20.0	19.6	19.3	18.9	18.5	18.2	17.8	17.4	17.1	16.7
25	30.0	29.6	29.1	28.7	28.2	27.8	27.3	26.8	26.4	25.9	25.5	25.0	24.5	24.1	23.6	23.2	22.7	22.2	21.8	21.3	20.9
32	38.5	37.9	37.3	36.7	36.1	35.5	34.9	34.3	33.8	33.2	32.6	32.0	31.4	30.8	30.2	29.7	29.1	28.5	27.9	27.3	26.7
40	48.1	47.3	46.6	45.9	45.1	44.4	43.7	42.9	42.2	41.5	40.7	40.0	39.3	38.5	37.8	37.1	36.3	35.6	34.9	34.1	33.4
50	60.1	59.2	58.3	57.3	56.4	55.5	54.6	53.7	52.8	51.8	50.9	50.0	49.1	48.2	47.2	46.3	45.4	44.5	43.6	42.7	41.7
63	75.7	74.6	73.4	72.2	71.1	69.9	68.8	67.6	66.5	65.3	64.2	63.0	61.8	60.7	59.5	58.4	57.2	56.1	54.9	53.8	52.6
80	96.1	94.7	93.2	91.7	90.3	88.8	87.3	85.9	84.4	82.9	81.5	80.0	78.5	77.1	75.6	74.1	72.7	71.2	69.7	68.3	66.8
100	120.2	118.4	116.5	114.7	112.8	111.0	109.2	107.3	105.5	129.6	101.8	100.0	98.2	96.3	94.5	92.7	90.8	89.0	87.2	85.3	83.5
125	150.2	147.9	145.6	143.4	141.1	138.8	136.5	134.2	131.9	129.6	127.3	125.0	122.7	120.4	118.1	115.8	113.5	111.2	108.9	106.7	104.4

Max. operating current depending on the ambient temperature of S800 with characteristics K, UCK.

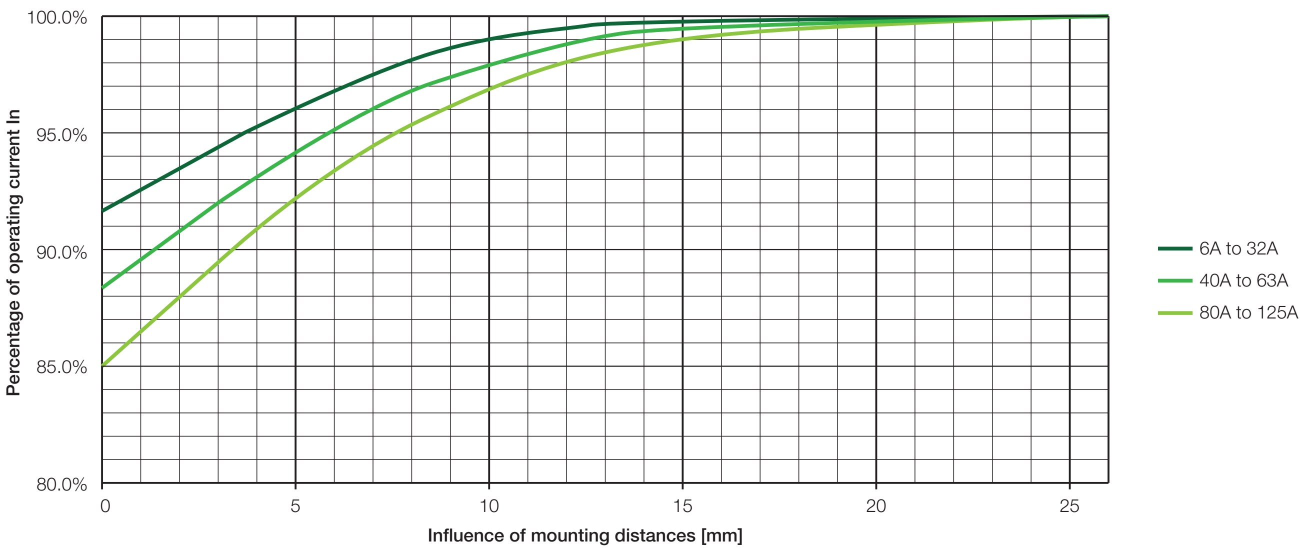
K, UCK	Ambient temperature T (°C)																				
In (A)	–25	–20	–15	–10	–5	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75
10	12.4	12.2	12.0	11.8	11.7	11.5	11.3	11.1	10.9	10.7	10.6	10.4	10.2	10.0	9.8	9.6	9.4	9.3	9.1	8.9	8.7
13	16.1	15.9	15.6	15.4	15.1	14.9	14.7	14.4	14.2	14.0	13.7	13.5	13.2	13.0	112.8	12.5	12.3	12.0	11.8	11.6	11.3
16	19.8	19.5	19.2	18.9	18.6	18.3	18.1	17.8	17.5	17.2	16.9	16.6	16.3	16.0	15.7	15.4	15.1	14.8	14.5	14.2	13.9
20	24.8	24.4	24.0	23.7	23.3	22.9	22.6	22.2	21.8	21.5	21.1	20.7	20.3	20.0	19.6	19.3	18.9	18.5	18.2	17.8	17.4
25	31.0	30.5	30.0	29.6	29.1	28.7	28.2	27.8	27.3	26.8	26.4	25.9	25.5	25.0	24.5	24.1	23.6	23.2	22.7	22.2	21.8
32	39.6	39.0	38.5	37.9	37.3	36.7	36.1	35.5	34.9	34.3	33.8	33.2	32.6	32.0	31.4	30.8	30.2	29.7	29.1	28.5	27.9
40	49.5	48.8	48.1	47.3	46.6	45.9	45.1	44.4	43.7	42.9	42.2	41.5	40.7	40.0	39.3	38.5	37.8	37.1	36.3	35.6	34.9
50	61.9	61.0	60.1	59.2	58.3	57.3	56.4	55.5	54.6	53.7	52.8	51.8	50.9	50.0	49.1	48.2	47.2	46.3	45.4	44.5	43.6
63	78.0	76.9	75.7	74.6	73.4	72.2	71.1	69.9	68.8	67.6	66.5	65.3	64.2	63.0	61.8	60.7	59.5	58.4	57.2	56.1	54.9
80	99.1	97.6	96.1	94.7	93.2	91.7	90.3	88.8	87.3	85.9	84.4	82.9	81.5	80.0	78.5	77.1	75.6	74.1	72.7	71.2	69.7
100	123.9	122.0	120.2	118.4	116.5	114.7	112.8	111.0	109.2	107.3	105.5	103.7	101.8	100.0	98.2	96.3	94.5	92.7	90.8	89.0	87.2
125	154.8	152.5	150.2	147.9	145.6	143.4	141.1	138.8	136.5	134.2	131.9	129.6	127.3	125.0	122.7	120.4	118.1	115.8	113.5	111.2	108.9

Max. operating current depending on the ambient temperature of S800U-K, -Z, -UCZ, PVS5.

U-K, Z, UCZ, PVS5	Ambient temperature T (°C)																				
In (A)	–25	–20	–15	–10	–5	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75
5	5,9	5,8	5,7	5,6	5,6	5,5	5,4	5,3	5,2	5,1	5,0	4,9	4,8	4,7	4,6	4,5	4,4	4,4	4,3	4,2	4,1
10	11,8	11,7	11,5	11,3	11,1	10.9	10.7	10.6	10.4	10.2	10.0	9.8	9.6	9.4	9.3	9.1	8.9	8.7	8.5	8,3	8,2
13	15,4	15,1	14,9	14,7	14,4	14.2	14.0	13.7	13.5	13.2	13.0	12.8	12.5	12.3	12.0	11.8	11.6	11.3	11.1	10,9	10,6
16	18,9	18,6	18,3	18,1	17,8	17.5	17.2	16.9	16.6	16.3	16.0	15.7	15.4	15.1	14.8	14.5	14.2	13.9	13.7	13,4	13,1
20	23,7	23,3	22,9	22,6	22,2	21.8	21.5	21.1	20.7	20.4	20.0	19.6	19.3	18.9	18.5	18.2	17.8	17.4	17.1	16,7	16,3
25	29,6	29,1	28,7	28,2	27,8	27.3	26.8	26.4	25.9	25.5	25.0	24.5	24.1	23.6	23.2	22.7	22.2	21.8	21.3	20,9	20,4
32	37,9	37,3	36,7	36,1	35,5	34.9	34.3	33.8	33.2	32.6	32.0	31.4	30.8	30.2	29.7	29.1	28.5	27.9	27.3	26,7	26,1
40	47,3	46,6	45,9	45,1	44,4	43.7	42.9	42.2	41.5	40.7	40.0	39.3	38.5	37.8	37.1	36.3	35.6	34.9	34.1	33,4	32,7
50	59,2	58,3	57,3	56,4	55,5	54.6	53.7	52.8	51.8	50.9	50.0	49.1	48.2	47.2	46.3	45.4	44.5	43.6	42.7	41,7	40,8
63	74,6	73,4	72,2	71,1	69,9	68.8	67.6	66.5	65.3	64.2	63.0	61.8	60.7	59.5	58.4	57.2	56.1	54.9	53.8	52,6	51,4
80	94,7	93,2	91,7	90,3	88,8	87.3	85.9	84.4	82.9	81.5	80.0	78.5	77.1	75.6	74.1	72.7	71.2	69.7	68.3	66,8	65,3
100	118,4	116,5	114,7	112,8	110,0	109.2	107.3	105.5	129.6	101.8	100.0	98.2	96.3	94.5	92.7	90.8	89.0	87.2	85.3	83,5	81,7
125	147,9	145,6	143,4	141,1	138,8	136.5	134.2	131.9	129.6	127.3	125.0	122.7	120.4	118.1	115.8	113.5	111.2	108.9	106.7	104,4	102,1

Influence of mounting distances between the devices

Multiply the rated current referring to your max. occurrent temperature with the factor of „influence of mounting distances„.
Example: 2 x S802B-B125 at T = 35°C with distance
In = 120.4 A x 92.1 % = 110.9 A



Further influencing factors, which can lead to a reduction of the maximum operating current, are:
Shortening the cable lenght compared to IEC 60947-1/2
Reducing the cable cross section compared to IEC 60947-1/2
Accumulation of cables

MCBs technical details

Performances at different ambient temperatures, altitudes and frequencies

2. Multiply the rated current (equivalent) referring to the new temperature by another factor only in case of presence of several devices installed alongside each other; see table.

2

Example: S 202 C 16 with T=40 °C

Type of use	Values to use	Formula	Calculation	Result
Load at ambient temperature	In (amb. t°) -see tables-			In=15.1 A
Load at ambient temperature with 8 adj. devices	In (amb. t°) -see tables- Fm (0.77)	In (amb. t°)x0.77	15.1x0.77	In=11.63 A

S200, DS200, DDA200+S200 Influence of adjacent devices Correction factor Fm

No. of adjacent devices	Fm
1	1
2	0.95
3	0.9
4	0.86
5	0.82
6	0.795
7	0.78
8	0.77
9	0.76
>9	0.76

SU200 M Influence of adjacent devices Correction factor Fm

No. of adjacent devices	Fm
1	1.00
2, 3	0.9
4, 5	0.8
> 6	0.75

S200 80-100A Influence of adjacent devices Correction factor Fm

No. of adjacent devices	Fm
1	1.00
2, 3	0.9
4, 5	0.8
> 6	0.75

SN201 Influence of adjacent devices Correction factor Fm

No. of adjacent devices	Fm
1	1.00
2	0.99
3	0.97
4	0.96
5	0.94
6	0.93
7	0.92
8	0.91
9	0.90
> 9	0.90

DS201 and DS202C Influence of adjacent devices Correction factor Fm

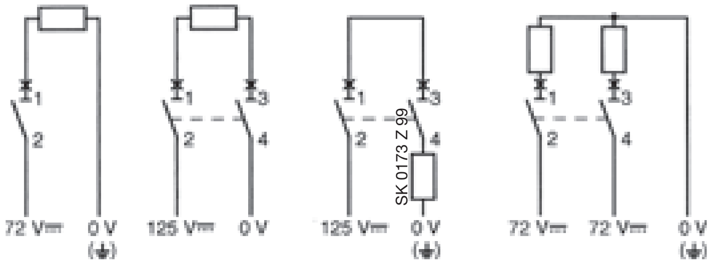
No. of adjacent devices	Fm
1	1.00
2	0.95
3	0.91
4	0.88
5	0.87
6	0.86
7	0.85
> 7	0.85

Use of MCBs in direct current circuits

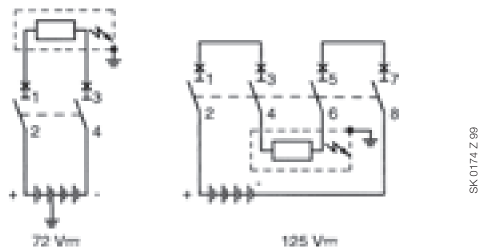
Use of S 200/S 200 M/S 200 P miniature circuit-breakers in direct current circuits 72 VDC/125 VDC

In DC systems up to 72 VDC or, as the case may be, series connection up to 125 VDC, customary S 200/S 200 M series MCBs can be used. Polarity does not need to be taken into consideration, the outgoing circuit may be implemented from above or below the device.
For higher direct voltage up to 440 VDC devices of the S 280 UC series must be used.

Example for max. permissible voltages between conductors depending on the number of poles and type of connection.



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



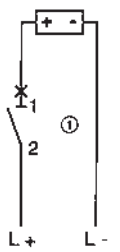
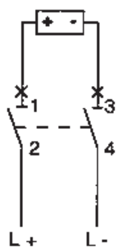
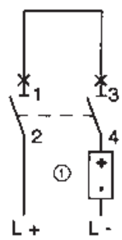
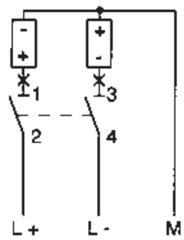
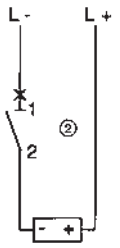
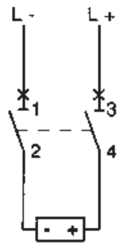
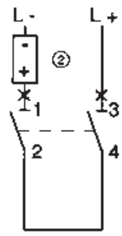
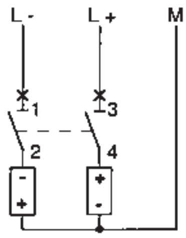
MCBs technical details
S 200 UDC series DC Applications

DC = Direct Current
S 200 UDC MCBs can be used in the one-pole version as 60 V DC, and in the 2-pole version with series connection of two poles up to 125 V DC.

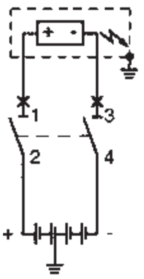
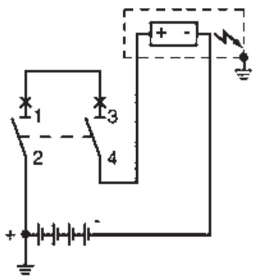
S 200 UDC contains fitted permanent magnets, which assists in the forced extinguishing of the arc.
If voltages to earth exceeding 60 V DC may occur, 2-pole S 200 UDC is to be used for one-pole disconnection.

For DC incoming supply from above S 200 UDC-… 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 to 3 (+).

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

voltage between conductors	Un	60 V–	125 V–	125 V–	125 V–
voltage between conductor and earth	Un	60 V–	60 V–	125 V–	60 V–
MCB		1-pole	2-pole	2-pole	2-pole
		S 201 UDC	S 202 UDC	S 202 UDC	S 202 UDC
supply from below					
supply from above					

Examples for different voltage levels betweeen conductor and earth in the case of identical voltage between conductors:

voltage between conductors	Un	125 V– all-pole disconnection	125 V– 1-pole disconnection
voltage between conductor and earth	Un	60 V– circuit symmetrically earthed	125 V– circuit unsymmetrically earthed
MCB		2-pole	2-pole
		S 202 UDC	S 202 UDC
			

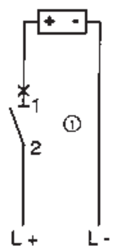
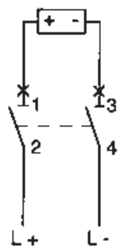
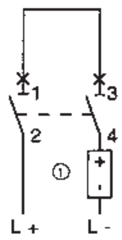
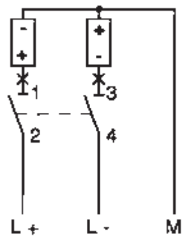
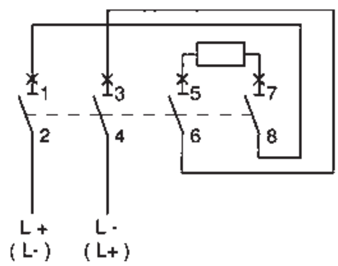
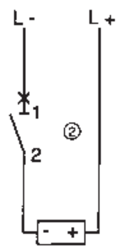
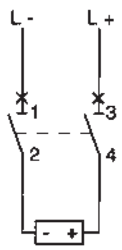
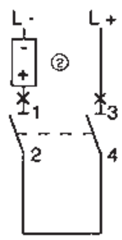
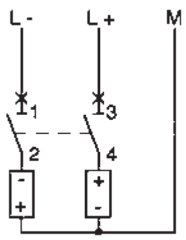
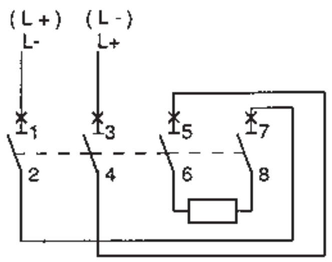
① in the circuit diagram, the negative pole is earthed.
② in the circuit diagram, the positive pole is earthed.

MCBs technical details
S 200 MUC series AC/DC Applications

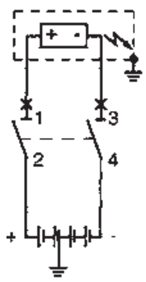
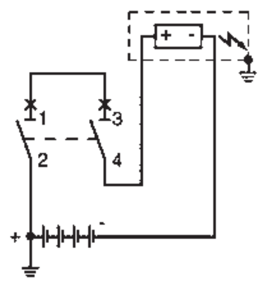
UC = Universal Current = AC/DC

S 200 MUC MCBs can be used in the one-pole version as 220 V DC, and in the 2-pole or 4-pole version with series connection of two poles up to 440 V DC.
S 200 MUC contains fitted permanent magnets, which assists in the forced extinguishing of the arc.
If voltages to earth exceeding 220 V DC may occur, 2-pole S 200 MUC is to be used for one-pole disconnection, and four-pole S 200 MUC for all-pole disconnection.
For DC incoming supply from above S 200 MUC-... 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 to 3 (+).

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

voltage between conductors	U_n	220 V–	440 V–	440 V–	440 V–	440 V– (voltage reversal)
voltage between conductor and earth	U_n	220 V–	220 V–	440 V–	220 V–	220 V–
MCB		1-pole	2-pole	2-pole	2-pole	4-pole
		S 201 MUC	S 202 MUC	S 202 MUC	S 202 MUC	S 204 MUC
supply from below						
supply from above						

Examples for different voltage levels betweeen conductor and earth in the case of identical voltage between conductors:

voltage between conductors	U_n	440 V– all-pole disconnection	440 V– 1-pole disconnection	440 V– all pole disconnection
voltage between conductor and earth	U_n	220 V– circuit symmetrically earthed	440 V– circuit unsymmetrically earthed	440 V– circuit unearthed or unsymmetrically earthed
MCB		2-pole	2-pole	4-pole
		S 202 MUC	S 202 MUC	S 204 MUC
				

① in the circuit diagram, the negative pole is earthed. ② in the circuit diagram, the positive pole is earthed.

MCBs technical details
Use of MCBs in altitude and different network frequency

Performance in altitude of MCBs
Up to the height of 2000 m, MCBs do not undergo any alterations in their rated performances. Over this height the properties of the atmosphere change in terms of composition, dielectric capacity, cooling capacity and pressure, therefore the performances of the MCBs undergo derating, which can basically be measured in terms of variations in significant parameters, such as the maximum operating voltage and the rated current.

S 200/S 200 M/S 200 P/ S 200 S

Altitude	[m]	2000	3000	4000
Rated service voltage Ue	[V]	440	380	340
Rated current In		In	0.96xIn	0.93xIn

S800

Altitude	[m]	2000	3000	4000	5000
Rated impulse withstand voltage Uimp	[V]	8	6	6	6
Rated operational voltage Ue	[V]	690	600	540	470
Max. rated current In		In	0.96xIn	0.93xIn	0.9xIn

Variation of tripping thresholds of MCBs according to network frequency
The circuit-breakers are calibrated for a current with a frequency range between 50 and 60 Hz.

	AC			DC
	100 Hz	200 Hz	400 Hz	
Multiplier	1.1	1.2	1.5	1.5

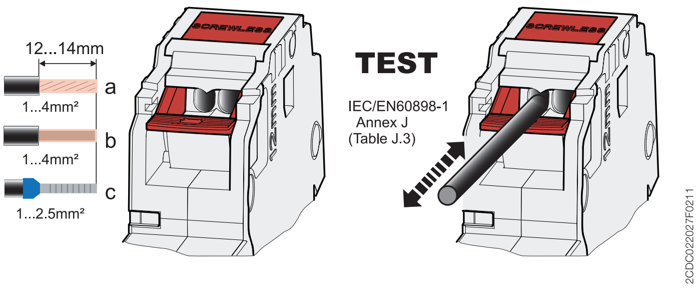
The thermal tripping performance is independent from the network frequency.

Example:
S 202 C10 supplied at 50-60 Hz, the electro-magnetic tripping current is: 50 A≤Im≤100 A;
S 202 C10 supplied at 400 Hz, the electro-magnetic tripping current is: 75 A≤Im≤150 A.

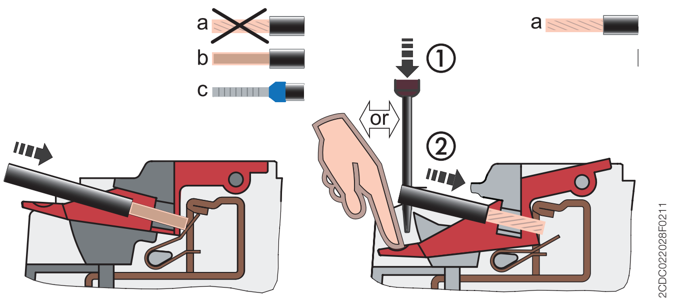
Instruction for use of S 200 S

Connection and disconnection of different types of cables on the load side

Type of cables and cross sections

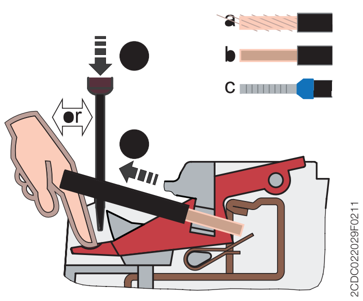


Connection of cables



- Connection of one cable per opening.
- Rigid and flexible cables with end sleeves may be directly connected.
- If flexible cables without end sleeves are to be connected, the terminal must be opened. Splicing of the wires must be avoided.
- The cable must be inserted into the terminal either as far as possible or in such a way that a sufficient connection is obvious.
- The tightness of the connection must be checked.

Disconnection of cables



The cables may only be removed after operating the terminal's opening mchanism.

- If one cable is removed, the correct position of the remaining cable must be checked.

Processing instructions

The screwless terminal at the load side of the S 200 S is designed so that copper cables basically may be connected without further preparation. If end sleeves are used as splicing protection for flexible cables, the compression of the end sleeves must comply with the pull-out forces in accordance with standard IEC/EN 60898-1 table J.3.

Recommended tools for flexible cables with end sleeves

Crimp tool with trapezoid compression profile

Wire stripping length / size of end sleeves for all cables

Wire stripping length and end sleeve length 12 (+2) mm

Distribution boards with metal cover

The distance from a metallic cover to the “shoulder” of the miniature circuit breaker must be at least 6 mm on the load side due to the arrangement of the easiliy accessible measurement point.

MCBs technical details
Particular supply sources and loads

Lighting circuit protection

Selection of circuit-breakers for the protection of lighting circuit and calculation of their rated current

To select the correct circuit-breaker for use in the protection of lighting circuits you need to know the type of load based on which you will work out the breaker's rated current. The protection circuit utilization current can be calculated simply starting with the rated power and the lighting voltage, or it may be supplied directly by the device manufacturer. Considering the utilization current, it is important to select the version of the breaker with a rated current just above the value calculated, defining the cable cross-section accordingly. The tables below show the rated current values of the circuit-breakers to be used according to the type and power of the device connected.

Table 1 High pressure discharge lamps

230 V and 400 VAC three-phase with or without power factor correcting capacitors, star or delta connection

Mercury vapour fluorescent lamp	Pw [W]	<700	<1000	<2000
	I [A]	6	10	16
Mercury vapour metal halogen lamp	Pw [W]	<375	<1000	<2000
	I [A]	6	10	16
High pressure sodium discharge lamp	Pw [W]	<400		<1000
	I [A]	6		16

Table 2 Fluorescent lamps

230 VAC single-phase/three-phase with neutral (400 V), with star connection.
The tables indicate the rated current of the circuit-breakers according to the lamp power and type of power supply.

Example of calculation

- Starter dissipated power: 25% of lamp power
- Reference temperature: 30 and 40 °C according to circuit-breaker
- Power factor: lamp without capacitors cos φ=0.6
  lamp with capacitors cos φ=0.86

Method of calculation

- IB = (PL * n°L * KST * KC) / (Un * cos φ) where:
  - Un = rated voltage 230 V
  - cos φ = power factor
  - PL = lamp power
  - n°L = number of lamps per phase
  - KST = 1.25
  - KC = 1 for star connection and 1.732 for delta connection

Type of lamp	Tube diss. pwr. [W]	Number of lamps per phase													
Single without capacitors	18	4	9	14	29	49	78	98	122	157	196	245	309	392	490
	36	2	4	7	14	24	39	49	61	78	98	122	154	196	245
	58	1	3	4	9	15	24	30	38	48	60	76	95	121	152
Single with capacitors	18	7	14	21	42	70	112	140	175	225	281	351	443	562	703
	36	3	7	10	21	35	56	70	87	112	140	175	221	281	351
	58	2	4	6	13	21	34	43	54	69	87	109	137	174	218
Double with capacitors	2x18=36	3	7	10	21	35	56	70	87	112	140	175	221	281	351
	2x36=72	1	3	5	10	17	28	35	43	56	70	87	110	140	175
	2x58=116	1	2	3	6	10	17	21	27	34	43	54	68	87	109
In [A] - 2P and 4P circuit-breakers		1	2	3	6	10	16	20	25	32	40	50	63	80	100

Fluorescent lamps. 230 VAC three-phase – Delta connection

Type of lamp	Tube diss. pwr. [W]	Number of lamps per phase													
Single without capacitors	18	2	5	8	16	28	45	56	70	90	113	141	178	226	283
	36	1	2	4	8	14	22	28	35	45	56	70	89	113	141
	58	0	1	2	5	8	14	17	21	28	35	43	55	70	87
Single with capacitors	18	4	8	12	24	40	64	81	101	127	162	203	255	324	406
	36	2	4	6	12	20	32	40	50	64	81	101	127	162	203
	58	1	2	3	7	12	20	25	31	40	50	63	79	100	126
Double with capacitors	2x18=36	2	4	6	12	20	32	40	50	64	81	101	127	162	203
	2x36=72	1	2	3	6	10	16	20	25	32	40	50	63	81	101
	2x58=116	0	1	1	3	6	10	12	15	20	25	31	39	50	63
In [A] - 3P circuit-break.		1	2	3	6	10	16	20	25	32	40	50	63	80	100

Transformer protection

Insertion current

When the LV/LV transformers are powered up, very strong currents occur, which must be considered when selecting the protective device. The peak value of the first current wave often reaches a value between 10 and 15 times the transformer's effective rated current.

For power ratings below 50 kVA, it may reach between 20 and 25 times the rated current. This transient current decreases very rapidly with a time constant T varying from several ms to 10, 20 ms.

Main protection on the primary side

The tables below are the result of a set of tests on co-ordination between circuit-breakers and BT/BT transformers. The transformers used in the tests are normalized. The table, referring to a primary supply voltage of 230 or 400 V and to single-phase and three-phase transformers, indicate which circuit-breaker should be used according to the transformer power rating.
The transformers considered have the primary winding outside the secondary winding.
The circuit-breakers suggested allow:
- transformer protection in the event of maximum short-circuit;
- prevention of unwanted tripping when the primary winding is powered up using
  1. modular circuit-breakers with a high magnetic threshold, curve D or K
- 2. circuit-breakers with magnetic only releaser;
- guaranteed circuit-breaker electrical life.

Protection on the secondary side

Due to the transformer's high insertion current, the circuit-breaker on the primary winding may not guarantee thermal protection for the transformer and its feeder line on the primary side.

This is typical of modular circuit-breakers which must have a higher rated current than the transformers. In such cases, in the event of a single-phase short-circuit at the transformer's primary terminals (minimum Icc at end of line), check that the circuit-breaker's magnetic releaser is tripped. In the normal application in distribution panels, this condition is always satisfied provided that the length of the feeder lines is reduced.

The transformer can be provided with thermal protection by installing a circuit-breaker with a rated current less than or equal to that of the transformer secondary winding immediately downstream of the LV/LV transformer.

In lighting systems protection against overloads is not necessary if the number of light points is clearly defined (no overloads).

Moreover, the Standard in force for these systems recommends the omission of protection against overloads in circuits in which unwanted tripping may prove hazardous, e.g.: circuits which supply fire-fighting equipment.

MCBs technical details
Particular supply sources and loads

Single-phase transformer (primary voltage 230 V)-1P and 1P+N MCBs

Pn [kVA]	In [A]	ucc (%)	Circuit-breaker on primary side (1) and (2)
0.1	0.4	13	S 2* D1 o K1
0.16	0.7	10.5	S 2* D2 o K2
0.25	1.1	9.5	S 2* D3 o K3
0.4	1.7	7.5	S 2* D4 o K4
0.63	2.7	7	S 2* D6 o K6
1	4.2	5.2	S 2* D10 o K10
1.6	6.8	4	S 2* D16 o K16
2	8.4	2.9	S 2* D16 o K16
2.5	10.5	3	S 2* D20 o K20
4	16.9	2.1	S 2* D40 o K40
5	21.1	4.5	S 2* D50 o K50
6.3	27	4.5	S 2* D63 o K63

Single-phase transformer (primary voltage 400 V)-2P MCBs

Pn [kVA]	In [A]	ucc (%)	Circuit-breaker on primary side (1) and (2)
1	2.44	8	S 2* D6 o K6
1.6	3.9	8	S 2* D10 o K10
2.5	6.1	3	S 2* D16 o K16
4	9.8	2.1	S 2* D20 o K20
5	12.2	4.5	S 2* D32 o K32
6.3	15.4	4.5	S 2* D40 o K40
8	19.5	5	S 2* D50 o K50
10	24	5	S 2* D63 o K63
12.5	30	5	S 2* D63 o K63

Three-phase transformer (primary voltage 400 V)-3P, 3P+N and 4P MCBs

Pn [kVA]	In [A]	ucc (%)	Circuit-breaker on primary side (1) and (2)
5	7	4.5	S 2* D20 o K20
6.3	8.8	4.5	S 2* D20 o K20
8	11.6	4.5	S 2* D32 o K32
10	14	5.5	S 2* D32 o K32
12.5	17.6	5.5	S 2* D40 o K40
16	23	5.5	S 2* D63 o K63
20	28	5.5	S 2* D63 o K63

S 2*.. = S 200, S 200 M, S 200 P
(1) With modular or magnetic only circuit-breakers, without thermal adjustment, thermal protection is required for the transformer's secondary winding.
(2) Breaking capacity selected according to estimated Icc at the point where the breaker is installed.

Double tampoprinting of S 200 P

The breaking capacity

For the modular circuit-breakers realized according to IEC/EN 60898 standard, the breaking capacity is expressed by the Icn quantity, indicated in Ampere, contained within a rectangle on the front side of the device.The max value of rated short-circuit capacity (Icn) considered by this standard is 25000 A.

Always according to IEC/EN 60898 standard, the ratio between the service short-circuit capacity (Ics) and the rated short-circuit capacity (Icn) – K factor – shall have to be conforming to the enclosed table.

Icn	K
< 6000 A	1
> 6000 A < 10000 A	0.75(*)
>10000 A	0.5(**)

(*) Ics minimum value: 6000 A (**) Ics minimum value: 7500 A

Limiting class

The Manufacturer of the circuit-breaker has the right to declare the energy limiting class of the device. According to IEC/EN 60898 standard, the Manufacturer classifies the circuit-breaker with a limiting class which ranges from 1 to 3 according to the I2t values let though by the circuit-breaker for rated current up to 16 A and rated currents exceeding 16 A up to 32 A included, according to the table below.

Rated current up to 16 A:

Short-circuit rated capacity	Limited energy classes				
	1	2		3	
	I2t max (A2s)	I2t max (A2s)		I2t max (A2s)	
(A)	B-C Type	B Type	C Type	B Type	C Type
3000	No limits are specified	31000	37000	15000	18000
4500		60000	75000	25000	30000
6000		100000	120000	35000	42000
10000		240000	290000	70000	84000

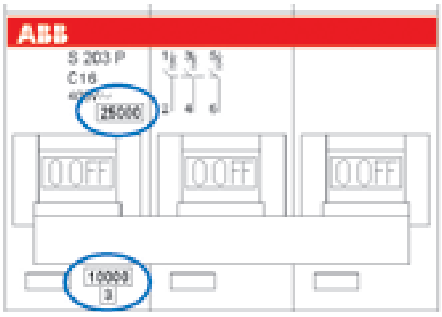
Rated current exceeding 16 A up to 32 A included:

Short-circuit rated capacity	Limited energy classes				
	1	2		3	
	I2t max (A2s)	I2t max (A2s)		I2t max (A2s)	
(A)	B-C Type	B Type	C Type	B Type	C Type
3000	No limits are specified	40000	50000	18000	22000
4500		80000	100000	32000	39000
6000		130000	160000	45000	55000
10000		310000	370000	90000	110000

MCBs technical details
Particular supply sources and loads

For instance, a circuit-breaker with rated current 16 A, B characteristic, with short-circuit rated capacity equal to 6 kA belongs to class 3 if it lets through max 35000 A^2s of specific energy.
The limiting class value (1, 2 or 3) is indicated on the front side of the device, within a square, in addition to the breaking capacity.

As regards the miniature circuit-breakers S200P series, two different breaking capacities are indicated on the front side of the device, contained in a rectangle.
The breaking capacity indicated above the operating toggle is the one of the device, according to IEC/EN 60898 standard, the breaking capacity indicated under the lever is regarding the limiting class which, according to the standard, can be expressed only for values up to 10000 A.



2CSC400227F0201

MCBs technical details
WT63

Motor starter combinations acc. to IEC/EN 60947-4-1

690 V AC, 35 kA, type 2, normal start-up

Motor		Short-circuit protection		Contactor		Overload protection		Wiring	
Rated output	Rated current	Current limiter	Manual motor starter	Tripping current	Type	Safety clearance	Type	Current setting range	WT63-MMS
[kW]	[A]			[A]		[mm]		[A]	[mm^2]
0.37	0.61	WT63-3 or WT63-3 HS	MS/MO 325-1.0	11.50	A9	15	TA 25 DU 1.0	0.63-1.0	max. 16
1.5	2.08		MS/MO 325-2.5	28.75	A12	15	TA 25 DU 2.4	1.7-2.4	max. 16
1.1	2.36		MS/MO 325-2.5	28.75	A12	15	TA 25 DU 3.1	2.3-3.1	max. 16
3	3.6		MS/MO 325-4.0	40.00	A12	15	TA 25 DU 4.0	2.8-4.0	max. 16
4	4.97		MS/MO 325-6.3	78.75	A26	15	TA 25 DU 6.5	4.5-6.5	max. 16
7.5	8.7		MS/MO 325-12.5	187.50	A26	15	TA 25 DU 11	7.5-11	max. 16

For further combinations please contact the manufacturer.

Application notes
- WT63 may only be used for motor starter combinations confirmed by the manufacturer
- Max. no. of motor groups to be protected by WT63: 5
- The wiring between WT63 and MMS has to be short-circuit proof
- WT63 has to be installed with fitted terminal covers (factory assembled)
- The max. total operating current of WT63 has to be limited to 63 A, the max. total start-up current shall not exceed 450 A

For more details see separate product brochure.

MCBs technical details
Special features of S800-SCL-SR

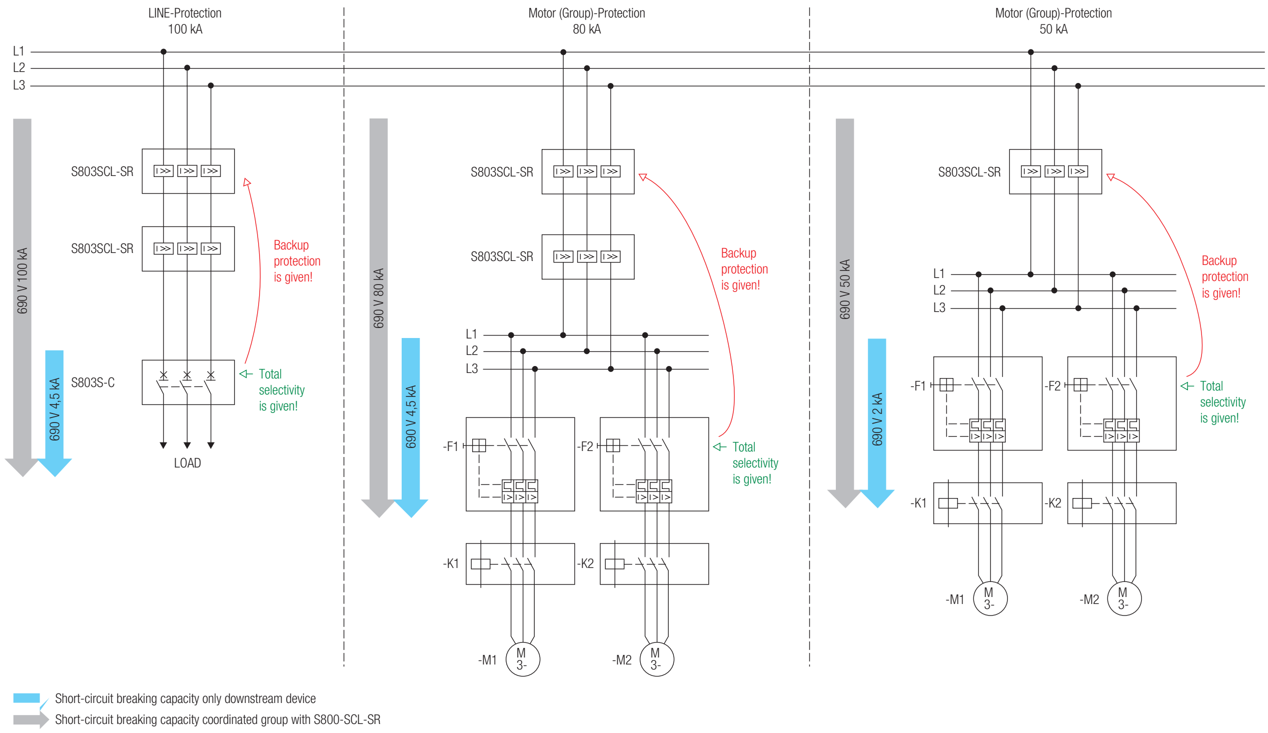
Group protection
In comparison to other short-circuit limiter you need only one S800-SCL-SR for several motor starters or high performance miniature circuit breakers.
Therefore the main application of the new S800-SCL-SR is group protection.
Several downstream motor protection combinations or several high performance miniature circuit breakers can be protected with only one S800-SCL-SR.

Single-line protection
For single-line protection we recommend to use the standard short-circuit limiter S803S-SCL. It has a toggle and will trip in case of a failure.

Current continuity
In case of a failure by using the S800-SCL-SR as group protection only the defective device will trip; all other devices will keep doing their work.
Therefore you will have a very low breakdown, because only one motor will stop and not all of them.

Maximum system availability is given.

Schematic examples for rated currents up to 100 A



S803S-SCL
Short-circuit current limiter
The S803S used together with an S803S-SCL ensures reliable switch-off of short-circuit currents up to 100 kA, at an operating voltage of 440 VAC and over the entire rated current range of up to 125 A.
For applications at 690 VAC, the combination of S803S-SCL ensures reliable short-circuit protection up to 50 kA; here also, this is ensured over the entire rated current range up to 125 A, typical for the S800.

Example combinations	Rated operational voltage Ue	Ultimate short-circuit breaking capacity Icu	Service short-circuit breaking capacity Ics
S803S-SCL125 +	440 VAC	100 kA	100 kA
S803S-C125	690 VAC	50 kA	50 kA
S803S-SCL63 +	440 VAC	100 kA	100 kA
S803S-K63	690 VAC	50 kA	50 kA
S803S-SCL32 +	440 VAC	100 kA	100 kA
S803S-B16	690 VAC	50 kA	50 kA

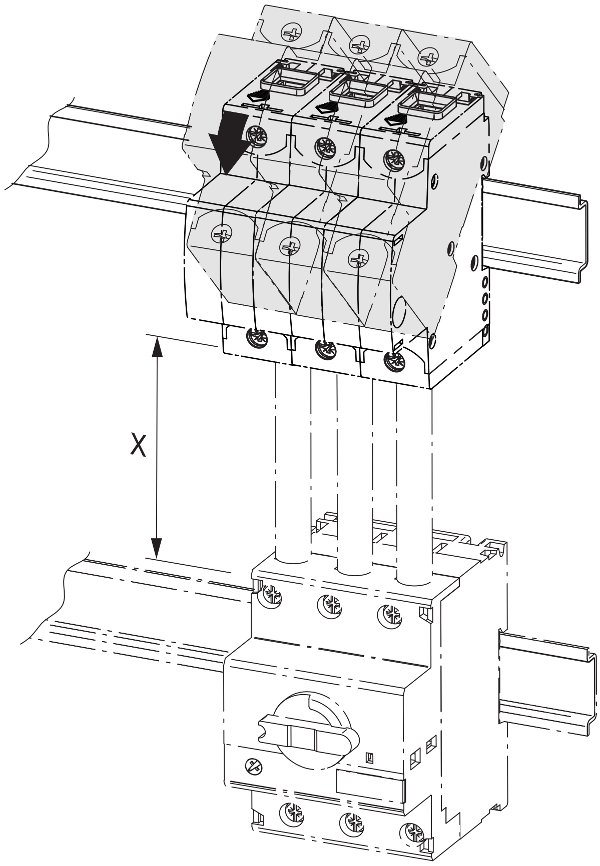
Special features of S800-SCL-SR

S800-SCL-SR

Self-resetting short-circuit limiter

The S800-SCL-SR can be used together with S800S High Performance MCB or Manual Motor Starters. It limits the short-circuit current until the downstream means of protection trips. Its current continuity makes it as the ideal solution for group protection. All parallel branches remain operative.

Minimum cable length between S800-SCL-SR/S803S-SCL and downstream devices (Connection has to be shortcircuit proofed acc. to IEC 61439-1)



MS/M0325
MS/M0132
S800

S800-SCL-SR/S803S-SCL	min. length X	min. cross section
32 A	80 mm	6 mm^2
63 A	80 mm	16 mm^2
100/125 A	250 mm	35 mm^2

Approved combinations with high performance MCB S800

Downstream devices				Upstream devices		
	S800S-SCL-SR/S803W-SCL-SR Self resetting short-circuit limiter			S803S-SCL Short-circuit limiter		
Rated current Ie [A]	32	63	100	32	63	125
S800S Characteristic B						
6	■					
8	■					
10	■	■	■	■		
13	■	■	■	■		
16	■	■	■	■		
20	■	■	■	■		
25	■	■	■	■		
32	■	■	■	■	■	
40		■	■		■	
50		■	■		■	
63		■	■		■	■
80			■			■
100			■			■
125						■
S800S Characteristic C						
6	■					
8	■					
10	■	■	■	■		
13	■	■	■	■		
16	■	■	■	■		
20	■	■	■	■		
25	■	■	■	■		
32		■	■	■	■	
40		■	■		■	
50		■	■		■	
63			■		■	■
80			■			■
100						■
125						■
S800S Characteristic D/K						
6	■					
8	■					
10	■	■	■	■		
13	■	■	■	■		
16	■	■	■	■		
20		■	■	■		
25		■	■	■		
32		■	■	■	■	
40		■	■		■	
50			■		■	
63					■	■
80						■
100						■
125						■

MCBs technical details
Special features of S800-SCL-SR

Approved combinations with motor starter/S800S-KM

Downstream devices				Upstream devices		
	S800S-SCL-SR/S803W-SCL-SR Self resetting short-circuit limiter			S803S-SCL Short-circuit limiter		
Rated current Ie [A]	32	63	100	32	63	125
MS/MO325						
0.1– 2.5	■	■	■			
4	■	■	■			
6.3	■	■	■			
9	■	■	■	■	■	
12.5	■	■	■	■	■	
16	■	■	■	■	■	
20		■	■	■	■	
25		■	■	■	■	
MS/MO132						
0.1– 2.5	■	■				
4	■	■				
6.3	■	■	■			
10	■	■	■	■	■	
16	■	■	■	■	■	
20		■	■	■	■	
25		■	■	■	■	
32		■	■	■	■	
S800S-KM						
20		■	■	■		
25		■	■	■		
32		■	■	■	■	
40		■	■		■	
50			■		■	
63			■		■	■
80						■

* Motor starter combinations acc. to IEC 60947-4-1

■ Applies for all voltages according to the table below

		S800S-SCL-SR	S803W-SCL-SR	S803S-SCL
Rated ultimate short-circuit breaking capacity				
Icu = Ics according to IEC 60947-2				
(AC) 50/60 Hz 240/415 V	kA	100	100	
(AC) 50/60 Hz 254/440 V	kA	100	100	100
(AC) 50/60 Hz 277/480 V	kA	65	65	
(AC) 50/60 Hz 289/500 V	kA	65	65	
(AC) 50/60 Hz 346/600 V	kA	65	65	
(AC) 50/60 Hz 400/690 V	kA	50	50	50
Short-circuit rating according to UL 508, CSA 22.2				
(AC) 50/60 Hz 480 V	kA	65		
(AC) 50/60 Hz 600 V	kA	65		

Internal resistance at 25°C ambient temperature and nominal power losses

Rated operational current Ie	Internal resistance Ri	Power losses Pvn
[A]	[mΩ]	[W]
32	2.8	3.6
63	1.3	5.7
100	0.7	7.8

2

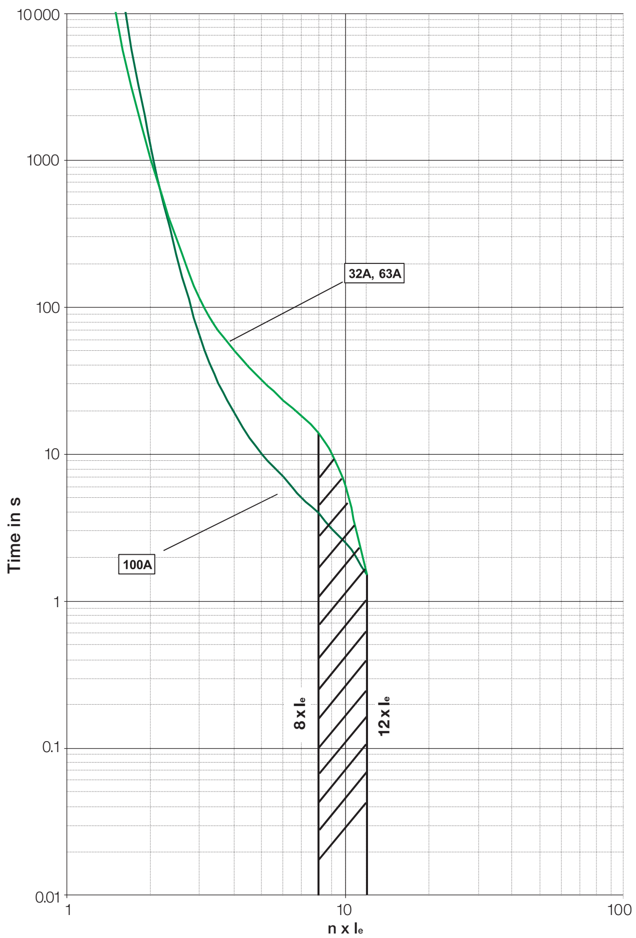
Influence of ambient temperature – single mounted devices

Rated operational current Ie [A]	10°C	15°C	20°C	25°C	30°C	35°C	40°C	45°C	50°C	55°C	60°C	65°C	70°C
32	38.2	37.2	35.8	35.2	34.2	33.3	32	30.7	29.8	28.8	27.8	26.5	25.1
63	75.3	73.2	70.6	69.3	67.4	65.5	63	60.5	58.6	56.7	54.8	52.3	49.8
100	119.5	116.2	112	110	107	104	100	96	93	90	87	84	80

Installation requirements

The total sum of the rated currents of all downstream motor starters or circuit breakers shall not exceed the rated current of the S800-SCL-SR. Furthermore the sum of all load currents including inrush currents shall not exceed the maximum permissible load of the S800-SCL-SR.

Maximum load



Multiple of the rated current I_e

Example:

You have 8 manual motor starters with each 5A as rated operational current

Sum: 8 x 5A = 40A

You have to use either the 63A or 100A S803-SCL-SR.

In this example we use the 63A version

We know that our maximum load is 245A. Thus we have to calculate if this maximum load can be handled with the 63A version and if yes, for how many seconds.

245A / 63A = 389 ~ 4

So now you have to have a look where the multiplier „4“ crosses the graph of the 63A version. Go to the left to have a look how many seconds this load can be handled.

In this example a load of 252A can be handled for max. 50 seconds

Please note: Stay always on the left side of the graph, otherwise the S800-SCL-SR will get damaged

MCBs technical details
Special features of S800-SCL-SR

Approved combinations with S803HV-K

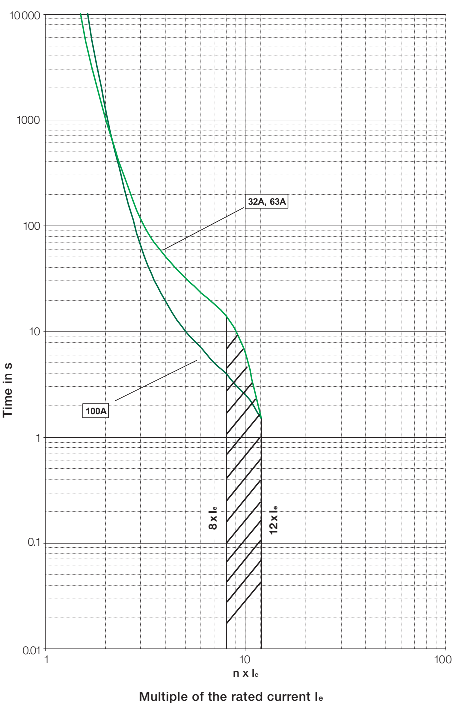
Downstream devices	Upstream devices S803HV-SCL-SR Self resetting short-circuit limiter		
Rated operational current Ie [A]	32	63	100
6	■		
8	■		
10	■	■	■
13	■	■	■
16		■	■
20		■	■
25		■	■
32		■	■
40		■	■
50			■
63			■
80			
100			
125			

Influence of ambient temperature – single mounted devices

Rated operational current In [A]	10 °C	15 °C	20 °C	25 °C	30 °C	35 °C	40 °C	45 °C	50 °C	55 °C	60 °C	65 °C	70 °C
32	38.2	37.2	35.8	35.2	34.2	33.3	32	30.7	29.8	28.8	27.8	26.5	25.1
63	75.3	73.2	70.6	69.3	67.4	65.5	63	60.5	58.6	56.7	54.8	52.3	49.8
100	119.5	116.2	112	110	107	104	100	96	93	90	87	84	80

Installation requirements

The total sum of the rated currents of all downstream S803HV-K shall not exceed the rated current of the S803HV-SCL-SR. Furthermore the sum of all load currents including inrush currents shall not exceed the maximum permissible load of the S803HV-SCL-SR.



Solutions for electrical distribution in buildings - Technical details
RCDs

RCDs technical details

RCDs technical details
Functions and classification criteria for RCDs

Functions and classification criteria for RCDs

A residual current operated circuit-breaker is an amperometric protection device which is tripped when the system leaks a significant current to earth.

This device continuously calculates the vector sum of the single-phase or three-phase system line currents and while the sum is equal to zero allows electricity to be supplied. This supply is rapidly interrupted if the sum exceeds a value preset according to the sensitivity of the device.

Residual current operated circuit-breakers can be classed according to four parameters:
- type of construction
- detectable wave form
- tripping sensitivity
- tripping time.

Depending on the type of construction, RCDs may be classed as:
- RCBOs (magnetothermic with overcurrent protection)
- RCCBs (without overcurrent protection releaser incorporated)
- RCD blocks.

RCBOs combine, in a single device, the residual current function and the overcurrent protection function typical of MCBs. RCBOs are tripped by both current leakage to earth and overloads and short-circuits and they are self-protecting up to a maximum short-circuit current value indicated on the label. RCCBs are only sensitive to current leakage to earth. They must be used in series with an MCB or fuse which protects them from the potentially damaging thermal and dynamic stresses of any overcurrents.

These devices are used in systems already equipped with MCBs which preferably limit the specific energy passing through, also acting as the main disconnecting switches upstream of any derived MCBs (e.g.: domestic consumer unit).

RCD blocks are residual current devices suitable for assembly with a standard MCB. IEC/EN 61009 app. G only allows assembly of RCBOs once on site, that is to say outside the factory, using adaptable RCD blocks and the appropriate MCBs. Any subsequent attempts to separate them must leave permanent visible damage. The residual current operated circuit-breaker obtained in this way maintains both the electrical characteristics of the MCB and those of the RCD block.

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)
- 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).

AC type RCDs are suitable for all systems where users have sinusoidal earth current.

They are not sensitive to impulsive leakage currents up to a peak of 250 A (8/20 wave form) such as those which may occur due to overlapping voltage impulses on the mains (e.g.: insertion of fluorescent bulbs, X-ray equipment, data processing systems and SCR controls).

A type RCDs are not sensitive to impulsive currents up to a peak of 250 A (8/20 wave form).

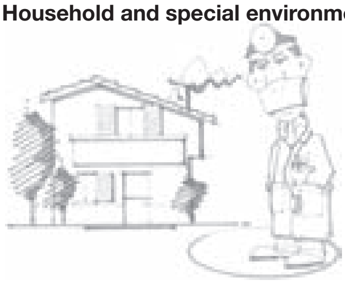
They are particularly suitable for protecting systems in which the user equipment has electronic devices for rectifying the current or phase cutting adjustment of a physical quantity (speed temperature, light intensity, etc.) supplied directly by the mains without the insertion of transformers and insulated in class I (class II is, by definition, free of faults to earth). These devices may generate a pulsating fault current with DC components which the A type RCD can recognise.

B type RCDs are recommended for use with drives and inverters for supplying motors for pumps, lifts, textile machines, machine tools, etc., since they recognise a continuous fault current with a low level ripple.
Type AC, A and B RCDs comply with IEC/EN 61008/61009, moreover type B is covered by IEC 62423 Ed. 1 and by IEC/EN 60755 for residual current operated protective devices.
According to tripping sensitivity (IΔn value), RCDs may be divided into the following categories:

- low-sensitivity (IΔn >0.03 A), not suitable for protection against direct contacts; co-ordinated with the earth system according to the formula IΔn <50/R, to provide protection against indirect contacts;
- high-sensitivity (IΔn: 0.01…0.03 A), or "physiologically sensitivity" for protection against indirect contacts, with simultaneous additional protection against direct contacts.
- against fire (up to 500 mA) according to IEC/EN 60364

Residual current sensitivity and environment

Household and special environments



IΔn ≤30 mA

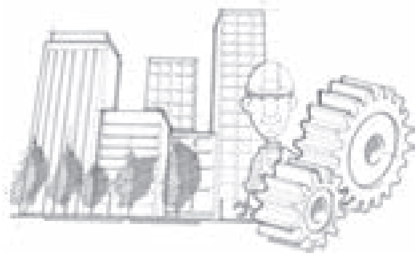
High-sensitivity or physiologically sensitive RCDs

IEC/EN 60364 makes the use of these devices mandatory in all bathrooms, showers and private and public swimming pools and environments in which plugs and sockets may be installed without insulating or low safety voltage transformers.

Laboratories, service industry and small industry

IΔn from 30 mA to 500 mA

Large service industry and industrial complex



IΔn from 500 mA to 1000 mA

Low-sensitivity RCDs

According to their tripping time, RCDs can be classed as:
- instantaneous (or rapid or general)
- type S selective (or - incorrectly - delayed).

Selective RCDs (RCBOs - RCCBs or RCD-blocks) have a delayed tripping action and are installed upstream of other rapid residual current operated circuit-breakers to guarantee selectivity and limit the power out only to the portion of the system affected by a fault.

Functions and classification criteria for RCDs

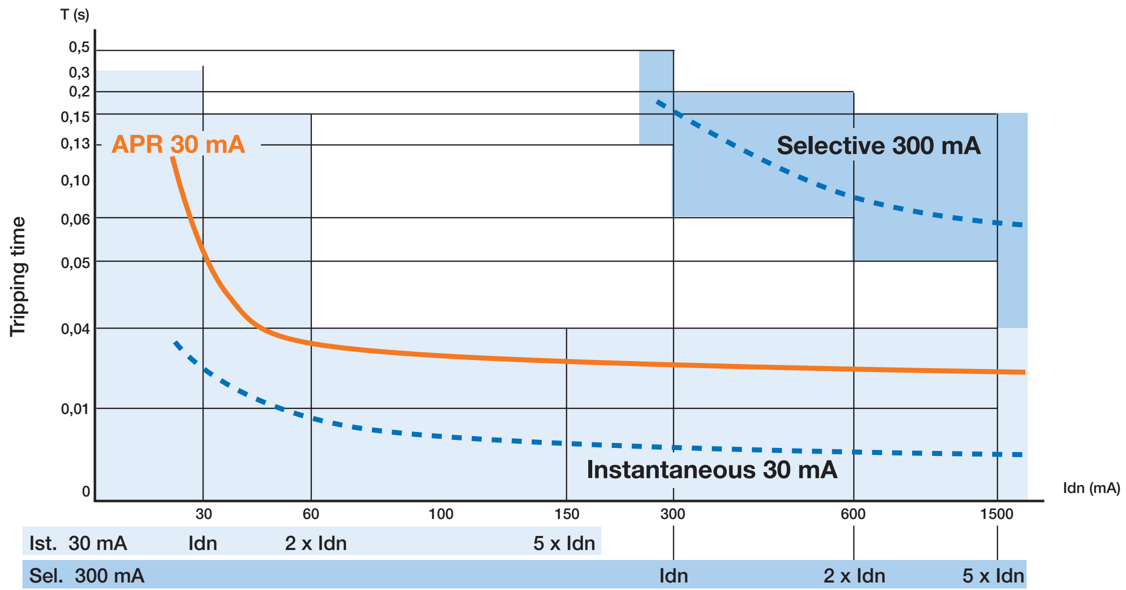
The tripping time is not adjustable. It is set according to a pre-determined time – current characteristic with an intrinsic delay for small currents, tending to disappear as the current grows.

IEC/EN 61008 and 61009 establish the tripping times relative to the type of RCD and the IΔn.

Type AC	In [A]	IΔ [A]	Tripping times (s)xcurrents			
			1xIΔ	2xIΔ	5xIΔ	500A
Generic	Any	Any	0.3	0.15	0.04	0.04
S (selective)	Any	>0.030	0.13-0.5	0.06-0.2	0.05-0.15	0.04-0.15

The indicated maximum tripping times are also valid for A type RCDs, but increasing the current values of factor 1.4 for RCDs with IΔn > 0.01 A and of factor 2 for RCDs with IΔn ≤ 0.01 A.
The range of ABB RCDs also includes AP-R (anti-disturbance) devices which trip according to the limit times allowed by the Standards for instantaneous RCDs. This function is due to the slight tripping delay (approx. 10 ms) relative to the standard instantaneous ones.

The graph shows the comparison of the qualitative tripping curves for:
– a 30 mA instantaneous RCD
– a 30 mA AP-R instantaneous RCD
– a 100 mA selective RCD (type S)

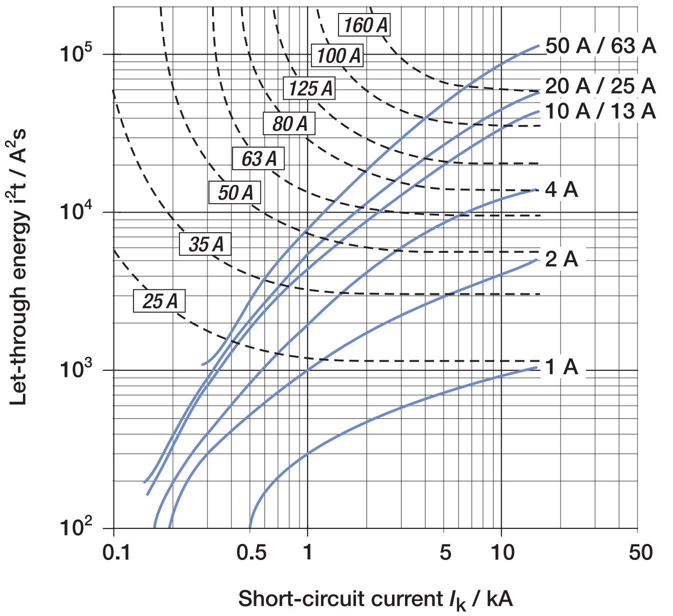


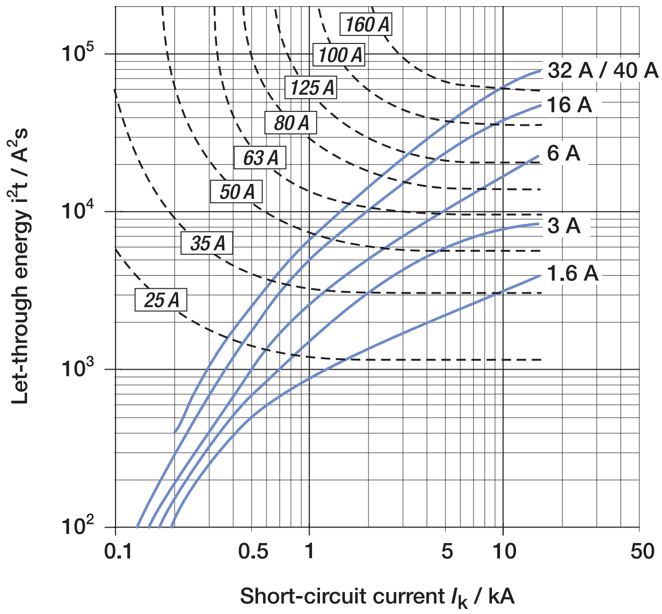
Note: this is a qualitative chart; it is referred only to industrial frequencies of 50-60 Hz.

RCDs technical details
Limitation of specific let-through energy I^2t

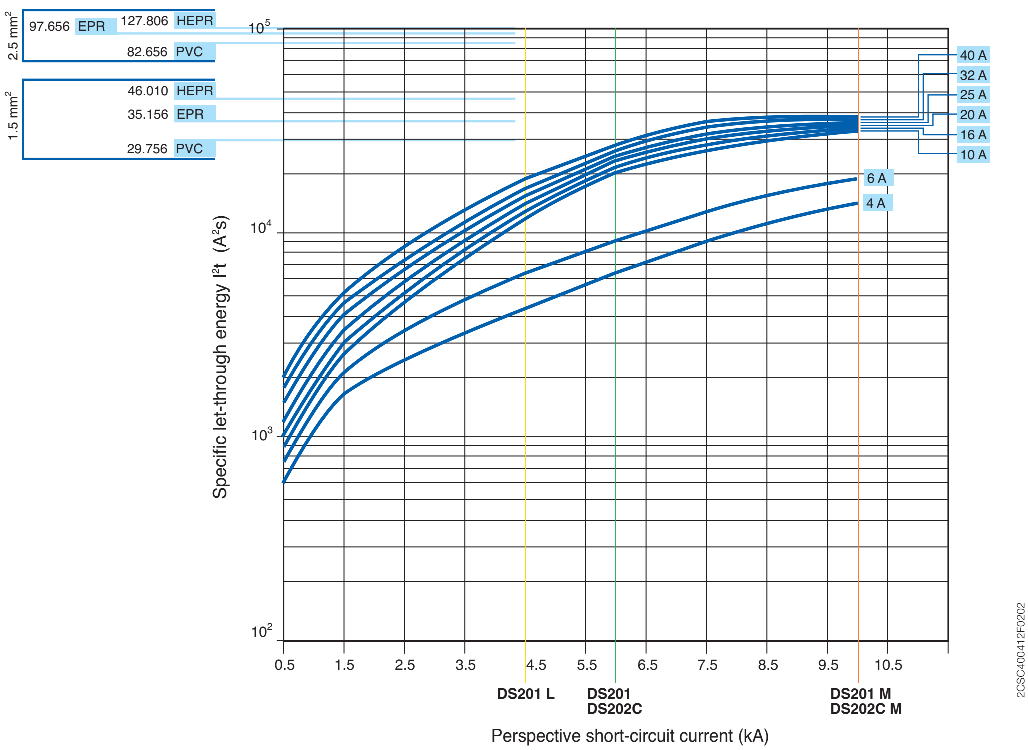
I^2t diagrams - Specific let-through energy value I^2t
The I^2t curves give the values of the specific let-through energy expressed in A^2s (A=amps; s=seconds) in relation to the perspective short-circuit current (Irms) in kA.

DS 200-DS 200 M, characteristics B and C
230/400 V let-through energy



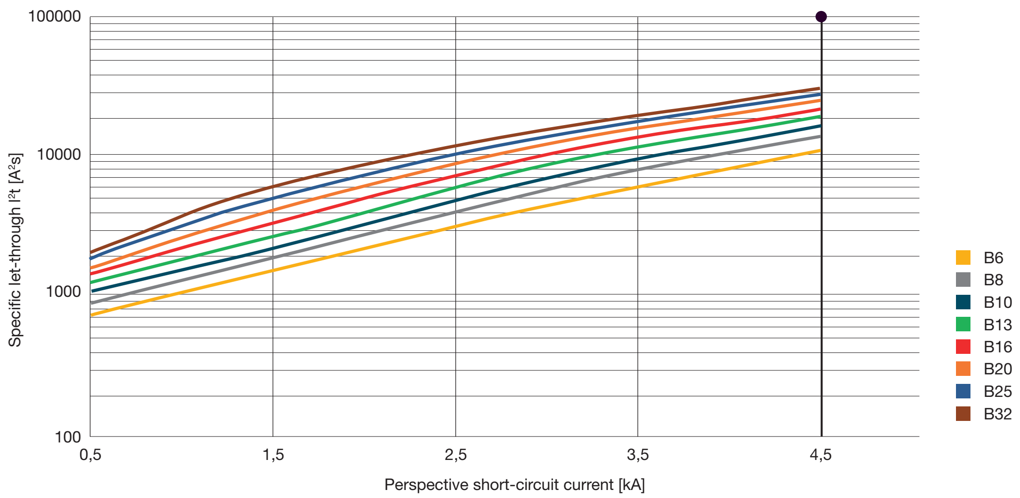


DS201 L - DS201 - DS201 M
DS202C - DS202C M, characteristics B and C
230 V let-through energy

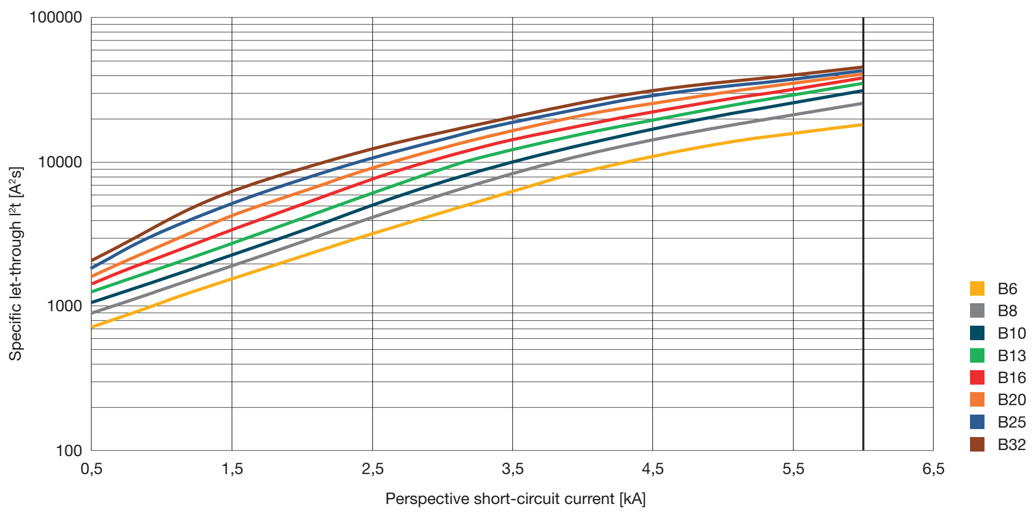


RCDs technical details
Limitation of specific let-through energy I^2t

DS203NC L, characteristic B
400 V let-through energy

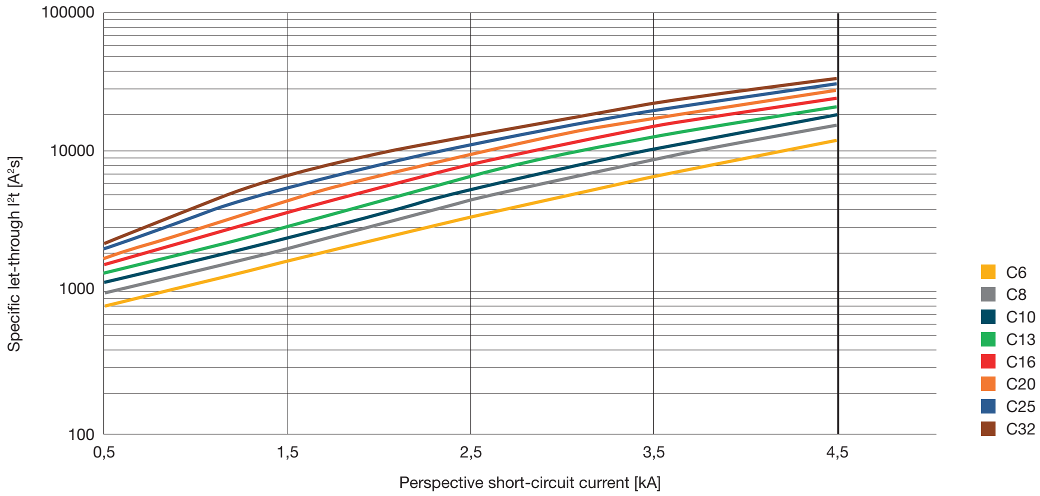


DS203NC, characteristic B
400 V let-through energy



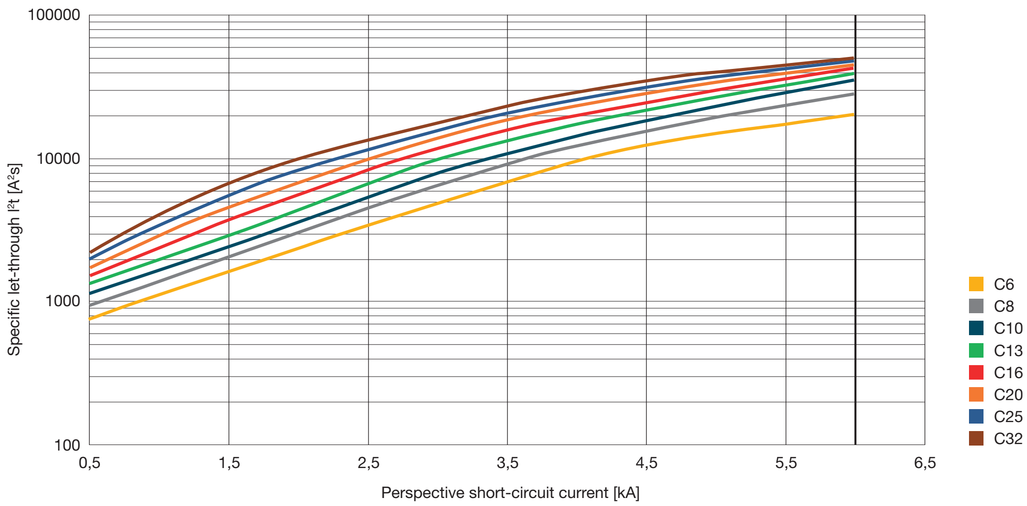
DS203NC L, characteristic C

400 V let-through energy



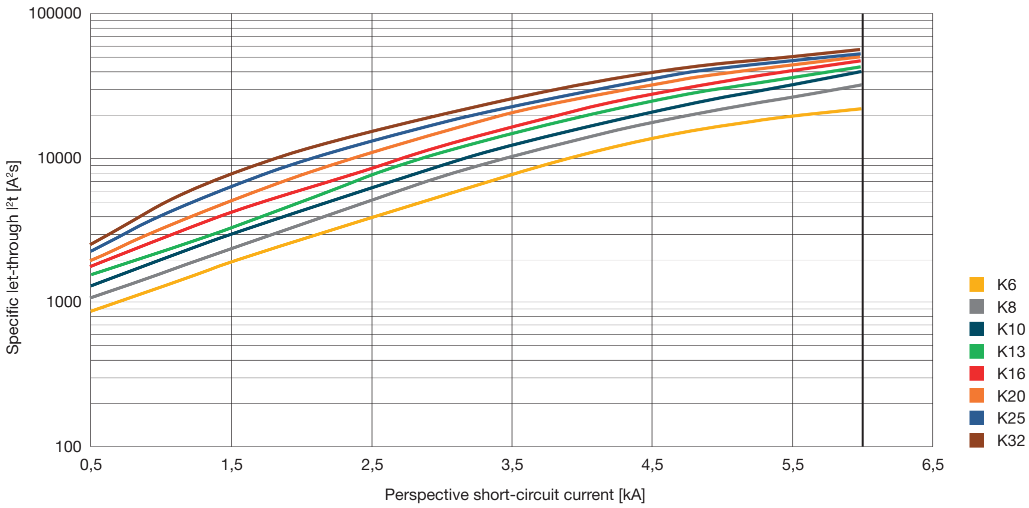
DS203NC, characteristic C

400 V let-through energy



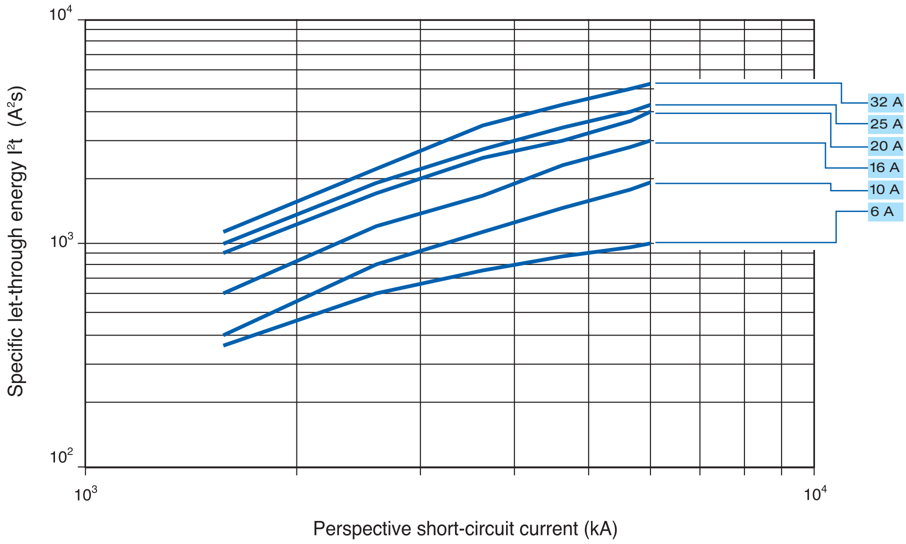
DS203NC, characteristic K

400 V let-through energy



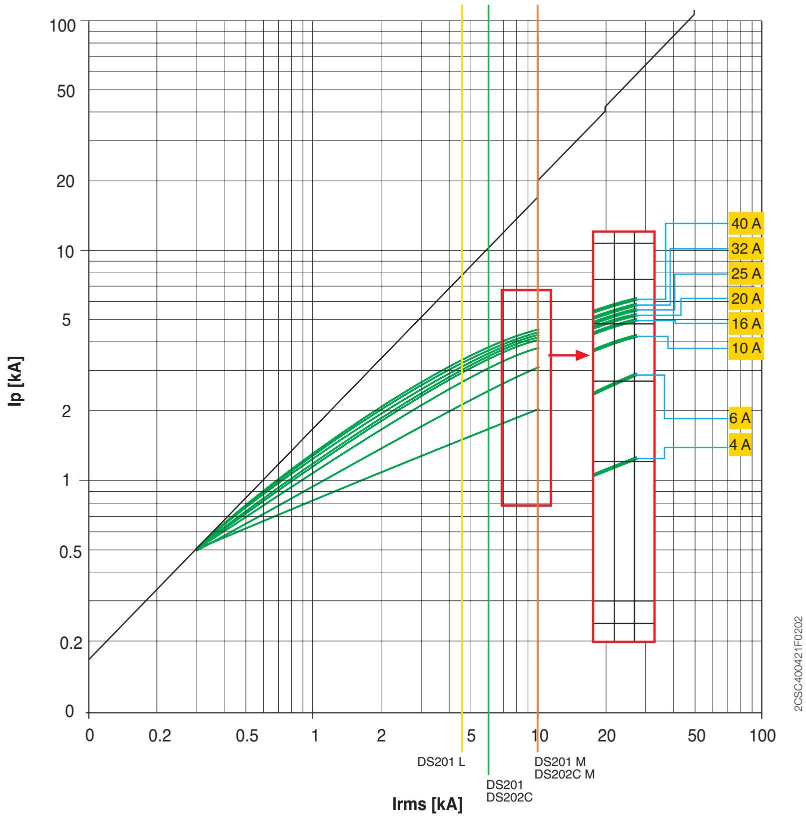
RCDs technical details
Limitation of specific let-through energy I^2t

DS271



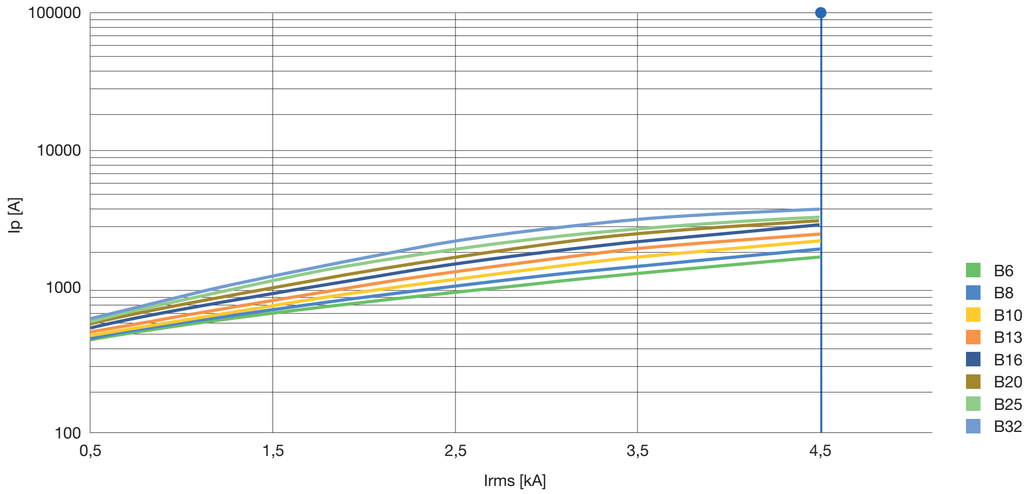
RCDs technical details
Peak current Ip

DS201 L - DS201 - DS201 M
DS202C - DS202C M characteristics B and C
230 V

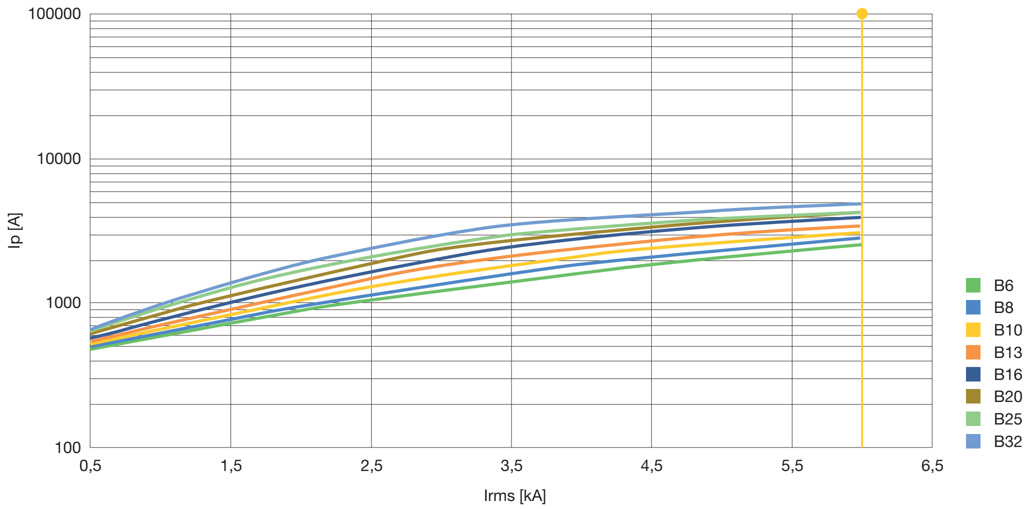


RCDs technical details
Peak current Ip

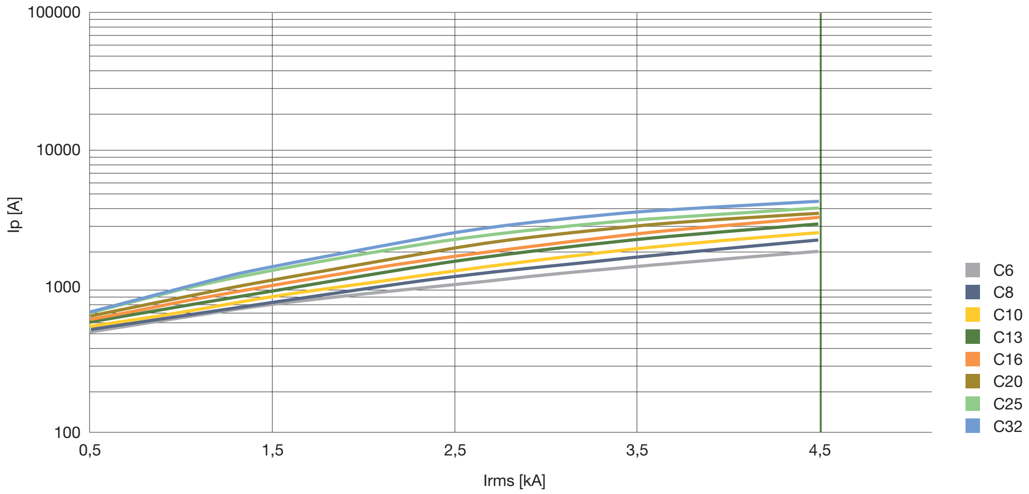
DS203NC L, characteristic B



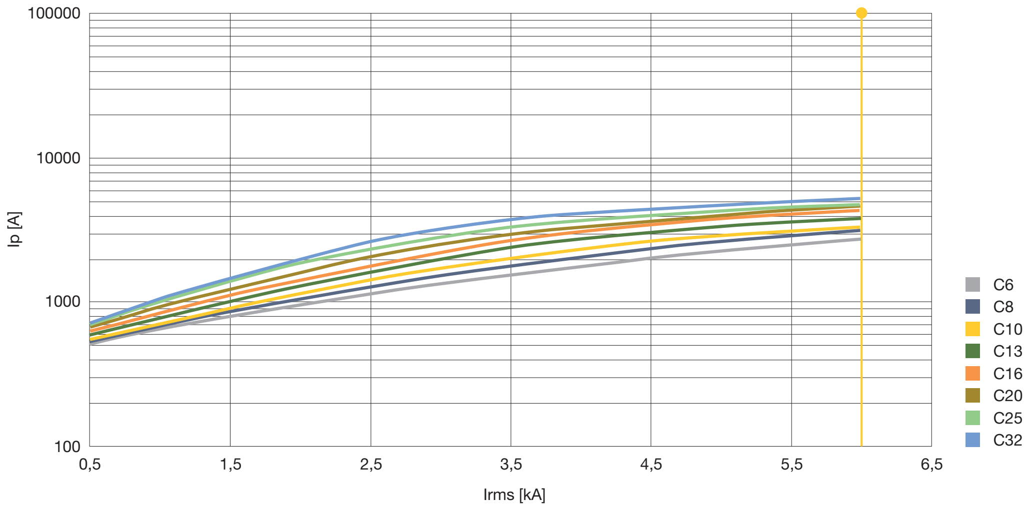
DS203NC, characteristic B



DS203NC L, characteristic C

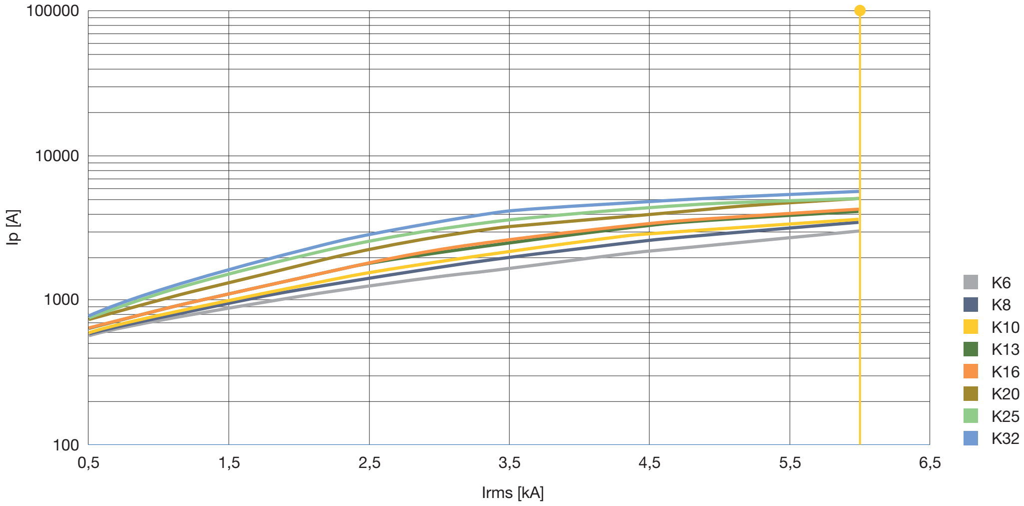


DS203NC, characteristic C

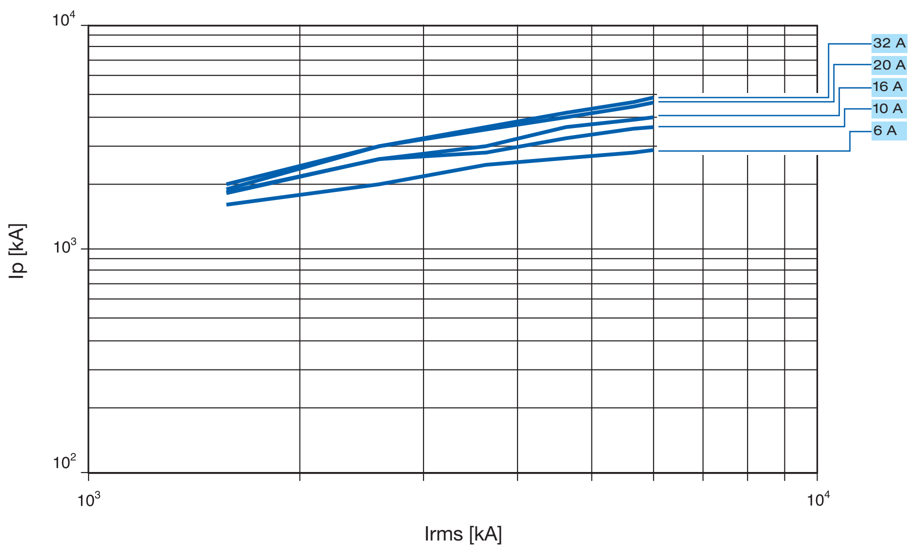


RCDs technical details
Peak current Ip

DS203NC, characteristic K



DS271



RCDs technical details

Coordination tables: F 200 RCCBs

Coordination tables between Short Circuit Protection Devices (SCPD) and F 200 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 co-ordination with the SCPD installed upstream or downstream. The tests are performed with SCPD with a rated current (thermal protection) less than or eqaul to the rated current of the associated RCCB.

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F 202

	Single-phases 230-240 V circuit					
	25 A	40 A	63 A	80 A	100 A	125 A
SN201L/S201L Na	4.5	4.5				
SN201/S201 Na	6	6				
SN201M/S201M Na	10	10				
S202L	10	10				
S202	20	20	20			
S202M	25	25	25			
S202P	40	25	25			
S292	25	25	25	25	25	25
S702	10	10	10	10	10	
S752	10	10	10			
S802N	36	36	36	36	36	36
S802S	50	50	50	50	50	50
Fuse 25 gG	100					
Fuse 40 gG	60	60				
Fuse 63 gG	20	20	20			
Fuse 100 gG	10	10	10	10	10	
Fuse 125 gG						10

F 202

	400-415 V circuits with isolated neutral (IT) under double faults					
	25 A	40 A	63 A	80 A	100 A	125 A
SN201N/SN201/SN201M	3	3				
S201L/S201L Na/S202L	4.5	4.5				
S201/S201 Na/S202	6	6	6			
S201M/S201M Na/S202M	10	10	10			
S201P/S201P Na/S202P	25	15	15			
S291/S292	10	10	10	10	10	10
S801N/S802N	20	20	20	20	20	20
S801S/S802S	25	25	25	25	25	25

See page 3/8 in Solutions for electrical distribution in building

RCDs technical details
Coordination tables: F 200 RCCBs

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F 204

	Three-phases circuits with neutral (y/D) 230-240 V/400-415 V*					
	25 A	40 A	63 A	80 A	100 A	125 A
SN201L/S201L/S201LNa*	4.5	4.5				
SN201/S201/S201Na*	6	6				
SN201M/S201M/S201MNa*	10	10				
S202L*	10	10				
S202*	20	20	20			
S202M*	25	25	25			
S202P*	40	25	25			
S292*	25	25	25	25	25	25
S702	10	10	10	10	10	
S752	10	10	10			
S802N*	36	36	36	36	36	36
S802S*	50	50	50	50	50	50
Fuse 25 gG	100					
Fuse 40 gG	60	60				
Fuse 63 gG	20	20	20			
Fuse 100 gG	10	10	10	10	10	
Fuse 125 gG						10

* The switches are considered between phase and neutral (230/240V)

F 204

	Three-phases circuits with neutral (y/D) 230-240 V/400-415 V					
	25 A	40 A	63 A	80 A	100 A	125 A
S203L/S204L	4.5	4.5				
S203/S204	6	6	6			
S203M/S204M	10	10	10			
S203P/S204P	25	15	15			
S293/S294	10	10	10	10	10	10
S702	10	10	10	10	10	
S752	10	10	10			
S803N/S804N	20	20	20	20	20	20
S803S/S804S	25	25	25	25	25	25
Fuse 25 gG	50					
Fuse 40 gG	30	30				
Fuse 63 gG	20	20	20			
Fuse 100 gG	10	10	10	10	10	
Fuse 125 gG						10

F 204

	Three-phases circuits with neutral (y/D) 133-138V/230-240V					
	25 A	40 A	63 A	80 A	100 A	125 A
SN201L	10	10				
SN201	15	15				
S201M	20	20				
S203L/S204L	10	10				
S203/S204	20	20	20			
S203M/S204M	25	25	25			
S203P/S204P	40	25	25			
S293/S294	25	25	25	25	25	25
S702	10	10	10	10	10	
S752	10	10	10			
S803N-S804N	36	36	36	36	36	36
S803S-S804S	50	50	50	50	50	50
Fuse 25 gG	100					
Fuse 40 gG	60	60				
Fuse 63 gG	20	20	20			
Fuse 100 gG	10	10	10	10	10	
Fuse 125 gG						10

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RCDs technical details
Coordination tables: back-up DS201, DS202C

MCB/Fuses - DS201/DS202C @ 230/240 V

			Supply s.	S200	S200M	S200P	S200P	25gG	40gG	50gG	63gG	80gG	100gG
	Char.			B-C	B-C	B-C	B-C						
		Icu		20	25	40	25						
Load s.		[kA]	In [A]	0,5…63	0,5…63	0,5…25	32…63						
DS201 L	B,C	6	2...40	20	25	40	25	35	25	20	15	10	10
DS201 DS202C	B,C, D,K	10	2...40	20	25	40	25	35	25	20	15	10	10
DS201 M DS202C M	B,C	10	2...40	20	25	40	25	35	25	20	15	10	10

MCCB @ 415 V - DS201/DS202C @ 230/240 V

			Supply S.[1]	T1	T1	T1	T2	T3	T2	T3	T2	T2
			Version	B	C	N			S		H	L
Load S.	Char.	In [A]	Icu [kA]	16	25	36			50		70	85
DS201 L	B, C	2..25	6	16	16	16	20	10	20	10	20	20
		32, 40		10	10	10	16		16		16	16
DS201 DS202C	B, C, D, K	2..25	10	16	16	16	25	16	25	16	25	25
		32, 40					16		16		16	16
DS201 M DS202C M	B, C	2..25	10	16	16	16	25	16	25	16	25	25
		32, 40					16		16		16	16

[1] Supply side circuit-breaker 4P (load side circuit branched between one phase and the neutral)

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MCCB @ 415V - DS201/DS202C @ 230/240 V

			Supply side	XT1	XT1	XT1	XT2	XT3	XT4	XT1	XT2	XT3	XT4	XT1	XT2	XT4	XT2	XT4	XT4
			Version	B	C	N	N	N	N	S	S	S	S	H	H	H	L	L	V
Load side	Char.	In [A]	Icu [kA]	18	25	36	36	36	36	50	50	50	50	70	70	70	85	120	150
DS201 L	B, C	2..25	6	18	18	18	20	10	18	18	20	10	18	18	20	18	20	18	18
		32, 40		10	10	10	10		10	10	18		10	10	18	10	18	10	10
DS201 DS202C	B,C, D,K	2..25	10	18	18	18	25	18	20	20	25	18	20	20	25	20	25	20	20
		32, 40					18		10	10	18		10	10	18	10	18	10	10
DS201 M DS202C M	B,C	2..25	10	18	18	18	25	18	20	20	25	18	20	20	25	20	25	20	20
		32, 40					18		10	10	18		10	10	18	10	18	10	10

RCBO - MCB @ 230/240 V

	Supply side			DS201
Load side	Characteristic			B, C
		Icu [kA]		10
			In [A]	2...40
SN201 L	B, C	6	2...40	10
SN201	B, C, D	10	2...40	10

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RCDs technical details
Coordination tables: back-up DS203NC

Fuses-DS203NC @ 400V

		Supply side		gL/gG						
Load side	Char	Icu [kA]	In[A]	25	40	63	80	100	125	160
DS203NC L	C	6	6…32	100	70	40	15	15	10	10
DS203NC	B,C,K	10	6…32	100	70	40	15	15	10	10

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MCCB @ 415V - DS203NC @ 400V

		Supply side		XT1	XT1	XT1	XT2	XT3	XT4	XT1	XT2	XT3
	Char			B	C	N	N	N	N	S	S	S
Load side		In [A]	Icu[KA]	18	25	36	36	36	36	50	50	50
DS203NC L	C	6…25	6	16	16	16	20	10	10	16	20	10
		32		10	10	10	16	10	10	10	16	10
DS203NC	B,C,K	6…16	10	16	16	16	25	16	25	16	25	16
		20…25					25		16		25	
		32					16		16		16	

		Supply side		XT4	XT1	XT2	XT4	XT2	XT4	XT2	XT4	
	Char			S	H	H	H	L	L	V	V	
Load side		In [A]	Icu[KA]	50	70	70	70	120	120	150	150	
DS203NC L	C	6…25	6	10	16	20	10	20	10	20	10	
		32		10	10	16	10	16	10	16	10	
DS203NC	B,C,K	6…16	10	25	16	25	25	25	25	25	25	
		20…25		16		25	16	25	16	25	16	
		32		16		16	16	16	16	16	16	

MCCB @ 415V - DS203NC @ 400V

		Supply side		T1	T1	T1	T2	T3	T4	T2	T3	T4	T2	T4	T2	T4	T4
	Char			B	C	N	N	N	N	S	S	S	H	H	L	L	V
Load side		In[A]	Icu [kA]	16	25	36	36	36	36	50	50	50	70	70	85	120	200
DS203NC L	C	6…25	6	16	16	16	20	10	10	20	10	10	20	10	20	10	10
		32		10	10	10	16	10	10	16	10	10	16	10	16	10	10
DS203NC	B,C,K	6…25	10	16	16	16	25	16	16	25	16	16	25	16	25	16	16
		32		16	16	16	16	16	16	16	16	16	16	16	16	16	16

S200 - DS203NC @ 400V

		Supply side		S200	S200M	S200P	S200P
	Char			B-C	B,C	B,C	B,C
Load side		Icu [kA]		20	25	40	25
			In[A]	0,5..63	0.5…63	0.5…25	32
DS203NC L	C	6	6…32	20	25	40	25
DS203NC	B,C,K	10	6…32	20	25	40	25

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S800 - DS203NC @ 400V

			Supply side	S800N							
	Char			B,C,D							
Load side		Icu [kA]		36							
			In[A]	25	32	40	50	63	80	100	125
DS203NC L	C	6	6…16	36	36	25	25	18	15	15	15
			20		36	25	25	18	15	15	15
			25			25	25	18	15	15	15
			32				25	18	15	15	15
DS203NC	B,C,K	10	6…16	36	36	36	36	36	36	36	36
			20		36	36	36	36	36	36	36
			25			36	36	36	36	36	36
			32				36	36	36	36	36

			Supply side	S800S							
	Char			B,C,D,K							
Load side		Icu [kA]		50							
			In[A]	25	32	40	50	63	80	100	125
DS203NC L	C	6	6…16	50	40	25	25	18	15	15	15
			20		40	25	25	18	15	15	15
			25			25	25	18	15	15	15
			32				25	18	15	15	15
DS203NC	B,C,K	10	6…16	50	50	50	50	50	50	50	50
			20		50	50	50	50	50	50	50
			25			50	50	50	50	50	50
							50	50	50	50	50

			Supply side	S800B							
	Char			B,C,D,K							
Load side		Icu [kA]									
			In[A]	25	32	40	50	63	80	100	125*
DS203NC L	C	6	6	-	16	16	16	16	15	15	15
			8	-	16	16	16	16	15	15	15
			10	-	16	16	16	16	15	15	15
			13	-	16	16	16	16	15	15	15
			16	-	16	16	16	16	15	15	15
			20	-	16	16	16	16	15	15	15
			25	-		16	16	16	15	15	15
			32	-			16	16	15	15	15
DS203NC	B,C,K	10	6	-	16	16	16	16	16	16	16
			8	-	16	16	16	16	16	16	16
			10	-	16	16	16	16	16	16	16
			13	-	16	16	16	16	16	16	16
			16	-	16	16	16	16	16	16	16
			20	-	16	16	16	16	16	16	16
			25	-		16	16	16	16	16	16
			32	-			16	16	16	16	16

*Only S800B B,C

RCDs technical details
Coordination tables: back-up DS203NC

		Supply side		S800C							
	Char			B,C,D,K							
Load side		Icu [kA]		25							
			In[A]	25	32	40	50	63	80	100	125
DS203NC L	C	6	6	25	25	25	25	18	15	15	15
			8	25	25	25	25	18	15	15	15
			10	25	25	25	25	18	15	15	15
			13	25	25	25	25	18	15	15	15
			16	25	25	25	25	18	15	15	15
			20		25	25	25	18	15	15	15
			25			25	25	18	15	15	15
			32				25	18	15	15	15
DS203NC	B,C,K	10	6	25	25	25	25	25	25	25	25
			8	25	25	25	25	25	25	25	25
			10	25	25	25	25	25	25	25	25
			13	25	25	25	25	25	25	25	25
			16	25	25	25	25	25	25	25	25
			20		25	25	25	25	25	25	25
			25			25	25	25	25	25	25
			32				25	25	25	25	25

RCDs technical details
Coordination tables: back-up DS271

MCCB @ 415V - DS271 @ 230/240V

			Supply S.	T1	T2	T3	T4
Load S.	Char.	Icu [kA]	Rated current [A]	160	160	250	250
DS271	B,C	10	6...16	20	20	20	20
			20...40				10

MCCB @ 415V - DS271 @ 230/240V

			Supply S.	XT1	XT2	XT3	XT4
Load S.	Char.	Icu [kA]	Rated current [A]	160	160	250	250
DS271	B,C	10	6…16	20	20	20	20
			20...40				10

Fuse 125 A gG, gL - DS271 @ 230/240V

			Supply S.	Fuse 125 A gG, gL
Load side	Char.	In [A]	Icu [kA]	
DS 271	B,C	6-40	10	15

RCDs technical details
Coordination tables: selectivity DS201, DS202C

MCCB @ 415 V - DS201/DS202C @ 230/240V

			Supply S.	T1												T2					
			Version	B, C, N												N, S, H, L					
			Release	TMD												TMD, MA					
Load S.	Char.	Icu [kA]	In [A]	16	20	25	32	40	50	63	80	100	125	160[2]	160	16	20	25	32	40	50
DS201 L	B, C	6	≤4	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	B, C		6	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	B, C		10			3	3	3	4.5	T	T	T	T	T	T		3[1]	3	3	3	4.5
	B, C		16					3	4.5	5	T	T	T	T	T				3[1]	3	4.5
	B, C		20						3	5	T	T	T	T	T				3[1]		3
	B, C		25							5	T	T	T	T	T						3[1]
	B, C		32							T	T	T	T	T	T						3[1]
	B, C		40									T	T	T	T						
DS201 DS202C	B, C, D, K	10	≤4	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	B, C, D, K		6	6	6	6	6	6	6	T	T	T	T	T	T	T	T	T	T	T	T
	B, C, D, K		8			3	3	3	4.5	7.5	8.5	T	T	T	T		3[1]	3	3	3	4.5
	B, C, D, K		10			3	3	3	4.5	7.5	8.5	T	T	T	T		3[1]	3	3	3	4.5
	B, C, D, K		13					3	4.5	5	7.5	T	T	T	T				3[1]	3	4.5
	B, C, D, K		16					3	4.5	5	7.5	T	T	T	T				3[1]	3	4.5
	B, C, D, K		20						3	5	6	T	T	T	T				3[1]		3
	B, C, D, K		25							5	6	T	T	T	T						3[1]
	B, C, D, K		32								6	7.5	T	T	T						3[1]
	B, C, D, K		40									7.5	T	T	T						
DS201 M DS202C M	B, C	10	≤4	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	B, C		6	6	6	6	6	6	6	12	T	T	T	T	T	T	T	T	T	T	T
	B, C		10			3	3	3	4.5	7.5	8.5	T	T	T	T		3[1]	3	3	3	4.5
	B, C		13					3	4.5	5	7.5	T	T	T	T				3[1]	3	4.5
	B, C		16					3	4.5	5	7.5	T	T	T	T				3[1]	3	4.5
	B, C		20						3	5	6	T	T	T	T				3[1]		3
	B, C		25							5	6	T	T	T	T						3[1]
	B, C		32								6	7.5	T	T	T						3[1]
	B, C		40									7.5	T	T	T						

Supply side circuit-breaker 4P (load side circuit branched between one phase and the neutral)
Load side circuit-breaker 1P+N (230/240 V)

1 Value valid for magnetic only supply side circuit-breaker
2 Neutral at 50%

												T3										
												N, S										
							EL					TMD, MA										
63	80	100	125[2]	125	160[2]	160	10	25	63	100	160	63	80	100	125[2]	125	160[2]	160	200[2]	200	250[2]	250
T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
T	T	T	T	T	T	T		T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
T	T	T	T	T	T	T		T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
5	T	T	T	T	T	T			T	T	T	5	T	T	T	T	T	T	T	T	T	T
5	T	T	T	T	T	T			T	T	T	5	T	T	T	T	T	T	T	T	T	T
5	T	T	T	T	T	T			T	T	T	5	T	T	T	T	T	T	T	T	T	T
	T	T	T	T	T	T			T	T	T		T	T	T	T	T	T	T	T	T	T
	T	T		T	T	T				T	T		T	T		T	T	T	T	T	T	T
T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
T	T	T	T	T	T	T		T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
7.5	8.5	T	T	T	T	T		T	T	T	T	7.5	8.5	T	T	T	T	T	T	T	T	T
7.5	8.5	T	T	T	T	T		T	T	T	T	7.5	8.5	T	T	T	T	T	T	T	T	T
5	7.5	T	7.5	T	T	T			T	T	T	5	7.5	T	7.5	T	T	T	T	T	T	T
5	7.5	T	7.5	T	T	T			T	T	T	5	7.5	T	7.5	T	T	T	T	T	T	T
5	6	T	6	T	T	T			T	T	T	5	6	T	6	T	T	T	T	T	T	T
5	6	T	6	T	T	T			T	T	T	5	6	T	6	T	T	T	T	T	T	T
	6	7.5	6	T	T	T			T	T	T		6	7.5	6	T	T	T	T	T	T	T
	6[1]	7.5	6	T	T	T	T			T	T		6[1]	7.5		T	T	T	T	T	T	T
T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
T	T	T	T	T	T	T		T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
7.5	8.5	T	T	T	T	T		T	T	T	T	7.5	8.5	T	T	T	T	T	T	T	T	T
5	7.5	T	7.5	T	T	T			T	T	T	5	7.5	T	7.5	T	T	T	T	T	T	T
5	7.5	T	7.5	T	T	T			T	T	T	5	7.5	T	7.5	T	T	T	T	T	T	T
5	6	T	6	T	T	T			T	T	T	5	6	T	6	T	T	T	T	T	T	T
5	6	T	6	T	T	T			T	T	T	5	6	T	6	T	T	T	T	T	T	T
	6	7.5	6	T	T	T			T	T	T		6	7.5	6	T	T	T	T	T	T	T
	6[1]	7.5	6	T	T	T				T	T		6[1]	7.5		T	T	T	T	T	T	T

1 Value valid for magnetic only supply side circuit-breaker
2 Neutral at 50%

3

RCDs technical details
Coordination tables: selectivity DS201, DS202C

MCCB@415V - DS201-DS202C @230/240V

			Supply S.	XT1										
			Version	B,C,N,S,H										
			Release	TM										
Load S.	Char	Icu [kA]	In[A]	16	20	25	32	40	50	63	80	100	125	160
DS201 L	B,C	6	≤ 4	T	T	T	T	T	T	T	T	T	T	T
			6	T	T	T	T	T	T	T	T	T	T	T
			10			3	3	3	4,5	T	T	T	T	T
			16					3	4,5	5	T	T	T	T
			20						3	5	T	T	T	T
			25							5	T	T	T	T
			32								T	T	T	T
			40									T	T	T
DS201	B,C,D,K	10	≤ 4	T	T	T	T	T	T	T	T	T	T	T
DS202C			6	6	6	6	6	6	6	T	T	T	T	T
			8			3	3	3	4,5	7,5	8,5	T	T	T
			10			3	3	3	4,5	7,5	8,5	T	T	T
			13					3	4,5	5	7,5	T	T	T
			16					3	4,5	5	7,5	T	T	T
			20						3	5	6	T	T	T
			25							5	6	T	T	T
			32								6	7,5	T	T
			40									7,5	T	T
DS201 M	B,C	10	≤ 4	T	T	T	T	T	T	T	T	T	T	T
DS202C			6	6	6	6	6	6	6	T	T	T	T	T
M			10			3	3	3	4,5	7,5	8,5	T	T	T
			13					3	4,5	5	7,5	T	T	T
			16					3	4,5	5	7,5	T	T	T
			20						3	5	6	T	T	T
			25							5	6	T	T	T
			32								6	7,5	T	T
			40									7,5	T	T

			Supply S.	XT2															
			Version	N,S,H,L,V															
			Release	TM											EL				
Load S.	Char	Icu [kA]	In[A]	16	20	25	32	40	50	63	80	100	125	160	10	25	63	100	160
DS201 L	B,C	6	≤ 4	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
			6	T	T	T	T	T	T	T	T	T	T	T		T	T	T	T
			10		3 [1]	3	3	3	4,5	T	T	T	T	T		T	T	T	T
			16				3 [1]	3	4,5	5	T	T	T	T			T	T	T
			20				3 [1]		3	5	T	T	T	T			T	T	T
			25						3 [1]	5	T	T	T	T			T	T	T
			32						3 [1]		T	T	T	T			T	T	T
			40								T	T	T	T				T	T
DS201 DS202C	B,C,D,K	10	≤ 4	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
			6	T	T	T	T	T	T	T	T	T	T	T		T	T	T	T
			8		3 [1]	3	3	3	4,5	7,5	8,5	T	T	T		T	T	T	T
			10		3 [1]	3	3	3	4,5	7,5	8,5	T	T	T		T	T	T	T
			13				3 [1]	3	4,5	5	7,5	T	T	T			T	T	T
			16				3 [1]	3	4,5	5	7,5	T	T	T			T	T	T
			20				3 [1]		3	5	6	T	T	T			T	T	T
			25						3 [1]	5	6	T	T	T			T	T	T
			32						3 [1]		6	7,5	T	T			T	T	T
			40								6 [1]	7,5	T	T				T	T
DS201 M DS202C M	B,C	10	≤ 4	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
			6	T	T	T	T	T	T	T	T	T	T	T		T	T	T	T
			10		3 [1]	3	3	3	4,5	7,5	8,5	T	T	T		T	T	T	T
			13				3 [1]	3	4,5	5	7,5	T	T	T			T	T	T
			16				3 [1]	3	4,5	5	7,5	T	T	T			T	T	T
			20				3 [1]		3	5	6	T	T	T			T	T	T
			25						3 [1]	5	6	T	T	T			T	T	T
			32						3 [1]		6	7,5	T	T			T	T	T
			40								6 [1]	7,5	T	T				T	T

[1] Value valid in case of Supply S. breaker only magnetic

RCDs technical details
Coordination tables: selectivity DS201, DS202C

			Supply S.	XT3						
			Version	N,S						
			Release	TM						
Load S.	Char	Icu [kA]	In[A]	63	80	100	125	160	200	250
DS201 L	B,C	6	≤ 4	T	T	T	T	T	T	T
			6	T	T	T	T	T	T	T
			10	T	T	T	T	T	T	T
			16	5	T	T	T	T	T	T
			20	5	T	T	T	T	T	T
			25	5	T	T	T	T	T	T
			32		T	T	T	T	T	T
			40		T	T	T	T	T	T
DS201 DS202C	B,C,D,K	10	≤ 4	T	T	T	T	T	T	T
			6	T	T	T	T	T	T	T
			8	7,5	8,5	T	T	T	T	T
			10	7,5	8,5	T	T	T	T	T
			13	5	7,5	T	T	T	T	T
			16	5	7,5	T	T	T	T	T
			20	5	6	T	T	T	T	T
			25	5	6	T	T	T	T	T
			32		6	7,5	T	T	T	T
			40		6 [1]	7,5	T	T	T	T
DS201 M DS202C M	B,C	10	≤ 4	T	T	T	T	T	T	T
			6	T	T	T	T	T	T	T
			10	7,5	8,5	T	T	T	T	T
			13	5	7,5	T	T	T	T	T
			16	5	7,5	T	T	T	T	T
			20	5	6	T	T	T	T	T
			25	5	6	T	T	T	T	T
			32		6	7,5	T	T	T	T
			40		6 [1]	7,5	T	T	T	T

[1] Value valid in case of Supply S. breaker only magnetic

			Supply S.	XT4																	
			Version	N,S,H,L,V																	
			Release	TM													EL				
Load S.	Char	Icu [kA]	In[A]	20	25	32	40	50	63	80	100	125	160	200	225	250	40	63	100	160	250
DS201 L	B,C	6	≤ 4	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
			6	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
			10	3 [1]	3	3	3	4,5	T	T	T	T	T	T	T	T	3	T	T	T	T
			16			3 [1]	3	4,5	5	T	T	T	T	T	T	T	3	T	T	T	T
			20			3 [1]		3	5	T	T	T	T	T	T	T		T	T	T	T
			25					3 [1]	5	T	T	T	T	T	T	T		T	T	T	T
			32					3 [1]		T	T	T	T	T	T	T		T	T	T	T
			40							T	T	T	T	T	T	T			T	T	T
DS201 DS202C	B,C,D,K	10	≤ 4	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
			6	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
			8	3 [1]	3	3	3	4,5	7,5	8,5	T	T	T	T	T	T	3	T	T	T	T
			10	3 [1]	3	3	3	4,5	7,5	8,5	T	T	T	T	T	T	3	T	T	T	T
			13			3 [1]	3	4,5	5	7,5	T	T	T	T	T	T	3	T	T	T	T
			16			3 [1]	3	4,5	5	7,5	T	T	T	T	T	T	3	T	T	T	T
			20			3 [1]		3	5	6	T	T	T	T	T	T		T	T	T	T
			25					3 [1]	5	6	T	T	T	T	T	T		T	T	T	T
			32					3 [1]		6	7,5	T	T	T	T	T		T	T	T	T
			40							6 [1]	7,5	T	T	T	T	T			T	T	T
DS201 M DS202C M	B,C	10	≤ 4	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
			6	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
			10	3 [1]	3	3	3	4,5	7,5	8,5	T	T	T	T	T	T	3	T	T	T	T
			13			3 [1]	3	4,5	5	7,5	T	T	T	T	T	T	3	T	T	T	T
			16			3 [1]	3	4,5	5	7,5	T	T	T	T	T	T	3	T	T	T	T
			20			3 [1]		3	5	6	T	T	T	T	T	T		T	T	T	T
			25					3 [1]	5	6	T	T	T	T	T	T		T	T	T	T
			32					3 [1]		6	7,5	T	T	T	T	T		T	T	T	T
			40							6 [1]	7,5	T	T	T	T	T			T	T	T

[1] Value valid in case of Supply S. breaker only magnetic

RCDs technical details
Coordination tables: selectivity DS203NC

Fuses-DS203NC @ 400V

			Supply S.	Fuse gL/gG							
Load S.	Char	Icu [kA]	In[A]	25	32	40	50	63	80	100	125
DS203NC L	C	6	6	1	1.5	4	4.5	T	T	T	T
			8		1.2	3.5	4	T	T	T	T
			10		1.2	3.5	4	T	T	T	T
			13		1	3	3.5	5	T	T	T
			16		1	3	3.5	5	T	T	T
			20		1	3	3.5	5	T	T	T
			25		1	2	3	4.5	T	T	T
			32		1	2	3	4.5	5	T	T
DS203NC	B,C,K	10	6	1	1.5	4	4.5	7	T	T	T
			8		1.2	3.5	4	6	T	T	T
			10		1.2	3.5	4	6	T	T	T
			13		1	3	3.5	5	T	T	T
			16		1	3	3.5	5	T	T	T
			20		1	3	3.5	5	8	T	T
			25		1	2	3	4.5	6.5	T	T
			32		1	2	3	4.5	5	8	T

MCCB @ 415V - DS203NC @ 400V

			Supply S.	XT2	XT1-XT2						XT1-XT2-XT3					XT3	
			Version	B,C,N, S, H, L,V													
Load S.	Char	Icu	Release	TM													
		[kA]	In[A]	12.5	16	20	25	32	40	50	63	80	100	125	160	200	250
DS203NC L	C	6	6	T	T	T	T	T	T	T	T	T	T	T	T	T	T
			8			3	3	3	4,5	T	T	T	T	T	T	T	T
			10			3	3	3	4,5	T	T	T	T	T	T	T	T
			13					3	4,5	5	T	T	T	T	T	T	T
			16					3	4,5	5	T	T	T	T	T	T	T
			20						3	5	T	T	T	T	T	T	T
			25							5	T	T	T	T	T	T	T
			32								T	T	T	T	T	T	T
DS203NC	B, C, K	10	6	6	6	6	6	6	6	T	T	T	T	T	T	T	T
			8			3	3	3	4,5	7,5	8,5	8,5	T	T	T	T	T
			10			3	3	3	4,5	7,5	8,5	8,5	T	T	T	T	T
			13					3	4,5	5	7,5	7,5	T	T	T	T	T
			16					3	4,5	5	7,5	7,5	T	T	T	T	T
			20						3	5	6	6	T	T	T	T	T
			25							5	6	6	T	T	T	T	T
			32								6	6	7,5	T	T	T	T

			Supply S.	XT4												
			Version	B,C,N,S,H,L,V												
Load S.	Char	Icu	Release	TM												
		[kA]	In[A]	20	25	32	40	50	63	80	100	125	160	200	225	250
DS203NC L	C	6	6	T	T	T	T	T	T	T	T	T	T	T	T	T
			8	3	3	3	4,5	T	T	T	T	T	T	T	T	T
			10	3	3	3	4,5	T	T	T	T	T	T	T	T	T
			13			3	4,5	5	T	T	T	T	T	T	T	T
			16			3	4,5	5	T	T	T	T	T	T	T	T
			20				3	5	T	T	T	T	T	T	T	T
			25					5	T	T	T	T	T	T	T	T
			32						T	T	T	T	T	T	T	T
DS203NC	B, C, K	10	6	6	6	6	6	T	T	T	T	T	T	T	T	T
			8	3	3	3	4,5	7,5	8,5	8,5	T	T	T	T	T	T
			10	3	3	3	4,5	7,5	8,5	8,5	T	T	T	T	T	T
			13			3	4,5	5	7,5	7,5	T	T	T	T	T	T
			16			3	4,5	5	7,5	7,5	T	T	T	T	T	T
			20				3	5	6	6	T	T	T	T	T	T
			25					5	6	6	T	T	T	T	T	T
			32						6	6	7,5	T	T	T	T	T

			Supply S.	XT2				XT4			
			Version	B,C,N,S,H,L,V							
Load S.	Char	Icu [kA]	Release	EL							
			In[A]	25	63	100	160	40	63	100, 160	250
DS203NC L	C	6	6	T	T	T	T	T	T	T	T
			8	T	T	T	T	T	T	T	T
			10	T	T	T	T	T	T	T	T
			13	T	T	T	T	T	T	T	T
			16		T	T	T	T	T	T	T
			20		T	T	T	T	T	T	T
			25		T	T	T		T	T	T
			32		T	T	T		T	T	T
DS203NC	B, C, K	10	6	T	T	T	T	T	T	T	T
			8	T	T	T	T	T	T	T	T
			10	T	T	T	T	T	T	T	T
			13	T	T	T	T	T	T	T	T
			16		T	T	T	T	T	T	T
			20		T	T	T	T	T	T	T
			25		T	T	T		T	T	T
			32		T	T	T		T	T	T

RCDs technical details
Coordination tables: selectivity DS203NC

MCCB @ 415V -DS203NC @ 400V

			Supply S.	T1										
			Version	B,C,N										
			Release	TM										
			Iu[A]	160										
Load S.	Char	Icu [kA]	In[A]	16	20	25	32	40	50	63	80	100	125	160
DS203NC L	C	6	6	T	T	T	T	T	T	T	T	T	T	T
			8			3	3	3	4,5	T	T	T	T	T
			10			3	3	3	4,5	T	T	T	T	T
			13					3	4,5	5	T	T	T	T
			16					3	4,5	5	T	T	T	T
			20						3	5	T	T	T	T
			25							5	T	T	T	T
			32							T	T	T	T	T
DS203NC	B,C,K	10	6	6	6	6	6	6	6	T	T	T	T	T
			8			3	3	3	4,5	7,5	8,5	T	T	T
			10			3	3	3	4,5	7,5	8,5	T	T	T
			13					3	4,5	5	7,5	T	T	T
			16					3	4,5	5	7,5	T	T	T
			20						3	5	6	T	T	T
			25							5	6	T	T	T
			32								6	7,5	T	T

			Supply S.	T2														
			Version	N,S,H,L														
			Release	TM											EL			
			Iu[A]	160											160			
Load S.	Char	Icu [kA]	In[A]	16	20	25	32	40	50	63	80	100	125	160	25	63	100	160
DS203NC L	C	6	6	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
			8		3	3	3	3	4,5	T	T	T	T	T	T	T	T	T
			10		3	3	3	3	4,5	T	T	T	T	T	T	T	T	T
			13				3	3	4,5	5	T	T	T	T		T	T	T
			16				3	3	4,5	5	T	T	T	T		T	T	T
			20				3		3	5	T	T	T	T		T	T	T
			25						3	5	T	T	T	T		T	T	T
			32						3		T	T	T	T		T	T	T
DS203NC	B,C,K	10	6	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
			8		3	3	3	3	4,5	7,5	8,5	T	T	T	T	T	T	T
			10		3	3	3	3	4,5	7,5	8,5	T	T	T	T	T	T	T
			13				3	3	4,5	5	7,5	T	T	T		T	T	T
			16				3	3	4,5	5	7,5	T	T	T		T	T	T
			20				3		3	5	6	T	T	T		T	T	T
			25						3	5	T	T	T	T		T	T	T
			32						3		6	7,5	T	T		T	T	T

			Supply S.	T3						
			Version	N,S						
			Release	TM, M						
			Iu[A]	250						
Load S.	Char	Icu [kA]	In[A]	63	80	100	125	160	200	250
DS203NC L	C	6	6	T	T	T	T	T	T	T
			8	T	T	T	T	T	T	T
			10	T	T	T	T	T	T	T
			13	5	T	T	T	T	T	T
			16	5	T	T	T	T	T	T
			20	5	T	T	T	T	T	T
			25	5	T	T	T	T	T	T
			32		T	T	T	T	T	T
DS203NC L	B,C,K	10	6	T	T	T	T	T	T	T
			8	7,5	8,5	T	T	T	T	T
			10	7,5	8,5	T	T	T	T	T
			13	5	7,5	T	T	T	T	T
			16	5	7,5	T	T	T	T	T
			20	5	6	T	T	T	T	T
			25	5	6	T	T	T	T	T
			32		6	7,5	T	T	T	T

S800-DS203NC @ 400V

		Supply S.	S800N-S					
	Char		B					
		Icu [kA]	36-50					
Load S.			In[A]	50	63	80	100	125
DS203NC L	C	6	6	0.6	1.2	1.6	2.6	3.8
			8	0.5	1.1	1.4	2	3
			10	0.5	1.1	1.4	2	3
			13		0.8	1.2	1.7	2.5
			16		0.8	1.2	1.7	2.5
			20			1	1.5	2.1
			25				1.3	1.8
			32				1.1	1.7
DS203NC	B,C,K	10	6	0.6	1.2	1.6	2.6	3.8
			8	0.5	1.1	1.4	2	3
			10	0.5	1.1	1.4	2	3
			13		0.8	1.2	1.7	2.5
			16		0.8	1.2	1.7	2.5
			20			1	1.5	2.1
			25				1.3	1.8
			32				1.1	1.7

RCDs technical details
Coordination tables: selectivity DS203NC

		Supply S.	S800N-S						
	Char		C						
		Icu [kA]	36-50						
Load S.			In[A]	40	50	63	80	100	125
DS203NC L	C	6	6	0.55	1.1	1.5	2.5	3.6	5.5
			8	0.45	1	1.3	1.9	2.8	4.2
			10	0.45	1	1.3	1.9	2.8	4.2
			13		0.75	1.1	1.6	2.3	3.6
			16		0.75	1.1	1.6	2.3	3.6
			20			0.9	1.4	1.9	3.3
			25				1.2	1.6	2.7
			32				1	1.5	2.5
DS203NC	B,C,K	6	6	0.55	1.1	1.5	2.5	3.6	5.5
			8	0.45	1	1.3	1.9	2.8	4.2
			10	0.45	1	1.3	1.9	2.8	4.2
			13		0.75	1.1	1.6	2.3	3.6
			16		0.75	1.1	1.6	2.3	3.6
			20			0.9	1.4	1.9	3.3
			25				1.2	1.6	2.7
			32				1	1.5	2.5

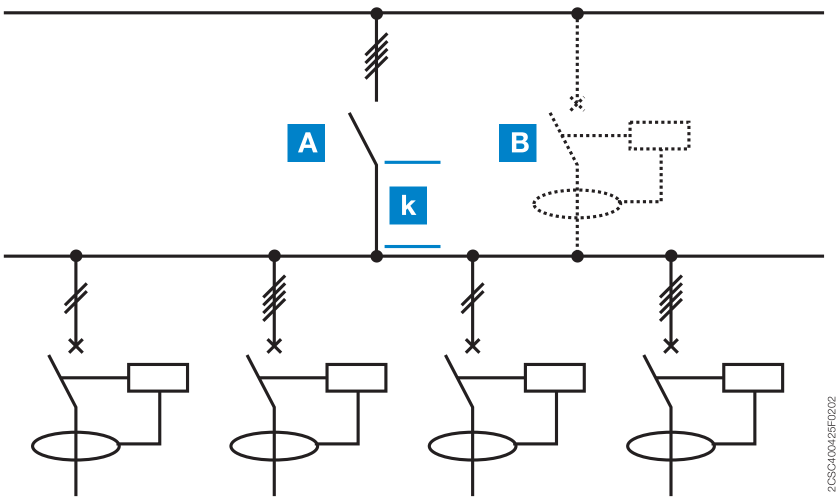
		Supply S.	S800 N-S								
	Char		D								
		Icu [kA]	36-50								
Load S.			In[A]	25	32	40	50	63	80	100	125
DS203NC L	C	6	6	0.6	1.3	2	3.2	3.9	T	T	T
			8	0.5	1.2	1.65	2.6	3.1	T	T	T
			10	0.5	1.2	1.65	2.6	3.1	T	T	T
			13		0.9	1.4	1.8	2.6	5	T	T
			16		0.9	1.4	1.8	2.6	5	T	T
			20			1.3	1.6	2.2	4.2	5.4	T
			25				1.5	1.9	3.5	4.5	T
			32					1.8	2.8	4.2	5.5
DS203NC	B,C,K	10	6	0.6	1.3	2	3.2	3.9	8	T	T
			8	0.5	1.2	1.65	2.6	3.1	6.2	8.6	T
			10	0.5	1.2	1.65	2.6	3.1	6.2	8.6	T
			13		0.9	1.4	1.8	2.6	5	6.3	8.8
			16		0.9	1.4	1.8	2.6	5	6.3	8.8
			20			1.3	1.6	2.2	4.2	5.4	7.6
			25				1.5	1.9	3.5	4.5	6.6
			32					1.8	2.8	4.2	5.5

RCDs technical details
Coordination tables: residual current protection selectivity

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.
If an electrical system has user devices with earth leakage currents which exceed the normal values (e.g.: presence of capacitor input filters inserted between the device phase and earth cables) or if the system consists of many user devices, it is good practice to install various RCDs, on the main branches, with an upstream main residual current or non-residual current device instead of a single main RCD.

Horizontal selectivity
The non-residual current main circuit-breaker provides “horizontal selectivity”, preventing an earth fault at any point on the circuit or small leakage from causing unwanted main circuit-breaker tripping, which would put the entire system out of order.
However, in this way, section k of the circuit between the main circuit-breaker and the RCDs remains without “active” protection. Using a main RCD to protect it would lead to problems with “vertical selectivity”, which require tripping of the various devices to be co-ordinated, so that service continuity and system safety are not compromised. In this case, selectivity may be amperometric (partial) or chronometric (total).

3

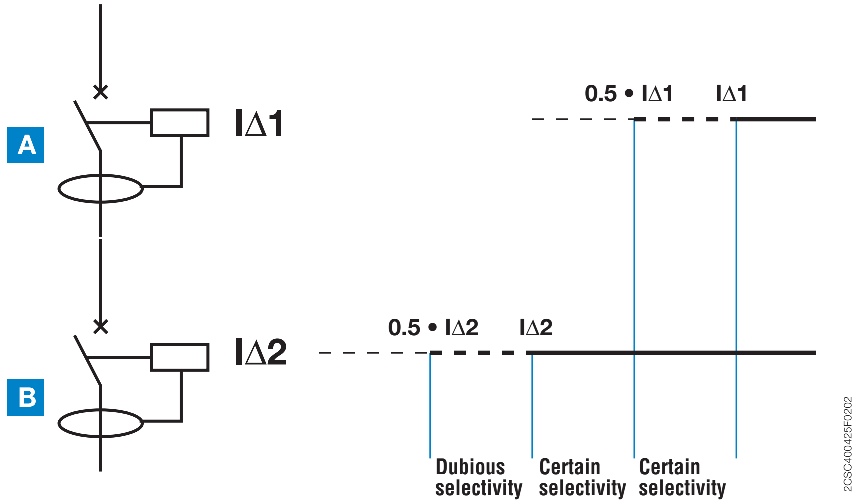


Vertical selectivity
Vertical selectivity may also be established for residual current tripping, bearing in mind that in working back from system peripheral branches to the main electrical panels the risk of unskilled persons coming into contact with dangerous parts is significantly reduced.

RCDs technical details
Coordination tables: residual current protection selectivity

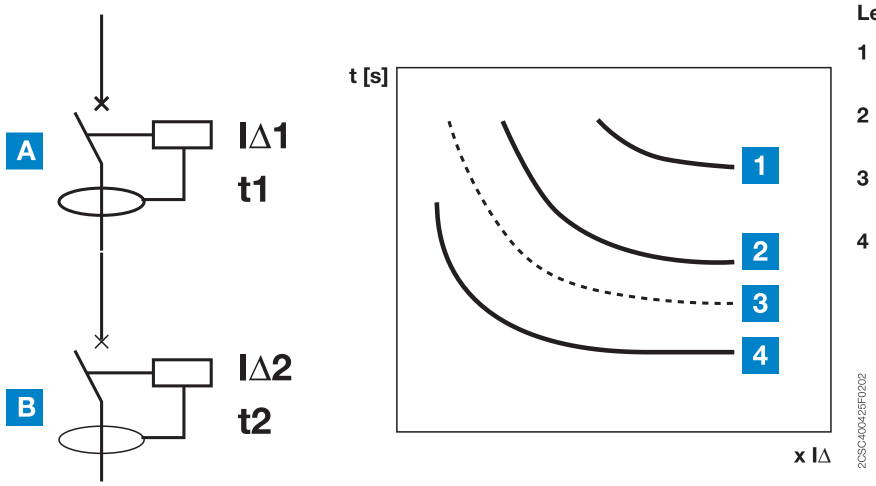
Amperometric (partial) selectivity

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 IΔ1 value of the breaker upstream (main breaker) is more than double the IΔ2 value of the breaker downstream. The operative rule to obtain an amperometric (partial) selectivity is IΔn of the upstream breaker = 3 x IΔn of the downstream breaker (e. g.: F 204, A type, 300 mA upstream; F 202, A type, 100 mA downstream).
In this case, selectivity is partial and only the downstream breaker trips for earth fault currents
IΔ2< IΔm<0.5*IΔ1.



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 t2 of the downstream breaker is less than the upstream breaker's no-response limit time t1, for any current value. In this way, the downstream breaker completes its opening before the upstream one.
To completely guarantee total selectivity, the IΔ value of the upstream device must also be more than double that of the downstream device in accordance with IEC 64-8/563.3, comments. The operative rule to obtain an choronometric (total) selectivity is IΔn of the upstream breaker = 3 x IΔn of the downstream breaker (e. g.: F 204, S type, 300 mA upstream; F 202, A type, 100 mA downstream).
For safety reasons, the delayed tripping times of the upstream breaker must always be below the safety curve.



Legend

1 Theoretical safety curve
2 RCD A tripping characteristic
3 No-response limit times
4 RCD B tripping characteristic

Table of RCD selectivity

	Upstream IΔn [mA]	10	30	100	300	300	500	500	1000	1000
Downstream IΔn [mA]	inst	inst	inst	inst	S	inst	S	inst	S	
10	inst		▲	▲	▲	■	▲	■	▲	■
30	inst			▲	▲	■	▲	■	▲	■
100	inst				▲	■	▲	■	▲	■
300	inst								▲	■
300	S								▲	▲
500	inst									
500	S									
1000	inst									
1000	S									

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

Back-up F-ATI Test and F-ARI Test

The values has to be delivered from the LAb

2P	Rated current	25	40	63	80	100
Single phase circuit with neutral 230-240 V	Fuse gG 25A	■				
	Fuse gG 40A	■	■			
	Fuse gG 63A	■	■	■		
	Fuse gG 100A	■	■	■		
	S800 S	■	■	■		
	S800 N	■	■	■		
	S200	■	■	■		
	S200 M	■	■	■		
	S200 P	■	■	■		

4P	Rated current	25	40	63	80	100
Three phase circuit with neutral 400-415 V	Fuse gG 25A	■				
	Fuse gG 40A	■	■			
	Fuse gG 63A	■	■	■		
	Fuse gG 100A	■	■	■	■	■
	S800 S	■	■	■	■	■
	S800 N	■	■	■	■	■
	S200	■	■	■	■	■
	S200 M	■	■	■	■	■
	S200 P	■	■	■	■	■

RCDs technical details
Power loss, derating and performance in altitude

3

Power loss and internal resistance of RCDs and RCBOs

RCCBs F200 series

Rated current	Power loss per pole W	
In [A]	[W]	
	2P	4P
16	1.5	-
25	1.0	1.3
40	2.4	3.2
63	3.2	4.4
80	4.5	5.3
100	6.5	8.2
125	-	7.5

RCCBs F200 Type B

	In [A]	Per Pole	Total
F202 B	16	0,02	0,04
	25	0,27	0,54
	40	1,70	3,40
	63	4,22	8,44
F204 B	25	0,29	1,16
	40	1,81	7,23
	63	4,50	17,98
	80	3,5	14
	125	7,5	44,8

RCD-Blocks DDA200 series

Rated current	Power loss Wlb* ①	
Ib [A]	[W]	
	2P	3P,4P
25	2.0	3.0
40	3.2	4.8
63	5.0	7.6

* The power loss W_{lb} shown in the table refers to Ib. For use with circuit-breakers with lower rated current In the power loss W must be determined using the formula: W = (I / Ib) • W_{lb}

RCD-Blocks DDA800

Rated current	Power loss Wlb* ①	
In [A]	[W]	
	2P	3P, 4P
63	9	13.5
100	7	10.5
125	-	16.6

* The power loss W_{lb} shown in the table refers to Ib. For use with circuit-breakers with lower rated current In the power loss W must be determined using the formula: W = (I / Ib) • W_{lb}

① datas available in the tables are reffered to the Power Loss per device

RCBOs DS 200, DS 200 M series

Rated current	Power loss W ①			
In [A]	[W]			
	Characteristic B-C		Characteristic K	
	2P	3P/4P	2P	3P/4P
6	4.1	6.2	3.9	5.9
10	2.9	4.4	2.9	4.2
13	5.2	7.7	3.1	4.5
16	4.5	6.6	4.9	7.2
20	6.4	9.3	6.8	9.9
25	8.5	12.4	7.9	11.5
32	10.9	15.7	10.7	15.4
40	15	21.6	14.4	20.7
50	11.4	18.4	10.7	17.4
63	17.4	28.2	18.2	29.4

RCBOs DS201, DS202C series

	DS201		DS202C	
Rated current	Power loss ①	Internal resistance	Power loss ①	Internal resistance
In [A]	[W]	[mΩ]	[W]	[mΩ]
1	1,0	1011		
2	1,6	411		
4	2,5	155		
6	4,4	123,4	8,1	224,8
8	1,5	23,1		
10	2,3	23,1	4,1	40,6
13	2,2	13,3	3,5	21
16	3,4	13,3	5,4	21
20	4,4	11,1	6,6	16,6
25	3,9	6,2	5,5	8,8
32	5,9	5,8	8,2	8
40	8,6	5,4		

RCBOs DS203NC series

In	Power loss [W]	Internal resistence [mΩ]
6A	7.5	207.3
8A	4.2	66.4
10A	5.6	55.9
13A	7.2	42.5
16A	10.0	39.3
20A	11.8	29.5
25A	10.3	16.4
32A	15.1	14.8

DS800 and DS800 N series ①			
Rated current	Rated current		
in [A]	2P	3P	4P
125	25.7	45.7	55.1

RCBO DS271 series		
Rated current	Power loss [W]	Internal resistance [mΩ]
6	1.5	0.04
10	2.2	0.02
16	5.5	0.02
20	6.4	0.02
25	6.3	0.01
32	12.2	0.01
40	13.7	0.09

Derating of load capability of RCBOs DS 200 series, DS201, DS202C and DS203NC

For DS 200 see tables for S 200 MCBs in technical details MCBs and dedicated tables for DS201 and DS202C, within the range of temperatures from -25 °C to +55 °C.

Performance in altitude of RCDs

ABB RCDs are able to operate at altitude higher then foreseen by the relevant standard IEC/ EN 61008 and IEC/ EN 61009 taking into account the corrective factor below detailed:

Elevation	[m]	3000	4000	5000	6000
Rated Current	[A]	0,96 x In	0,94 x In	0,92 x In	0,90 x In
Rated Voltage	[V]	0,877 x Un	0,775 x Un	0,676 x Un	0,588 x Un

For altitude higher then 3.000 m the isolating characteristic is no longer available.

For DDA800 RCD Blocks according to IEC/EN 60947-2, up to 2000 meters above sea level, the rated characteristics remain unchanged.
With increasing altitude, the properties of the atmosphere change regarding composition, dielectricity, the cooling capacity and the pressure.
The characteristics of the DDA800 RCD Blocks therefore change: this can be measured for the most part using the change in significant parameters such as the maximum rated operational voltage and the rated current:

Elevation	[m]	2000	3000	4000	5000
Rated operational voltage Ue	[V]	690	600	540	470
Max rated current In	[A]	1x In	0.96 x In	0.93 x In	0.9 x In

Derating in temperature for DS203NC series

Max operating current depending on the ambient temperature of a circuit breaker in load circuit of characteristics type B, C, K.

	Temperature (°C)								
In	-25	-20	-10	0	10	20	30	40	55
6A	7.29	7.16	6.91	6.65	6.41	6.17	6.00	5.90	5.75
8A	9.71	9.54	9.20	8.85	8.55	8.24	8.00	7.83	7.57
10A	12.13	11.92	11.49	11.06	10.68	10.31	10.00	9.76	9.39
13A	15.77	15.49	14.93	14.37	13.89	13.41	13.00	12.65	12.12
16A	19.40	19.06	18.37	17.68	17.10	16.52	16.00	15.54	14.85
20A	23.66	23.32	22.63	21.94	21.26	20.57	20.00	19.53	18.84
25A	29.00	28.65	27.96	27.27	26.46	25.65	25.00	24.53	23.83
32A	38.67	38.13	37.04	35.96	34.48	33.00	32.00	31.47	30.67

RCDs technical details
Emergency stop using DDA 200 AE series

RCD-blocks type AE

Emergency stop using DDA 200 AE series RCD-blocks

The AE series RCD-block combines the protection supplied by the RCBOs with a positive safety emergency stop function for remote tripping.
In the AE version, the DDA 200 AE series RCD-blocks are available.

Operating principle (patented)

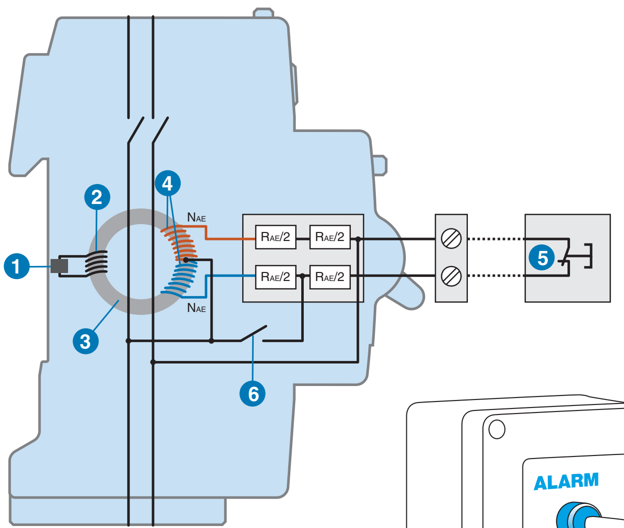
Two additional primary circuits powered with the same voltage and equipped with the same resistance have been added to the transformer; under normal conditions the same current would flow through, but since they are wound by the same number of coils in opposite directions they cancel each other out and do not produce any flow.
One of these two windings acts as the remote control circuit: the emergency stop is obtained by interrupting the current flow in this circuit.
The positive safety is therefore obvious: an accidental breakage in the circuit is equivalent to operating an emergency control button.

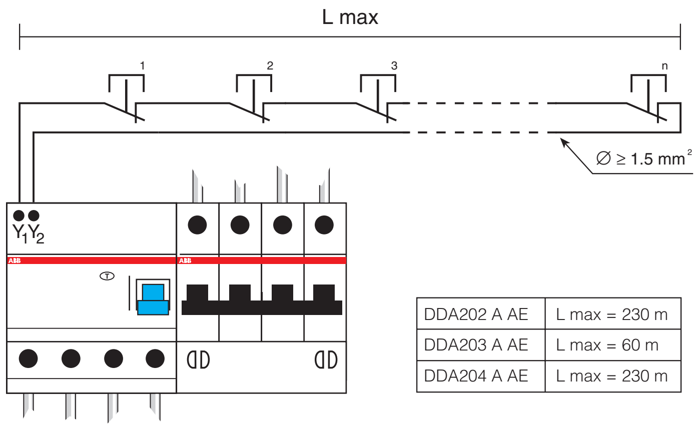
Advantages

Compared with the devices which are normally used in emergency circuits, DDA 200 AE blocks have the following advantages:
- positive safety
- no unwanted tripping if there is a temporary reduction or interruption of the mains voltage
- efficient immediate operation even after long off-service periods of the installation

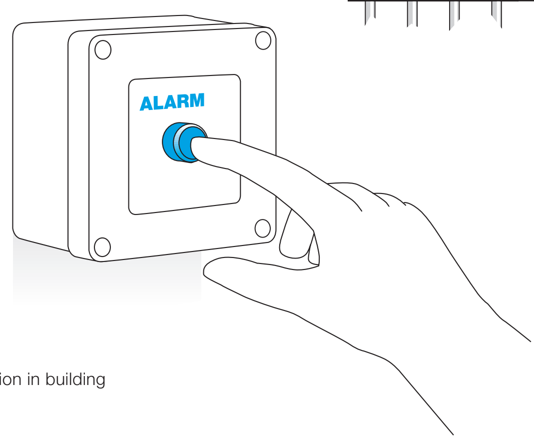
Use

Application of the DDA 200 AE blocks complies with the requirements of IEC 60364-8. They are therefore suitable, for example, for escalators, lifts, hoists, electrically operated gates, machine tools, car washes and conveyor belts.
No more than one DDA 200 AE can be controlled using the same control circuit. Each DDA 200 AE requires a dedicated control circuit.





DDA202 A AE	L max = 230 m
DDA203 A AE	L max = 60 m
DDA204 A AE	L max = 230 m



1 Polarised relay
2 Sensor winding
3 Induction toroid
4 Supplementary primary windings
5 Single or multiple push-button unit
6 Test button

See page 3/32 in Solutions for electrical distribution in building

RCDs technical details
Unwanted tripping - AP-R solution (high immunity)

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.

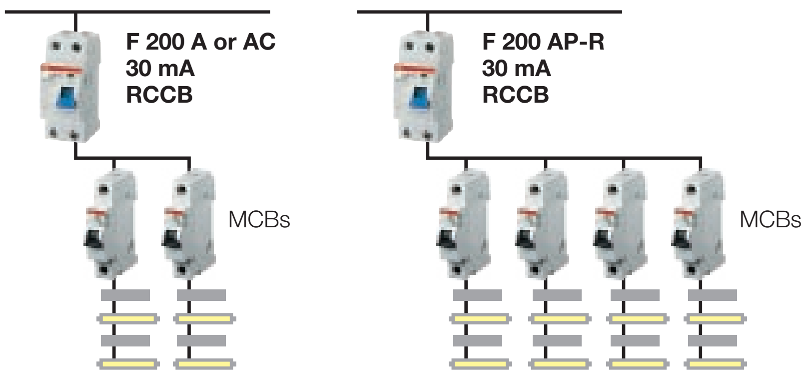
Under these circumstances, breaker tripping is unwanted, since it does not satisfy the need to avoid the risks due to direct and indirect contacts. On the contrary, the sudden and unjustified interruption of the power supply may result in very serious problems.

AP-R RCDs
The ABB range of AP-R anti-disturbance residual current circuit-breakers 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.
AP-R 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 IΔn=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 AP-R residual current devices especially suited for installations involving motor starters/variable speed drives, fluorescent lamps or IT/electronic equipment.

The use of multiple electronic reactors for the supply of fluorescent lamps instead generates permanent leakage currents and inrush currents that can cause nuisance tripping of a standard residual current circuit 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 circuit breaker. For these situations, the AP-R breakers allow a greater number of devices to be connected to the installation.
Frequency converters include a rectifier section and an inverter section.

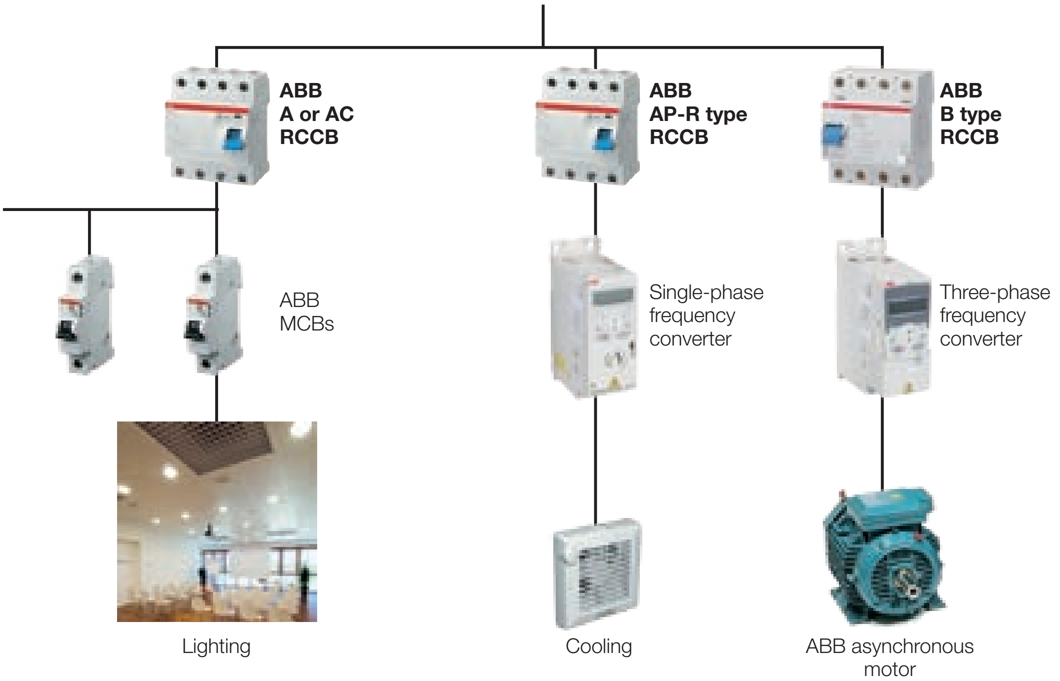
In case of fault within a single-phase frequency converter AP-R type RCDs provide complete protection, because an earth fault occurring downstream the inverter, produces an earth fault current with multi-frequency shape with high amount of harmonics.
While, in case of fault within a three-phase frequency converter, B type RCDs ensure complete protection because in case of insulation fault between the rectifier and the inverter or downstream the inverter we can have a smooth DC earth fault current.



Max 50 electronic reactors

See page 3/31 in Solutions for electrical distribution in building

RCDs technical details
Unwanted tripping - AP-R solution (high immunity)



Compared with standard type breakers, AP-R 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.

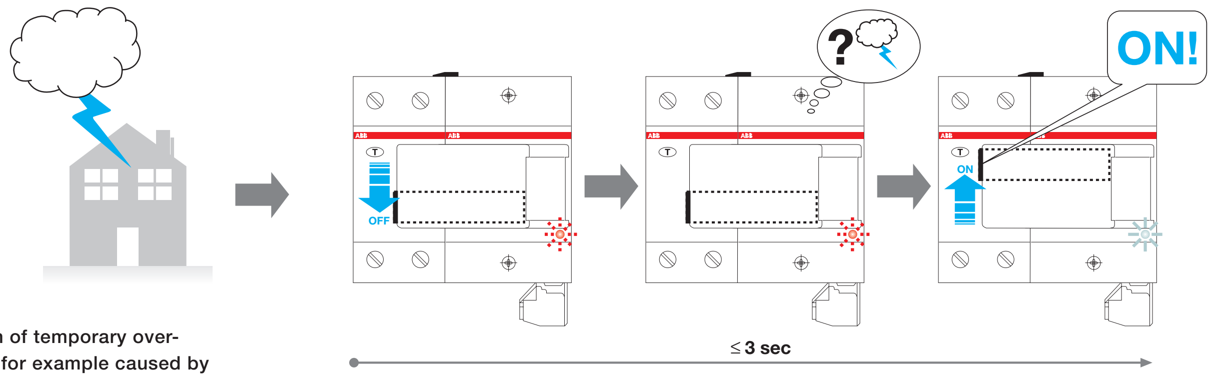
For what concerns atmospheric overvoltages, the IEC 61008 and 61009 standards prescribe the 8/20 μs surge test with a 3000 A peak current, but limit the requirement to residual current devices classified as selective; no test is required for other types.

The ABB range of AP-R anti-nuisance tripping breakers and blocks pass the general 0.5 μs/100 kHz ring wave test and also withstand the 8/20 μs impulse test with the same peak current of 3000 A prescribed for selective devices.

	A or AC	AP-R	B	Selective
Resistance to unwanted tripping caused by network disturbances with wave shape (0.5 μs/100 kHz)	250	250	200	250
Resistance to nuisance tripping due to overvoltages (operational or atmospheric) peak (8/20 wave)	250	3000	3000	5000

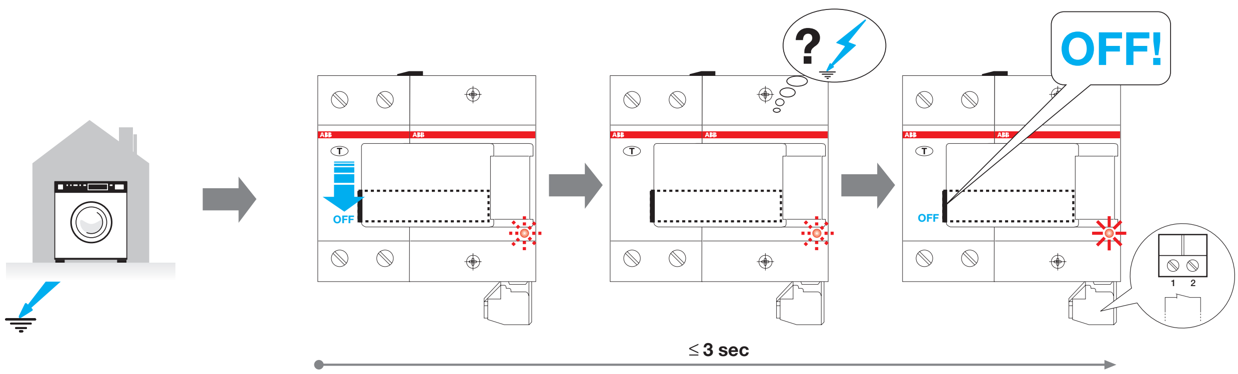
RCDs technical details
Unwanted tripping - F2C-ARH solution

The F2C-ARH is an auto-reclosing device particularly suited for household and similar uses. It doesn't require a separate low voltage power supply, and can be supplied by the associated RCCBs (2 pole RCCBs up to 63 A – 30 mA) at the 230 V a.c. rated voltage.
Another feature that makes the product ideal for home applications is an internal control unit that checks there are no insulation faults in the system before allowing the RCCB to reclose.
This ensures that reclosing occurs only in case of unwanted tripping of the RCCB (i.e. overvoltages induced by electrical storms), thus assuring continuity of power supply also in these situations.



Situation of temporary over-voltage, for example caused by a lightning, that causes RCCB's untimely tripping.

When the RCCB operates in presence of an effective insulation fault, the auto-reclosing device doesn't allow its reclosing and guarantees the system insulation.



Situation of permanent earth fault that causes RCCB's tripping.

See page 4/21 in Solutions for electrical distribution in building

RCDs technical details
Type B RCDs

Type B RCDs
In industrial electrical applications it is more and more common to use devices where in the event of an earth fault current unidirectional direct currents or currents with a minimum residual ripple which flow through the PE conductor can emerge. These devices can be for example inverters, medical equipment (e.g. x-ray equipment and CAT), or UPS.

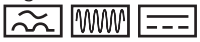
Type A RCDs sensitive to pulsating currents (in addition to sinusoidal currents detected by RDCs of type AC as well) cannot detect and break these earth fault direct currents or currents with a minimum level residual ripple. In case there are electrical appliances which generate this type of currents in the event of an earth fault the use of RCDs of type AC or type A would not be appropriate.

In order to meet these new demands, type B RCDs have been designed (which are able to detect the same earth fault currents detected by type AC and type A RCDs).
This type of RCD (type B) is not mentioned in the reference standards for RCDs (IEC 61008-1 and IEC 61009-1). An international standard has been introduced in 2007 an it specifies additional requirements for B type RCDs.

This new standard, IEC 62423, can only be referred to together with IEC 61008-1 (for RCCBs) and IEC 61009-1 (for RCD-blocks and RCBOs), this means that B type RCDs have to be compliant to all the prescriptions of IEC 61008/9.

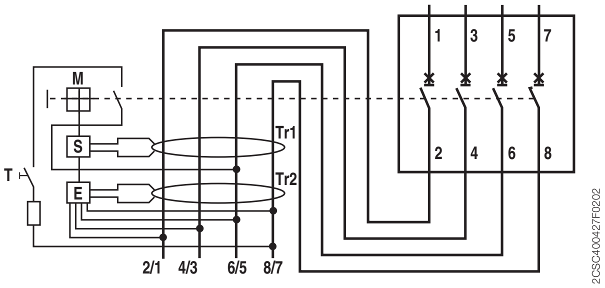
As already said, type B RCDs are not only sensitive to alternating and pulsating earth fault currents with DC components at a frequency of 50/60 Hz (type A), but they are also sensitive to:
- alternating currents up to a frequency of 1000 Hz;
- alternating and/or pulsating currents with DC components overlapping with a direct current;
- earth fault currents generated by a rectifier with two or more phases;
- direct earth fault currents without residual ripple

...independently of the polarity or whether the earth fault current appears suddenly or increases gradually.

Type B RCDs must be marked with the following symbols highlighting the switches' capacity to detect every type of current:  .

Construction features

Type B RCDs consist of one section for the detection of alternating earth fault currents and unidirectional pulsating earth fault currents, which functions independently of the line voltage. For the detection of direct earth fault currents or currents with a minimum residual ripple, type B RCDs have a second electronic section, the functioning of which depends on the line voltage.
The structure of the product is illustrated in the following diagram.

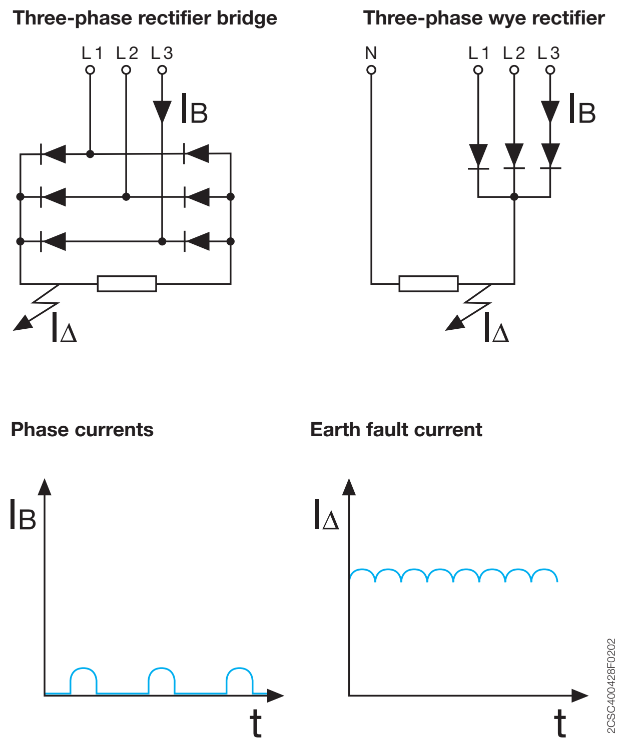


S Release
M Protection device mechanism
E Electronics for the intervention with direct unidirectional earth fault currents
T Test device
Tr1 Residual current transformer for the detection of sinusoidal earth fault currents
Tr2 Residual current transformer for the detection of direct unidirectional currents.

The residual current transformer Tr1 monitors the presence of pulsating and alternating earth fault currents in the electronic installation while residual current transformer Tr2 measures the direct unidirectional currents. In the event of a fault the second transformer transmits the opening command to the release S via the (printed) circuit board E. In type B RCCBs, the section whose functioning depends on the line voltage is supplied by all three-phase conductors and the neutral, so that the functioning as type B is guaranteed even if there is a voltage only in two of the 4 power conductors. In addition, the supply of the electronic section is sized in such a way that the device can safely intervene even if there is a voltage drop of 70%.
In this way an intervention takes place when direct unidirectional earth fault currents emerge, even in the event of faults in the electric power supply grid, for example if there is no neutral conductor.

Direct or similar earth fault currents

An increasing amount of industrial equipment is supplied by circuits which in the event of a fault generate direct earth fault currents with a very low residual ripple, which can be even less than 10%. For example with direct current supplied motor drives for pumps, elevators, textile machines etc. it is becoming more common to use inverters with a three-phase rectifier bridge.
In the event of an earth fault current the wave of the earth fault is as indicated in the figure below.



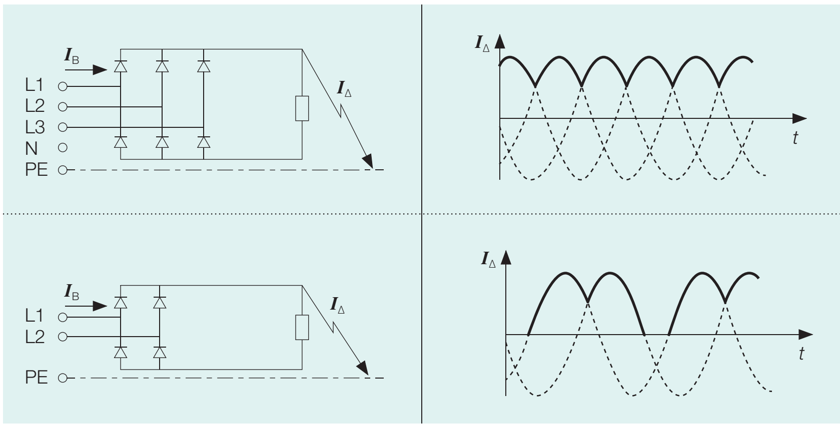
RCDs technical details
Type B RCDs

F200 B RCCBs provide additional protection against direct contact and are the right choice to ensure maximum system safety thanks to early detection of fault currents with continuous waveforms or high frequencies.

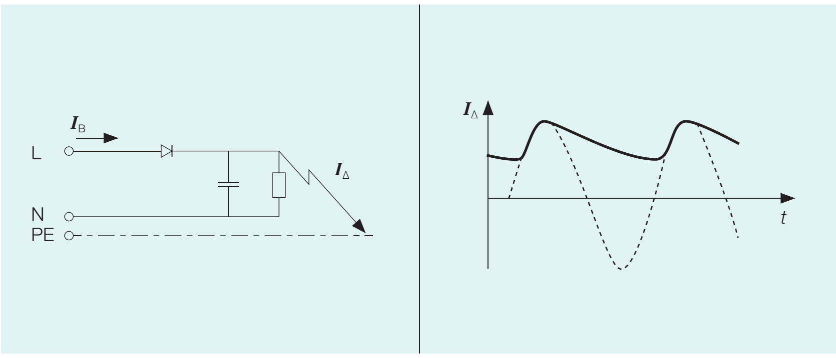
Selection of RCDs. General rules

Type B RCDs are suitable for non-linear circuits that can generate leakages with high direct current (> 6 mA) and/or high frequency components. Such components can be found in several industrial components and applications that embed or depend on electronics.
The main circuits that can be considered responsible for such leakages and the common applications where Type B could be demanded are:

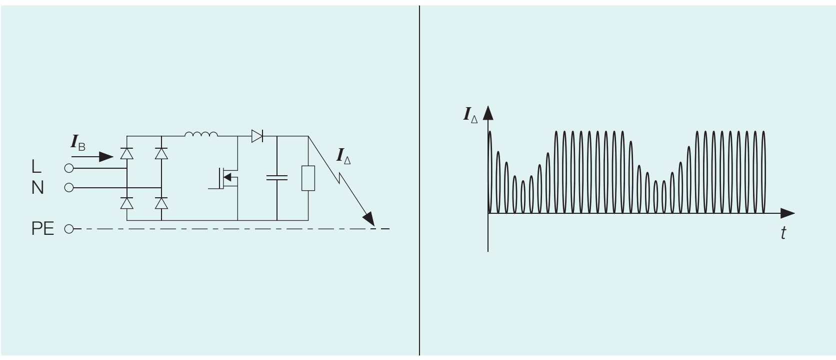
Circuits containing single and three-phase rectifiers



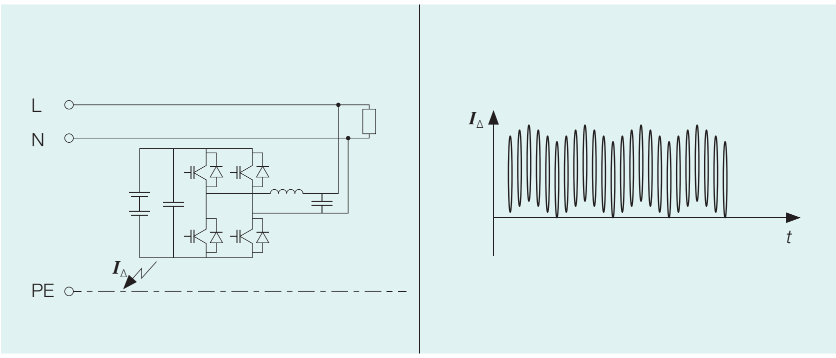
Circuits containing rectifiers with high levelling capacity



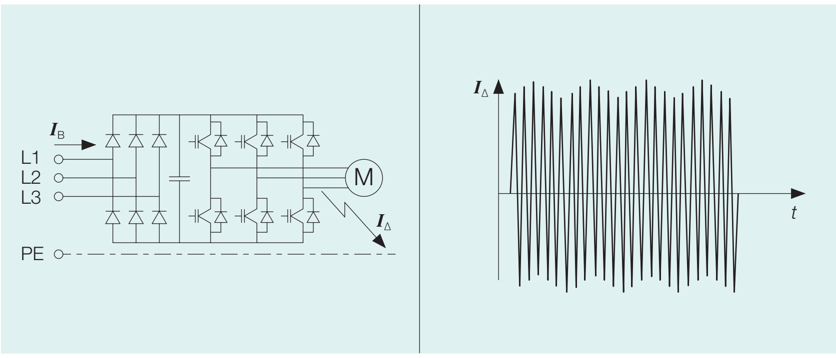
Circuits containing rectifiers with active power factor correction



Circuits containing continuos voltage generators with no separation from a.c. network



Circuits containing continuos voltage generators

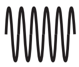
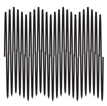


RCDs technical details
Type B RCDs

Immunity to nuisance tripping: advantages of Type B RCCBs
RCDs Type B are advance-designed products that, on one hand, are able to protect from different kinds of faults, regardless of their waveform; on the other hand, they are immune to unwanted trippings.

In order to be such an effective device in terms of protection, every Type B RCD must withstand successfully all the tests provided by the Standards. In the testplan are foreseen several tripping waveforms that are considered to represent the best approximation to a real fault condition in case of non linear circuits.

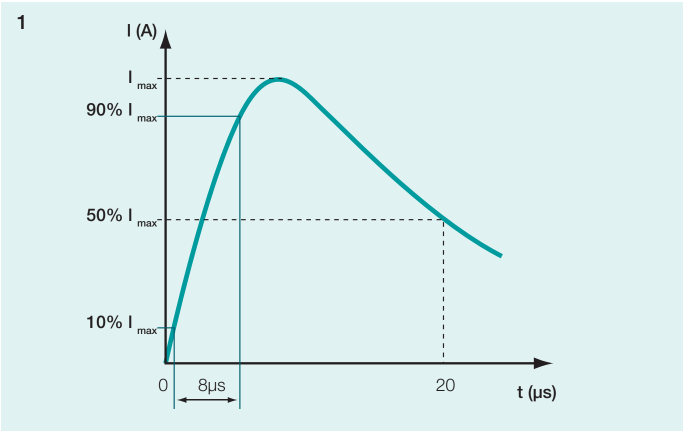
Tripping waveforms for Type B RCDs

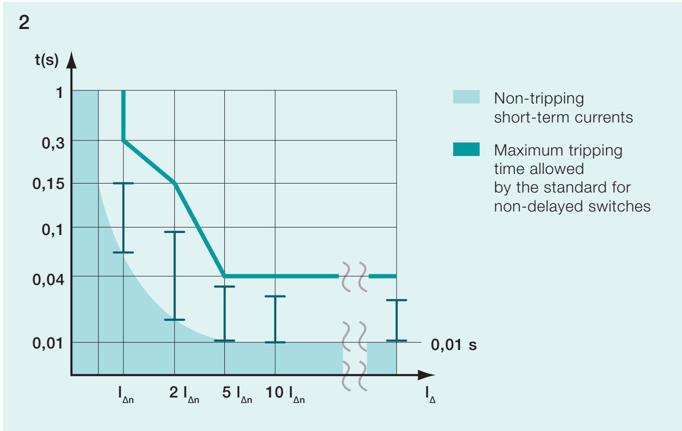
	Residual current form	Limit value of tripping current
Alternating		0,5...1,0 $I_{\Delta n}$
Unidirectional pulsating		0,35...1,4 $I_{\Delta n}$
Unidirectional pulsating with phase angle mode		Cut-off angle 90° from 0,25 to 1,4 $I_{\Delta n}$
		Cut-off angle 135° from 0,11 to 1,4 $I_{\Delta n}$
Alternating sinusoidal residual current plus pulsating dc current, suddenly applied or smoothly increasing		Max. 1,4 $I_{\Delta n}$ + 0,4 $I_{\Delta n}$ d.c.
Unidirectional pulsating superimposed on direct		Max. 1,4 $I_{\Delta n}$ + 0,4 $I_{\Delta n}$ d.c.
Multi-frequency		From 0,5 to 1,4 $I_{\Delta n}$
Two-phase rectified		From 0,5 to 2,0 $I_{\Delta n}$
Three-phase rectified		
Direct without ripple		
Alternating up to 1 kHz		Current frequency 150 Hz from 0,5 to 2,4 $I_{\Delta n}$
		Current frequency 400 Hz from 0,5 to 6 $I_{\Delta n}$
		Current frequency 1000 Hz from 0,5 to 14 $I_{\Delta n}$

To prove their immunity to unwanted tripping, Type B residual current devices must successfully pass further severe tests such as:

- 8/20 μs impulse up to 3000 A (s. fig. 1);
- 10 ms impulse up to10 IΔn (s. fig. 2).

These tests emulate the conditions that an RCD must withstand in case of overvoltages or leakages due to EMC filters or electronic loads. Type B and devices can be considered suitable for all difficult applications, not only in terms of protection, but of operational continuity as well.





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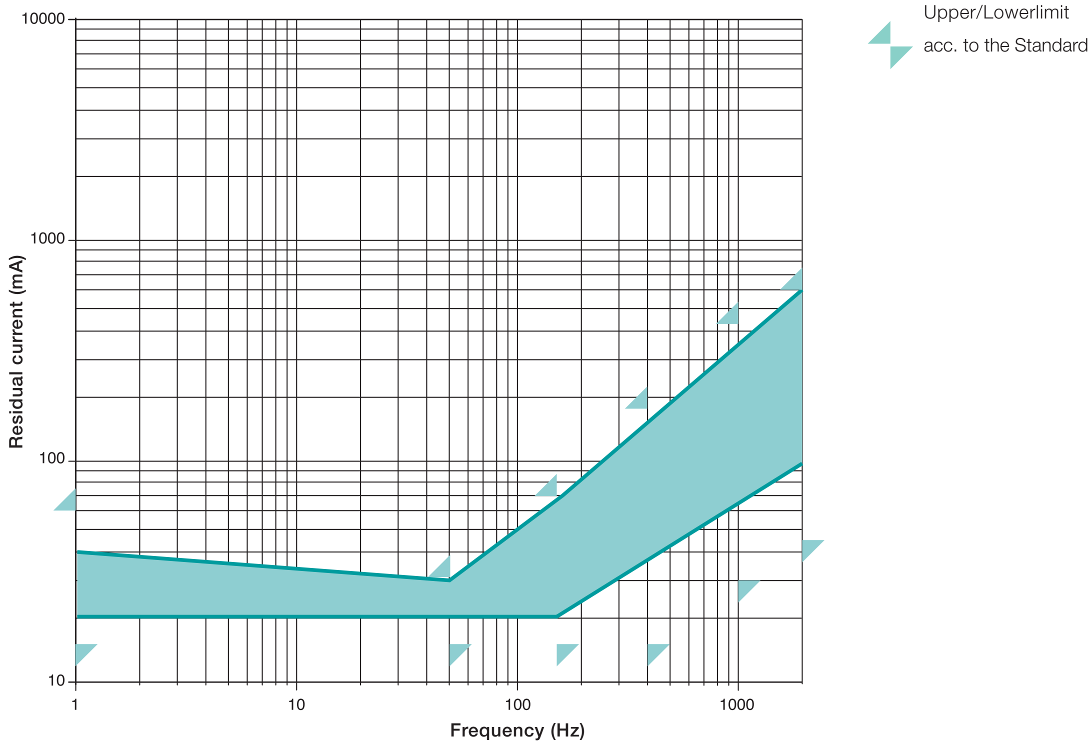
Tripping times

Type	Fault currents	Tripping time at			
	Alternating currents	1 x IΔn	2 x IΔn	5 x IΔn	500 A
	Pulsating DC currents	1,4 x IΔn	2 x 1,4 x IΔn	5 x 1,4 x IΔn	500 A
	Smooth DC currents	2 x IΔn	2 x 2 x IΔn	5 x 2 x IΔn	500 A
Standard or short-time delay		Max. 0,3 s	Max. 0,15 s	Max. 0,04 s	Max. 0,04 s
Selectiv S		0,13 - 0,5 s	0,06 - 0,2 s	0,05 - 0,15 s	0,04 - 0,15 s

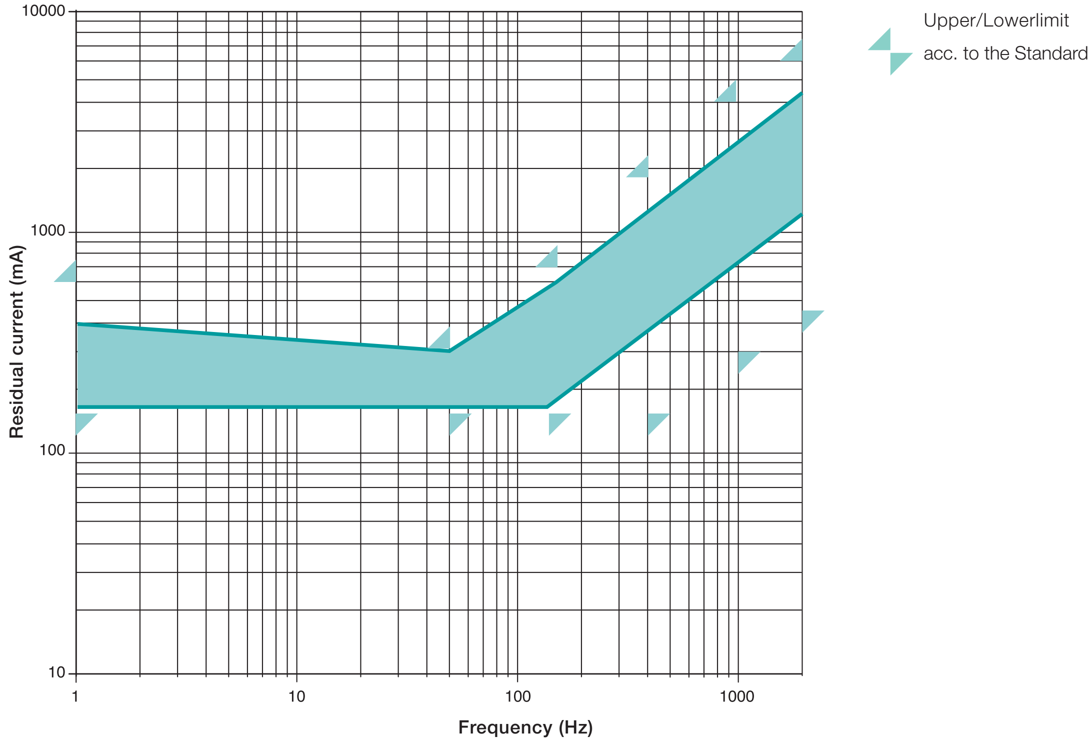
RCDs technical details
Type B RCDs

Variation of residual current tripping thresholds according to frequency

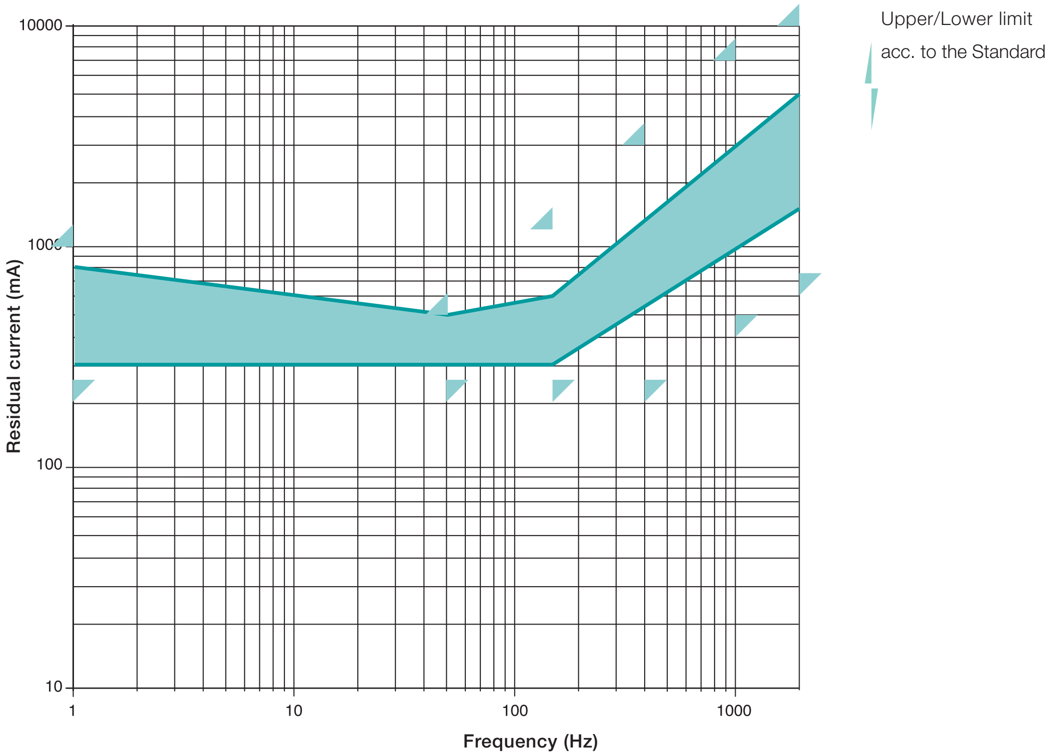
F200 B 30 mA



F200 B 300 mA



F200 B 500 mA



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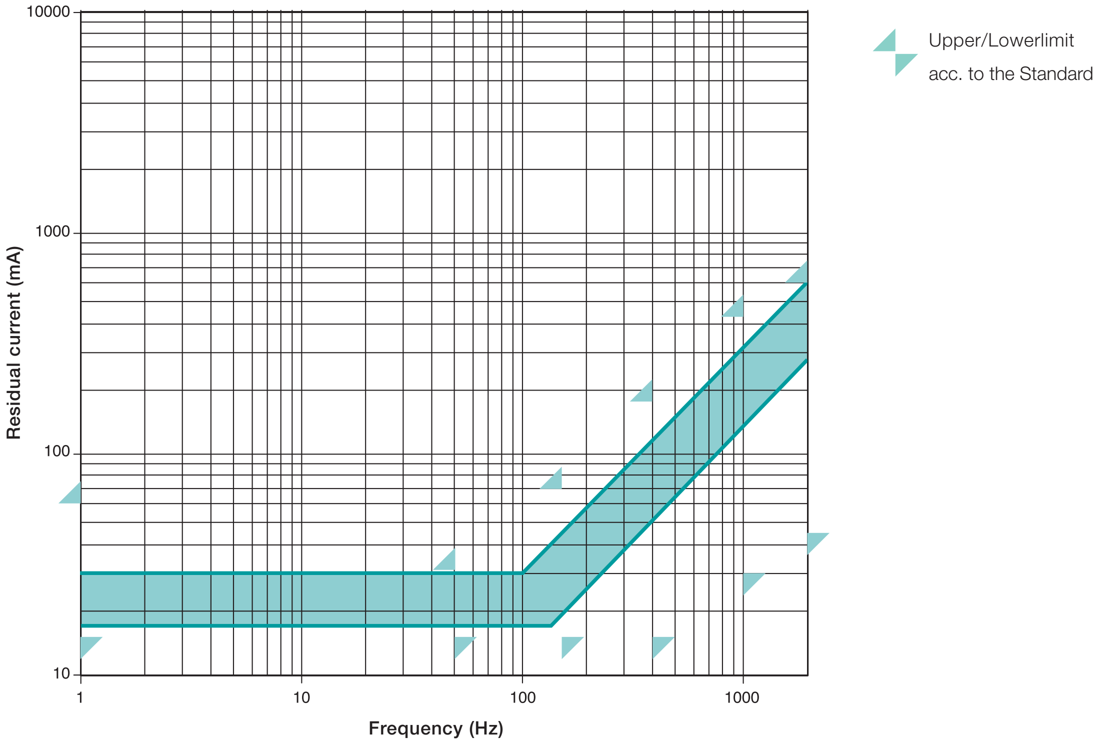
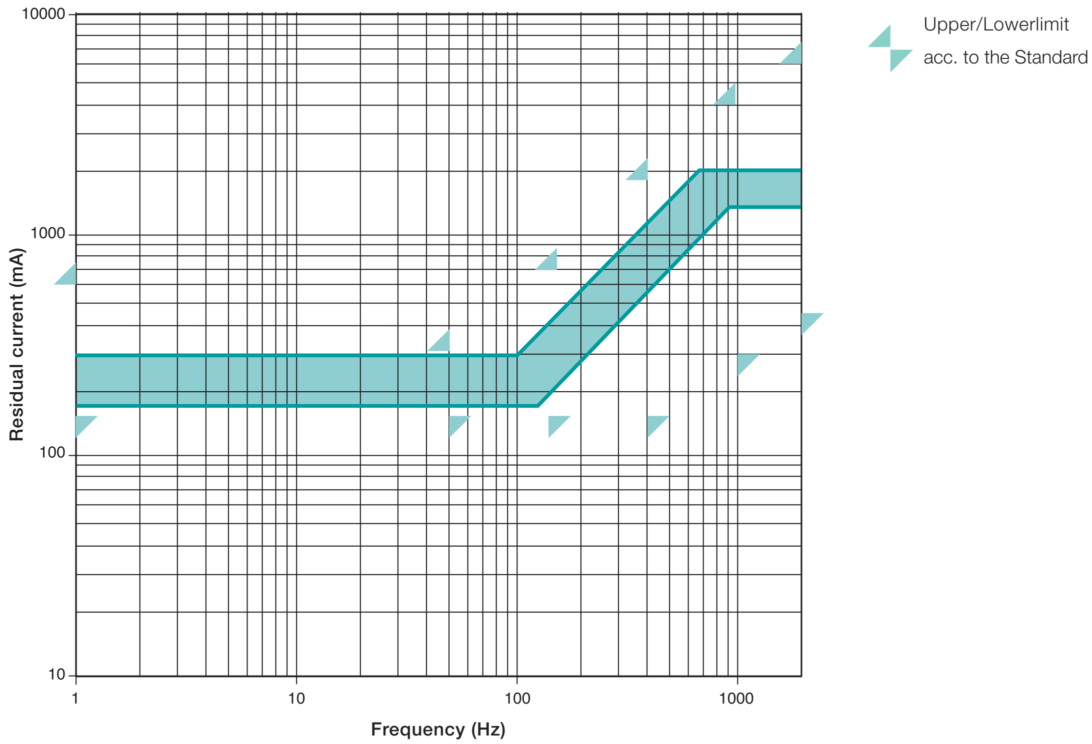
F200 B high ratings

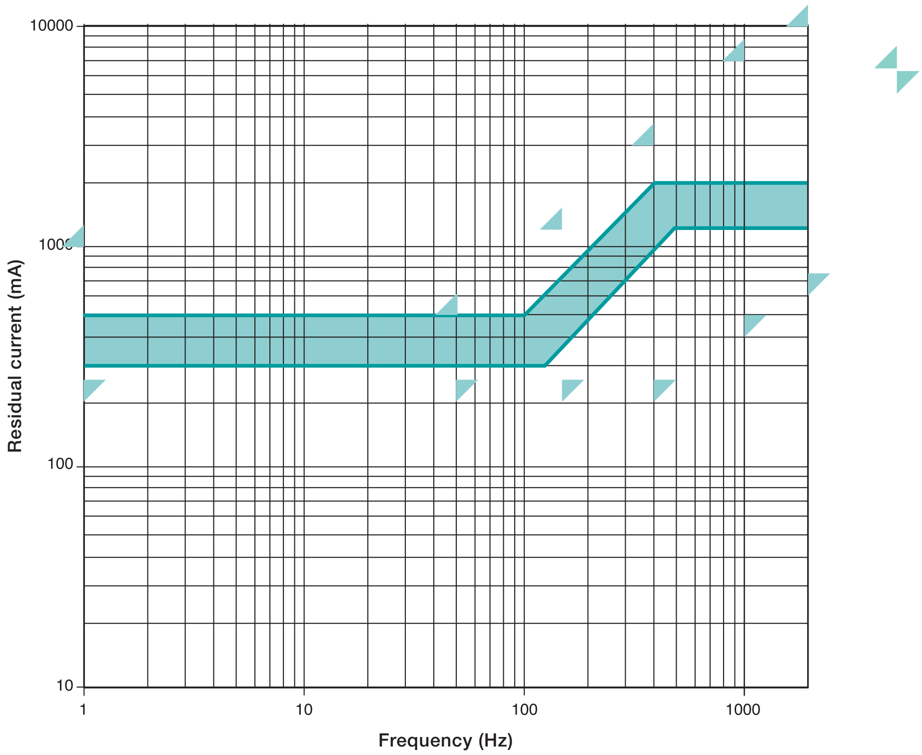
F204 B 30 mA



F204 B 300 mA



F204 B 500 mA

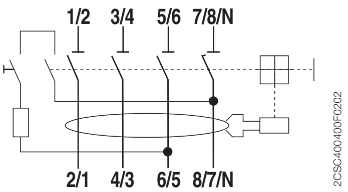


3

RCDs technical details
Use of 4P RCCBs in 3-phase system without neutral pole

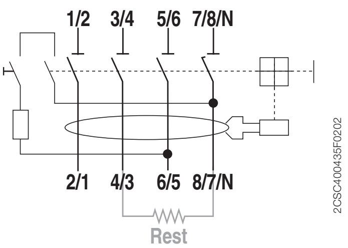
Use of a 4P RCCB in a 3-phase circuit without neutral

The test button circuit of these RCCBs 4P F 200 is wired inside the device between terminal 5/6 and 7/8/N as indicated below, and has been sized for an operating voltage between 110V (170V for the 30mA version according to EN standard) and 254 V (110 and 277 V according to UL 1053).



In case of installation in a 3 phase circuit without neutral, if the concatenate voltage is between 110V (170V for the 30mA version according to EN standard) and 254 V (277 V according to UL 1053) for the correct working of the test button there are two possible solutions:
1) To connect the 3 phases to the terminals 3/4 5/6 7/8/N and the terminals 4/3 6/5 8/7/N (supply and load side respectively)
2) To connect the 3 phases normally (supply to terminals 1/2 3/4 5/6 and load to terminals 2/1
4/3 6/5) and to bridge terminal 1/2 and 7/8/N in order to bring to the terminal 7/8/N the potential of the first phase. In this way the test button is supplied with the phases' concatenate voltage.

If the circuit is supplied with a concatenate voltage higher than 254 V, as in the typical case of 3 phase net with concatenate voltage of 400 V - or 480 V according to UL 1053 - (and voltage between phase and neutral of 230 V or 277 V according to UL 1053), it is not possible to use these connections because the circuit of the test button will be supplied at 400 V and could be damaged by this voltage.



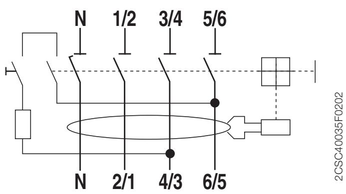
IΔn [A]	Rest [Ω]
0.03	3300*
0.03	3900
0.1	1000
0.3	330
0.5	200

* Only for IEC range

In order to allow the correct operation of the test button also in 3 phase nets at 400 V - 480 V according to UL 1053 - (concatenate voltage) it is necessary to connect normally the phases (supply to terminals 1/2 3/4 5/6 and load to terminals 2/1 4/3 6/5) and to jump terminal 4/3 and 8/7/N by mean of an electric resistance as indicated above.
In this way the test button circuit is fed at 400 V - 480 V according to UL 1053 - but for example in an IEC compliant RCCB with IΔn=0.03 A there will be the Rest=3.3 kOhm resistance in series to the test circuit resistance. Rest will cause a voltage drop that leaves in the test circuit a voltage less than 254 V - 277 V according to UL 1053. Rest resistance must have a power loss higher than 4 W.
In the normal operation of the RCCB (test circuit opened) the Rest resistance is not fed so it does not cause any power loss.

The solution RCCBs with neutral pole on left side

The test button circuit of these RCCBs is wired inside the device between terminal 3/4 and 5/6 as indicated below, and it has been sized for an operating voltage between 195 V and 440 V - 480 V. In case of a three phase system without neutral with concatenate voltage between phases of 230 V or 400 V - 277 V or 480 V - it is enough to connect the 3 phases normally (supply to terminals 1/2 3/4 5/6 and load to terminals 2/1 4/3 6/5) without any bridge.



RCDs technical details
Operating voltage of test button

Operating voltage of test button

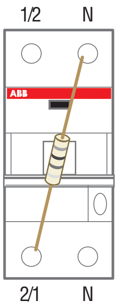
The operation of RCDs depends on the maximum and minimum operating voltage of the test button.

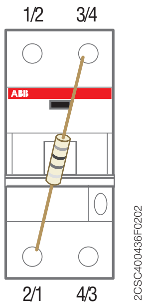
This symbol represents the circuit of test button

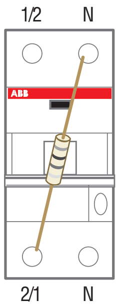
Maximum and minimum operating voltage of DS201 and DS202C test button

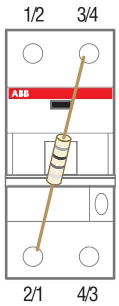
DS201 - DS202C
Ut = 110-254 V;
for 30mA: Ut = 170-254V

DS201 M - DS202C M 110V
Ut = 110-254V





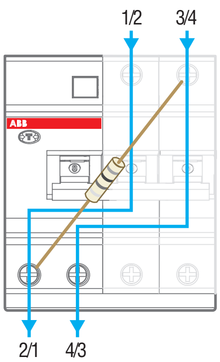




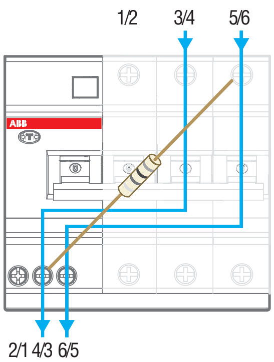
Between the two terminals there is a rated voltage of 110-254 V

Maximum and minimum operating voltage of DS 200 and DDA 200 test button

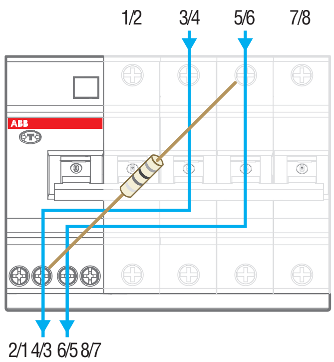
DDA 202 and DS 202
In = 25-40 A
Ut = 110 - 254 V;
for 30mA: Ut = 170-254V



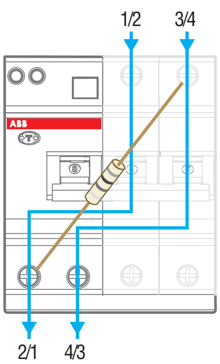
DDA 203 and DS 203
In = 25-40 A
Ut = 195 - 440 V;
for 30mA: Ut = 300-440V



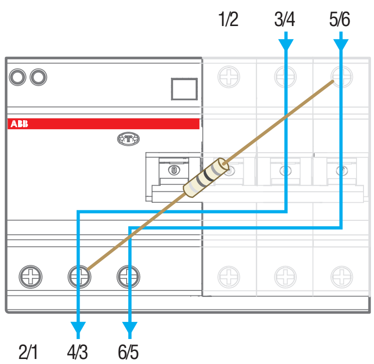
DDA 204 and DS 204
In = 25-40 A
Ut = 195 - 440 V;
for 30mA: Ut = 300-440V



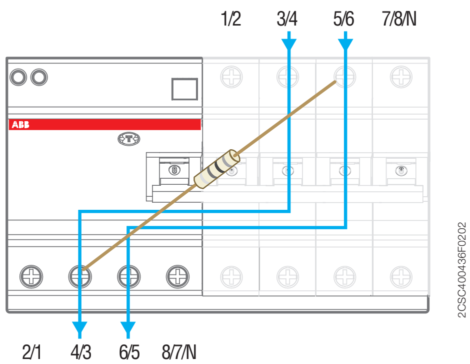
DDA 202 and DS 202
In = 63 A
Ut = 110 - 254 V;
for 30mA: Ut = 170-254V



DDA 203 and DS 203
In = 63 A
Ut = 195 - 440 V;
for 30mA: Ut = 300-440V



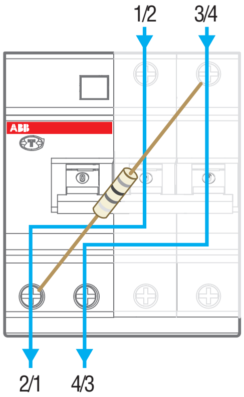
DDA 204 and DS 204
In = 63 A
Ut = 195 - 440 V;
for 30mA: Ut = 300-440V



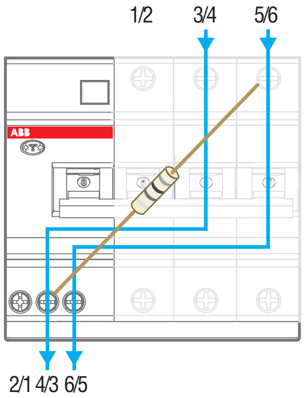
RCDs technical details
Operating voltage of test button

Maximum and minimum operating voltage of DDA 200, special version 110 V

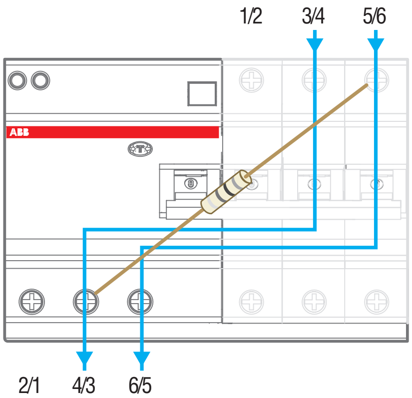
DDA 202 110 V
In = 25-40-63 A
Ut = 110-254 V



DDA 203 110 V
In = 40 A
Ut = 110-254 V



DDA 203 110 V
In = 63 A
Ut = 110-254 V



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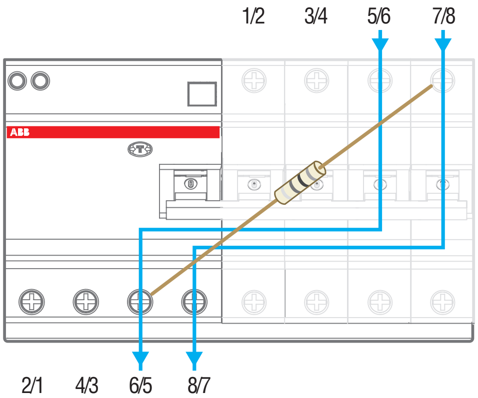
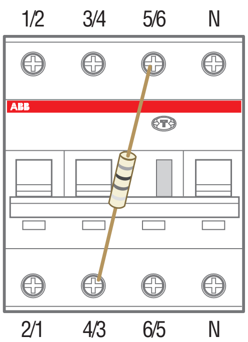
DDA 204 110 V
In = 63 A
Ut = 110-254 V



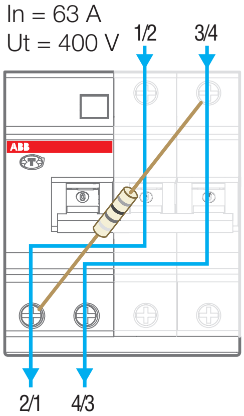
Maximum and minimum operating voltage of the DS203NC

DS203NC
Ut= 195-440V (300-440V for 30 mA)



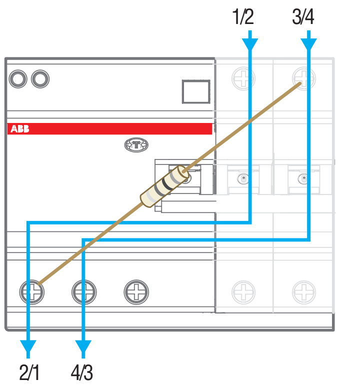
Maximum and minimum operating voltage of DDA 200, special version 400 V

DDA 202
In = 63 A
Ut = 400 V

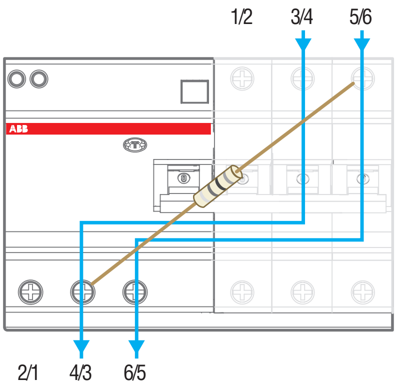


Maximum and minimum operating voltage of DDA 200 B type test button

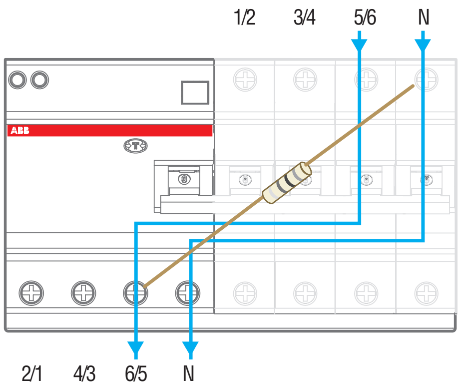
DDA 202 B
In = 63 A
Ut=195-254 V (170-254 V
for 30 mA)



DDA 203 B
In = 63 A
Ut=310-440 V (300-440 V
for 30 mA)



DDA 204 B
In = 63 A
Ut=195-254 V (300-440 V
for 30 mA)



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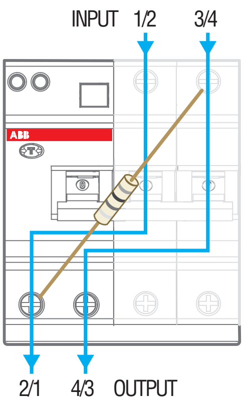
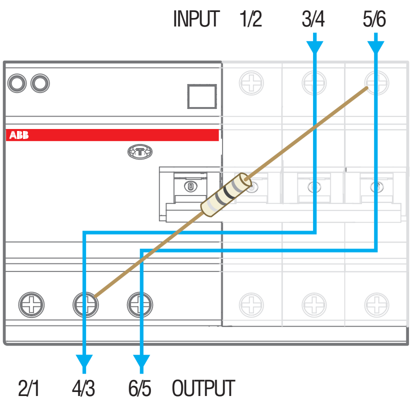
Maximum and minimum operating voltage of DDA 200 AE test button

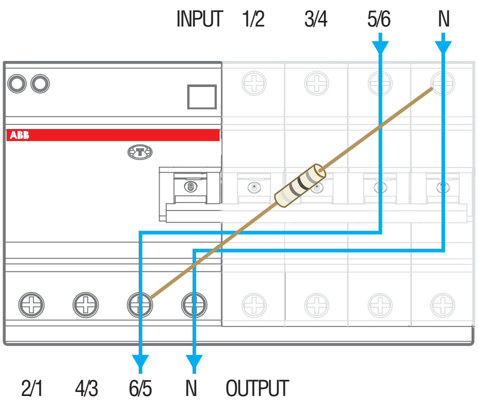
DDA 202 AE
In = 63 A
Ut = 184-264 V



DDA 203 AE
In = 63 A
Ut = 310-440 V



DDA 204 AE
In = 63 A
Ut = 184-264 V



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RCDs technical details
Operating voltage of test button

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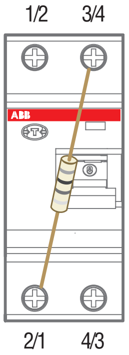
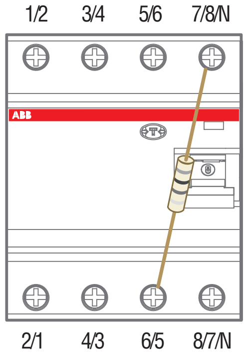
Maximum and minimum operating voltage of F 200 standard test button

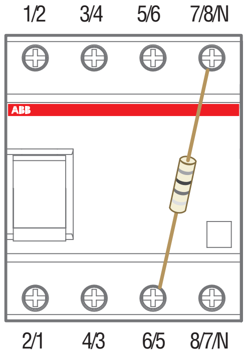
F 202 standard
In = ≤ 100 A
Ut = 110 - 254 V;
for 30mA①: Ut = 170-254V



F 204 standard
In = ≤ 100 A
Ut = 110 - 254 V;
for 30mA①: Ut = 170-254V



F 204 standard
In = 125 A
Ut = 185 - 440 V;
for 30mA①: Ut = 150-250V



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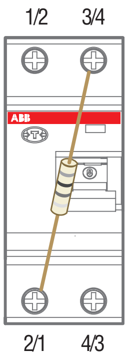
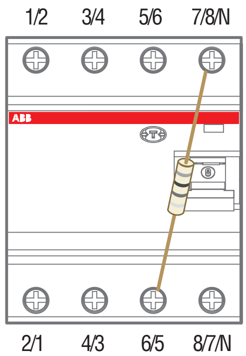
① Only for versions with marking according to EN 61008-1;EN 61008-2-1

Maximum and minimum operating voltage of F 200 110V standard test button

F202 110V
In =< 100 A
Ut = 110 - 254 V

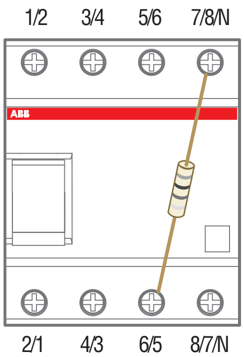


F 204 110V
In =< 100 A
Ut = 110 - 254 V

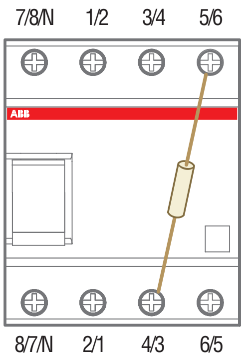


Maximum and minimum operating voltage of F 200 B and F 200 B (N on the left) type test button

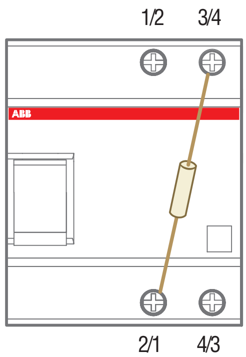
F 204 B
In = ≤ 63 A
Ut = 185 - 440 V;
for 30mA: Ut = 150-250V



F 204 B
In = 125 A
Ut=195-440V
for 30mA: Ut = 250-440V



F 202 PV B
In = ≤ 63 A
Ut = 230 V



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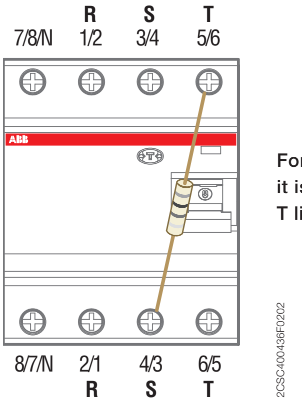
Maximum and minimum operating voltage of F 200 (N on the left) test button

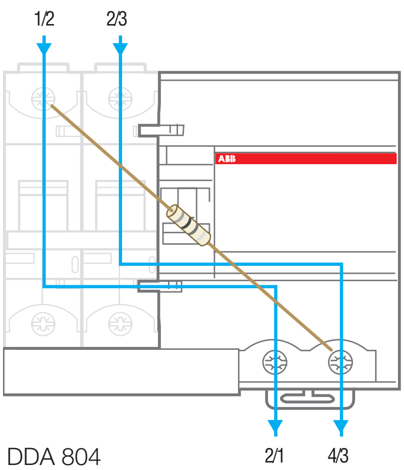
F 204 neutal on left
In = ≤ 100 A
Ut=195-440V; for 30mA: Ut = 250-440V



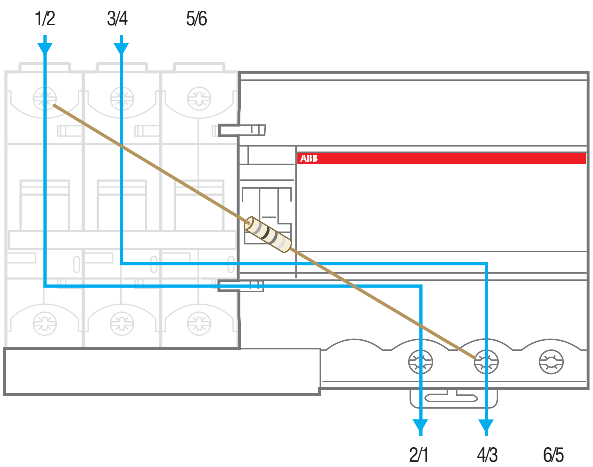
For use in 3-phases circuit without neutral at 400 V it is possible to connect the three phases R, S and T like in the figure.

Maximum and minimum operating voltage of DDA 800 and DS800 test button

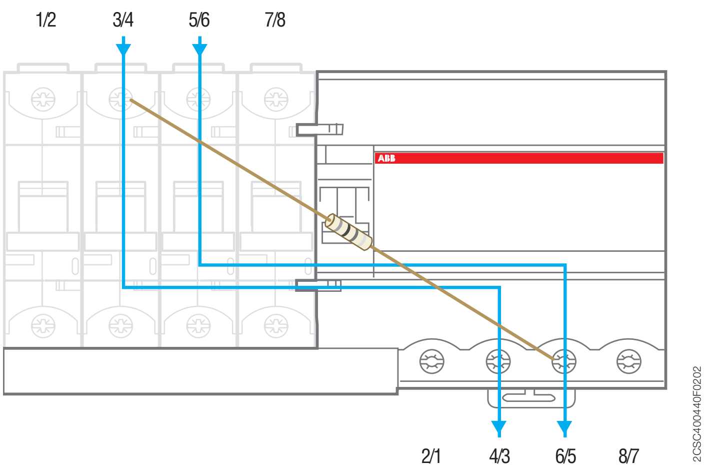
DDA 802
DS802
IN ≤ 125 A
Ut = 195-690 V



DDA 803
DS803
IN ≤ 125 A
Ut = 195-690 V



DDA 804
DS804
IN ≤ 125 A
Ut = 195-690 V



RCDs technical details
RD2 residual current relays

RD2 residual current monitors

They operate combined with appropriate toroidal transformers (in 9 different diameters).
The relay can command the tripping of the protection circuit-breaker release, thus opening the circuit.
According to the IEC 62020 Standard, these relays are “A Type”. They are sensitive to leakage sinusoidal currents and to leakage pulsanting currents with direct components. Thus they can be defined as “A type”.

2CSC400321F0201

More technical characteristics

Calibration tolerances		- sensitivity	75% ± 10%
		- time	75% ± 10%
Power consumption	[W]	0.45 at 48 V AC/DC	
		1.2 at 110 V AC/DC	
		3.4 at 230 V AC	
		11 at 400 V AC	
Dielectric test voltage at ind. freq. for 1 min.	[kV]	2.5	
Max. peak current with 8/20 µs wave	[A]	5000	
Installation position		any	
Protection degree		IP20	

See page 3/112 in Solutions for electrical distribution in building

RCDs technical details
RD3 residual current relays

RD3 electronic residual current relay
RD3 is a residual current device that in combination with a toroidal transformer is able to detect and evaluate earth fault current. If used in combination with a shunt-trip or undervoltage release, it can realize the opening of a circuit breaker ensuring earth leakage current protection.

RD3

2CSC400450F0202

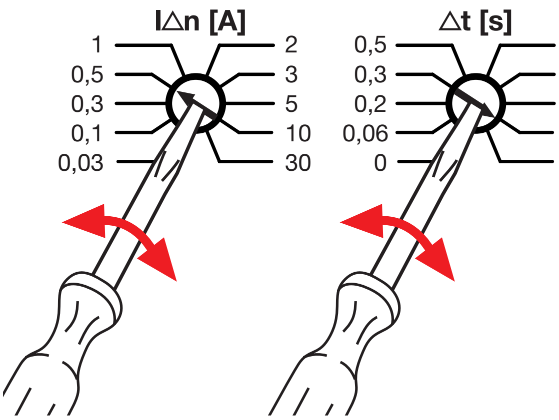
RD3M

2CSC400451F0202

RD3P

2CSC400452F0202

Setting of residual operating current and trip time delay.
Using the rotary selectors on the front of the device, it is possible to adjust the residual operating current and the trip time delay.



2CSC400454F0202

Adjustment of residual operating current (IΔn [A]) and trip time delay (Δt [s]).

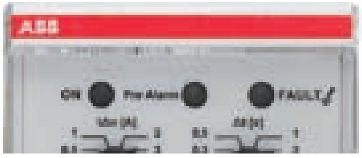
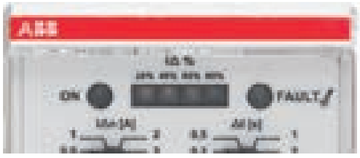
Main features

	Pre-alarm Placing the dip-switch in the ON position enables the pre-alarm function: the output contact on terminals 7 8 9 will change state in the event of a residual current exceeding 60% IΔ.	**Autoreset** Placing the dip-switch in the ON position enables the automatic Reset function: the Relay OUTPUT contacts revert to their original state once the fault condition ceases.	**Fail-safe** Built into the device (positive safety). In case of absence of supply to the device RD3 the output contact on terminals 10 11 12 will change state as shown in the figures.
RD3			■
RD3M	■		■
RD3P	■	■	■

See page 3/113 in Solutions for electrical distribution in building

RCDs technical details
RD3 residual current relays

Indicators

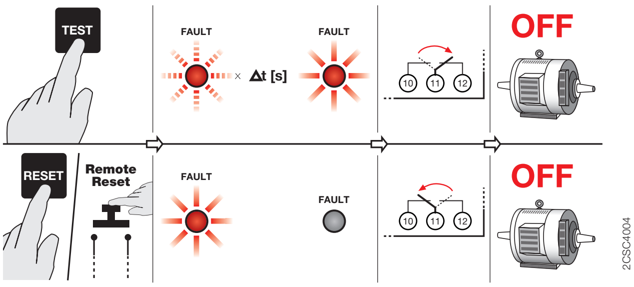
	RD3	RD3M	RD3P
			
Stand by	ON FAULT	ON Pre Alarm FAULT	ON IΔ% 20% 40% 60% 80% FAULT
Fault	ON FAULT	ON Pre Alarm FAULT ON Pre Alarm FAULT	ON IΔ% 20% 40% 60% 80% FAULT 20% 40% 60% 80% 20% 40% 60% 80% 20% 40% 60% 80% 20% 40% 60% 80% 20% 40% 60% 80%
Absent connection with toroid	ON FAULT	ON Pre Alarm FAULT	ON IΔ% 20% 40% 60% 80% FAULT

Test

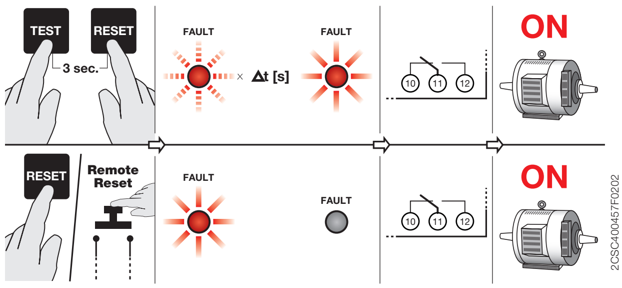
To perform the relay test, press the button on the front. The relay can be reset via the front button or a remote button, as shown in the figure:

On RD3P version, a no trip test can also be performed by simultaneously pressing the front test and reset buttons for 3 seconds. In this case, the output contacts will not switch, as shown in the figure below:

Test



Test NO TRIP



Associated circuit breakers (and relative releasers)

- Tmax range from T1 to T5, In up to 630 A, Ue up to 690 V, with UVR undervoltage release or SOR shunt opening release
- pro M Compact S200 range with In up to 63 A, Ue up to 440 V, with S 2C-A shunt trip or S 2C-UA undervoltage release

Tripping time (RD3 output relay switching time), cumulative time (with associate circuit breakers), non-trip time limit:

RD3: tripping time. cumulative time. non intervention time

Time selection Dt [s]	IΔn		2 IΔn			5 IΔn		10 IΔn	
	tripping time ≤ [s]	cumulative time with associate circuit breaker ≤ [s]	non-intervention time [s]	tripping time ≤ [s]	cumulative time with associate circuit breaker ≤ [s]	tripping time ≤ [s]	cumulative time with associate circuit breaker ≤ [s]	tripping time ≤ [s]	cumulative time with associate circuit breaker ≤ [s]
0	0.2	0.3	0.1	0.12	0.15	0.02	0.04	0.02	0.04
0.06	0.3	0.5	0.12	0.17	0.2	0.09	0.15	0.09	0.15
0.2	0.45	0.5	0.3	0.45	0.5	0.45	0.5	0.45	0.5
0.3	0.55	0.6	0.4	0.55	0.6	0.55	0.6	0.55	0.6
0.5	0.6	0.6	0.5	0.6	0.6	0.6	0.6	0.6	0.6
1	1.2	-	1	1.2	-	1.2	-	1.2	-
2	2.2	-	2	2.2	-	2.2	-	2.2	-
3	3.2	-	3	3.2	-	3.2	-	3.2	-
5	5.2	-	5	5.2	-	5.2	-	5.2	-
10	10.2	-	10	10.2	-	10.2	-	10.2	-

RCDs technical details
ELR front panel residual current relays

ELR: tripping time, cumulative time, non intervention time

Time selection Δt [s]	IΔn		2 IΔn			5 IΔn		10 IΔn	
	tripping time ≤ [s]	cumulative time with associate circuit breaker ≤ [s]	non-intervention time [s]	tripping time ≤ [s]	cumulative time with associate circuit breaker ≤ [s]	tripping time ≤ [s]	cumulative time with associate circuit breaker ≤ [s]	tripping time ≤ [s]	cumulative time with associate circuit breaker ≤ [s]
0	0.04	0.3	-	0.025	0.15	0.02	0.04	0.02	0.04
0.06	0.1	0.5	0.06	0.08	0.2	0.08	0.15	0.08	0.15
0.2	0.16 +15%	-	0.2	0.15 +15%	-	0.15 +15%	-	0.15 +15%	-
0.3	0.3 +15%	-	0.3	0.3 +15%	-	0.3 +15%	-	0.3 +15%	-
0.5	0.5 +15%	-	0.5	0.5 +15%	-	0.5 +15%	-	0.5 +15%	-
1	1 +15%	-	1	1 +15%	-	1 +15%	-	1 +15%	-
2	2 +15%	-	2	2 +15%	-	2 +15%	-	2 +15%	-
3	3 +15%	-	3	3 +15%	-	3 +15%	-	3 +15%	-
5	5 +15%	-	5	5 +15%	-	5 +15%	-	5 +15%	-

RCDs technical details
Toroidal transformers

Toroidal transformers

The choice of toroidal transformers is made according to the useful diameter and the minimum value of the leakage current to be detected.

Toroidal transformers selection for use with ELR according to IEC/ EN 60947-2 Annex M in combination with MCBs S200 range and MCCBs Tmax range up to T5

Type	Toroid useful diameter [mm]	Max rated current [A]	Min measurable current [mA]
TRM	29	65	30
TR1	35	75	30
TR2	60	85	30
TR3	80	160	100
TR4	110	250	100
TR4/A	110	250	300
TR160	160	400	300
TR160/A	160	400	500
TR5	210	630	300
TR5/A	210	630	500

Technical features of the toroidal transformers

Type	Toroid useful diameter [mm]	Min measurable current [mA]	Maximum capacity [A]
TRM	29	30	160
TR1	35	30	250
TR2	60	30	400
TR3	80	100	800
TR4	110	100	1250
TR4/A	110	300	1250
TR160	160	300	2000
TR160/A	160	500	2000
TR5	210	300	3200
TR5/A	210	500	3200

See page 3/115 in Solutions for electrical distribution in building

More technical characteristics

		TRM	TR1	TR2	TR3	TR4	TR4A	TR160	TR160A	TR5	TR5A
Core		closed	closed	closed	closed	closed	open	closed	open	closed	open
Available internal diameter	[mm]	29	35	60	80	110	110	160	160	210	210
Weight	[kg]	0.17	0.22	0.28	0.45	0.52	0.6	1.35	1.6	1.45	1.85
Minimum measurable current	[mA]	30	30	30	100	100	300	300	500	300	500
Installation position		Any									
Operating temperature	[°C]	-10…+70									
Storage temperature	[°C]	-20…+80									
Transformation ratio		500/1									
Dielectric test voltage at industrial freq. for 1 min.	[kV]	2.5									
Max. insulating voltage	[V a.c.]	1000									
Max. thermal overload	[kA]	40/1 sec.									
Connections		Screw terminal boards, max. section 2.5 mm^2									
Protection degree		IP20									

3

Generality
They must be mounted with residual current monitors upstream the lines or loads to be protected; all active conductors (phases and neutral) of single-phase as well as of three-phases lines must pass through them.

In this way these devices perform the vector sum of line currents detecting the possible homopolar differential currents that leak to earth: their core of sheet iron has high magnetic properties that allow to detect even very low leakage currents. The choice of a toroidal transformer depends on the conductor or on the bar to be used.
It is suggested to use the open versions in case of revamping or upgrading of an existing installation.

Installation
All active conductors can be introduced in the toroidal transformers without the need of respecting any specific sense of introduction (P1-P2 or P2-P1). The output signal must be picked up from terminals 1 (S1) and 2 (S2) and connected to the residual current monitor, while terminals 3 and 4 must be connected to the test output of those relays of FPP range with this function. With RD2 they must remain disconnected. For this connection it is better to use twisted or shielded cables, possibly far from busbars. The minimum recommended section of connection cables should have a maximum resistance of 3 Ω; anyway consider a maximum length of connection of 20 m for 0.5 mm^2 and of 100 m for 2.5 mm^2.

For versions with openable core it is necessary to control that the contact surface of the two semi-cores is clean, that bolts are tight and that connection cables connections on both sides are intact.

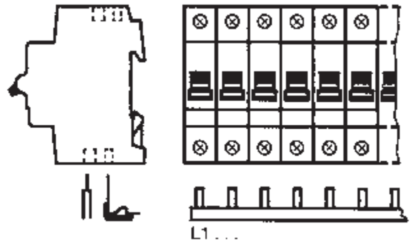
Connection cables with metallic shielding or armor must be earthed downstream the toroidal transformer; if they run within the transformer they must be earthed in the opposite direction.

Solutions for electrical distribution in buildings - Technical details
Accessories for MCBs and RCDs

4

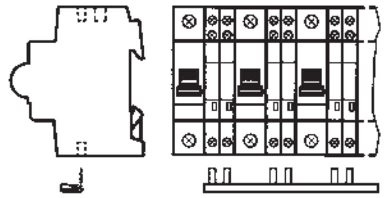
Accessories for MCBs and RCDs
Busbars

PS 1/...
PS 1/.../16
PS 1/.../30



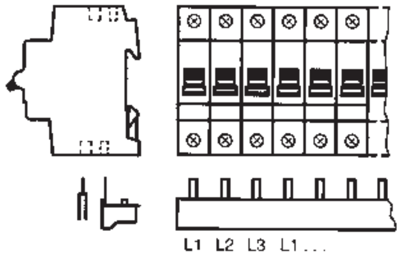
2CDC062166F0003

PS 1/29/6



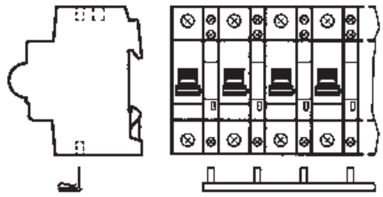
2CDC062389F0003

PS 3/...
(2CDL 231 ...)



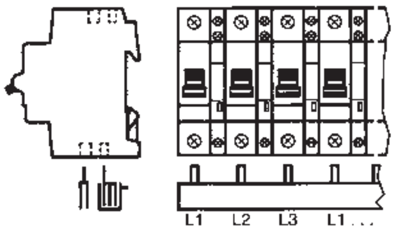
2CDC062021F0004

PS 1/38/6



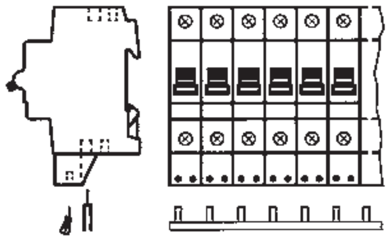
2CDC062390F0003

PS 3/39 H
PS 3/39/16 H



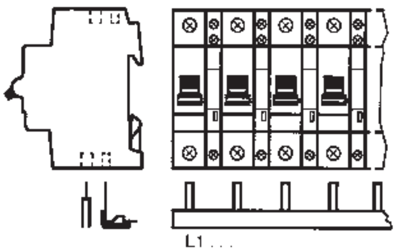
s0061z02

PS 1/57/6 H
(integrierter
Hilfskontakt)



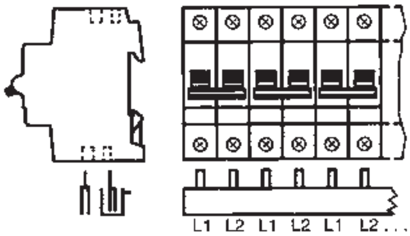
2CDC062527F0003

PS 1/38 H
PS 1/38/16 H



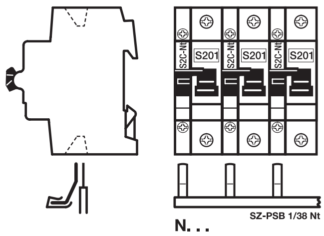
2CDC062526F0003

PS 2/12
PS 2/58
PS 2/58/16
PS 2/12 A
PS 2/58/16 A
PS 2/58 SP
PS 2/58/16 SP



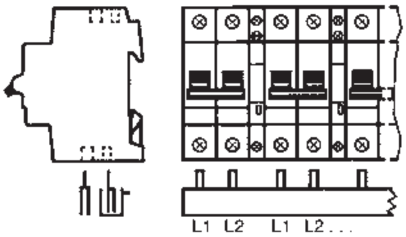
2CSC400010F0202

PS 1/38 NT



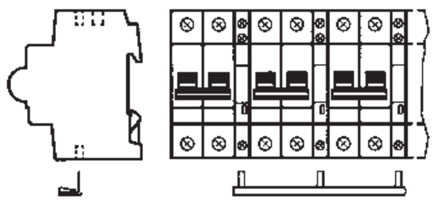
2CDC062148F0008

PS 2/48 H
PS 2/48/16 H
PS 2/48/16 HA
PS 2/48/16 SP



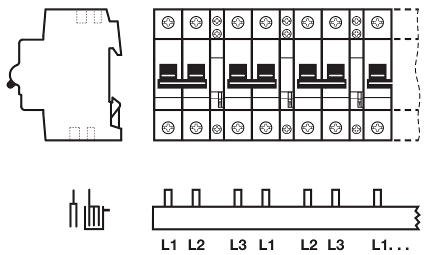
s0059z02

PS 1/23/6



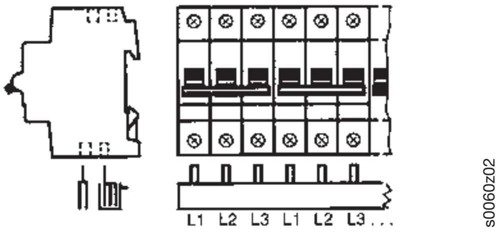
2CDC062019F0004

PS 3/46/16 H-IT

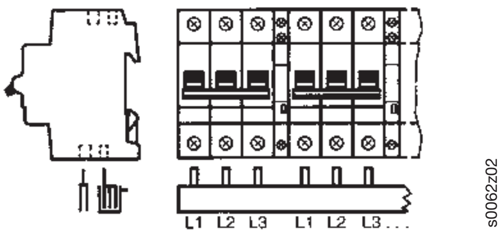


2CDC062092F0007

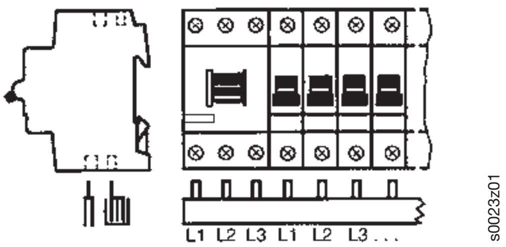
PS 3/12
PS 3/12 A
PS 3/12/16
PS 3/60
PS 3/60/16
PS 3/60/30
PS 3/60 A
PS 3/60/16 A
PS 3/60 SP
PS 3/60/16 SP



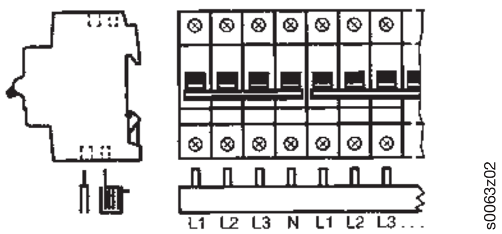
PS 3/48 H
PS 3/48/16 H
PS 3/48/16 HA
PS 3/48/16 SP



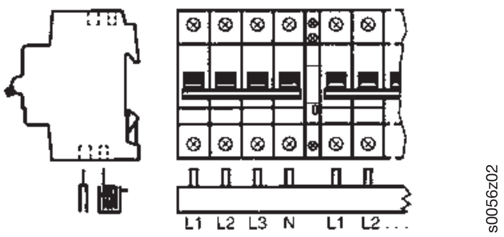
PS 3/12 E 463



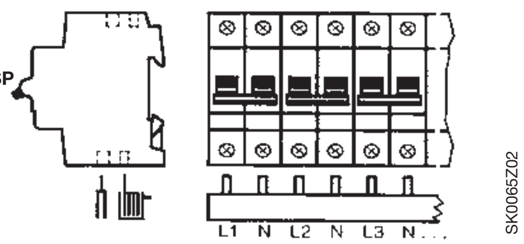
PS 4/12
PS 4/12/16
PS 4/60
PS 4/60/16
PS 4/12 A
PS 4/60/16 A
PS 4/60/16 SP



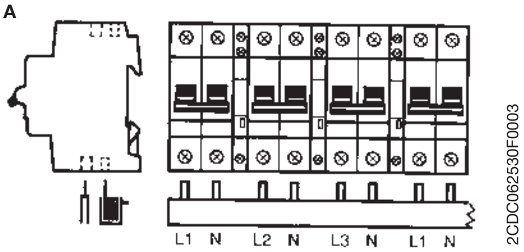
PS 4/52/16 H
PS 4/52/16 HA
PS 4/52/16 SP



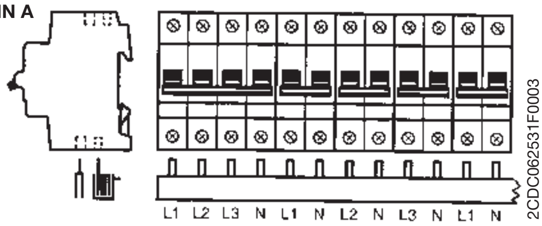
PS 4/12 NA
PS 4/58 N
PS 4/58/16 N
PS 4/58/16 NA
PS 4/58/16 N SP



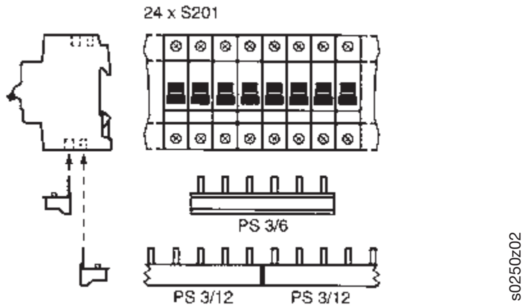
PS 4/48/16 NH A



PS 4/58/ NN A
PS 4/58/16 NN A



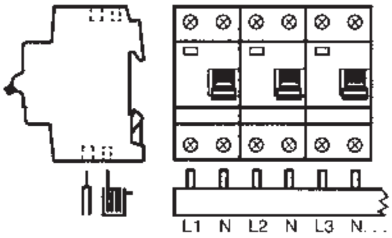
Example for overlap



4

Accessories for MCBs and RCDs
Busbars

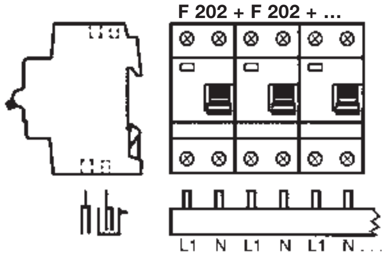
PS 4/12 NA
PS 4/58 N
PS 4/58/16 N
PS 4/58/16 NA



2CDC062443F0004

PS 2/12
PS 2/12/16
PS 2/58
PS 2/58/16
PS 2/12 A
PS 2758/16 A

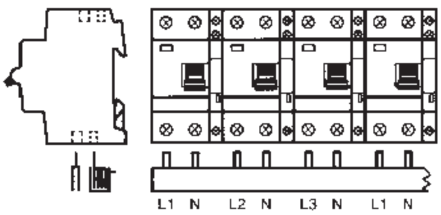
F 202 + F 202 + ...



2CDC062437F0004

PS 4748/16 NH A

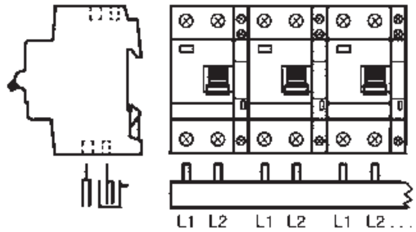
F 202 + S2C-S/H6R + F 202 + S



2CDC062440F0004

PS 2/48 H
PS 2/48/16 H
PS 2/48/16 HA

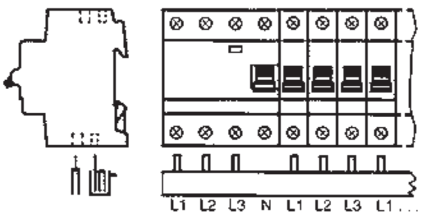
F 202 + S2C-S/H6R + F 202 + ...



2CDC062438F0004

PS 3/12 FI
(2CDL 230 ...)
PS 3/9 FI
PS 3/10 FI
PS 3/57 FI

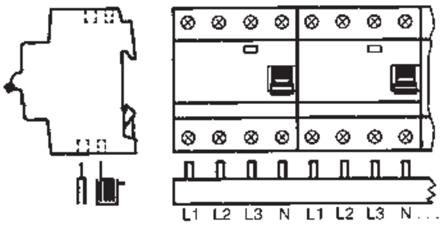
F 204 + S 200 + S 200 + ...



s0058z02

PS 4/12
PS 4/12/16
PS 4/60
PS 4/60/16
PS 4/12 A
PS 4/60/16 A

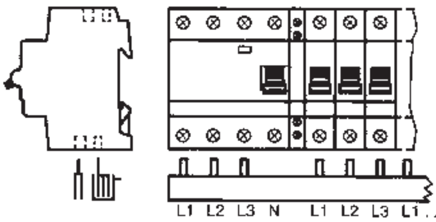
F 204 + F 204 + ...



s0064z02

PS 3/12 FI H

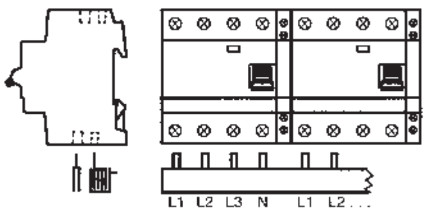
F 204 + S2C-S/H6R + S 200 + S 200 ...



s0139z02

PS 4/52/16 H
PS 4/52/16 HA

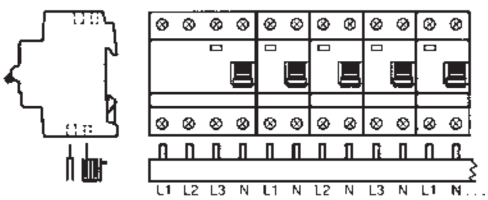
F 204 + S2C-S/H6R + ...



2CDC062441F0004

PS 4/58 NN A
PS 4/58/16 NN A

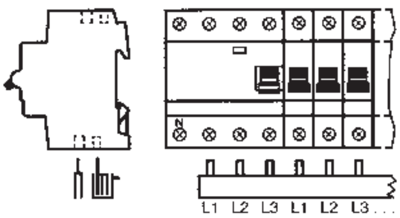
F 204 + F 202 + F 202 + ...



2CDC062442F0004

PS 3/11
PS 3/12
PS 3/12 A
PS 3/12/16
PS 3/60
PS 3/60/16
PS 3/60 A
PS 3/60/16 A

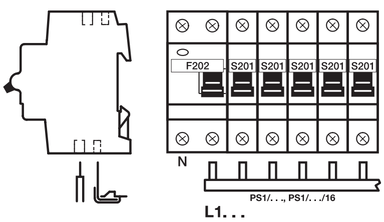
F 204 (N links) + S 200 + S 200 ...



2CDC062439F0004

PS 1/3
PS 1/6
PS 1/9
PS 1/60
PS 1/60/16

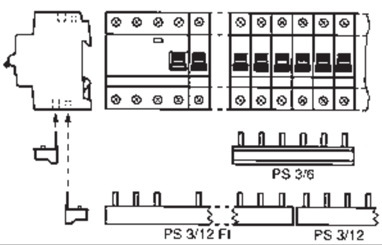
F 202 + S 201 + S 201 + ...



2CDC062141F0008

Example for overlapping

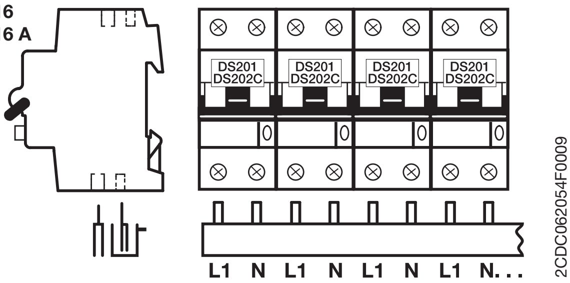
1 x 1 x F 204 + 20 x S 201



s0251z02

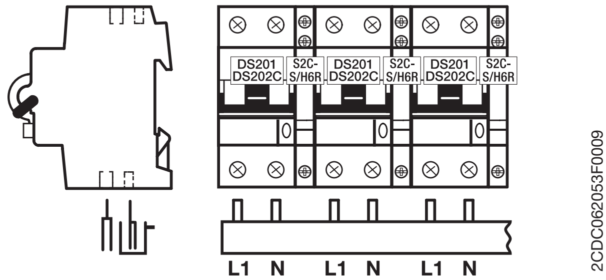
PS 2/12
PS 2/12 A
PS 2/58
PS 2/58/16
PS 2/58/16 A

DS 201 DS 201 ...
DS 202 C DC 202 C ...



PS 2/48 H
PS 2/48/16 H
PS 2/48/16 HA

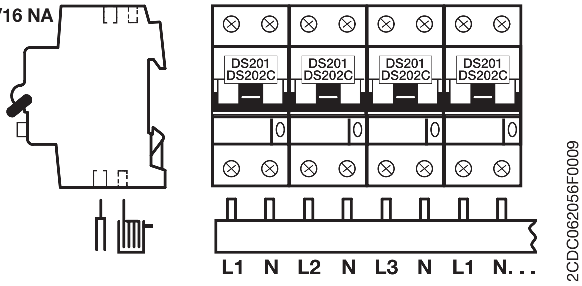
DS201 + S2C-S/H6R + DS201 ...
DS202C + S2C-S/H6R + DS202C ...



4

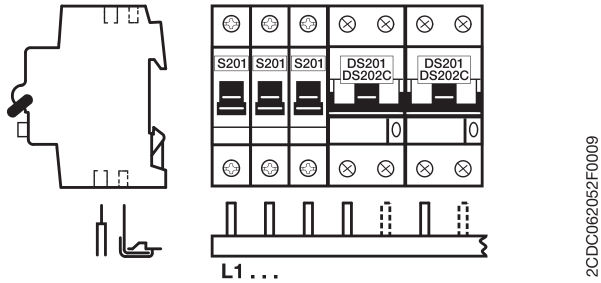
PS 4/12 NA
PS 4/58 N
PS 4/58/16 N
PS 4/58/16 NA

DS 201 DS 201 ...
DS 202 C DC 202 C ...



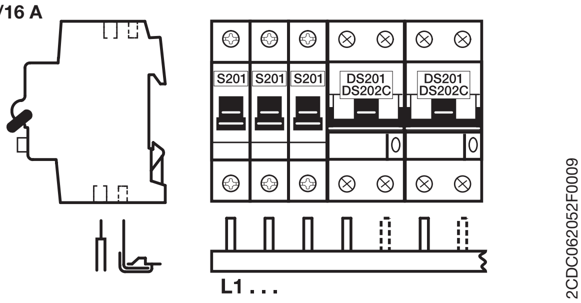
PS 2/48 H
PS 2/48/16 H
PS 2/48/16 HA

DS 201 + S2C-S/H6R + DS 201...
DS 202 + S2C-S/H6R + DS 202 C...



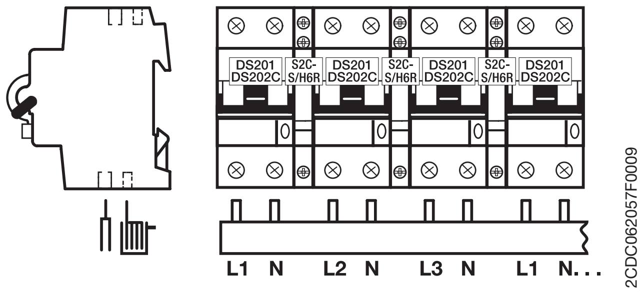
PS 1/12 A
PS 1/60 A
PS 1/60/16 A

S 201 S 201 S 201 DS 201 ...
DS 202 C ...



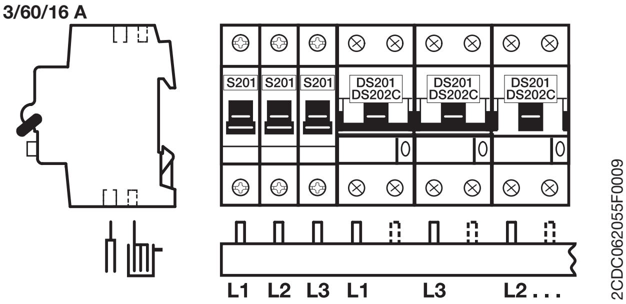
PS 4/48 NHA
PS 4/48/16 NHA

DS 201 + S2C-S/H6R + DS 201 ...
DS 202 + S2C-S/H6R + DS 202 ...



PS 3/12 A
PS 3/60 A
PS 3/60/16 A

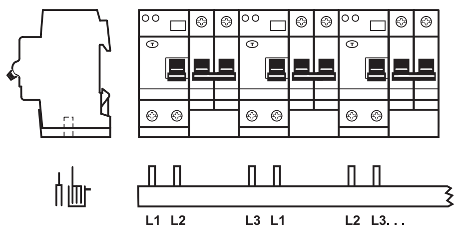
S 201 S 201 S 201 DS 201 DS 201
DS 202 C DS 202 C



Accessories for MCBs and RCDs
Busbars

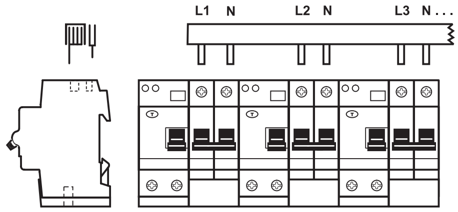
PS 3/30-DDA 202
PS 3/30/16-DDA 202

DS 202 + DS 202 + (DDA 202 + S 202) + (DDA 202 + S 202) ...



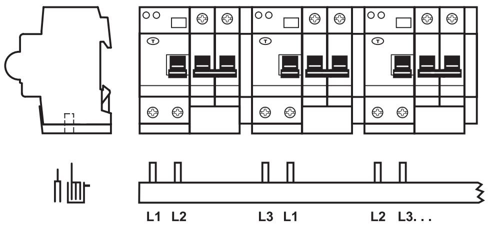
PS 4/30/16N-DDA 202 T

DS 202 + DS 202 + (DDA 202 + S 202) ...



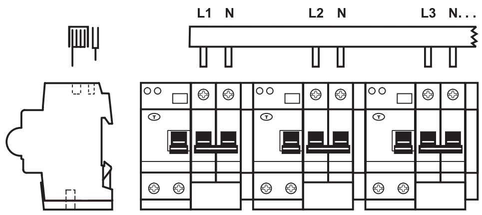
PS 3/26/16H-DDA 202

DS 202 + S2C-S/H6R + DS 202 + S2C-S/H6R + DDA 202 + S 202 + S2C-S/H6R + DDA 202 + S 202 + S2C-S/H6R ...



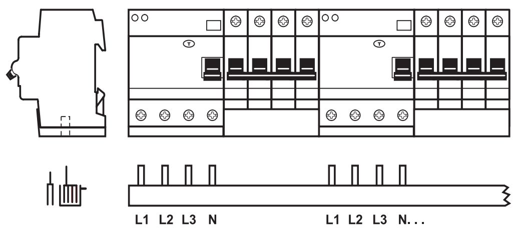
PS 4/30/16NH-DDA 202 T

DS 202 + S2C-S/H6R + DS 202 + S2C-S/H6R + (DDA 202 + S 202) + S2C-S/H6R + (DDA 202 + S 202) + S2C-S/H6R ...



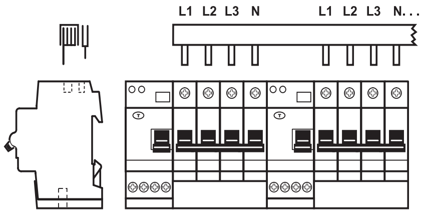
PS 4/32-DDA 204 PS 4/32/16-DDA 204

DS 204 (50/63 A) + (DDA 204 (63 A) + S 204) ...



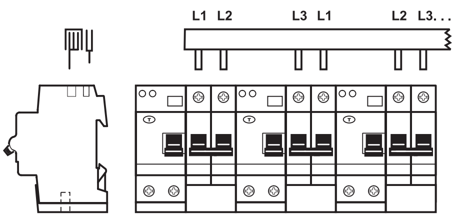
PS 4/40/16-DDA 204 T

DS 204 (≤ 40 A) + DS 204 (≤ 40 A) + DDA 204 (≤ 40 A) + S 204 + DDA 204 (≤ 40 A) + S 204 ...



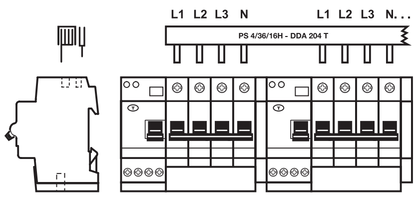
PS 3/30/16-DDA 202 T

DS 202 + DS 202 + DA 202 + S 202 + DDA 202 + S 202 ...



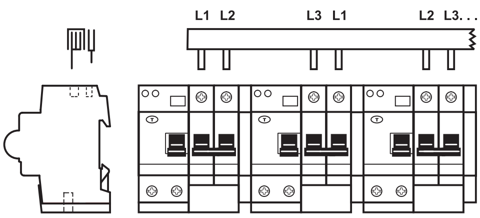
PS 4/36/16 H-DDA 204 T

DS 204 (≤ 40 A) + S2C-S/H6R + DS 204 (≤ 40 A) + S2C-S/H6R + DDA 204 (≤ 40 A) + S 204 + S2C-S/H6R + DDA 204 (≤ 40 A) + S 204 + S2C-S/H6R



PS 3/28/16 H-DDA 202 T

DS 202 + S2C-S/H6R + (DDA 202 + S 202) + S2C-S/H6R ...



Accessories for MCBs and RCDs
Auxiliary switch S700 + H2WR

Auxiliary switch S700 + H2WR	
2 Switch-over contacts	
Conv. thermal current Ith	10 A
Min. operating voltage	24 V AC/DC
Min. switching power	5 VA ①
Short-circuit withstand capability	1000 A @ 230 V AC with S 200 K6 back-up
Isolation coordination	
– overvoltage category	III
– pollution degree	2
– surge withstand capability	4 kV (1.2/50 μs)
Wiring	up to 2 x 1.5 mm2
Contact reliability under	5 g, 20 cycles 5…150…5 Hz @ 24 V AC/DC, 5 mA –> contact

① the min. operating current under operating conditions acc. to EN 60204-1 and EN 60439-1 (indoor installation): 24 V AC/DC, 5 mA (AC 12, DC 12)

AC 14	Ue	400 V	230V
	Ie	2 A	6 A
DC 12	Ue	220 V	110 V
	Ie	1 A	1.5 A
DC 13	Ue	60 V	24 V
	Ie	2 A	4 A

4

4

Solutions for electrical distribution in buildings - Technical details
Protection and safety

Protection and safety technical details

Selection of surge protective devices

The IEC standard introduced the concept of lightning protection zones (LPZ) to help in selecting the correct surge protection. This concept ensure the gradual reduction by stages of the energies and overvoltage caused by lightning or switching operations. This logic of coordination in the protection is what we call the “stepping protection”.

External Zones:

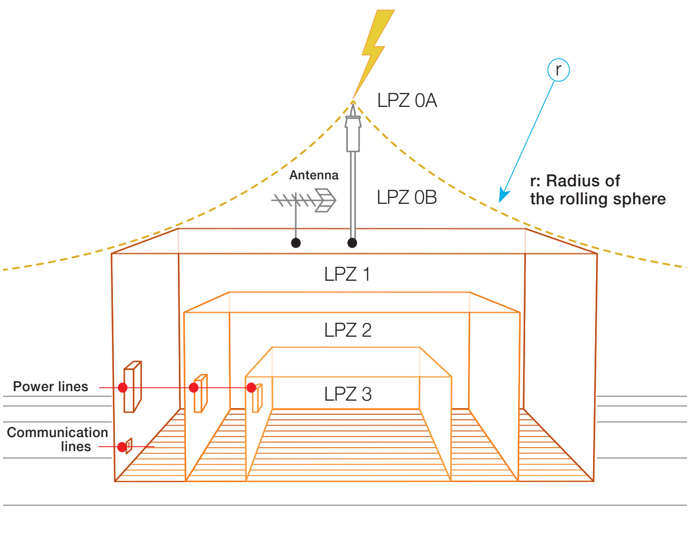
– LPZ 0A Unprotected zone outside the building subject to direct lightning strikes and therefore may have to handle to the full lightning current and lightning electromagnetic field.
– LPZ 0B Zone protected against direct lightning strikes by external air terminal and where the threat is the full lightning electromagnetic field.

Internal Zones:

Zones inside the building which are protected against direct lightning flashes.

– LPZ 1 Zone subject to partial lightning or surge currents. Type I SPDs shall be installed at the boundary between LPZ OA and LPZ 1 to reduce the entrance of lightning currents through power lines.
– LPZ 2...n Zone where the surge current is limited by current sharing and where the surge energy is reduced by additional surge protection like SPDs. Type 2 SPDs are installed at the boundaries of each zone, i.e. LPZ 1 and LPZ 2, LPZ 2 and LPZ 3, etc.

External lightning protection system

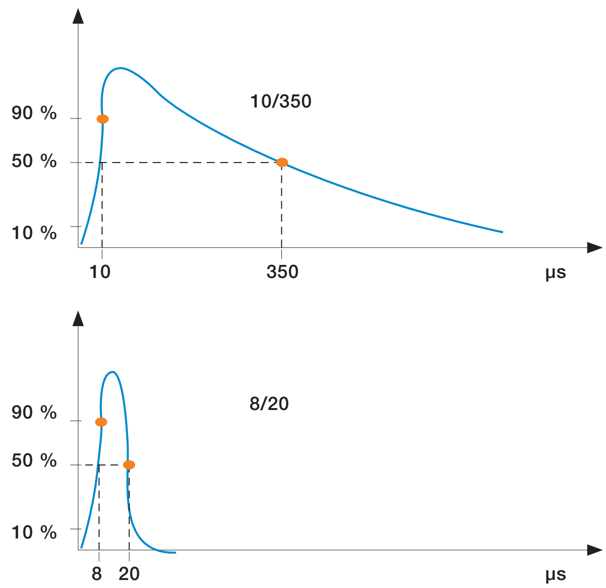


Lightning protection zones description (IEC 62305-4):

It consists in dividing a building in several volumes: the protection zone. The objective is to ensure that the LPZ gives enough protection to the equipment inside this zone. To do so, SPDs are installed at the protection zone boundaries. Each time an SPD is installed, a new protection zone is created.

Current impulse:

The 10/350 and 8/20 impulse waves are used in the Class I and Class II SPDs tests. The first number gives the rising time of the current impulse to reach 90% of the peak level and the second number gives the time to half value in micro-seconds (µs).



See page 5/2 in Enclosures and DIN-Rail products

Mode of surge protection

Protection in common and/or differential mode

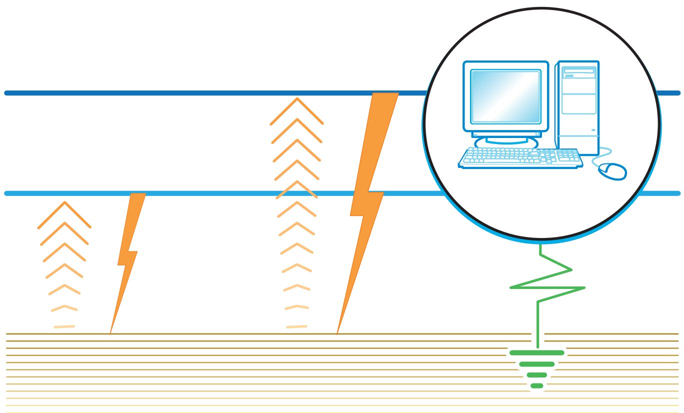
Common mode

Overvoltages in common mode concern all neutral point connections. They occur between the live conductors and earth (e.g. phase/earth or neutral/earth). The neutral conductor is a live cable, as well as the phase conductors.
This overvoltage mode destroys not only earthed equipment (Class I), but also non-earthed equipment (Class II) with insufficient electrical insulation (a few kilovolts) located close to an earthed mass.
Class II equipment that is not situated close to an earthed mass is theoretically protected from this type of attack.

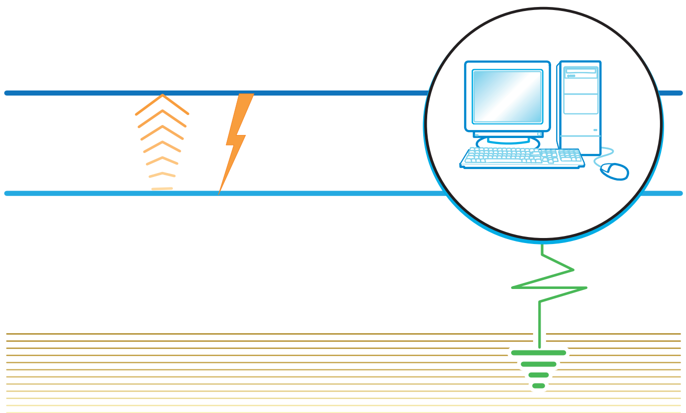
Differential mode

Overvoltages in differential mode circulate between the live phase/phase or phase/neutral conductors. They can cause considerable damage to any equipment connected to the electrical network, particularly "sensitive" equipment.

These overvoltages concern TT earthing systems. They also affect TN-S systems if there is a significant difference in length between the neutral cable and the protective cable (PE).



Overvoltages in common mode

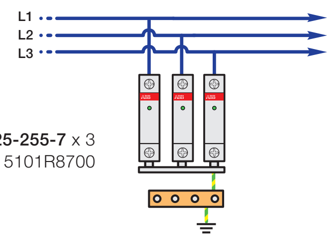


Overvoltages in differential mode

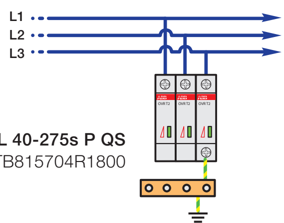
Different types of OVR configuration

Either Common mode or differential mode of protection are required depending on the system configuration (IT, TNC, TNS, TT). For that purpose, you can find different OVR configuration (single pole, 3L, 4L, 1N, 3N).

Common mode configurations (TNC networks)

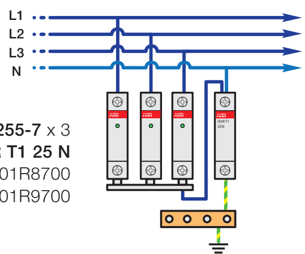


OVR T1 25-255-7 x 3
Ref.: 2CTB815101R8700

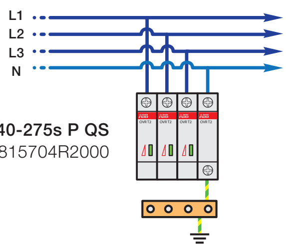


OVR T2 3L 40-275s P QS
Ref.: 2CTB815704R1800

Common and differential mode configurations (TNS, TT networks)



OVR T1 25-255-7 x 3
+ **OVR T1 25 N**
Ref.: 2CTB815101R8700
+ 2CTB815101R9700



OVR T2 3N 40-275s P QS
Ref.: 2CTB815704R2000

Protection and safety technical details
OVR Surge Protective Devices

Coordination and wiring principals

The SPD installed at the line entrance of an installation may not ensure an effective protection to the whole system. As a matter of fact, the selection of the voltage protection level (U_p) of SPDs depends on many parameters: Type of equipment to be protected, the length of the connections to the SPDs, the length in between the SPDs and the equipment to be protected.

Coordination required if :

The protection level (U_p) of the SPDs is not low enough to protect the equipment.
If the distance in between the SPDs and the equipment is >10 m.

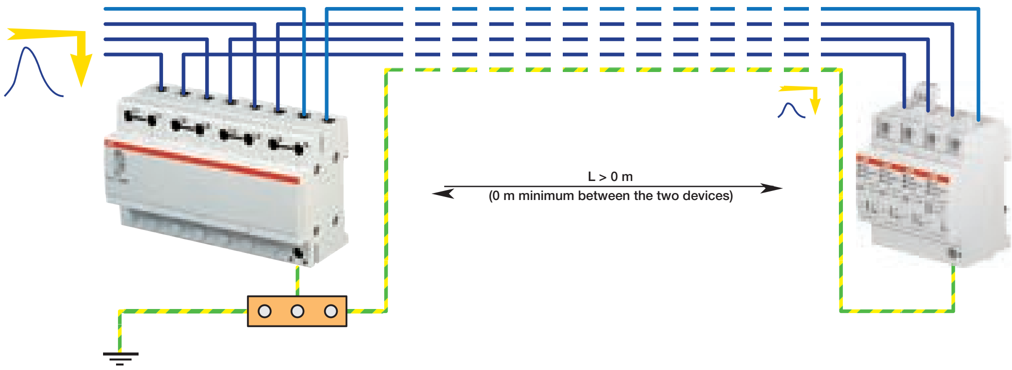
NOTE:
The first SPD is diverting most of the surge current to the ground, and the second SPD will ensure a good protection level to the equipment.

It is what we call the stepping protection.

5

Coordination between Type 1, Ptype 1+2, Type 2 (with and without Safety System) and Type 2+3 surge protective device

Type 1
25 kA (10/350) Ifi = 50 kA



Type 2
40 kA (8/20)

Type 2 s
(safety system)
80 kA (8/20) QS

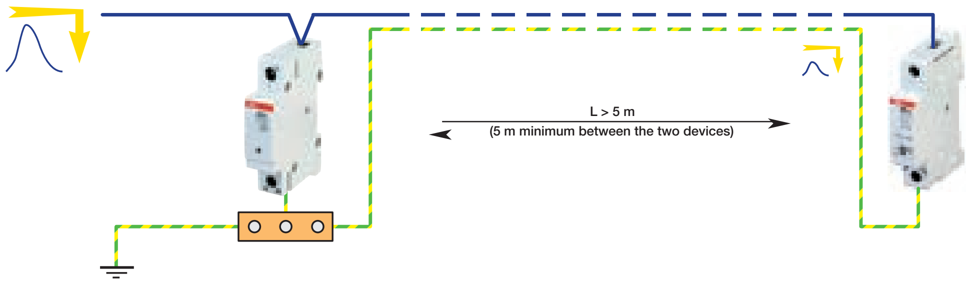
Type 2+3 QS
20 kA (8/20)

Type 1
25 kA (10/350)
Ifi = 7 kA

Type 1+2
Iimp=15kA (10/350)
Ifi=7kA

Type 1+2 s (Safety system) QS
12.5 kA (10/350)

Type 2 s (Safety System) QS
80 kA (8/20)

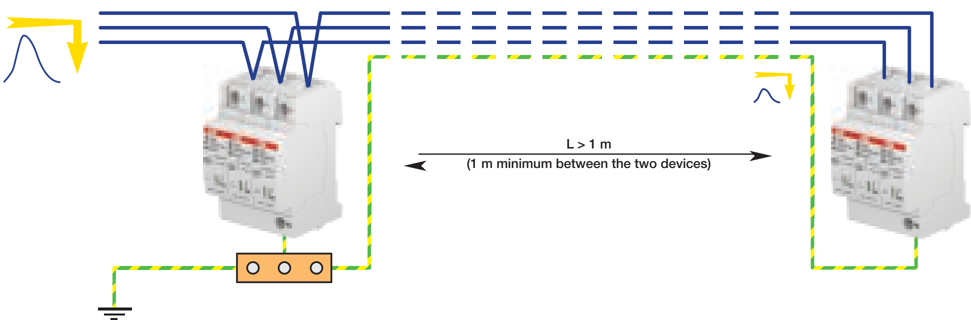


Type 2
40 kA (8/20)

Type 2+3 QS
20 kA (8/20)

Coordination between Type 2 surge protective devices

Type 2 s (Safety System) QS
80 kA (8/20)

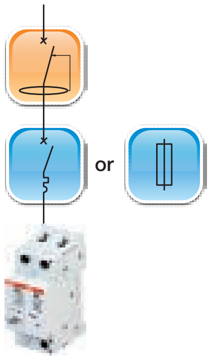


Type 2
40 kA (8/20)

Type 2+3 QS
20kA (8/20)

Surge protective device disconnectors - Choice of backup protection

Surge protective device must have disconnectors which are internal and external. Internal is the so called thermal disconnection which helps to disconnect the SPD at the end of life (varistors technology). External is the backup protection which can be an MCB or a fuse dedicated to the SPD protection in case of short circuit due to very high surge transient current for example.



Designation	Function
Protection against indirect contact	Residual current devices (RCDs) assure a protection to people and installation. When installed with SPDs they must be of selective type "S" to avoid nuisance tripping. In ABB portfolio you can choose the F200 S type range for a safer installation.
Protection against fault currents	Miniature circuit breakers (MCBs) or fuses protect the installation against overload and short circuit. They can be associated with SPDs for the backup protection in agreement with coordination installation rules. You can either choose MCBs from the S200 or S800 series or fuses from the E90 range.
Thermal protection	The thermal disconnection is an internal disconnection which is there to bring a safer protection to the equipment. ABB is always developing new patents and has developed a thermal disconnection mechanism specifically dedicated to PV installation with the OVR PV range for a better and safer protection.

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Type of Surge Protective Devices		Circuit breaker maximum ratings * curve B or C Prospective short circuit current at SPD location (IP)			Fuses maximum ratings* (gL - gG)
	Ip ≤ 6 kA	IP ≤ 10kA	IP ≤ 15kA	IP ≤ 50kA	
Type 1					
OVR T1 25kA Iimp 25kA Uc 275, 440v		-		S 800 S - 125	125A fuse
Type 1					
OVR T1 15kA Iimp kA Uc 275, 440v		-		S 800 S - 125	125A fuse
Type 1+2					
OVR T1+2 Iimp 25 kA/Ifi < 15kA Uc 255 V		-		S 800 S - 125	125A fuse
OVR T1+2 Iimp 15 kA/Ifi < 7kA Uc 255 V		-		S 800 S - 125	125A fuse
OVR T1-T2 QuickSafe® Iimp 12,5kA Uc 275, 440v		-		S 800 S - 125	160A fuse
Type 2					
Type 2 QuickSafe® pluggable Imax 40 kA Uc 275, 350, 440, 600V	S 200 - 63	S 200 M - 63	S 200 P - 63	S 800 S - 125	125 A fuse
OVR T2 Safety QuickSafe® Imax 80kA Uc 275, 440v	S 200 - 63	S 200 M - 63	S 200 P - 63	S 800 S - 125	160A fuse
Type 3					
OVR T2-T3 Safety QuickSafe® Imax 20kA Uc 275, 350, 440, 600V	S 200 - 63	S 200 M - 63	S 200 P - 63	S 800 S - 125	125 A fuse

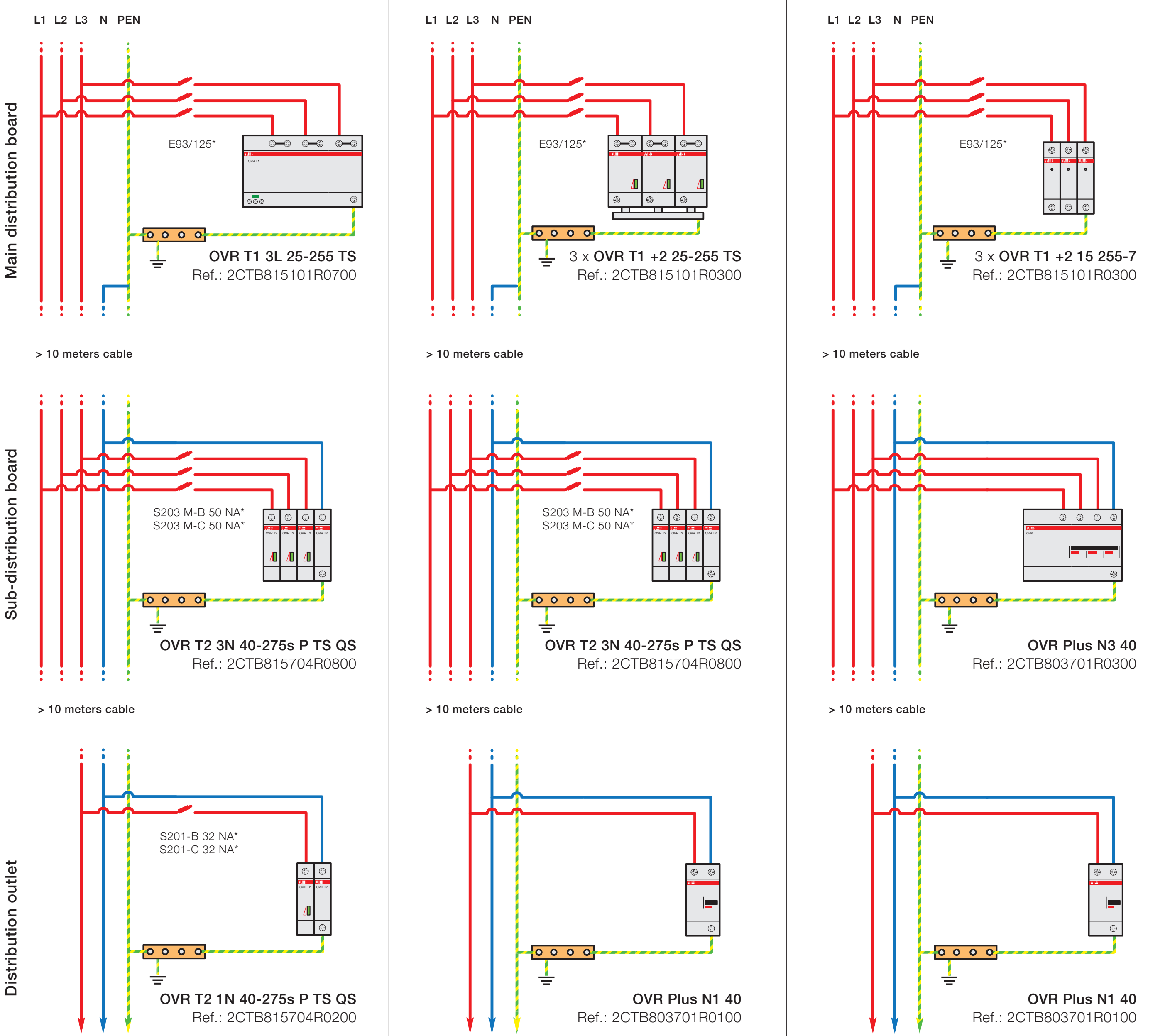
* Maximum ratings, must be in accordance with the installation to follow coordination rules with main or upstream short circuit protection(s).

Service entrance SPDs	PE connection cable size
Type 1	16 mm²
Type 1+2	16 mm²
Type 2	4 mm²
Type 2+3	4 mm²
Type 3	4 mm²

Protection and safety technical details
OVR Surge Protective Devices

Selection tool: TNC-S network 230/400 V
Industry, commercial building

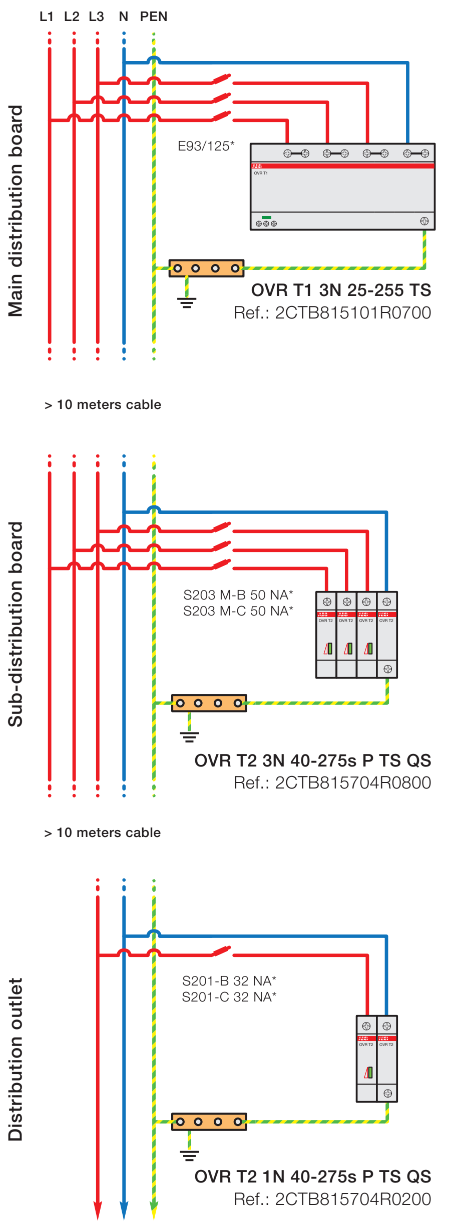
Configuration 1	Configuration 2	Configuration 3
15 kA ≤ I_p ≤ 50 kA	7 kA ≤ I_p ≤ 15 kA	I_p ≤ 7 kA



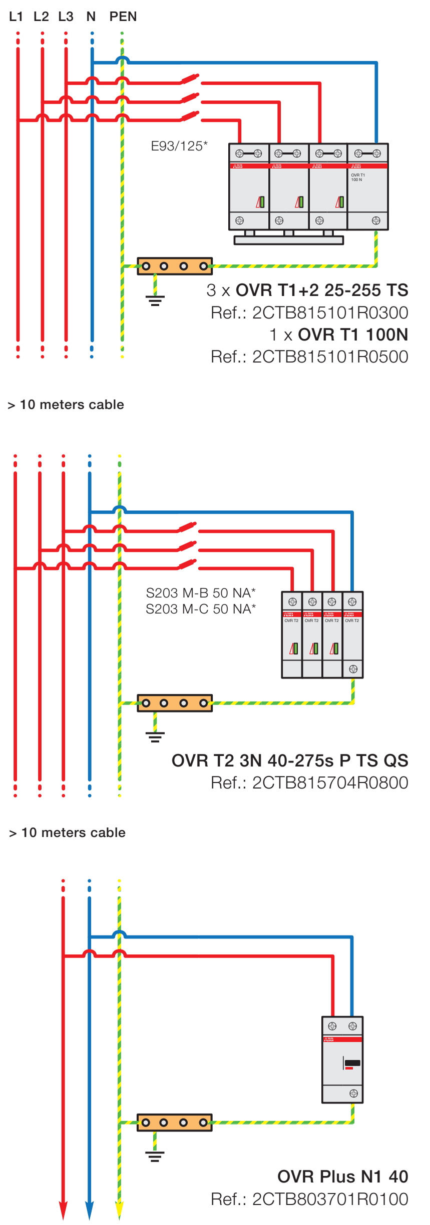
Ip: prospective short circuit current of the power supply
* Must be according to the coordination rules with main or upstream short circuit protection(s).

Selection tool: TT network 230/400 V
Industry, commercial building

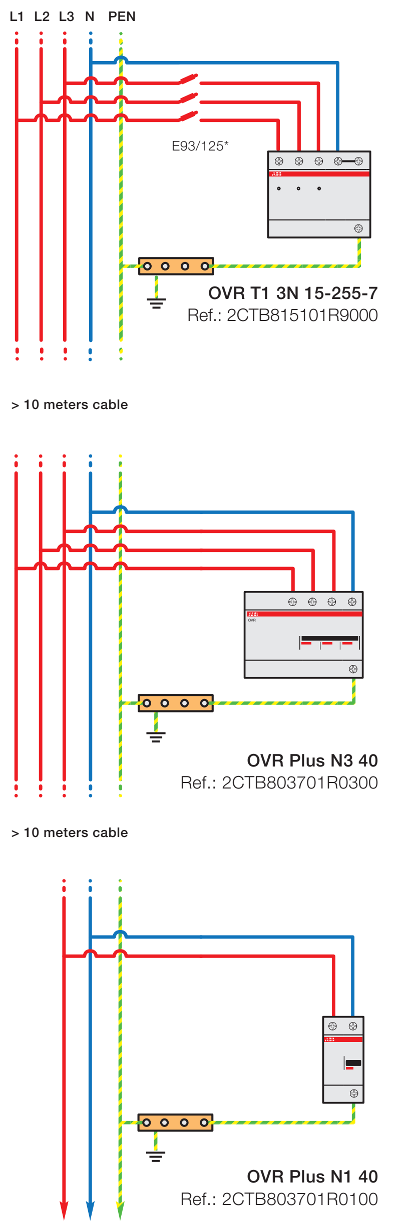
Configuration 1
15 kA ≤ I_p ≤ 50 kA



Configuration 2
7 kA ≤ I_p ≤ 15 kA



Configuration 3
I_p ≤ 7 kA



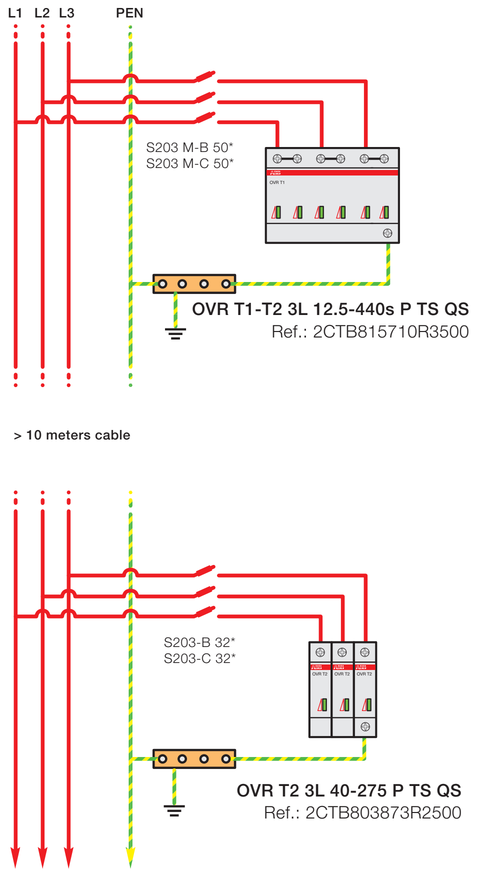
Ip: prospective short circuit current of the power supply
* Must be according to the coordination rules with main or upstream short circuit protection(s).

Protection and safety technical details
OVR Surge Protective Devices

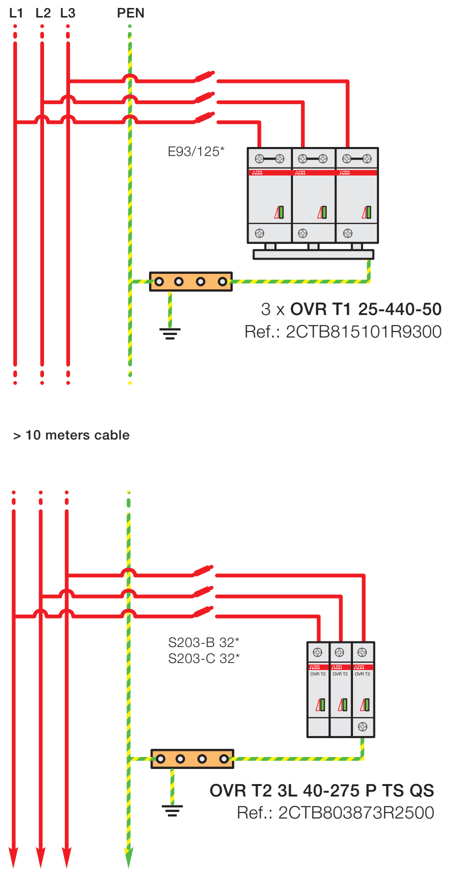
Selection tool: IT network 230 V without neutral
Commercial, residential

The IT system has all live parts at the source isolated from earth or one part connected to earth with a high impedance.

Configuration 1
$I_p \leq$ 50 kA



Configuration 2
$I_p \leq$ 15 kA

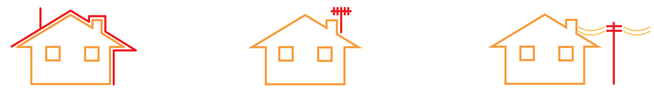


Ip: prospective short circuit current of the power supply
* Must be according to the coordination rules with main or upstream short circuit protection(s).

Selection tool: TNC, TNS/TT networks 230/400 V
Residential

With external conductive parts (external lightning protection air terminal, antenna...) or powered by aerial lines

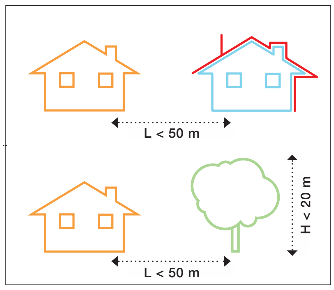
YES



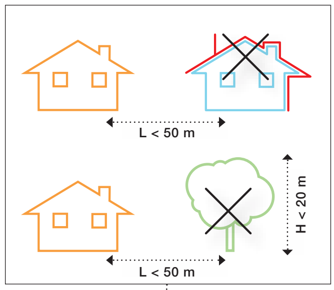
NO

Neighbour with external lightning protection system (or generally with earthed extraneous conductive parts), or proximity of high points

YES



NO



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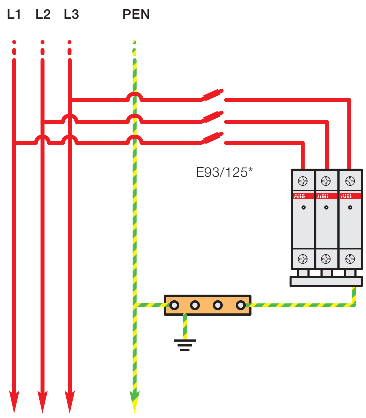
Configuration 1

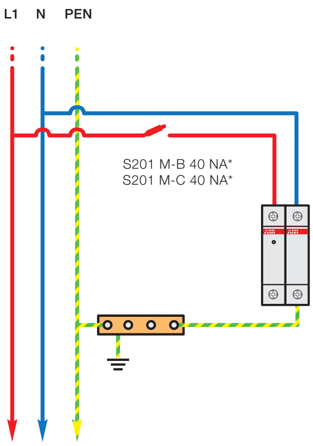
With risk of direct lightning current (external protection, aerial lines...)

Distribution board TNC



3 x **OVR T1+2 15-255-7**
Ref.: 2CTB815101R8900

Distribution board TNS/TT



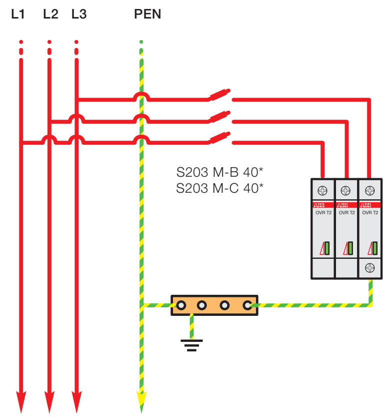
OVR T1+2 15-255-7
Ref.: 2CTB815101R8900

OVR T1 25 N
Ref.: 2CTB815101R9700

Configuration 2

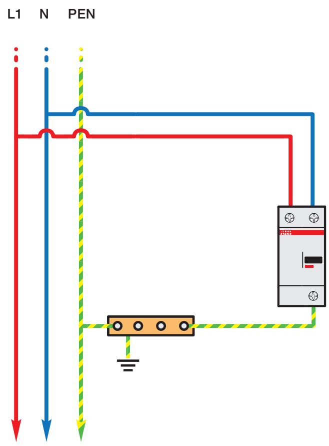
With risk of indirect lightning current, transient surges

Distribution board TNC



OVR T2 3L 40-275s P QS
Ref.: 2CTB815704R1800

Distribution board TNS/TT



OVR Plus N1 40
Ref.: 2CTB803701R0100

* Should be according to the coordination rules with installed main breakers

Protection and safety technical details
E 90 fuseholders

5

E 90 fuse-holders

IEC 60947-3: Switches, disconnectors, switch-disconnectors and fuse combination units
This standard sets out the requirements of devices for connect/disconnect and switching operations.
Disconnector:
The disconnector is a mechanical device that, in the open position, meets the requirements specified for the disconnect function by the international IEC 60947-3 standard. The opening of a disconnector guarantees that the downstream circuit is electrically isolated from the upstream circuit. This is a required condition before personnel can access the equipment on the network, for example to perform maintenance. The IEC 60364 standard prohibits carrying out maintenance on the installation if the circuits have not been disconnected.
Fuse disconnector:
This is the definition of a fuse carrier that performs a disconnect function. Not all fuse carriers are disconnectors: in order to be classified as such they must meet the requirements and pass the tests prescribed by the IEC 60947-3 standard.
Fuse switch-disconnector:
This is the designation given by the IEC 60947-3 standard to a fuse disconnector that permits switching under load. Not all fuse disconnectors allow this type of operation: in order to be classified as a fuse switch-disconnector, a device must have utilization category AC-21B or higher.
Utilization categories:
Not all connect/disconnect devices have the same performance specifications: the permitted operations depend on a parameter which defines the specific conditions of use, called the utilization category.
It specifies:
a. The type of network (a.c./d.c.)
b. The permitted type of operation (under no load, for resistive loads, for highly inductive loads, ecc…)
c. The frequency of use
The E90 fuse switch-disconnectors have utilization category AC-22B. The E 90 PV fuse disconnectors have utilization category DC-20B.

Type of current	Utilization category		Typical applications
	A	B	
Alternating current	AC-20A	AC-20B	Connecting and disconnecting under no load.
	AC-21A	AC-21B	Switching of resistive loads, including moderate overloads
	AC-22A	AC-22B	Switching of mixed, resistive and inductive loads, including moderate overloads
	AC-23A	AC-23B	Switching of motors or other highly inductive loads
Direct current	DC-20A	DC-20B	Connecting and disconnecting under no load.
	DC-21A	DC-21B	Switching of resistive loads including moderate overloads
	DC-22A	DC-22B	Switching of mixed, resistive and inductive loads, including moderate overloads (e.g. shunt motors)
	DC-23A	DC-23B	Switching of highly inductive loads (e.g. series connected motors)

What loads can be connected/disconnected by a product with utilization category AC-22B?
Utilization category AC-22B permits occasional switching of mixed, resistive and inductive loads, including moderate overloads, in alternating current circuits. Examples of mixed loads are: transformers, power-factor corrected motors, capacitor banks, discharge lamps, heating, etc..

What loads can be connected/disconnected by a product with utilization category AC-20B?
Utilization category AC-20B does not permit connecting or disconnecting under load. An additional load break device is required.

IEC 60269-1: Fuses with voltage rating not exceeding 1000 V for alternating current and 1500 V for direct current
This standard sets out the requirements for low voltage fuses, and consequently the requirements for the fuse carrier devices that hold them.
The standard has two separate sections with different requirements, depending on the type of person using the equipment.
IEC 60269-2: supplementary requirements for fuses for use by authorized persons, mainly for industrial applications.
IEC 60269-3: supplementary requirements for fuses for use by unskilled persons, mainly for household and similar applications.

See page 5/82 in Enclosures and DIN-Rail products

Meaning	Suffix A	Frequent use
	Suffix B	Infrequent use

What is the difference between a fuse carrier conforming to the IEC 60947-3 standard and one conforming to the IEC 60269-2 standard?
These are two complementary standards: IEC 60269-2 sets out the characteristics of the fuses, which in turn also determine the general requirements for the fuse carriers. It is therefore the reference standard for overcurrent protection, but not for connecting/disconnecting and switching.

Is a fuse carrier conforming to IEC 60269-1 a disconnector?
A device conforming only to IEC 60269 has a “disconnect function” but is not classified as a disconnector under the more stringent IEC 60947-3 standard.

Why does the E 90 series have a lower direct current voltage rating under the IEC 60269-3 standard than under the IEC 60269-2 standard?
IEC 60269-2 sets out the requirements for industrial applications, and therefore the reference voltages are higher than those for the residential and commercial applications covered by IEC 60269-3. In other words, the rated voltage of the fuse carrier depends on the type of installation in which it is used, and the regulations applicable to it.

Is it possible to create multi-pole configurations using an assembly kit?
Multi-pole units made up using an assembly kit to combine single pole units will no longer conform to the reference standards.

In case of installations with many poles side by side, or installations in particular climate conditions, what derating of the nominal values should be taken into account?
The following tables give the parameters for derating the nominal current as a function of the number of poles installed side by side or the temperature and relative humidity.

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Installation of multiple poles side by side:

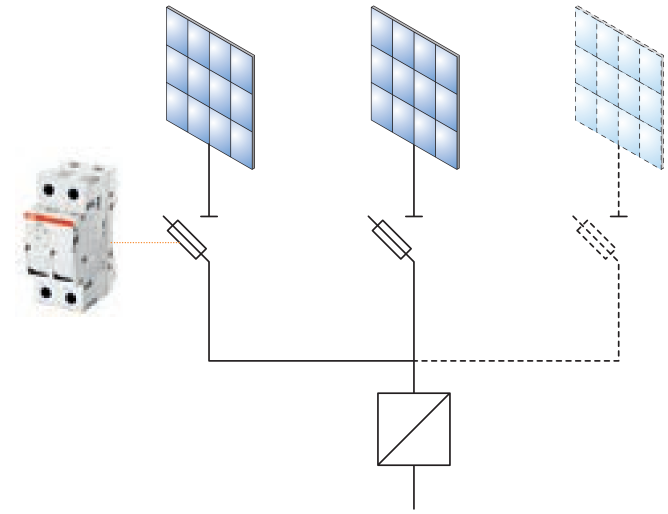
E 91/32		E 91hN/32		E90 50/125	
Poles	Maximum current	Poles	Maximum current	Poles	Maximum current
1 …4	In	1 …3	In	1...3	In
5…7	0.8 x In	4…9	0.7 x In	4...6	0.95 x In
more than 7	0.7 x In	more than 10	0.6 x In	more than 7	0.9 x In

Climate conditions:

E90/32		E90 50/125	
Maximum temperature	Maximum current	Maximum temperature	Maximum current
20° C	In	20° C	In
30° C	In x 0.95	30° C	In x 0.95
40° C	In x 0.9	40° C	In x 0.9
50° C	In x 0.8	50° C	In x 0.85

Protection and safety technical details
E 90 fuseholders

Protection and disconnection of 1000 V DC lines



String protection
To avoid equipments damage on DC lines and to ensure isolation of the PV system in case of maintenance, E90 PV disconnectors fuses can be installed downstream the inverter to protect each single string. The fuses must be selected according to the rated current of the line and to the maximum dissipated power.

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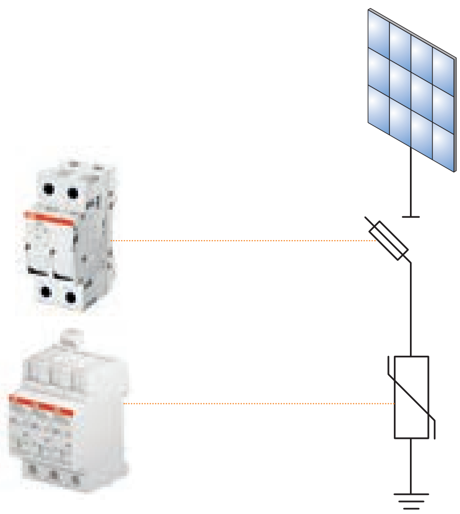
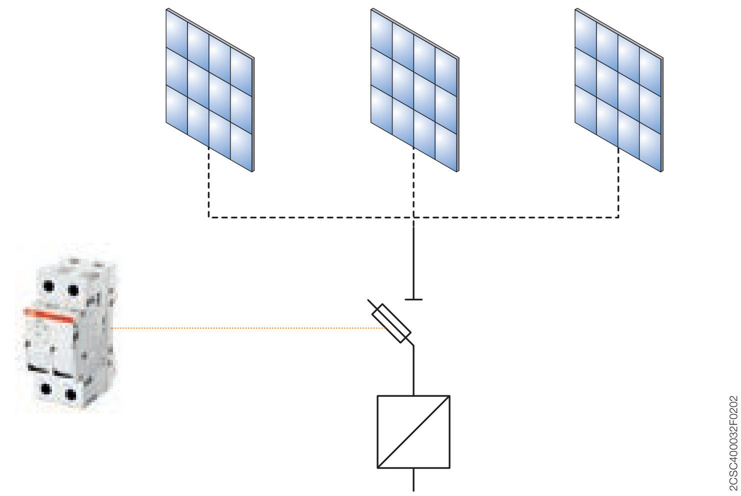


Back-Up Download
When the Icc short circuit current, at the point of installation, is greater than 100 A DC, the OVR PVs Surge Protective Devices require a back-up protection with a specific type gR fuse.



DC side of the inverter
For small size photovoltaic systems, E 90 PV fuse disconnectors can be used to protect the DC side of the inverter. The fuse should be chosen according to the rated current of the inverter.

Protection system selection

Maximum fuse rated current

		Fuseholder			
Rated voltage		**E 90/20** **8.5 x 31.5 mm**	**E 90/32** **10.3 x 38 mm**	**E 90/50** **14 x 51 mm**	**E 90/125** **22 x 58 mm**
400 V a.c.	gG	20 A	32 A	-	-
	aM	10 A	32 A	-	-
500 V a.c.	gG	-	25 A	50 A	100 A
	aM	-	20 A	50 A	125 A*
690 V a.c.	gG	-	10 A	25 A	80 A
	aM	-	-	25 A	80 A

* = to be used in combination with a device which guarantees protection against overload.

5

In the table above you will find indication about the highest rated current fuse that you can host inside a fuseholder, depending on the rated voltage of the circuit, the fuse size and the tripping curve characteristic.

ABB fuses and fuseholders comply with all regulatory requirements and sometimes they allow to install a fuse with rated current higher than the one set by the Standard IEC EN 60269-2-1.

Protection and safety technical details
E 9F fuses

E 9F fuses

Can fuses with rated current values higher than the one indicated in the table be used? For example, can a 10.3 x 38 mm 32 A gG fuse be used in a 10.3 x 38 mm E 90/32 fuse holder?
Yes, by following the manufacturer's instructions: you have to check that the power dissipated at the rated voltage value declared by the manufacturer for the size considered does not exceed the maximum dissipated power limit of the fuse holder. In this specific case, an E 9F10 GG32 fuse dissipates 3 W at 400 V rated voltage.
Since an E 90/32 series fuse holder for 10.3 x 38 mm fuses achieves 3 W thermal dissipation, the fuse in question can be used at 400 V rated voltage or less.

Can a 10.3 x 38 mm 32 A gG fuse be used in a 10.3 x 38 mm E 90/32 fuse holder with a rated voltage exceeding 400 V?
In the specific case of E 9F10 GG32, use of rated voltage exceeding 400 V fails to allow the equipment to comply with the maximum dissipated power limit.

Must the rated voltage always be derated if a fuse with a rated current exceeding the value in the table is used?
No, it depends on the technical specifications of the fuse. De-rating is not required for E 9F 8 gG 20 fuses since they ensure (at 400 V AC) 2.30 W dissipated power, which is lower than the 2.5 W limit imposed by the standard.

Maximum dissipated power value for cylindrical fuses according to IEC EN 60269-2-1 (Art. 5-5)

Characteristic curve	Fuse			
	8.5 x 31.5	10.3 x 38	14 x 51	22 x 58
gG	2.5 W	3 W	5 W	9.5 W
aM	0.9 W	1.2 W	3 W	7 W

The table lists the maximum dissipated power values of the fuses, considering the size and the characteristic curve. The high-lighted values correspond to the maximum dissipated power limit for fuse holders.

E9F gG

Power dissipation [W]

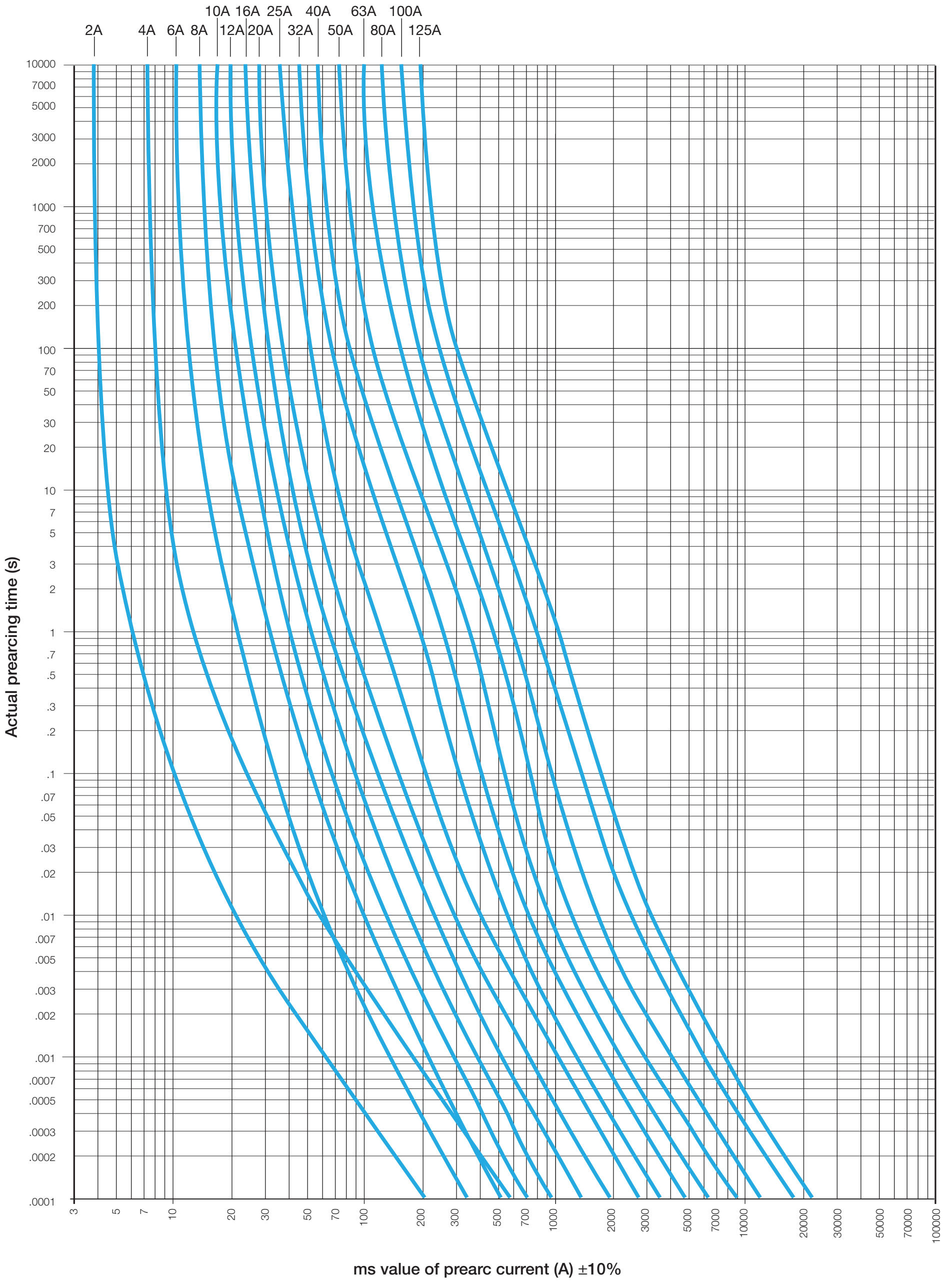
In [A]	Size			
	8.5x31.5	10.3x38	14x51	22x58
0.5	0.55 W	0.07 W		
1	0.35 W	0.45 W	0.6 W	
2	0.45 W	0.5 W	0.75 W	0.9 W
4	0.06 W	0.85 W	1.1 W	1.25 W
6	0.83 W	0.95 W	1.25 W	1.4 W
8	1 W	1.15 W	1.45 W	1.6 W
10	1.2 W	1.3 W	1.65 W	1.9 W
12	1.3 W	1.4 W	1.8 W	2 W
16	1.7 W	1.9 W	2.35 W	2.5 W
20	2 W	2.4 W	2.75 W	3.4 W
25	2.4 W	2.7 W	3.1 W	3.5 W
32		2.8 W	3.6 W	3.7 W
40			4 W	4.3 W
50			4.8 W	5.3 W
63				6.3 W
80				7.4 W
100				8.3 W
125				11.3 W

It is important verify that the power dissipation by the fuse does not exceed the limit allowed by the fuse it is hosted.

In blue are shown the maximum values of power dissipation according with the range E 90 and E 90 50/125 specifications.

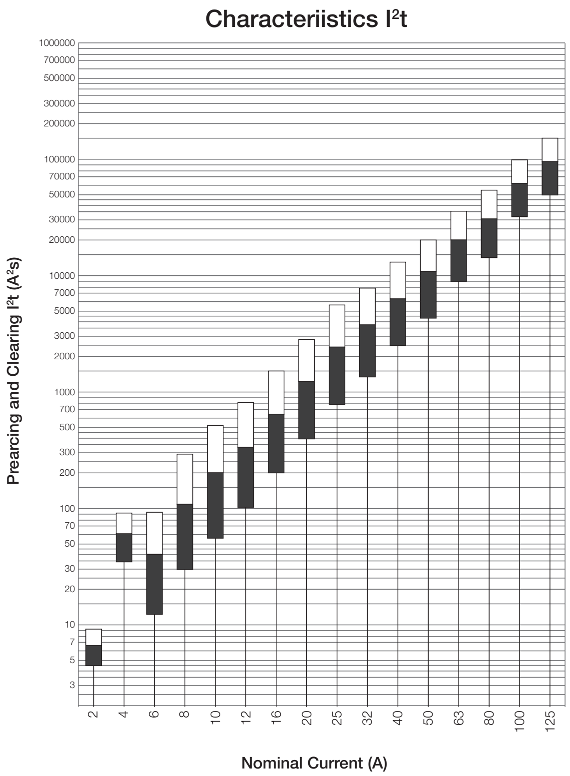
See page 5/91 in Enclosures and DIN-Rail products

Characteristics tI

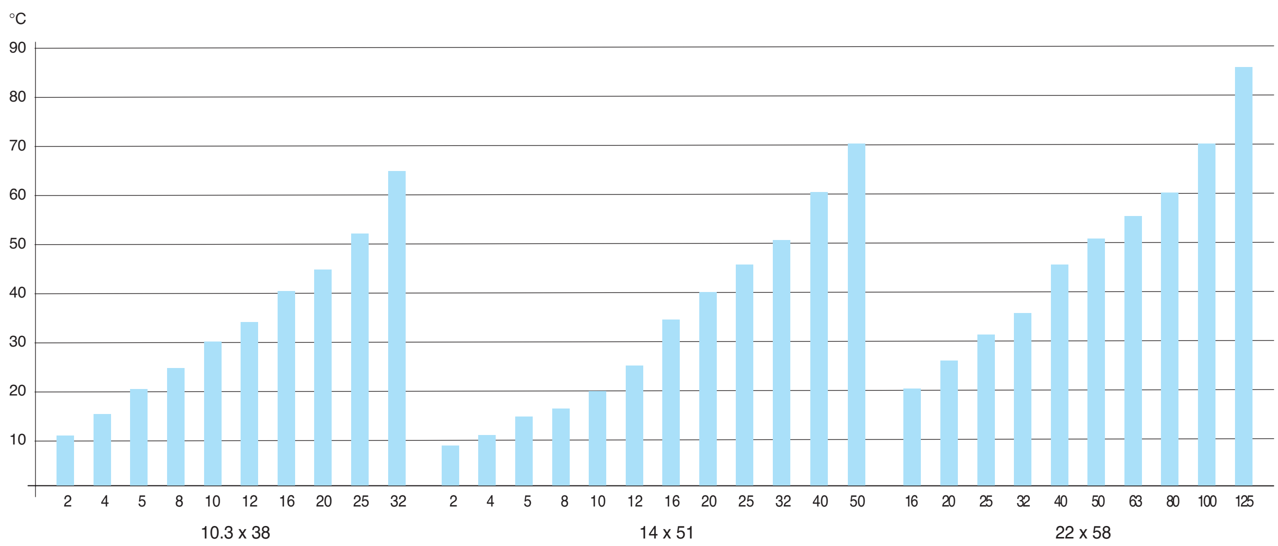


Protection and safety technical details
E 9F fuses

Characteristics I²t



Temperature increase



2CSC400042F0202

E9F aM

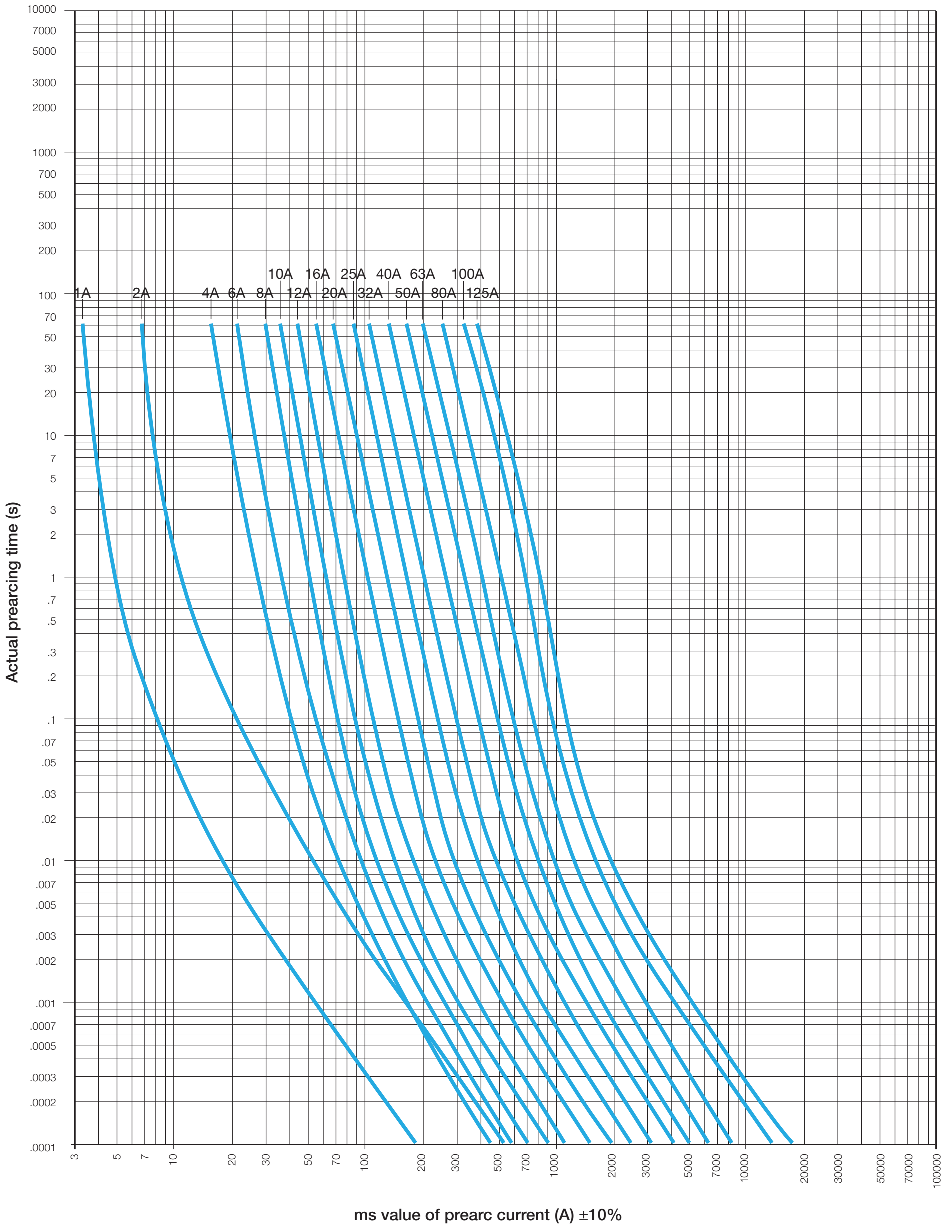
Power dissipation [W]

In [A]	Size			
	8.5x31.5	10.3x38	14x51	22x58
0.5		0.07 W	0.9 W	
1	0.09 W	0.1 W	0.13 W	0.2 W
2	0.15 W	0.14 W	0.18 W	0.25 W
4	0.26 W	0.28 W	0.28 W	0.35 W
6	0.35 W	0.38 W	0.42 W	0.45 W
8	0.47 W	0.55 W	0.55 W	0.6 W
10	0.55 W	0.62 W	0.65 W	0.75 W
12	0.7 W	0.82 W	0.75 W	0.85 W
16		0.87 W	1.05 W	1.15 W
20		1.05 W	1.3 W	1.35 W
25		1.2 W	1.55 W	1.7 W
32		1.8 W	2.05 W	2.2 W
40			2.65 W	2.7 W
45			2.85 W	
50			2.95 W	3.6 W
63				4.8 W
80				6.2 W
100				6.65 W
125				9.9 W

It is important verify that the power dissipation by the fuse does not exceed the limit allowed by the fuse it is hosted. In blue are shown the maximum values of power dissipation according with the range E 90 and E 90 50/125 specifications.

Protection and safety technical details
E 9F fuses

Characteristics tI



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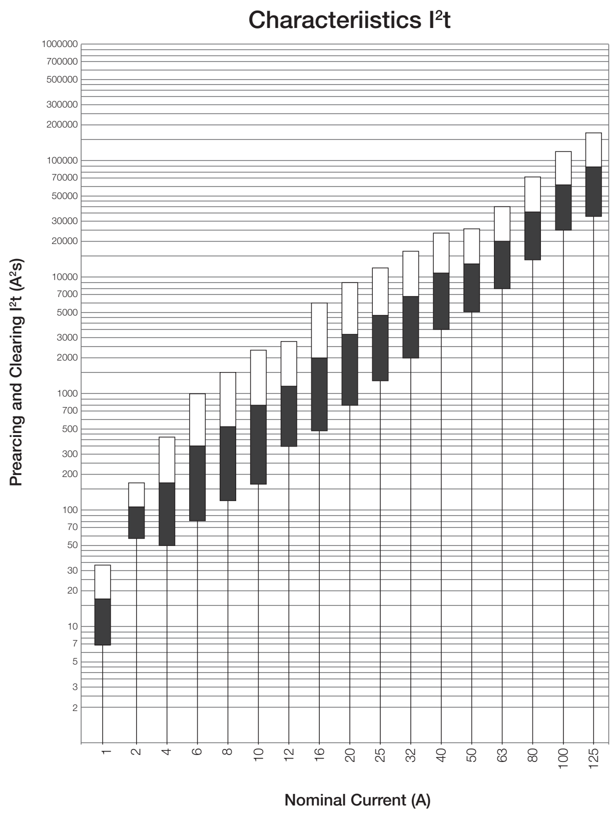
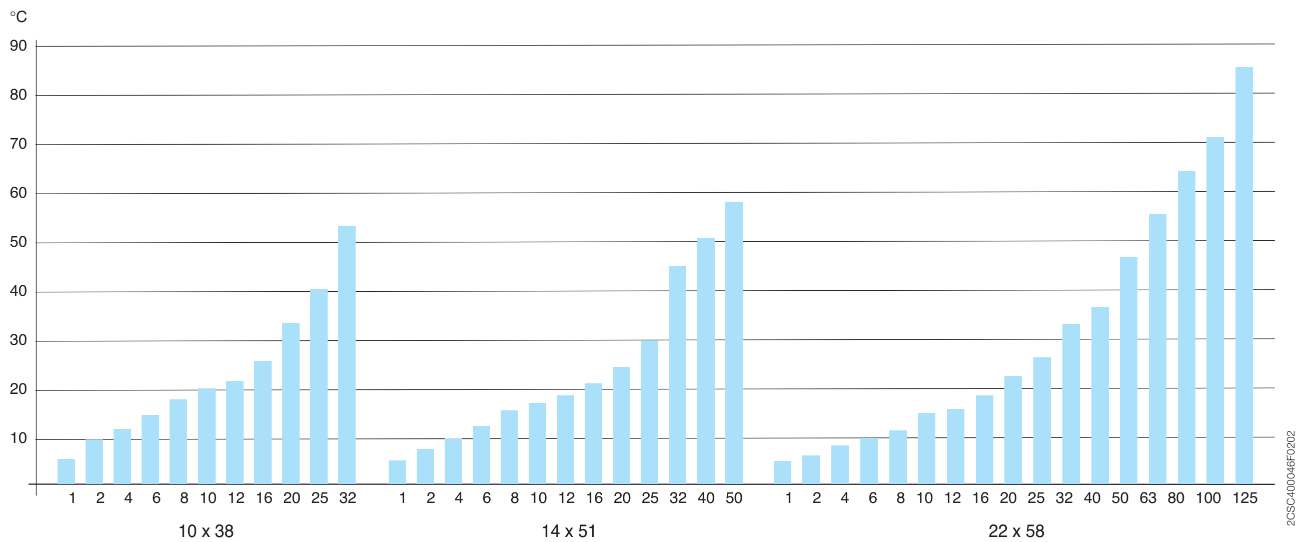
Characteristics I²t



Temperature increase (testing in superior contact)



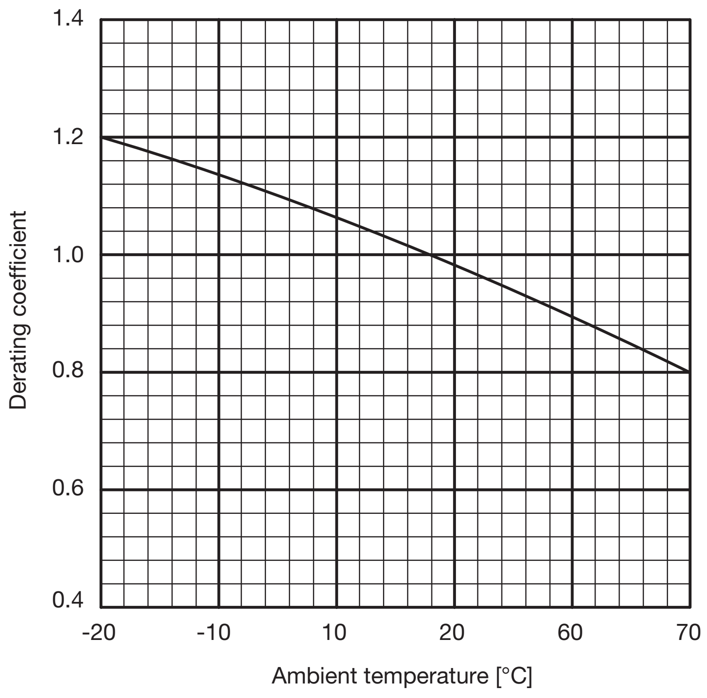
Protection and safety technical details
E 9F fuses

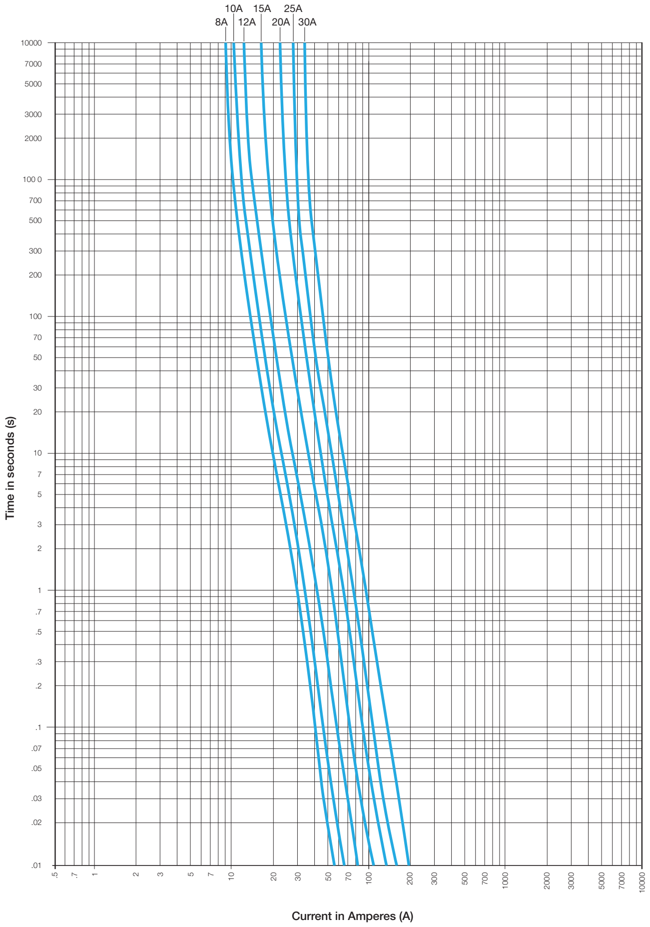
E9F gPV 10.3 x 38 mm cylindrical fuses

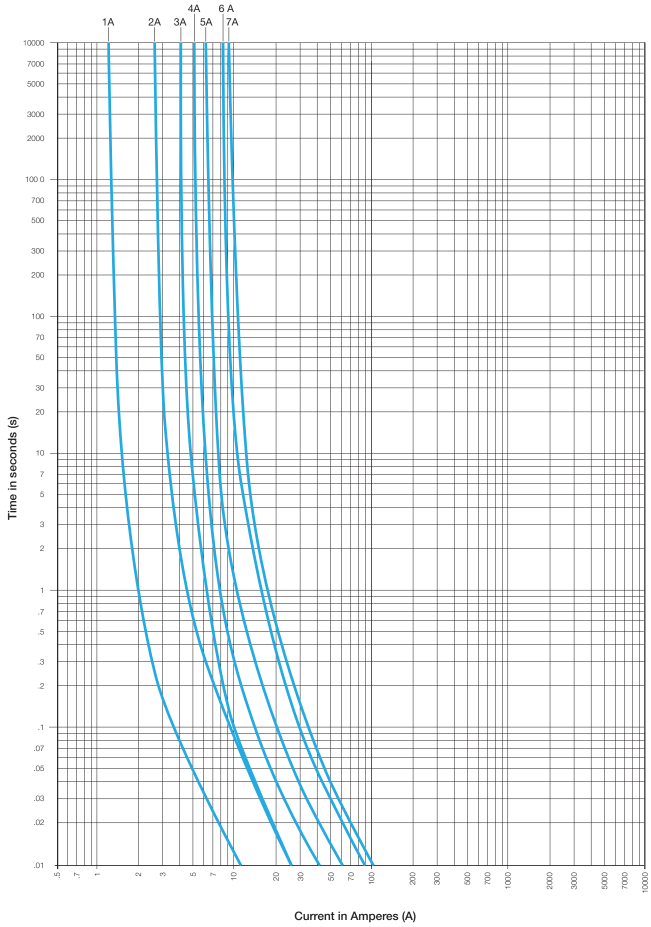
Type	Rated current [A]	Dissipated power 0.7 In [W]	Dissipated power 0.8 In [W]	Dissipated power In [W]
E 9F1 PV	1	0.125	0.175	0.250
E 9F2 PV	2	0.160	0.250	0.320
E 9F3 PV	3	0.66	0.87	1.36
E 9F4 PV	4	0.69	0.8	1.25
E 9F5 PV	5	0.59	0.73	1.12
E 9F6 PV	6	0.42	0.67	1.05
E 9F7 PV	7	0.40	0.64	1.0
E 9F8 PV	8	0.77	0.88	1.48
E 9F10 PV	10	0.67	0.90	1.5
E 9F12 PV	12	0.72	1.0	1.8
E 9F15 PV	15	0.9	1.3	2.2
E 9F20 PV	20	1.1	1.5	2.8
E 9F25 PV	25	1.3	1.8	3.0
E 9F30 PV	30	1.5	1.9	3.7

The power dissipation of the fuse cannot exceed the maximum power dissipation accepted by the fuseholder

Derating in combination with ambient temperature




10A 15A 25A
8A 12A 20A 30A
Time in seconds (s)
Current in Amperes (A)


4A 6 A
1A 2A 3A 5A 7A
Time in seconds (s)
Current in Amperes (A)

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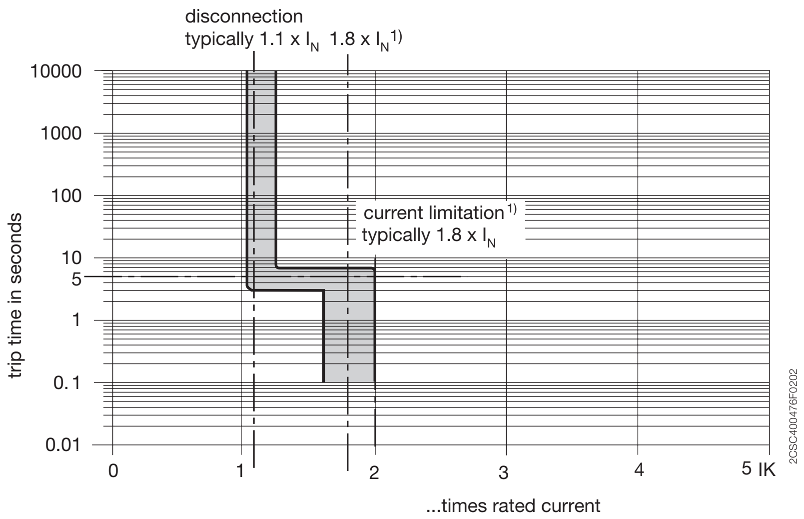
Protection and safety technical details
EPD 24-TB-101

EPD 24

Time/Current characteristic curve (TU = 25 °C)
The trip time is typically 3 s in the range between 1.1 and 1.8 x IN1).
Electronic current limitation occurs at typically 1.8 x IN1) which means that under all overload conditions (independent of the power supply and the resistance of the load circuit) the max. overload before disconnection will not exceed 1.8 x IN1) times the current rating.
Trip time is between 100 ms and 3 sec (depending on overload or at short circuit).
Without this current limitation a considerably higher overload current would flow in the event of an overload or short circuit.



1) Current limitation typically 1.8 x I_N at I_N = 0.5 A...6 A
Current limitation typically 1.5 x I_N at I_N = 8 A or 10 A
Current limitation typically 1.3 x I_N at I_N = 12 A

Maximum cable lenghts
EPD24 reliably trips from 0 Ω up to max. circuit resistance Rmax.

Calculation of Rmax		
Selected rating IN (A)	3	6
Operating voltage US (V DC) (= 80 % of 24 V) 2)	19.2	19.2
Trip current Iab = 1.25 x IN (A) (EPD24 trips after 3 s)	3.75	7.50
Rmax (Ω) = (UB/Iab) -0.050	5.07	2.51

2) Voltage drop of EPD24 and tolerance of trip point (typically 1.1 x IN = 1.05 ... 1.35 x IN) have been taken into account

See page 5/104 in Enclosures and DIN-Rail products

Selection table for the incoming cable lengths with different cable cross-sections

Cable cross section A (mm^2)	0.14	0.25	0.34	0.5	0.75	1.00	1.50
Cable length L (m) (= single length)	cable resistance (Ω) = (ρ_0 x 2 x L) / A 3)						
5	1.27	0.71	0.52	0.36	0.24	0.18	0.12
10	2.54	1.42	1.05	0.71	0.47	0.36	0.24
15	3.81	2.14	1.57	1.07	0.71	0.53	0.36
20	5.09	2.85	2.09	1.42	0.95	0.71	0.47
25	6.36	3.56	2.62	1.78	1.19	0.89	0.59
30	7.63	4.27	3.14	2.14	1.42	1.07	0.71
35	8.90	4.98	3.66	2.49	1.66	1.25	0.83
40	10.17	5.70	4.19	2.85	1.90	1.42	0.95
45	11.44	6.41	4.71	3.20	2.14	1.60	1.07
50	12.71	7.12	5.24	3.56	2.37	1.78	1.19
75	19.07	10.68	7.85	5.34	3.56	2.67	1.78
100	25.34	14.24	10.47	7.12	4.75	3.56	2.37
125	31.79	17.80	13.09	8.90	5.93	4.45	2.97
150	38.14	21.36	15.71	10.68	7.12	5.34	3.56
175	44.50	24.92	18.32	12.46	8.31	6.23	4.15
200	50.86	28.48	20.94	14.24	9.49	7.12	4.75
225	57.21	32.04	23.56	16.02	10.68	8.01	5.34
250	63.57	35.60	26.18	17.80	11.87	8.90	5.93

3) Resistivity of copper ρ_0 = 0.0178 (Ω x mm^2)/m

Example 1: max. length for 1.5 mm^2 and 3 A: 214 m
Example 2: max. length for 1.5 mm^2 and 6 A: 106 m
Example 3: mixed wiring: (Control cabinet --- sensor/actuator level)
R1 = 40 m for 1.5 mm^2 and R2 = 5 m for 0.25 mm^2:
R1 = 0.95 Ω, R2 = 0.71 Ω, total (R1 + R2) = 1.66 Ω

Please note

The user should ensure that the cable cross sections of the relevant load circuit are suitable for the current rating of the EPD24 used.

Automatic start-up of machinery after shut down must be prevented (Machinery Directive 98/37/EG and EN 60204-1).
In the event of a short circuit or overload the load circuit will be disconnected electronically by the EPD24.

Protection and safety technical details
EPD 24-TB-101

Information on UL approvals/CSA approvals

UL1604

Operating Temperature Code T5
– This equipment is suitable for use in Class I, Division 2, Groups A, B, C and D or non-hazardous locations only

WARNING:
– Exposure to some chemicals may degrade the sealing properties of materials used in the following device: relay

Sealant Material:

Generic Name: Modified diglycidyl ether of bisphenol A
Supplier: Fine Polymers Corporation
Type: Epi Fine 4616L-160PK

Casing Material:

Generic Name: Liquid Crystal Polymer
Supplier: Sumitomo Chemical
Type: E4008, E4009, or E6008

RECOMMENDATION:
– Periodically inspect the device named above for any degradation of properties and replace if degradation is found

WARNING – EXPLOSION HAZARD:
– Do not disconnect equipment unless power has been removed or the area is known to be non-hazardous
– Substitution of any components may impair suitability for Class I, Division 2

UL2367
Non-hazardous use

UL 508
Non-hazardous use

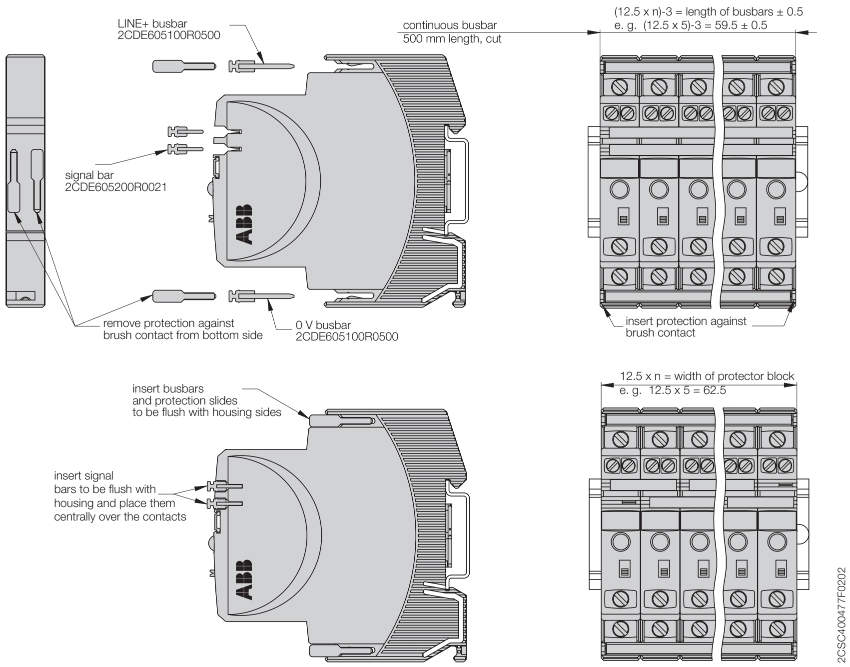
CSA C22.2 No. 213 (Class I, Division 2)
CSA C22.2 No. 142

Class 2
Meets requirement for Class 2 current limitation (EPD24 ... -0,5 A/1 A/2 A/3 A)

The EPD24 features an integral power distribution system.
The following wiring modes are possible with various pluggable current and signal busbars:

- LINE+ (24 V DC)
- 0 V

  Caution: The electronic devices EPD24 require a 0 V connection
- Auxiliary contacts



Mounting procedure

Before wiring insert busbars into protector block. A maximum of 10 connection cycles are permissible using connecting bus-bars.

Recommendation

After 10 units the busbars should be interrupted and receive a new entry live.

Table of length for busbars

(Order code 2CDE605100R0500)									
No. of units	2	3	4	5	6	7	8	9	10
Length of busbar (mm) ± 0.5 mm	22	34.5	47	59.5	72	84.5	97	109.5	122

Protection and safety technical details
SQZ3 phase and sequence relays

Operating principle
Through an output relay with contact in safety switching, the SQZ3 phase and sequence presence devices for 400 V a.c. three-phase networks enable the phase and sequence presence management monitoring also the minimum voltage (adjustable up to 70% of Vn). In case of any defect, the device operates within a range from 2 to 20 seconds, with the opportunity to control the appropriate acoustic signals, motor controlling contactors or circuit breakers.

Application environments
The installation of the SQZ3 phase and sequence presence relays are particularly suitable for any environment and situation where it is necessary to control the three-phase network operation promptly signalling any defect.

Example of installation
As shown in the diagrams, one of the possible applications is the installation of the SQZ3 phase and sequence presence relays in a department store, where the escalator supply circuit has a phase variation determining the SQZ3 relay intervention on the ESB contactor and causing the motor block and the alarm lighting indication.

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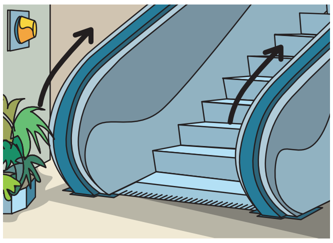
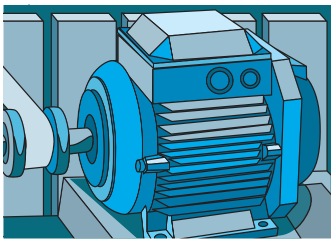
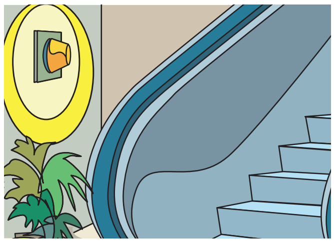
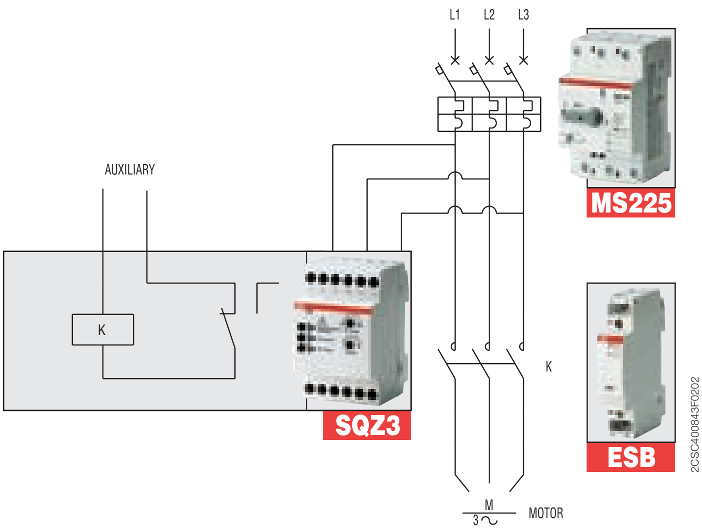
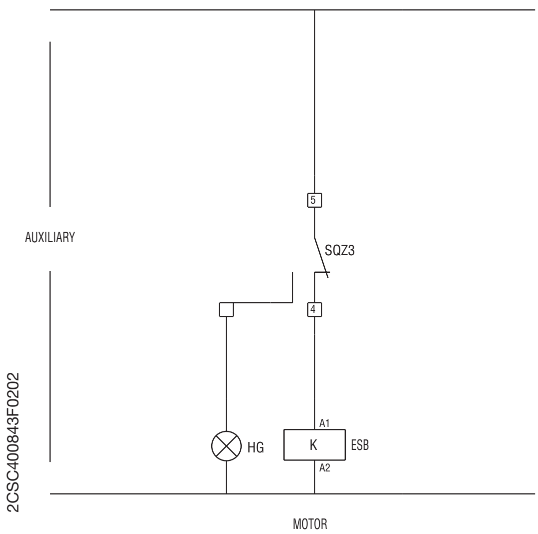
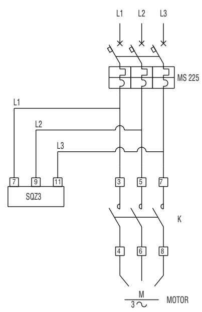












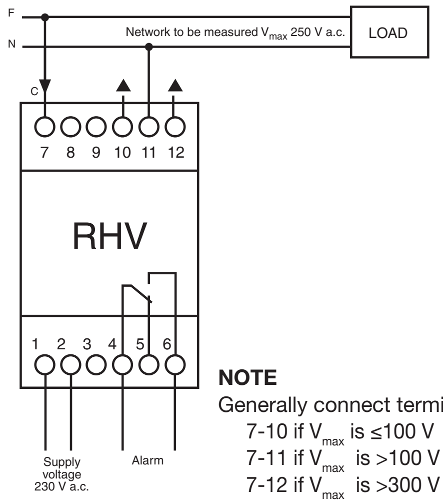
See page 5/107 in Enclosures and DIN-Rail products

Maximum voltage relay (RHV) application example

Monitoring a load with the following ratings:

I_n	=	5 A	(standard rated operating current)
V_n	=	230 V a.c.	(standard rated operating voltage)
V_{max}	=	250 V a.c.	(RHV relay intervention voltage)

1. Connect as in the diagram (since V_{max}=250 V).

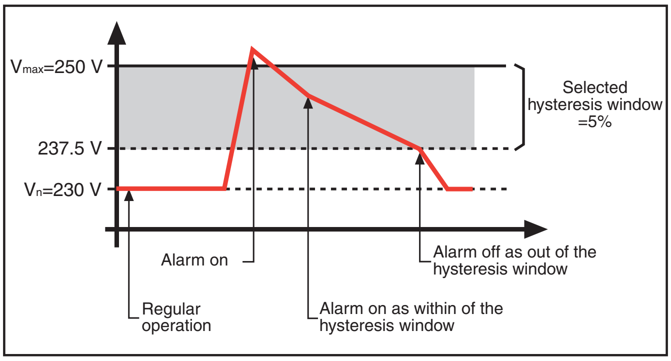


NOTE
Generally connect terminals:
7-10 if V_{max} is ≤100 V
7-11 if V_{max} is >100 V and ≤300 V
7-12 if V_{max} is >300 V and ≤500 V

2. Set the “Voltage%” trimmer to 83.33%, since:
$$V\% = \frac{250\ (V_{max})}{300\ (V_{set})} \times 100 = 83.33\%$$
being terminal 7-11 wired.

3. Set the “hysteresis %” trimmer; choosing 5% gives a intervention range from 237.5 to 250 V (250-5%=237.5 V).
The relay will switch at 250 V and return to its normal state at 237.5 V

4. Adjust the “delay” trimmer to select the desired relay intervention delay (1…30 sec).
During this delay the “Power ON” LED blinks; at the end of the delay the “Alarm” LED becomes steadily lit and the relay intervenes.



OEPM0124

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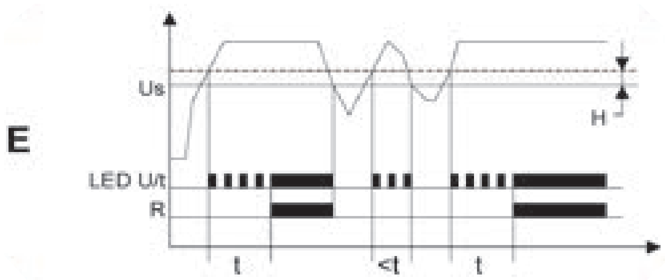
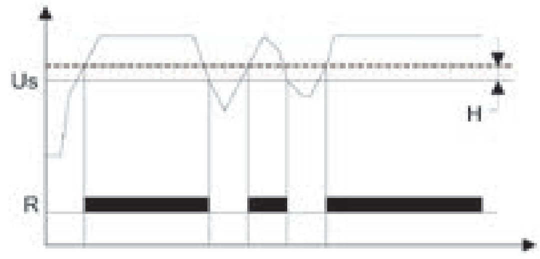
Protection and safety technical details
E 236 undervoltage monitoring relays

Function



Function E236-US 1.1D



Function E236-US 1.1, E 236-US 2.1, E 236-US 1 and E 236-US 2

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See page 5/109 in Enclosures and DIN-Rail products

Protection and safety technical details
Insulation monitoring devices

ISOLTESTER-DIG-PLUS

The new Isoltester-DIG-PlUS stands out for its superior and outstanding constructional and functional characteristics. Unlike conventional insulation monitors, state-of-the-art technology is used to monitor the condition of the network insulation. These control the network by applying a direct voltage between the power-supply line of the device and the earth. The direct current generated in this way is made up of ohmic components and capacitive components whose ratio establishes the total leakage level; if this is higher than the preset threshold value, the device triggers an alarm signal. However, the recording of the current values may be distorted by the direct-type components emitted by the electro-medical equipment that is more and more frequently connected to the system, resulting in triggering of the insulation monitor even when the reason the monitored values exceed the threshold is not due to an actual earth fault.

The new Isoltester- DIG-PLUS, on the other hand, inject into the encoded control signal circuit, which does not affect the calculation of the total leakage. In this way, false alarms can be avoided, thus increasing the efficiency of the control carried out on the insulation of the supply line. ISOLTESTER-DIG-PLUS monitoring devices also offer new functions, including:
- the possibility to set a precise network insulation threshold value from 50 to 1 M , rather than selecting a range preset by the manufacturer.
- temperature control of both the primary and secondary windings (T1 and T2) of the isolation transformer
- monitoring via current transformers of the maximum current to detect any overload status
- a screen on the display showing all recorded measurements
- a programmable relay output for the remote signalling of faults inside the device, low insulation status, recording high temperature values and achieving the maximum current threshold
- a RS485 serial port for connecting the device to other control and protection equipment, personal computers, etc. through the Modbus RTU communication protocol
- Error/Link Fail mode, a self-test to search for any faults inside the device, for the control of the connection to the network to be monitored and the correct operation of the thermometric probe.

The new ISOLTESTER-DIG is also available in the RZ version, for the insulation monitoring in networks up to 230 V AC

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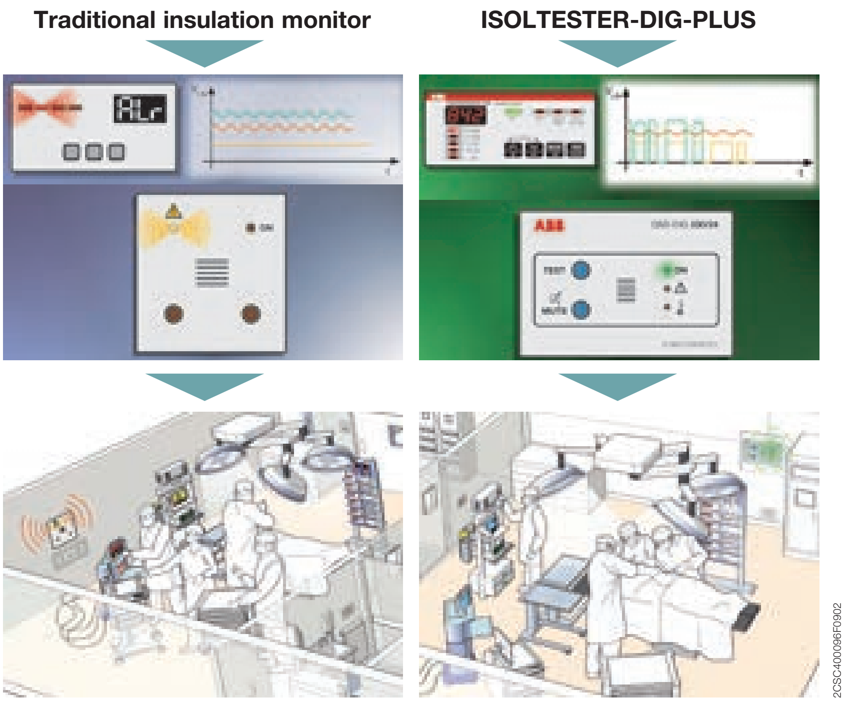

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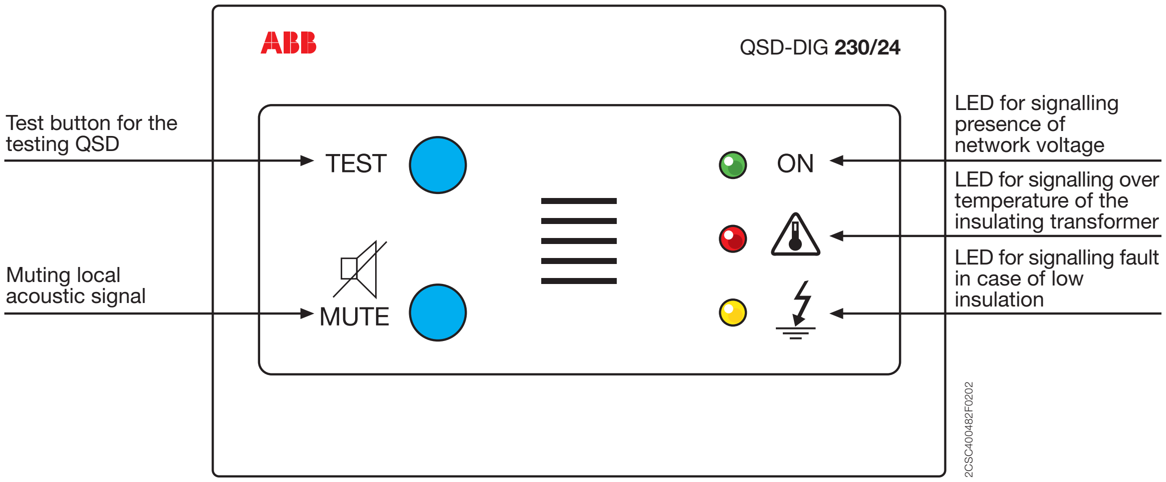
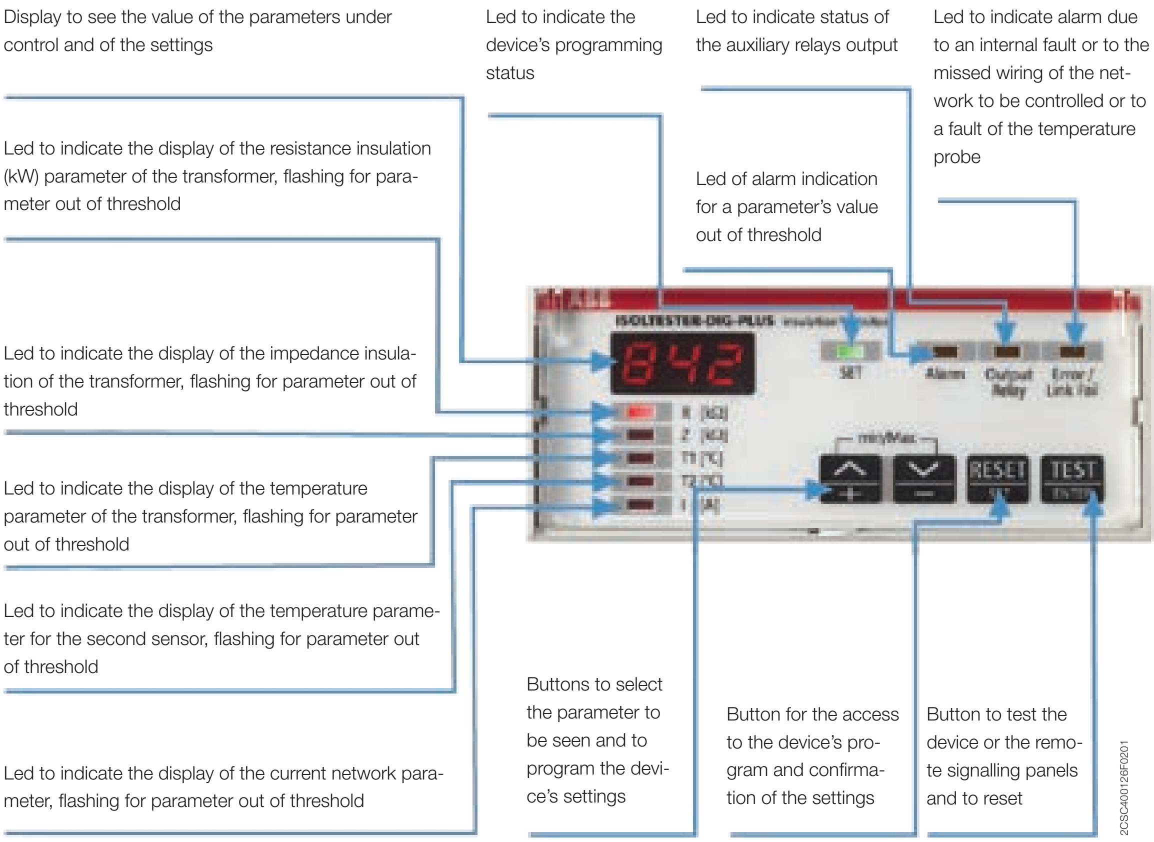
QSD-DIG 230/24



Functioning of the frontal operators



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Protection and safety technical details
Insulation monitoring devices

Operating principle
ISOLTESTER-DIG-PLUS uses an encoding measuring signal that guarantees reliable measurements even in the presence of strong harmonic distortions.

Application environments
Thanks to the fact that it prevents nuisance tripping, ISOLTESTER-DIG-PLUS is ideal for all group 2 medical locations that need high operational continuity.

Example of installation
Conventional CRT or LCD displays, portable oxygen delivery systems, X-ray and sterilizing equipment can all provoke network disturbances.

Unlike conventional insulation monitoring devices ISOLTESTER-DIG-PLUS uses an encoded measuring signal that is not affected by network disturbances
The medical staff are thus able to continue working as normal, without any interruptions due to nuisance tripping.

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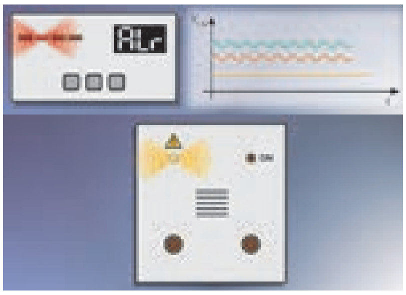
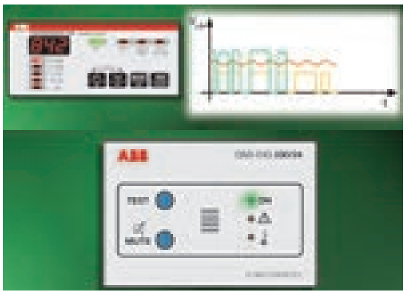
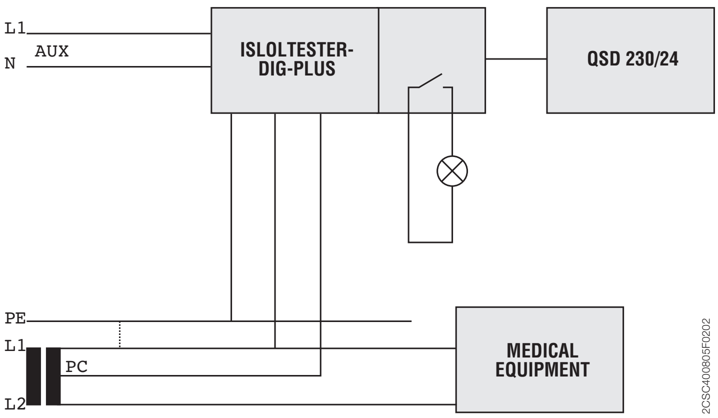
Without ISOLTESTER-DIG-PLUS



With ISOLTESTER-DIG-PLUS





Protection and safety technical details
Monitor for medical locations

ISOLTESTER MRM

CP415

Features	
Front panel dimensions L x H x D	96 x 96 x 7 mm
Mounting depth	40.6 mm
Cut-out dimensions	89.3 x 89.3 mm
Front panel degree of protection	IP65/NEMA 4X (indoor use only)
Weight	0.21 kg
COM1	9 pin female connector: RS232,RS422, RS485
COM2	-
USB Port	-
CF card port	-
Ethernet	-
Flash ROM	4 MB
RAM	256 KB
CPU	32-bit RISC
Backup battery	-
Data/ Instructions	-
Internal clock	Yes, with rechargeable lithium battery
Display	Mono STN LCD, 16 grayscale, 240x240 pixel
	Backlight LED life: about 30,000 hours at 25°C
Usable display area LxH	58.5 x 58.5 mm
	30 x 30, characters 8 x 8 pixels
Display adjustments	Via touch screen
Touch screen	Analog
Power supply	24 V dc +-15%. Power consumption lass than 4 W
Ambient temperature	from 0 to +50 °C
Storage temperature	from -10 to +60 °C
Ambient humidity	20-90% relative humidity without condensate
Vibration endurance	0.5 mm displacement, 10-55 Hz, 2 hours for X, Y and Z-axis
Shock endurance	10 G, 11 ms for 3 times on each X, Y and Z-axis
CE	EN61000-6-4, EN61000-6-2
Cooling	Natural cooling

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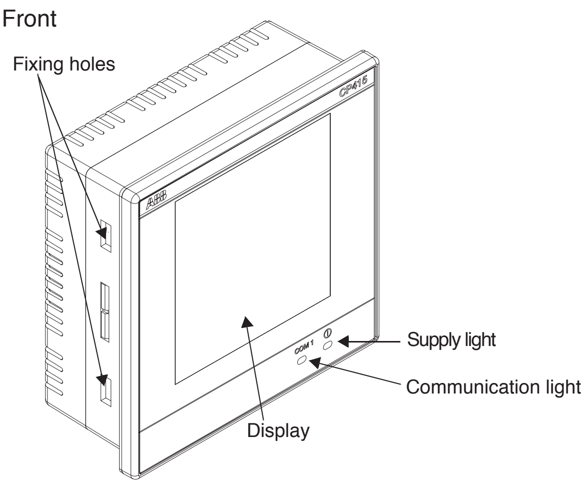
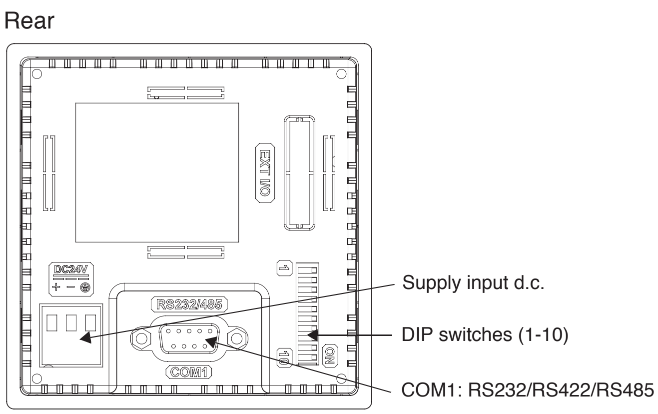
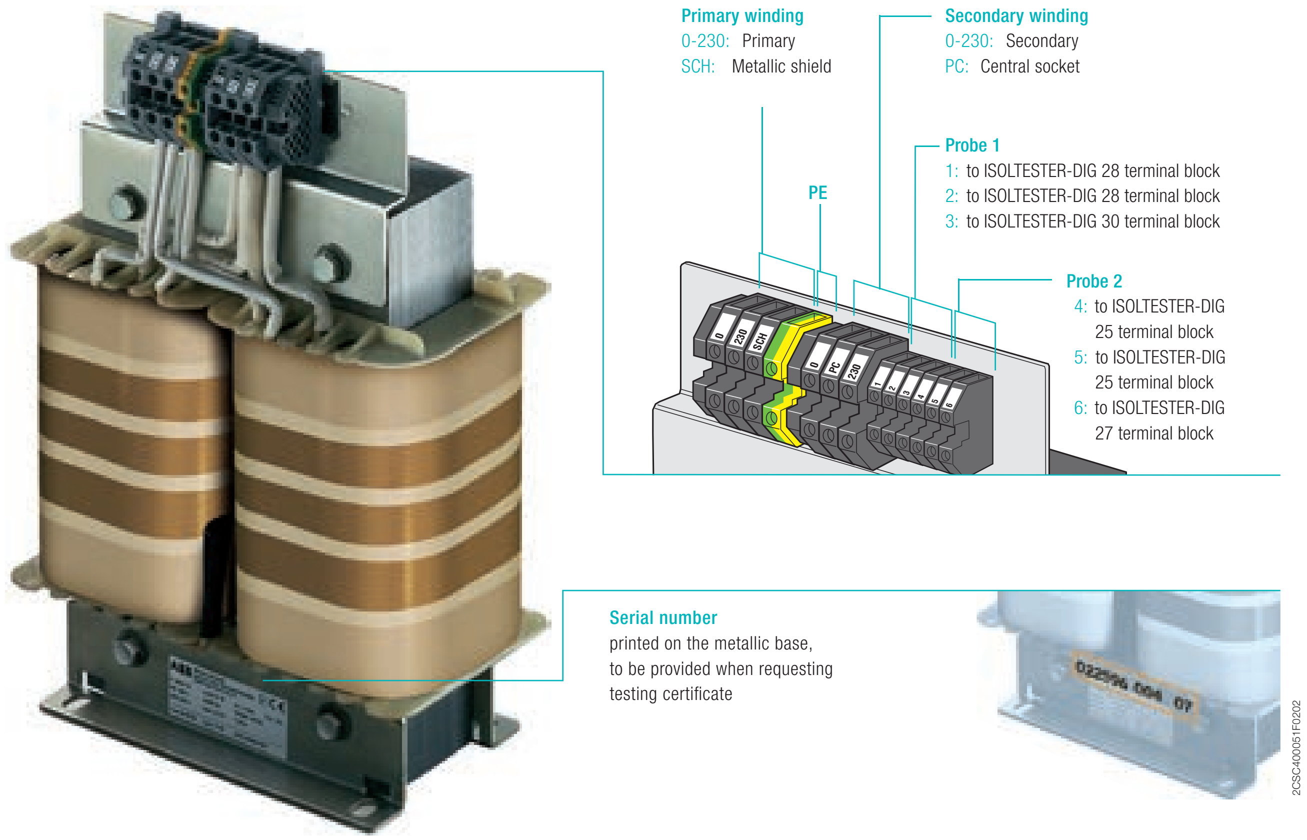
Description





Protection and safety technical details
TI insulating transformers for medical locations

Wirings and serial number location



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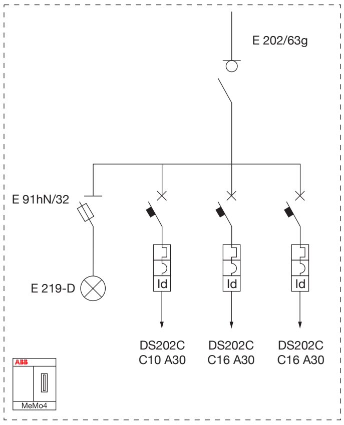
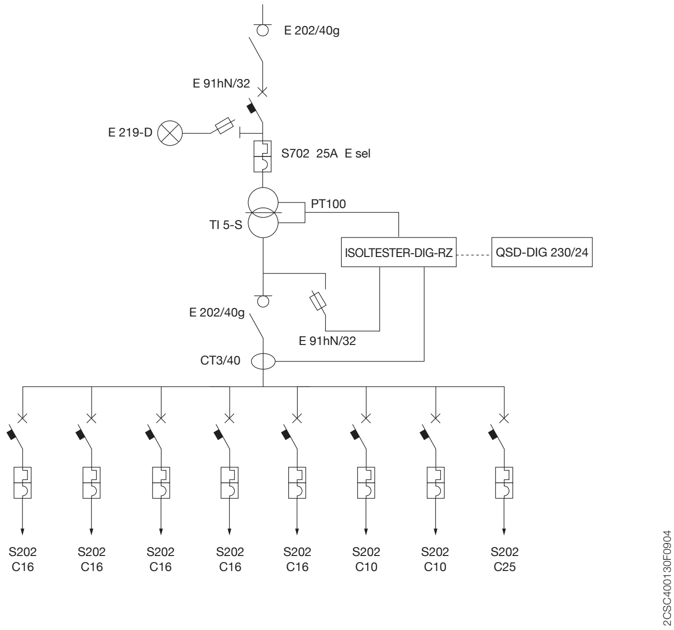
Protection and safety technical details
QSO switchboard for medical locations

Operating diagrams

QSO S





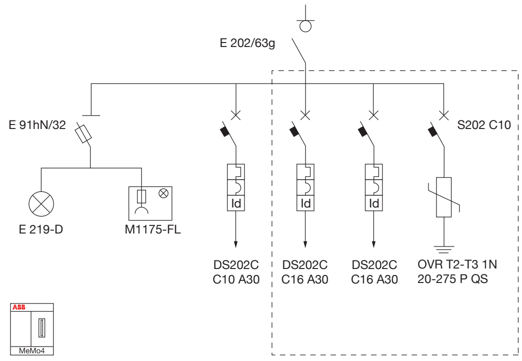
The devices inside the dotted areas are available only in the premium installation

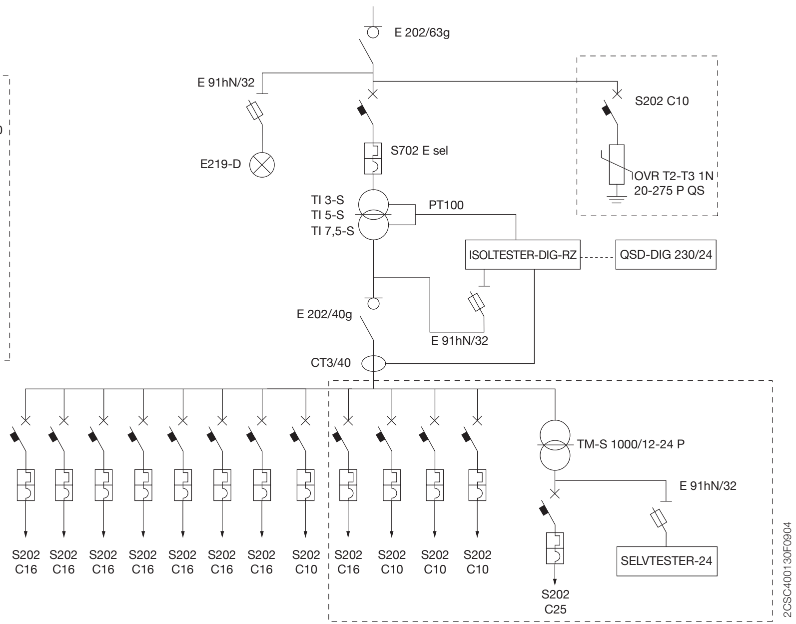
Description	QSO 3S Classic	QSO 5S Classic	QSO 3S Premium	QSO 5S Premium
Switch disconnector 2P 40 A E202/40g	2	2	2	2
Switch disconnector 2P 63 A E202/63g			1	1
Fuse holder E 91hN/32	2	2	3	3
Green indicator lamp 1/2 network on E219-D	1	1	2	2
USB2.0 modular storage device 4GB MeMo4	1	1	1	1
Insulation monitoring device ISOLTESTER-DIG-RZ	1	1	1	1
MCB 6 kA 2P C10 S202	2	2	2	2
MCB 6 kA 2P C16 S202	5	5	5	5
MCB 6 kA 2P C25 S202	1	1	1	1
MCB 25 kA 2P E25 S702	1	1	1	1
RCBO 1N 10 A 0,03 A DS202 C C10 A30			1	1
RCBO 1N 16 A 0,03 A DS202 C C16 A30			2	2
Damper set AMM	4	4	4	4
Current transformer CT3 40/5 A	1	1	1	1
Insulating transformer for medical locations 3000 VA 230/230 V TI 3-S	1		1	
Insulating transformer for medical locations 5000 VA 230/230 V TI 5-S		1		1
Fuse 10 x 38 gG 2A E 9F10 GG2	4	4	6	6

See page 5/121 in Enclosures and DIN-Rail products

Protection and safety technical details
QSO switchboard for medical locations

QSO M

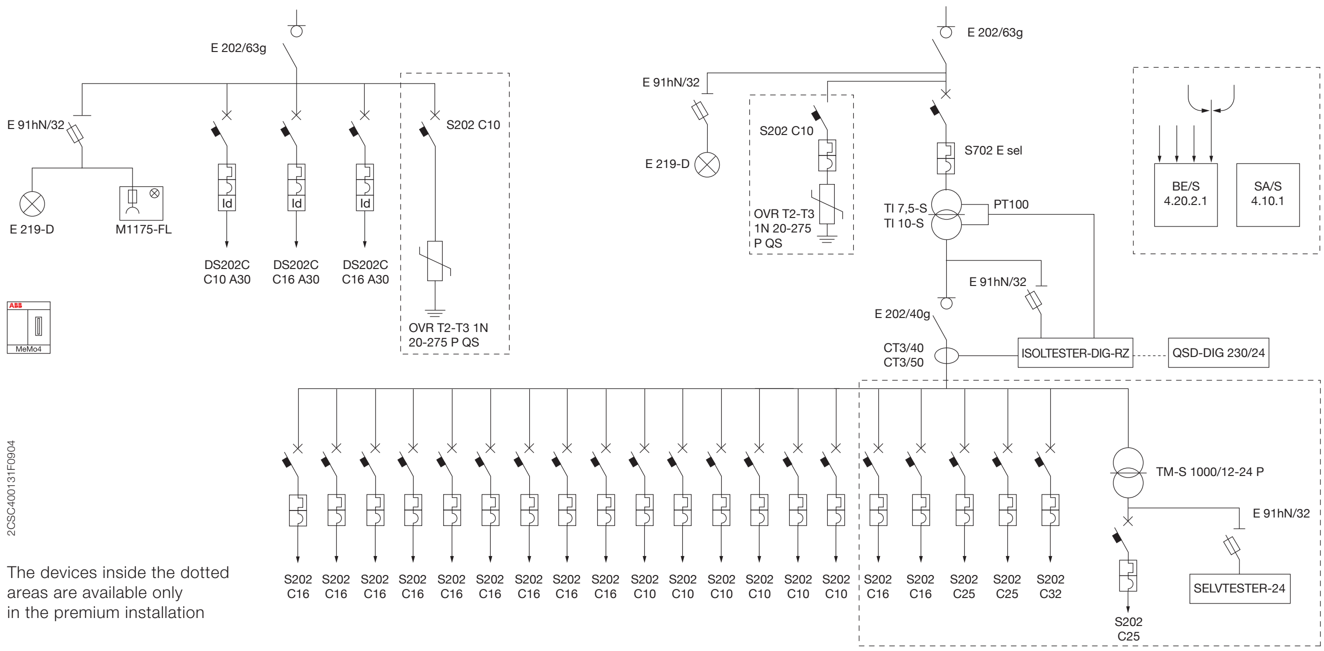




The devices inside the dotted areas are available only in the premium installation

Description	QSO 3M Classic	QSO 5M Classic	QSO 7,5M Classic	QSO 3M Premium	QSO 5M Premium	QSO 7,5M Premium
Switch disconnector 2P 63 A E202/63g	3	3	3	3	3	3
Fuse holder E 91hN/32	3	3	3	4	4	4
Green indicator lamp 1/2 network on E219-D	2	2	2	2	2	2
USB2.0 modular storage device 4GB MeMo4	1	1	1	1	1	1
Insulation monitoring device ISOLTESTER-DIG-RZ	1	1	1	1	1	1
Insulation monitoring device 24 V SELVTESTER-24				1	1	1
Surge protection device OVR T2-T3 1N 20-275 P QS				2	2	2
MCB 6 kA 2P C10 S202	3	3	3	8	8	8
MCB 6 kA 2P C16 S202	7	7	7	8	8	8
MCB 6 kA 2P C25 S202				1	1	1
Shucko socket with light and fuse 2P+T 16 A M1175-FL	1	1	1	1	1	1
MCB 25 kA 2P E25 S702	1	1	1			1
MCB 25 kA 2P E35 S702			1			1
RCBO 1N 10 A 0,03 A DS202 C C10 A30	1	1	1	1	1	1
RCBO 1N 16 A 0,03 A DS202 C C16 A30				2	2	2
Damper set AMM	4	4	4	8	8	8
Current transformer CT3 40/5 A	1	1	1	1	1	1
Control and safety transformer TM-S 1000/12-24 P. 230-400V S. 24V				1	1	1
Insulating transformer for medical locations 3000 VA 230/230 V TI 3-S	1			1		
Insulating transformer for medical locations 5000 VA 230/230 V TI 5-S		1			1	
Insulating transformer for medical locations 7500 VA 230/230 V TI 7.5-S			1			1
Fuse 10 x 38 gG 2A E 9F10 GG2	6	6	6	8	8	8

QSO L

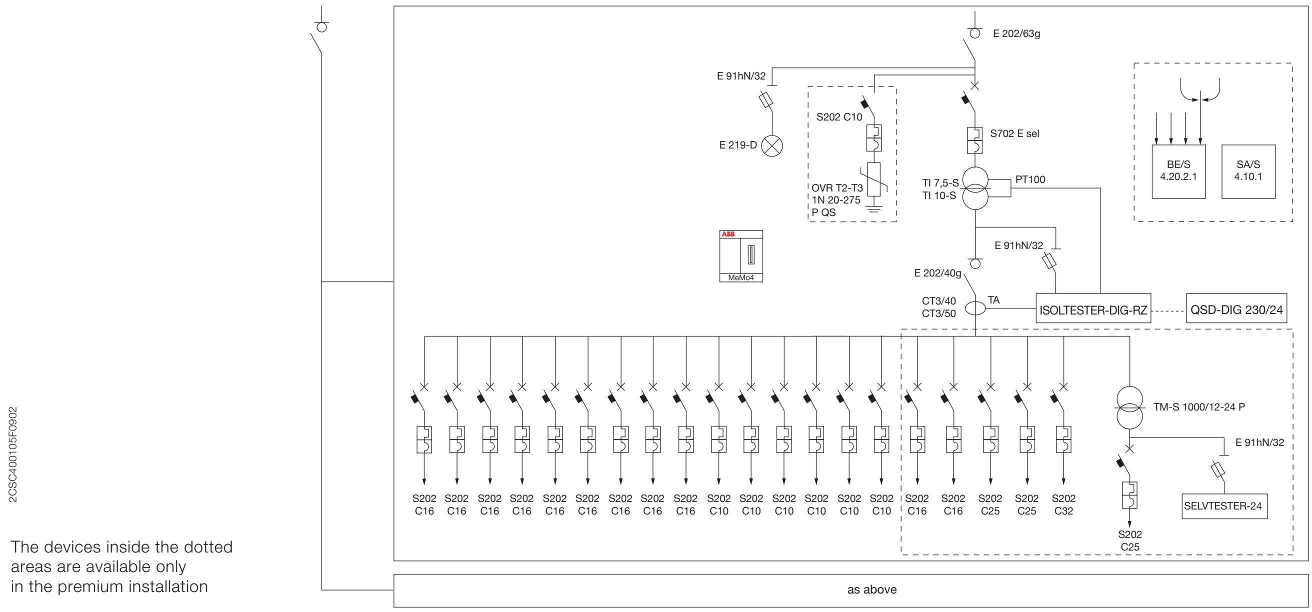


The devices inside the dotted areas are available only in the premium installation

Description	QSO 10L Classic	QSO 7,5L Premium	QSO 10L Premium
Switch disconnector 2P 63 A E202/63g	3	3	3
Fuse holder E 91hN/32	2		4
Green indicator lamp 1/2 network on E219-D	2	2	2
USB2.0 modular storage device 4GB MeMo4	1	1	1
Binary Input 4-fold BE/S 4.20.2.1			1
Insulation monitoring device ISOLTESTER-DIG-RZ	1	1	1
Insulation monitoring device 24 V SELVTESTER-24		1	1
Switch actuator 4-fold 10 A SA/S 4.10.1			1
Surge protection device OVR T2-T3 1N 20-275 P QS		2	2
Auxiliary contact 1 change over S2-CS/H6R			1
MCB 6 kA 2P C10 S202	5	7	7
MCB 6 kA 2P C16 S202	9	11	11
MCB 6 kA 2P C25 S202		3	3
MCB 6 kA 2P C32 S202		1	1
Shucko socket with light and fuse 2P+T 16 A M1175-FL	1	1	1
MCB 25 kA 2P E25 S702			
MCB 25 kA 2P E35 S702		1	
MCB 25 kA 2P E50 S702	1		
MCB 25 kA 2P S702-E 50+H2WR selettivo			1
RCBO 1N 10A 0,03A DS202 C C10 A30	1	1	1
RCBO 1N 16A 0,03A DS202 C C16 A30	2	2	2
Damper set AMM	4	8	8
Current transformer CT3 40/5 A		1	
Current transformer CT3 50/5 A	1		1
Control and safety transformer TM-S 1000/12-24 P. 230-400 V S.24 V		1	1
Insulating transformer for medical locations 7500 VA 230/230 V TI 7.5-S		1	
Insulating transformer for medical locations 10000 VA 230/230 V TI 10-S	1		1
Fuse 10 x 38 gG 2A E 9F10 GG2		8	8

Protection and safety technical details
QSO switchboard for medical locations

QSO XL

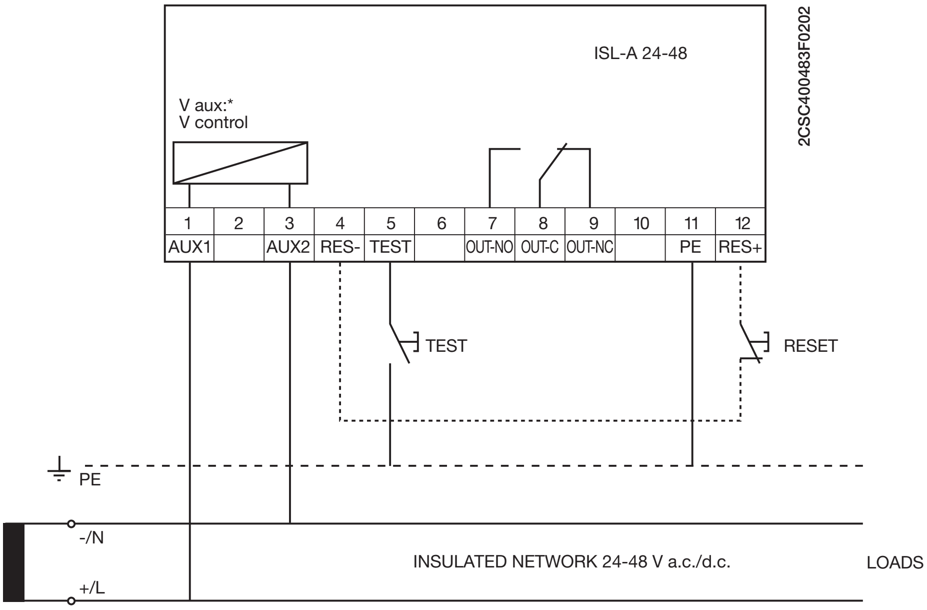


The devices inside the dotted areas are available only in the premium installation

Description	QSO 7,5XL Premium	QSO 10XL Premium
OT80F3C Switch disconnector 3P 80 A	1	1
Switch disconnector 2P 63 A E202/63g	3	3
Fuse holder E 91hN/32	7	7
Green indicator lamp 1/2 network on E219-D	3	3
USB2.0 modular storage device 4GB MeMo4	1	1
Binary Input 4-fold BE/S 4.20.2.1	2	2
Insulation monitoring device ISOLTESTER-DIG-RZ	2	2
Insulation monitoring device 24 V SELVTESTER-24	2	2
Switch actuator 4-fold 10 A SA/S 4.10.1	2	2
Surge protection device OVR T2-T3 1N 20-275 P QS	3	3
MCB 6 kA 2P C10 S202	15	15
MCB 6 kA 2P C16 S202	23	23
MCB 6 kA 2P C25 S202	6	6
MCB 6 kA 2P C32 S202	2	2
Shucko socket with light and fuse 2P+T 16 A M1175-FL	1	1
MCB 25 kA 2P S702-E 35+H2WR selettivo	2	
MCB 25 kA 2P S702-E 50+H2WR selettivo		2
RCBO 1N 10 A 0,03 A DS202 C C10 A30	1	1
RCBO 1N 16 A 0,03 A DS202 C C16 A30	2	2
Damper set AMM	16	16
Current transformer CT3 40/5A	2	
Current transformer CT3 50/5A		2
Control and safety transformer TM-S 1000/12-24 P. 230-400V S.24V	2	2
Insulating transformer for medical locations 7500 VA 230/230 V TI 7.5-S	2	
Insulating transformer for medical locations 10000 VA 230/230 V TI 10-S		2
Fuse 10 x 38 gG 2A E 9F10 GG2	14	14
Shaft for disconnector square sect. 6 mm, lenght 360 mm	1	1
Handle for disconnector I-0-II 45mm OHB45J6E011	1	1

Insulation monitoring devices ISL for industrial applications

ISL-A 24-48



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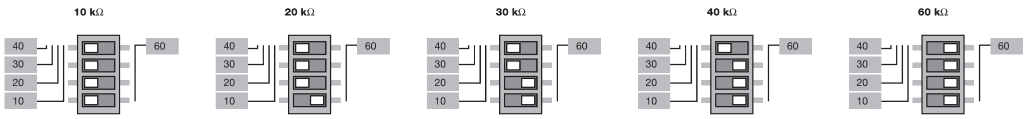
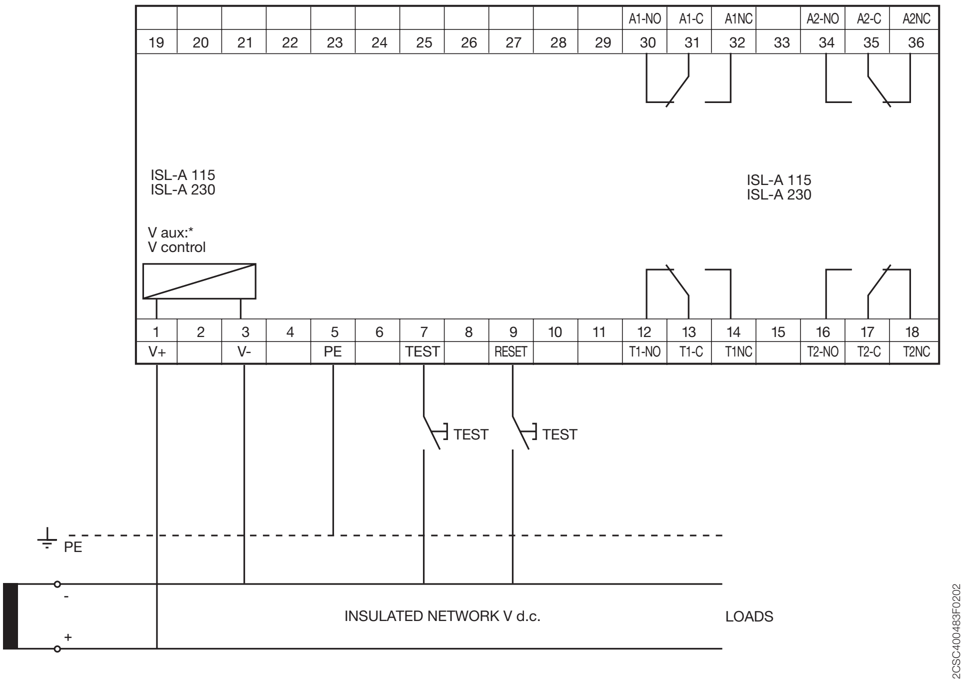
MICROSWITCH SETTINGS
The front microswitches allow the insulation threshold level to be adjusted between 10 and 60 kΩ, as shown below:



ISL-A 115 and ISL-A 230



MICROSWITCH SETTINGS

The front microswitches are used for adjusting the insulation threshold level, enabling the fail-safe function and configuring the reset mode for both the alarm and trip thresholds.

Microswitches A, B, C, D for programming the trip and alarm thresholds:

ALARM		TRIP	
300 kΩ:	A=0, B=0, C=0, D=0	100 kΩ:	A=0, B=0, C=0, D=0
150 kΩ:	A=1, B=0, C=0, D=0	60 kΩ:	A=1, B=0, C=0, D=0
80 kΩ:	A=1, B=1, C=0, D=0	40 kΩ:	A=1, B=1, C=0, D=0
50 kΩ:	A=1, B=1, C=1, D=0	20 kΩ:	A=1, B=1, C=1, D=0
30 kΩ:	A=1, B=1, C=1, D=1	10 kΩ:	A=1, B=1, C=1, D=1

Microswitch E for configuring the FAIL SAFE mode

E=0 fail safe mode disabled

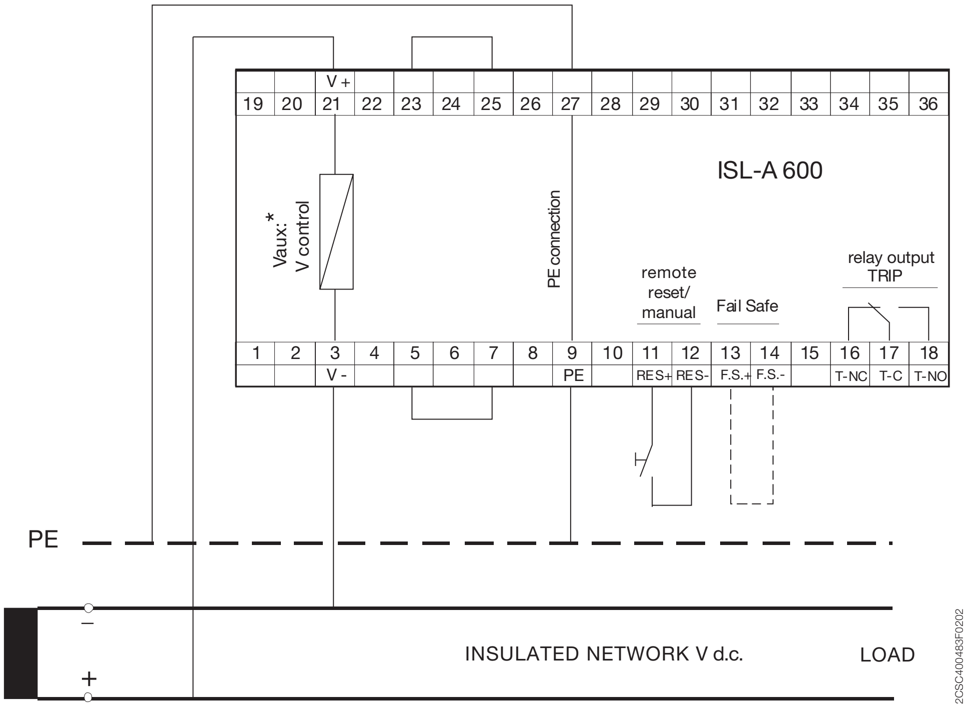
E=1 fail safe mode enabled

Microswitch F for configuring the RESET mode

F=0 manual reset

F=1 automatic reset

ISL-A 600



V +
19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36
ISL-A 600
Vaux:*
V control
PE connection
remote
reset/
manual
Fail Safe
relay output
TRIP
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18
V -
PE
RES+
RES-
F.S.+
F.S.-
T-NC
T-C
T-NO
PE
–
+
INSULATED NETWORK V d.c.
LOAD
2CSC400483F0202

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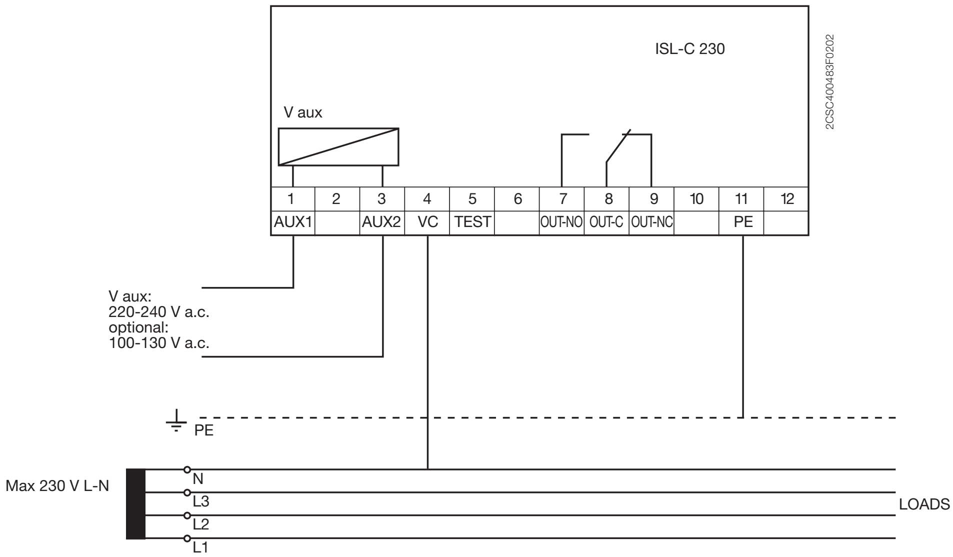
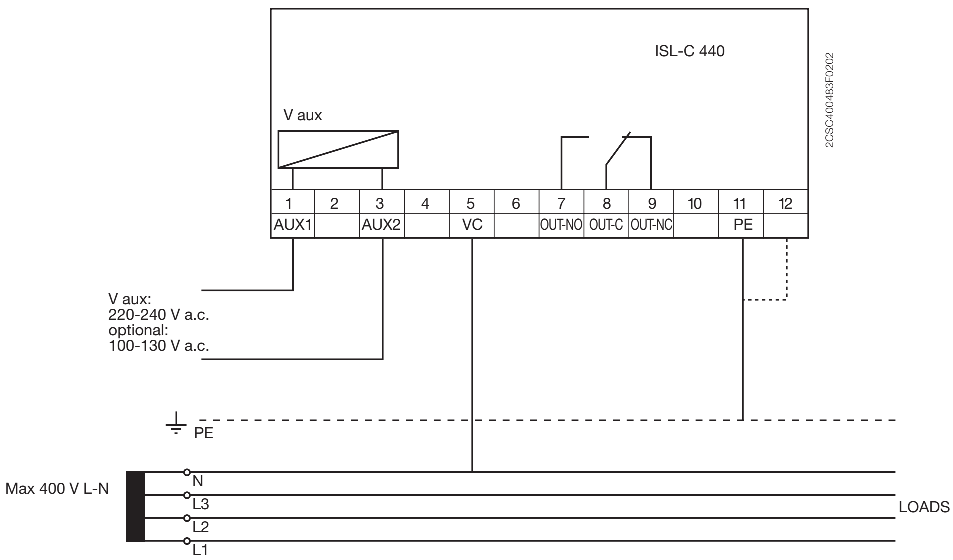
ISL-C 230

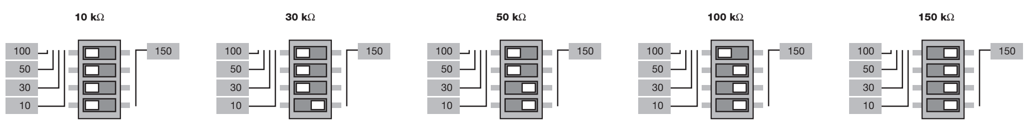


ISL-C 440



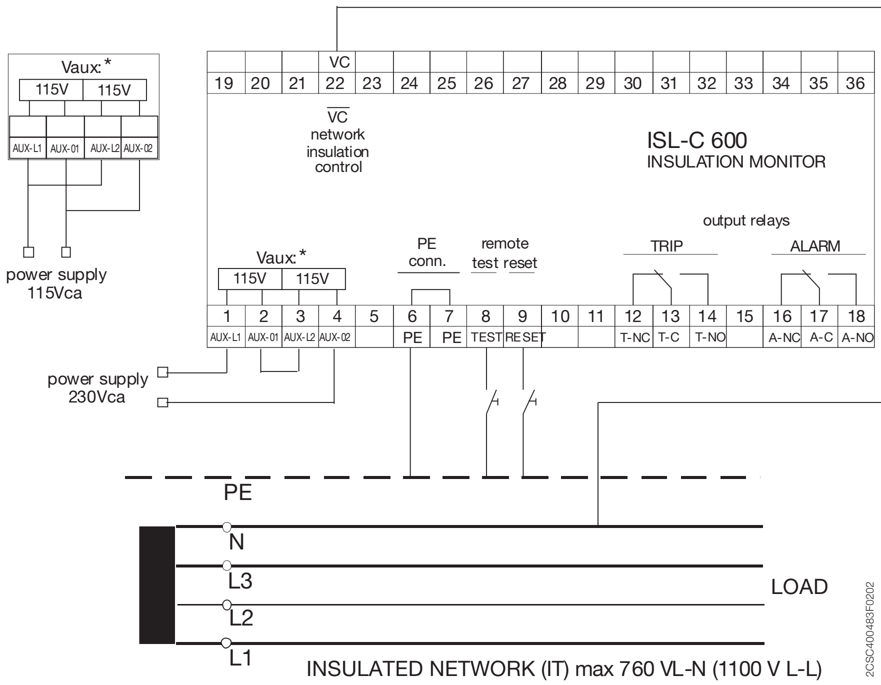
MICROSWITCH SETTINGS

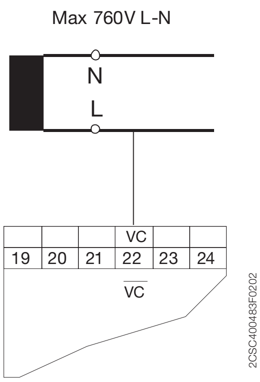
The front microswitches are used for adjusting the insulation threshold level between 10 and 150 kΩ, as shown below:

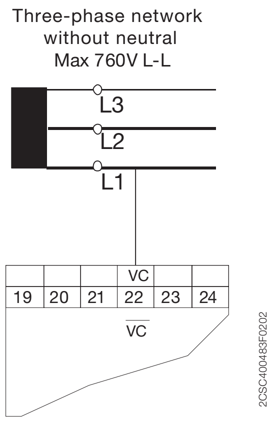


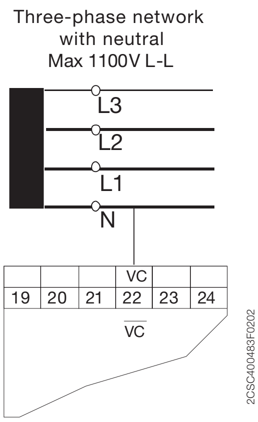
5

ISL-C 600


Vaux: *
115V
115V
AUX-L1
AUX-01
AUX-L2
AUX-02
power supply
115Vca
VC
19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36
VC
network
insulation
control
ISL-C 600
INSULATION MONITOR
output relays
TRIP
ALARM
Vaux: *
115V
115V
PE
conn.
remote
test reset
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18
AUX-L1
AUX-01
AUX-L2
AUX-02
PE
PE
TEST
RESET
T-NC
T-C
T-NO
A-NC
A-C
A-NO
power supply
230Vca
PE
N
L3
L2
L1
LOAD
INSULATED NETWORK (IT) max 760 VL-N (1100 V L-L)
2CSC400483F0202

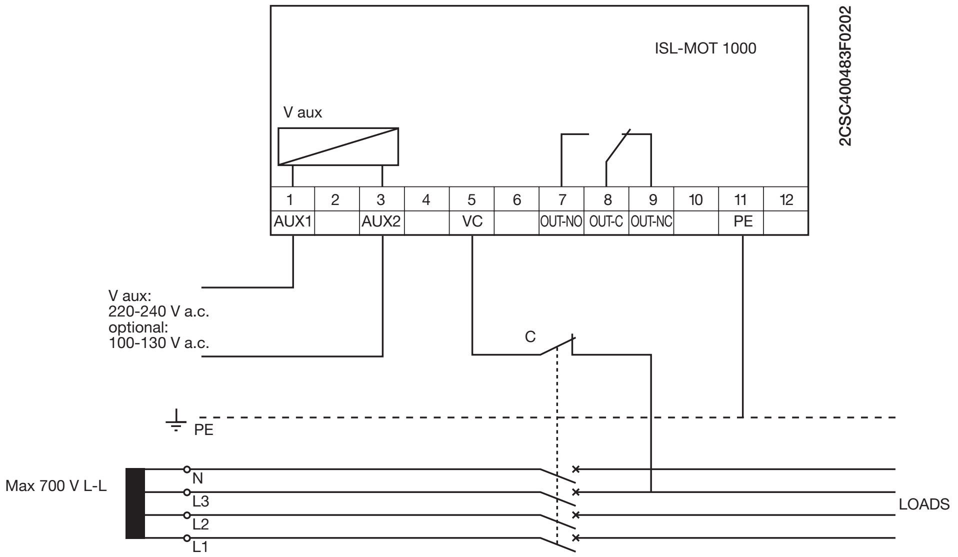

Max 760V L-N
N
L
VC
19 20 21 22 23 24
VC
2CSC400483F0202


Three-phase network
without neutral
Max 760V L-L
L3
L2
L1
VC
19 20 21 22 23 24
VC
2CSC400483F0202


Three-phase network
with neutral
Max 1100V L-L
L3
L2
L1
N
VC
19 20 21 22 23 24
VC
2CSC400483F0202

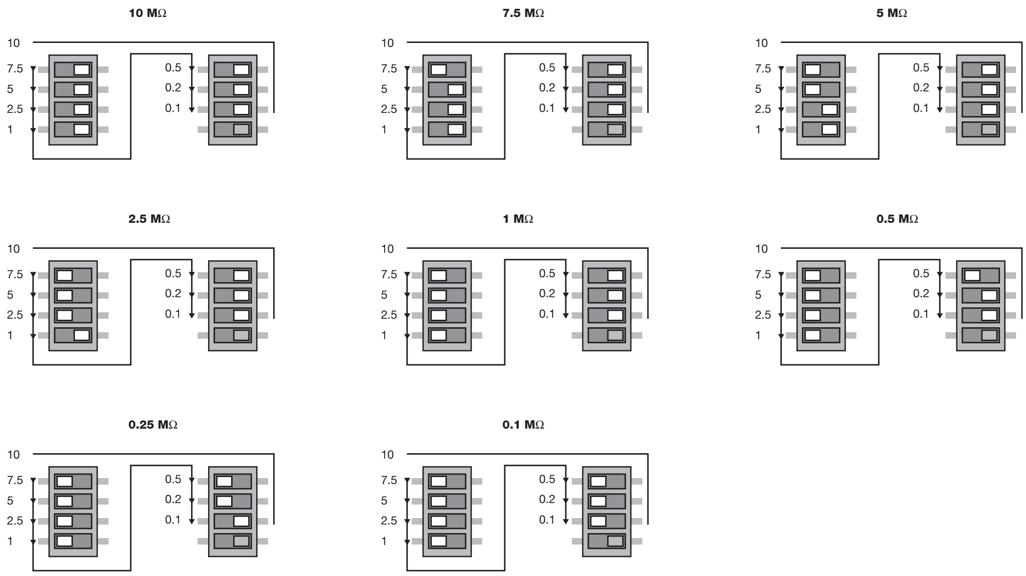
Protection and safety technical details
Insulation monitoring devices

ISL-MOT 1000



MICROSWITCH SETTINGS

The front microswitches are used for adjusting the insulation threshold level between 0.1 and 10 MΩ. A total of 7 microswitches are used, divided into two groups as shown below:

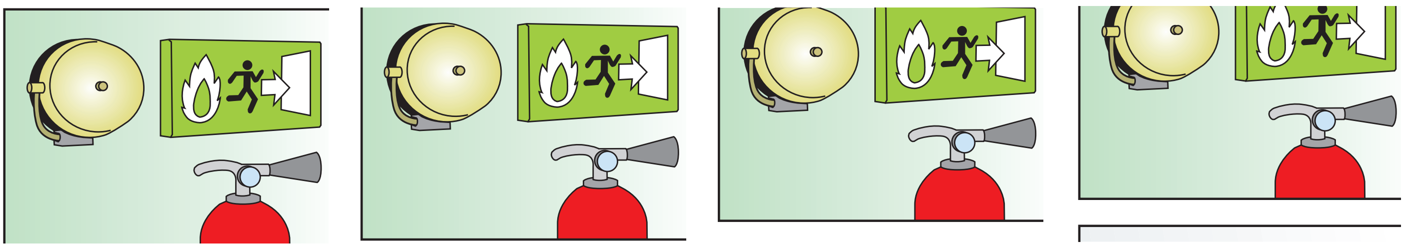


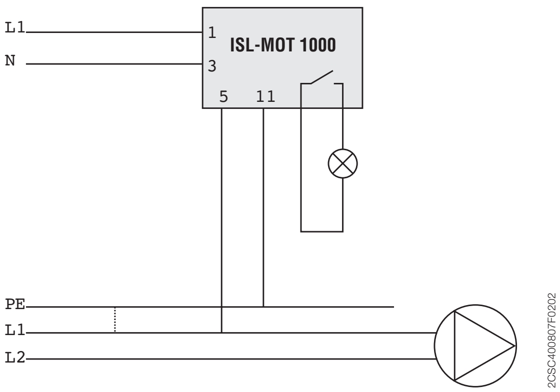
Operating principle
In IT electrical distribution systems that supply critical applications, where operational continuity is essential, ISL insulation monitoring devices assure continuous surveillance to promptly detect any insulation loss.

Application environments
All IT distribution systems in which operational continuity is a critical factor, and in particular:
- 24-28 V, 100-144 V and 220 V d.c. networks
- 24-48 V, 100-144 V and 380-415 V a.c. networks
- 20-700 V a.c./d.c. voltageless networks

Example of installation
ISL-MOT 1000 is suitable for preventive protection of voltageless circuits such as alarm and fire-fighting systems, pumps, etc.
ISL-MOT 1000 continually monitors the insulation level between the line and earth, to guarantee that the system will function correctly when needed.
The trip threshold is programmable, and insulation loss can be signalled via a change-over contact, which can also be used for switching loads.

5



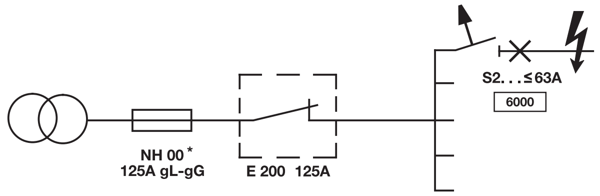


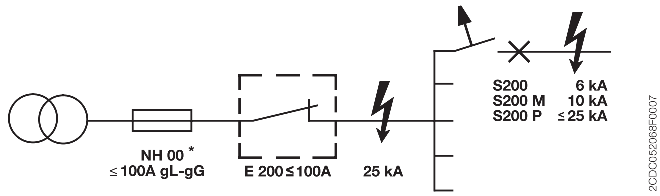
5

Solutions for electrical distribution in buildings - Technical details
Command and signalling

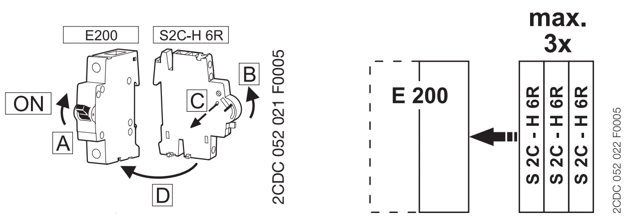
Command and signalling technical details

E200 Short-circuit withstand capacity

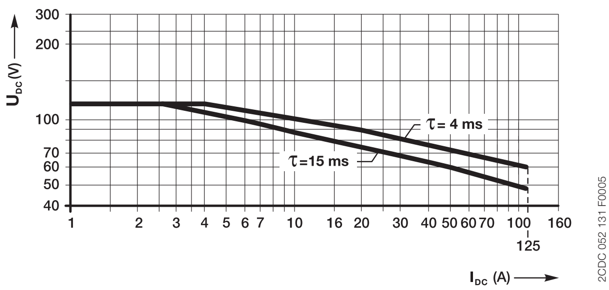




Assembling of S2C-H 6R and E 200



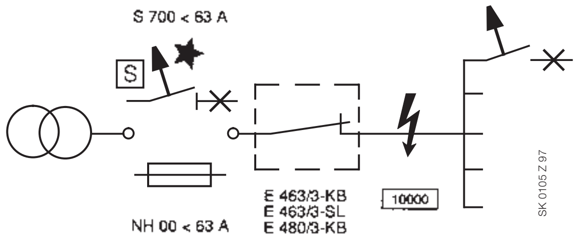
E 200 DC switching capacity



See page 6/13 in Solutions for electrical distribution in building

Command and signalling technical details
E 463 switches

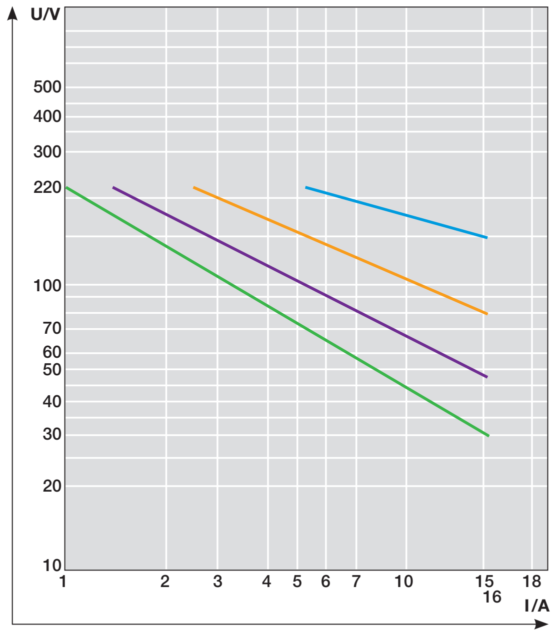
E463 / E480 Short-circuit withstand capacity



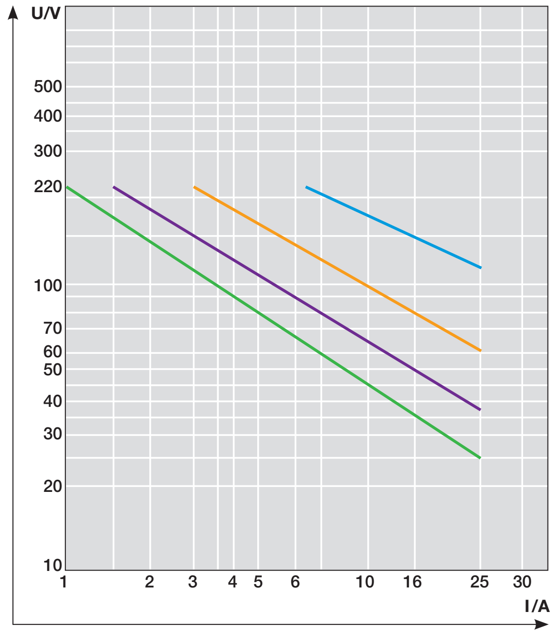
See page 6/14 in Solutions for electrical distribution in building

Command and signalling technical details
E 210 switches

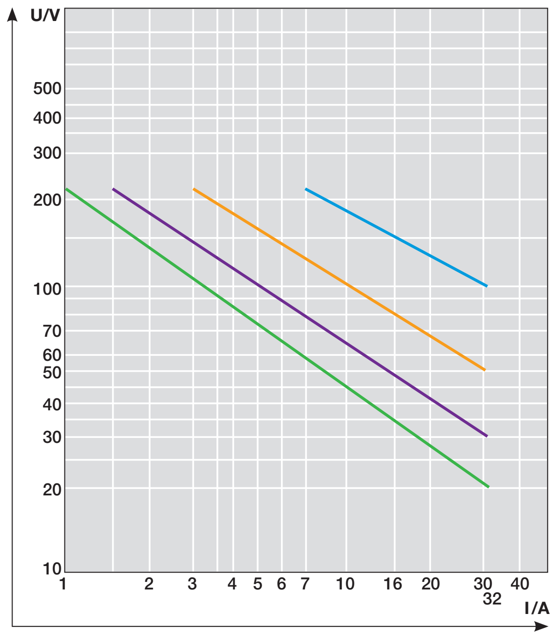
DC switching capacity E211 16A



DC switching capacity E211 25A



DC switching capacity E211 32A



Ohmic load
- Normally-open contact
- Normally-closed contact

Load with time constant
t = 15ms (inductive load)
- Normally-open contact
- Normally-closed contact

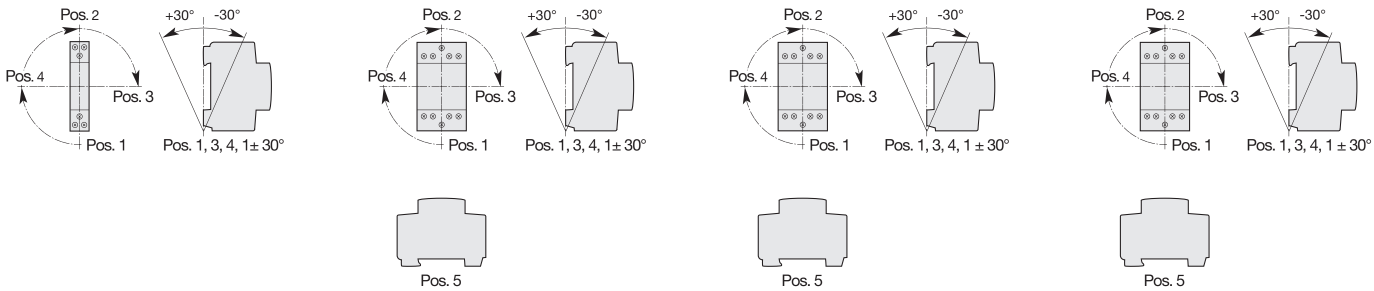
See page 6/20 in Solutions for electrical distribution in building

Command and signalling technical details
ESB installation contactors

Certifications and Approvals

CCC RMRS BV CE

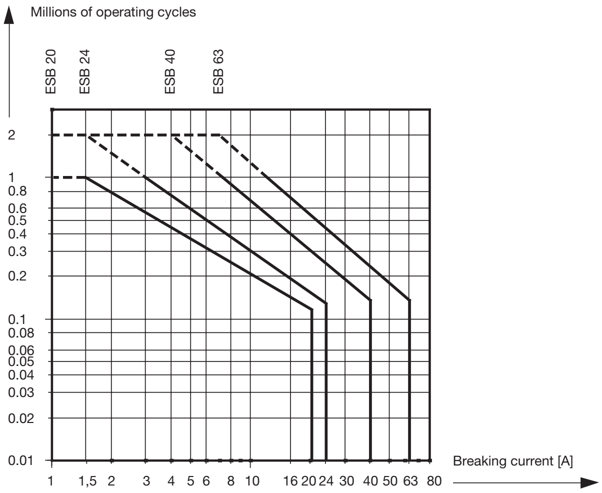
Mounting positions



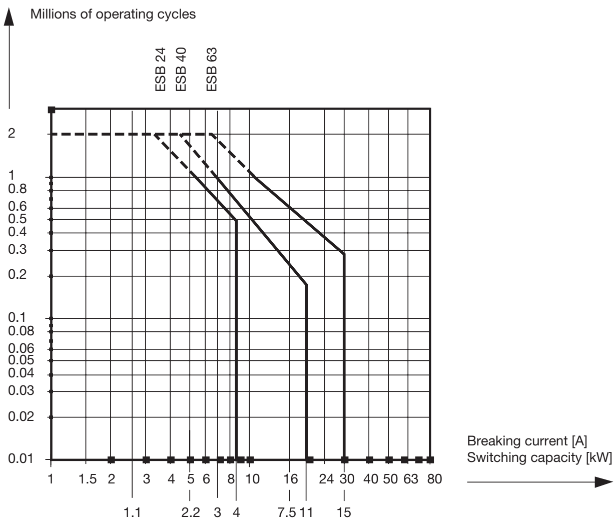
6

Electrical durability

AC-1 / 400 V / 3-phase for ESB 20, 24, 40, 63

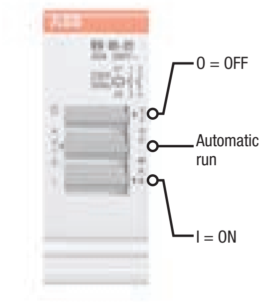


AC-3 / 400 V / 3-phase for ESB 24, 40, 63



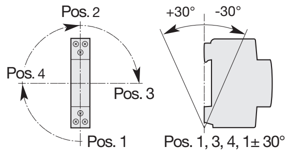
See page 6/31 in Solutions for electrical distribution in building

Command and signalling technical details
EN installation contactors



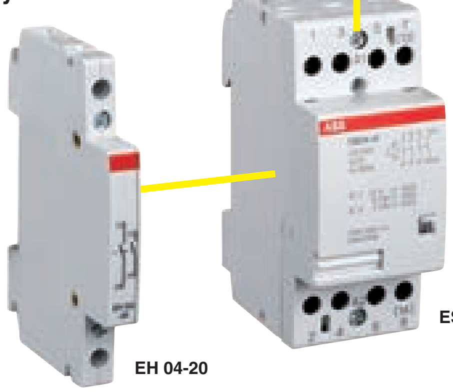
1CSC400063F0202

Mounting positions



Sealing cover

Auxiliary Contact Blocks



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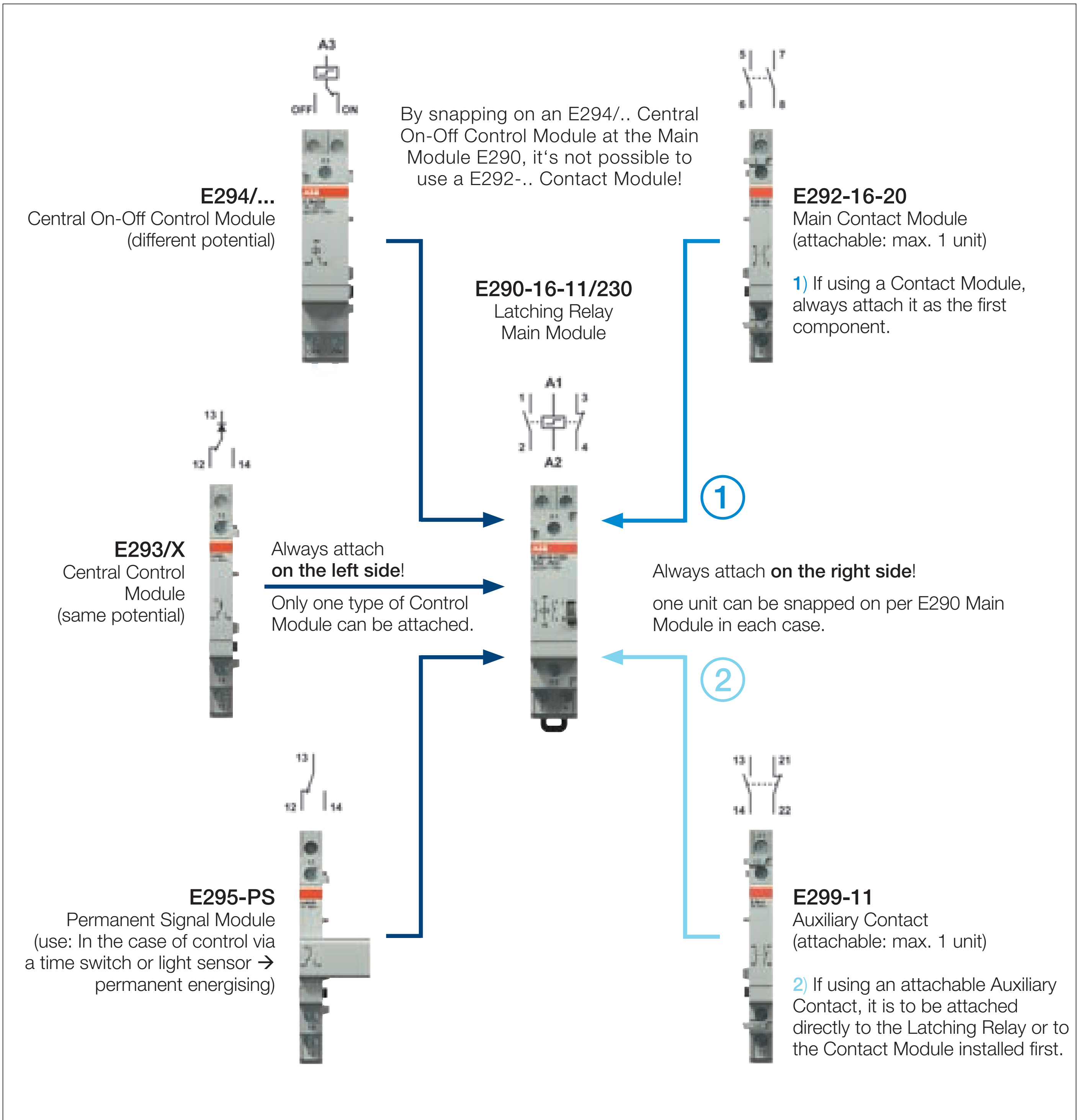
See page 6/34 in Solutions for electrical distribution in building

Command and signalling technical details
E290 latching relays

E290 Latching Relay



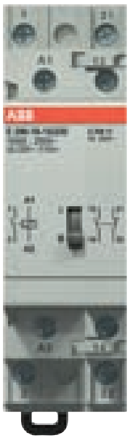
Safety information

If more than one Latching relay installed next to each other, it is recommended to use a intermediate piece (distance). This guarantees optimal heat dissipation by the main modules. The intermediate pieces (9 or 18mm wide) can be found in the order information as types ZLS725 or ZLS726 (the use depends on the application).

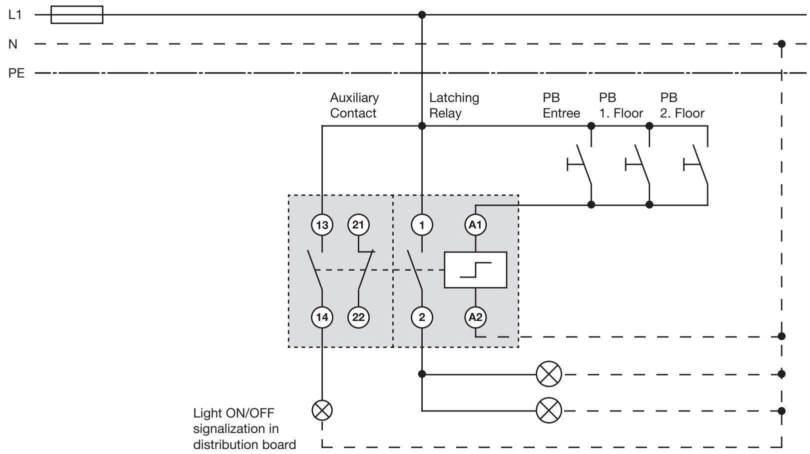
See page 6/42 in Solutions for electrical distribution in building

Command and signalling technical details
E290 latching relays

E290-16-10 + E299-11 — Latching Relay with Auxiliary Contact

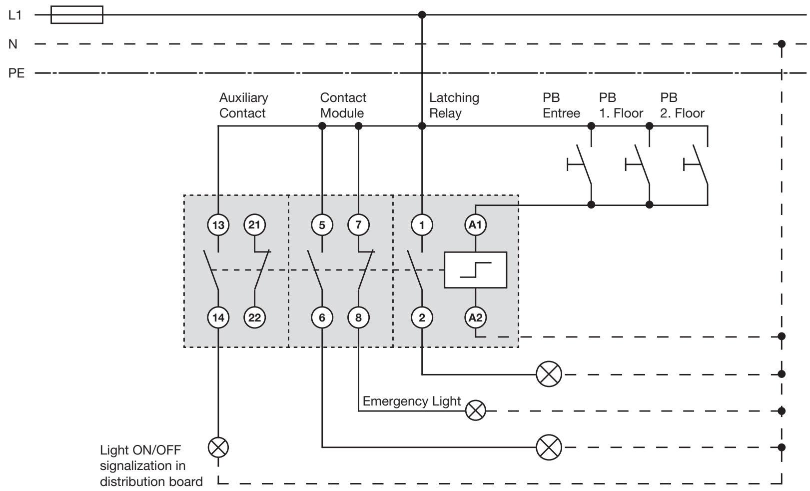


Application at a normal light control via different push buttons (PB);
The snapped-on auxiliary contact (E299-11) displays the current switching state of the light control (ON/OFF).



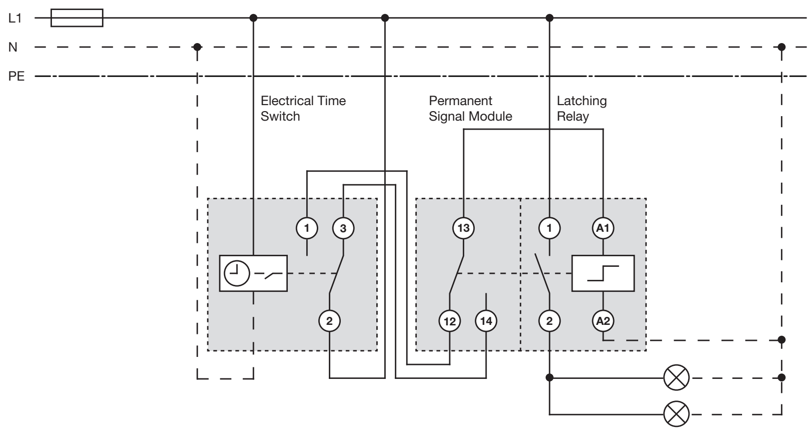
E290-16-10 + E292-16-11 + E299-11 — Latching Relay with Auxiliary Contact

Latching Relay E290 with attached contact module E292-16-11 (additional main contact tracks) plus an auxiliary contact to externally display the switching state of the main contacts (ON/OFF).



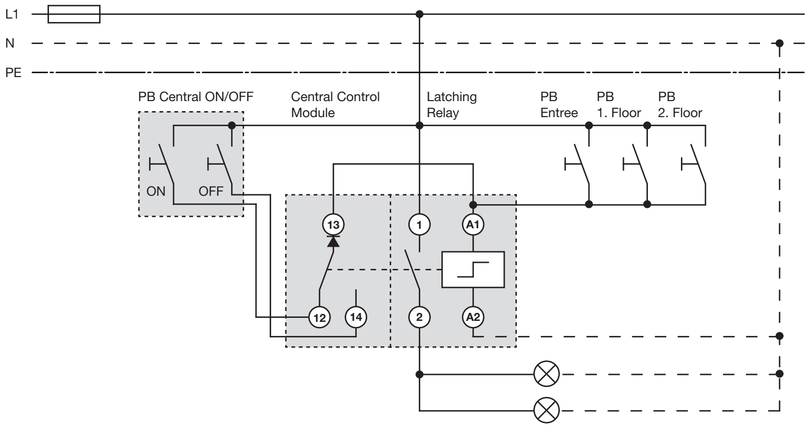
E290-16-10 + 295-PS — Latching Relay with permanent signal module

This combination permits control of the E290 coil via a permanent signal (e.g. directly controlled by a timer or a twilight switch).
When using this accessory, manual switching at the main unit is not possible.

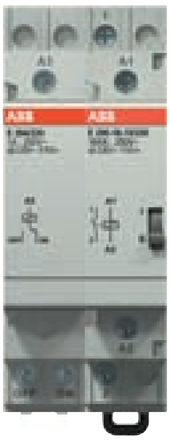


E290-16-10 + E293/X — Latching Relay with Central Control Module

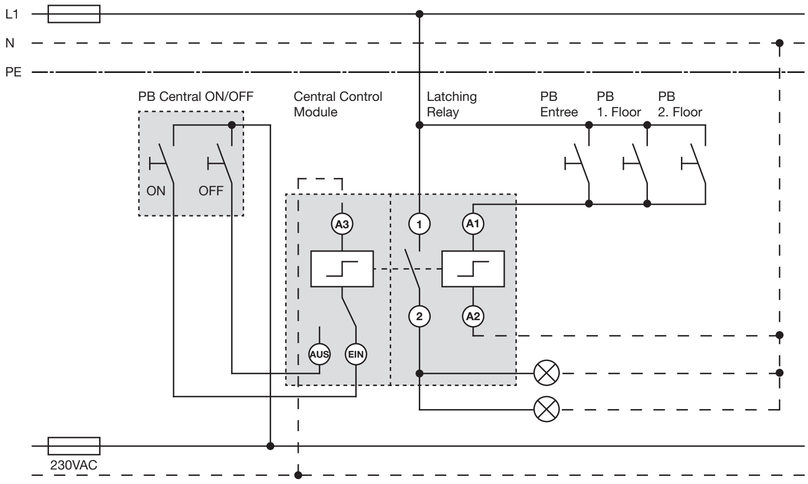
The function of a Central ON/OFF control is implemented by using the accessory E293/X. The E293/X Central ON/OFF module uses the same coil voltage potential as the main unit E290.
The light control can be either on site via the local buttons, or by the Central ON/OFF button.



E290-16-10 + E294/230 — Latching Relay with Central Control Module

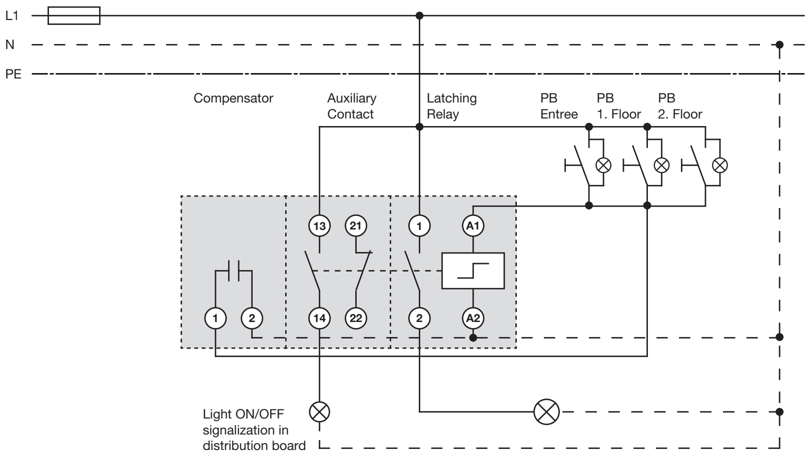


This is a second possibility to implement a Central ON/OFF control. When a E294/... accessory is snapped on, this Central ON/OFF device uses a different
voltage source for coil control.
The light control can be performed locally on site via the regular button.
The Central ON/OFF button permits a general switching state change from a central location.



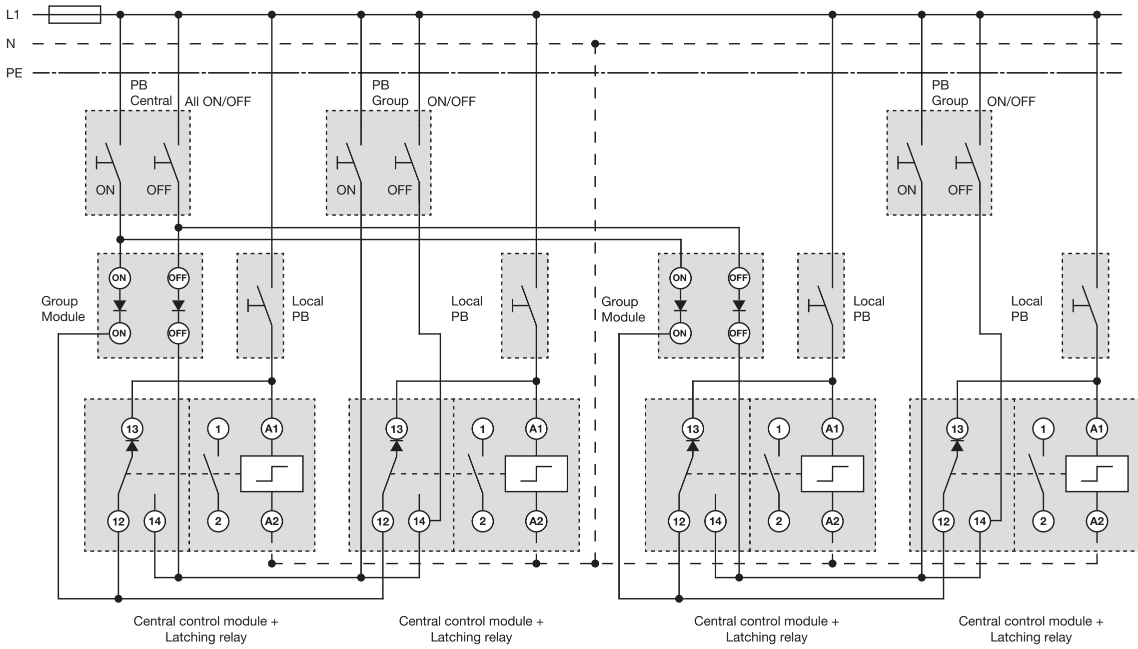
E296CP + E290-16-10 + E299-11 — Latching Relay with Auxiliary Contact plus Compensator

The compensator E296-CP is used every time a certain number of lit local buttons is exceeded.



Command and signalling technical details
E290 latching relays

E290-16-10 + E293/X + E295GM — Latching Relay with Central Control Module and Group Module



An example of a central ON/OFF control E290 with E293/X combined with Group Modules E295-GM; The Group Modules are integrated into the control to be structured into different light area groups. The on-site local buttons permit individual control of each Latching Relay. The Integration of the Group Modules into this control permits a distribution into two groups. Pushing the button „Group ON/OFF“ permits individual switching of each group. The general button „Central ALL ON/OFF“ can put the switching state of all E290 devices into the desired position (ON/OFF).

In an office building, supermarket or other large building complex, latching relays can be used to achieve a flexible, modern and reliable lighting control system for the whole site.

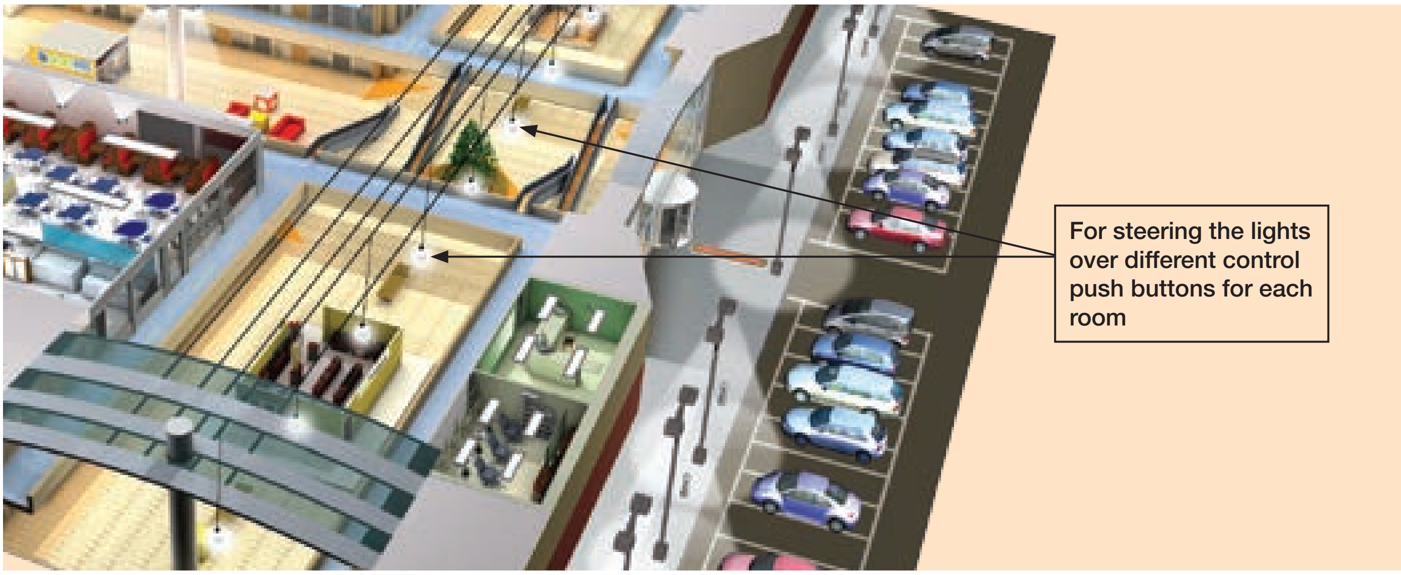
Application for an E290 Latching Relay:

Each time the impulse button is operated, an electrical pulse is applied to the latching relay that results in a change to the switching state. This state is held mechanically until the next pulse is received.

Switching sequence:
OFF – ON – OFF – ON

The main application for a latching relay is to simply switch various independent lighting areas on and off. Switching from „on“ to „off“ is carried out by means of a short impulse.
As the device coil of the latching relay is only excited by a pulse for a short time during switching, no additional holding energy is required. The contact position (on/off) is held by means of a mechanical interlock until the next pulse command is sent. In the event of a power failure, the current switch position will always be held. This technology considerably helps to reduce the temperature rise and current consumption of devices operated by magnetic coils, thus saving on unnecessary energy costs.

Example of use within a commercial building



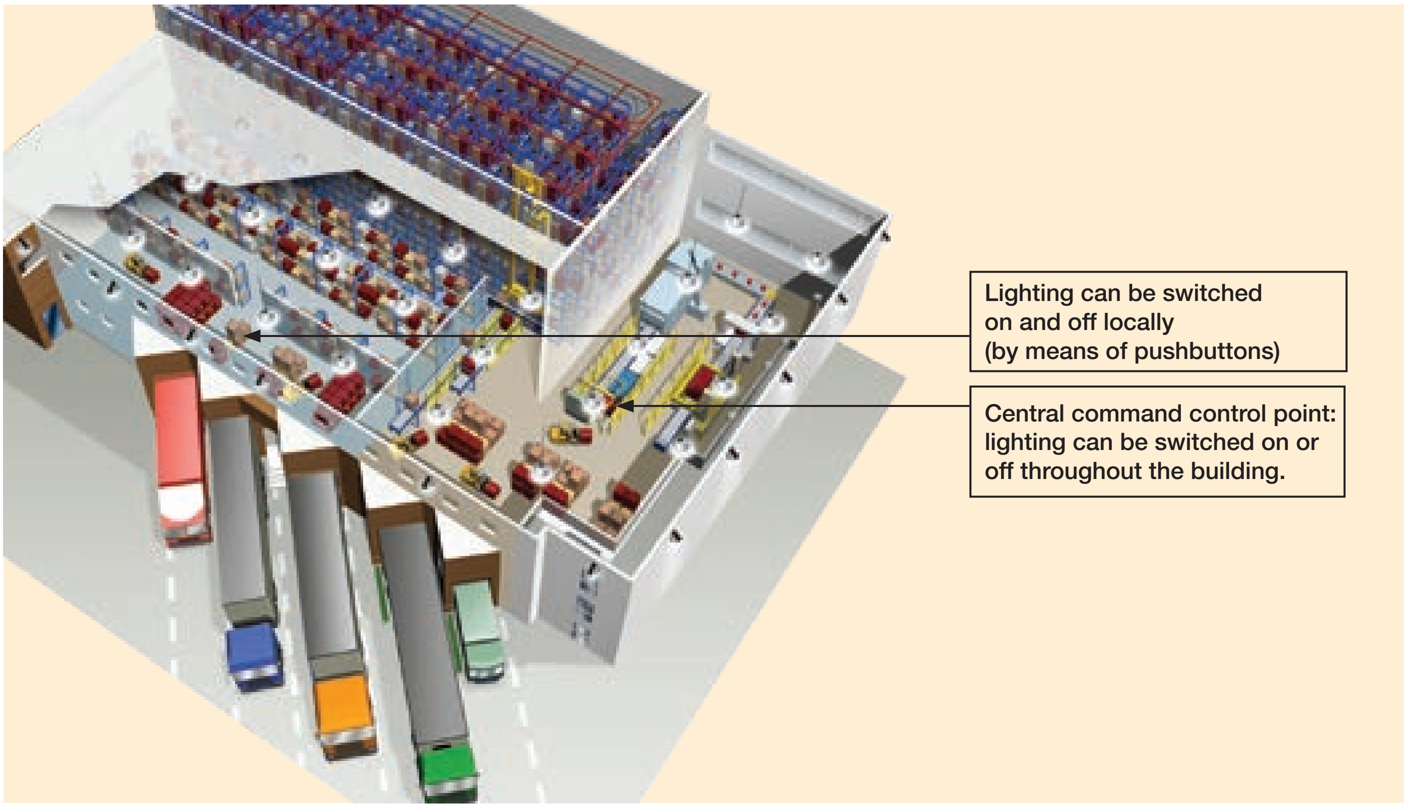
Command and signalling technical details
E290 latching relays

Application for an E290 Latching Relay in conjunction with an E293/X or E294 Central On-Off Control Module:
The interior lighting controlled by means of various impulse buttons can also be operated from a central control point by snapping on a central on-off control module onto the left side of the E290 latching relay.

Switching sequence:
Local => OFF – ON
Central => OFF – ON
(the central command is the superordinate command)

The combination of a Main device plus central on-off control module can be used to switch multiple lights on and off at the same time without any dependence on the current switch position of the devices. The actual switch position of the various devices (on/off) can be indicated by snapping an auxiliary contact (attachable on the right side) to the control center.
Another possibility would be the combination of an E290 with an E294 central on-off control module for various control voltages. This combination enables for example the cooperation with a PLC (programmable logic controller). Any number of different logical activations in respect of latching relays can be recorded and visualised.

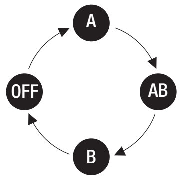
Example of use within an industrial warehouse



Command and signalling technical details
E291 sequential latching relays

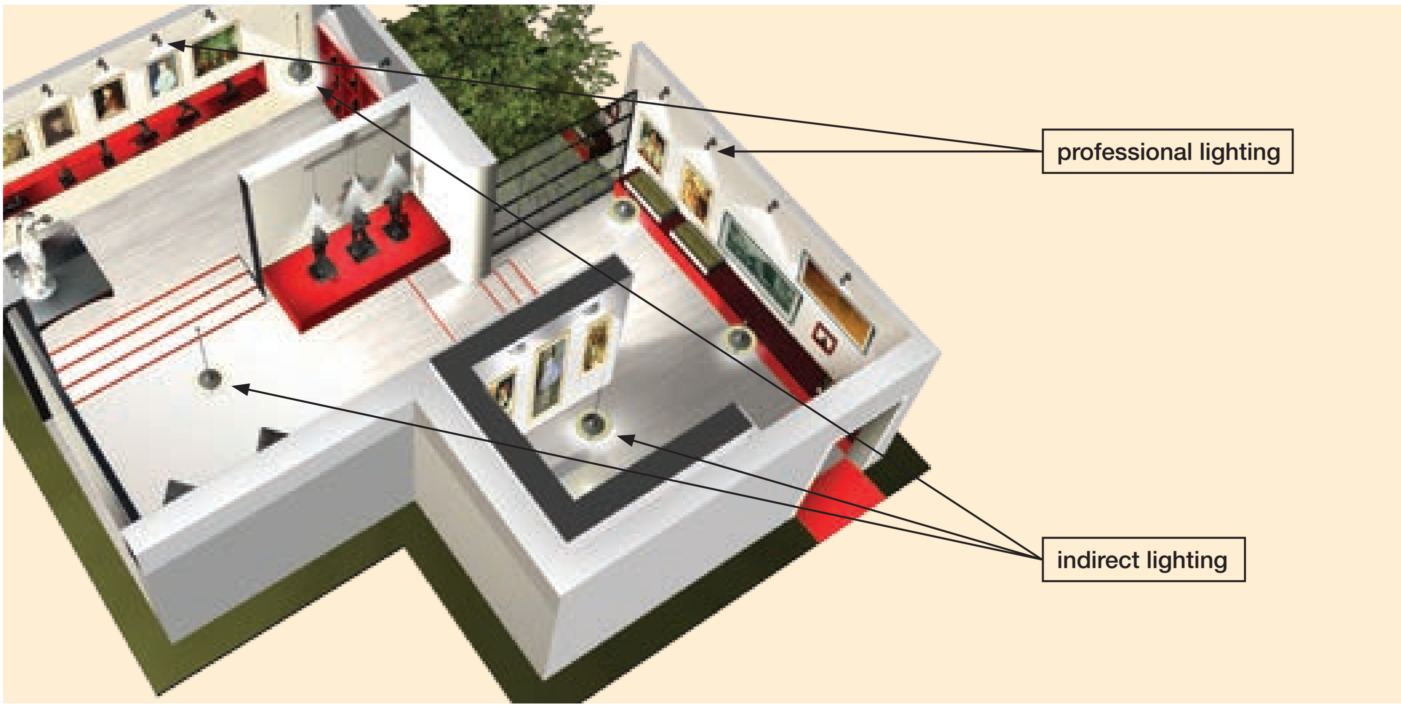
Application using an E291S Sequential Latching Relay:
This independent special sequential latching relay switches the contact position in a preset fixed switching sequence.

Switching sequence:
OFF – A – AB – B – OFF



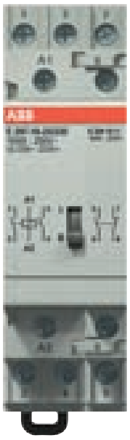
This preset internal switching sequence enables for example the following lighting sequence to be used. As two separate switching circuits are available, lights A, AB and B can be operated individually or together as required. If the button is pressed once or several times (pulse control), the sequential latching relay changes the contact position in the preset switching sequence. An amazingly refined interior or exterior lighting system can be realised with this user-friendly and reliable lighting control option, without any additional installation costs.

Example of use of a Sequential Latching Relay within an exhibition space

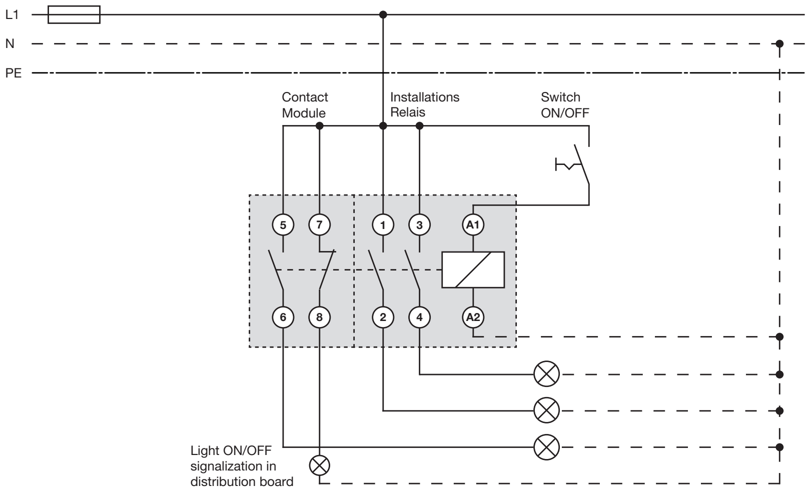


Command and signalling technical details
E297 installation relay

E297-16-20 + E298-16-11 — Installation Relay with Contact Module

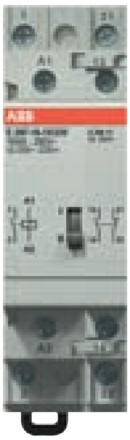


Light control via an Installation Relay E297 with connected Contact Module E298-16-11 (additional main contacts) to externally signal the switching state of the main contacts (ON/OFF).

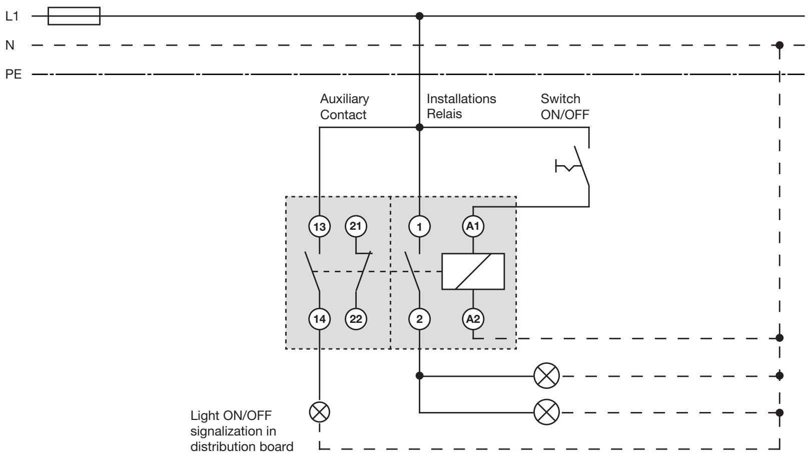


6

E297-16-10 + 299-11 — Installation Relay with Auxiliary Contact

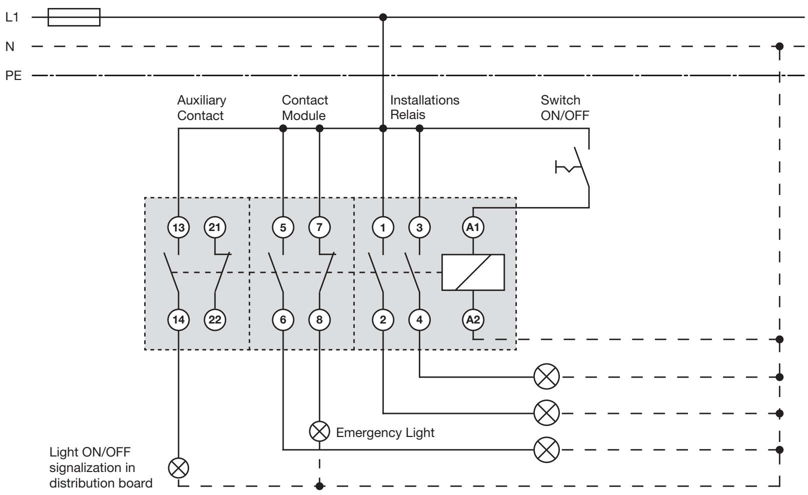


Application with a normal light control via an ON/OFF switch. The current condition indication of the light control (ON/OFF) is implemented, e.g., in the distribution board, with the help of the auxiliary contact (E299-11).

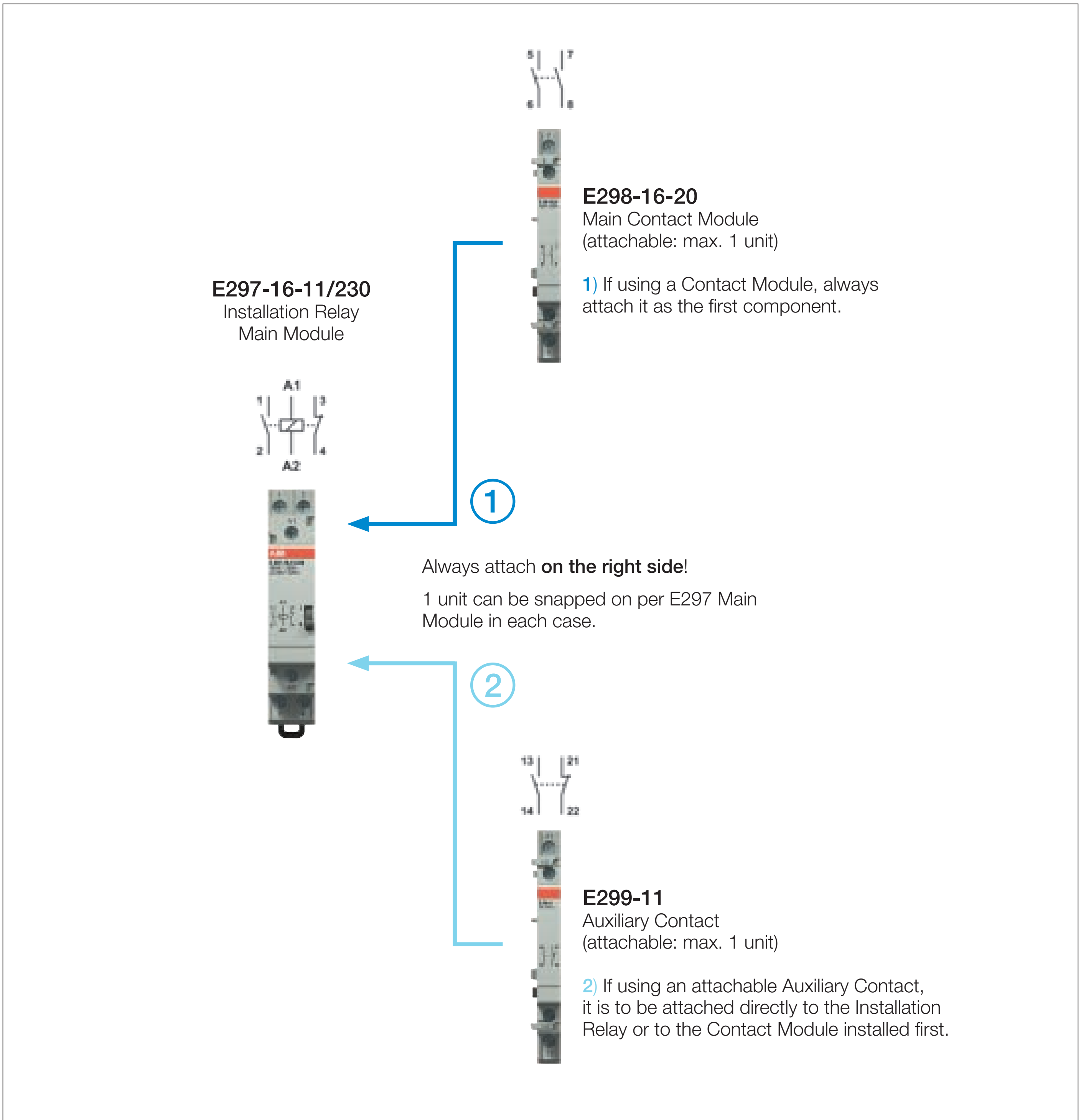


E297-16-20 + E298-16-11 + 299-11 — Installation Relay with Contact Module and Auxiliary Contact

Combination of an installation relay E297 with an attached Contact Module E298-16-11 (additional main contacts) plus an Auxiliary Contact to clearly indicate the switching state of the main contacts (ON/OFF).



E297 Installation Relay



Safety information

If more than one Latching relay installed next to each other, it is recommended to use a intermediate piece (distance). This guarantees optimal heat dissipation by the main modules. The intermediate pieces (9 or 18mm wide) can be found in the order information as types ZLS725 or ZLS726 (the use depends on the application).

Command and signalling technical details
E297 installation relays

Because of the individual options for using the installation relays in building management systems, these devices can be used to realise a modern and reliable consumer control system.

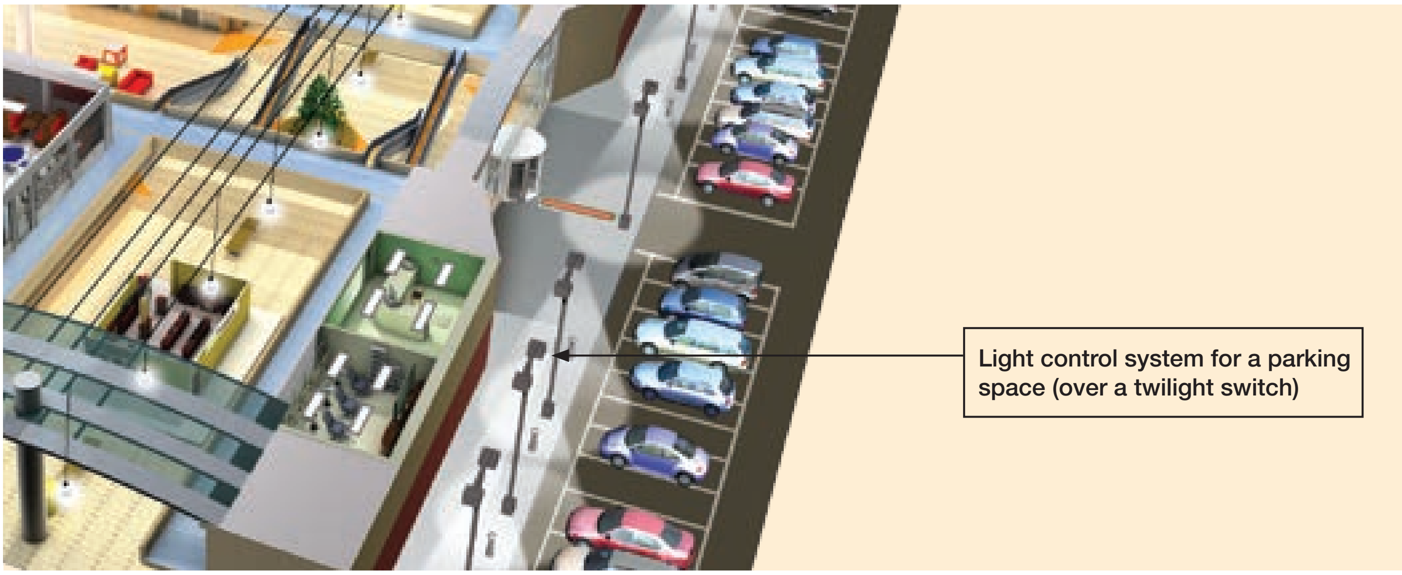
Application for an E297 Installation Relay:

When current is applied to an installation relay, the relay coil attracts one of the main contacts and changes the contact position. The coil of an installation relay has to remain energised in order to hold the contact position. If the voltage is removed from the coil, the installation relay always returns to the off position.

Switching sequence:
OFF – ON

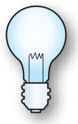
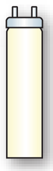
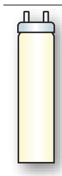
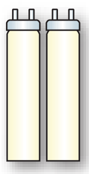
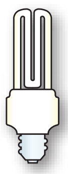
Main areas of application include exterior lighting for office buildings or supermarket car parks as well as other big installations. An extremely flexible and modern lighting control system can be created, using E297 installation relays. Activation can be carried out by means of a twilight switch or a timer but also by means of a simple on-off switch or another electrical control unit. Reliable switching of an exterior lighting system, for example, is realised by sending clear on and off control commands from an external control point. The magnetic coil has to be permanently energised in order for the installation relay to be held in the on position. The energy consumption of the installation relay is reduced to a minimum by the performance-optimised magnetic coil. The low switching noise also makes it suitable for professional use in closed inhabited areas.

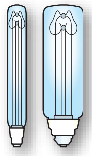
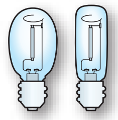
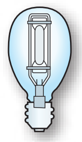
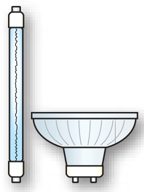
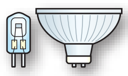
Example of use within a commercial building



INSTALLATION RELAYS

Information about lamp insertion between phase and neutral

	Power [W]	Number of switchable lamps
Incandescent lamps (230 V AC)		
	15	120
	25	72
	40	45
	60	30
	75	24
	100	18
	150	12
	200	9
	300	6
	500	3
Fluorescent lamps without power factor capacitors		
	18	50
	36	25
	40	23
	58	16
	65	13
Fluorescent lamps with power factor capacitors		
	18	17
	36	13
	40	12
	58	8
	65	7
Fluorescent twin-lamps		
	2 x 18	50
	2 x 36	25
	2 x 40	23
	2 x 58	16
	2 x 65	13
Lamps with electronic reactor		
	1 x 18	38
	1 x 36	30
	1 x 58	17
	2 x 18	19
	2 x 36	15
	2 x 58	8

	Power [W]	Number of switchable lamps
Low pressure sodium vapor lamps (SOX)		
	55	6
	90	4
	135	3
	180	2
	185	2
High pressure sodium vapor lamps (NAV)		
	70	10
	150	5
	250	3
	400	2
	1000	-
Metal halide and high pressure mercury vapor lamps (HQL)		
	50	16
	80	10
	125	7
	250	3
	400	2
	1000	-
230 V halogen lamps (HQI)		
	150	12
	250	7
	300	6
	400	4
	500	3
	1000	2
Very low voltage halogen lamps (12 or 24 V AC)		
	20	72
	50	29
	75	20
	100	15
	150	10
	200	7
	300	5

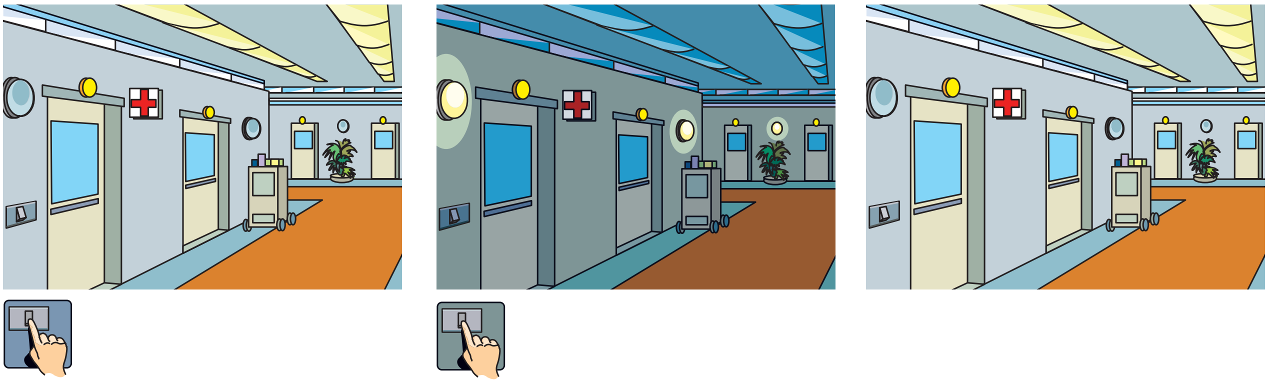
6

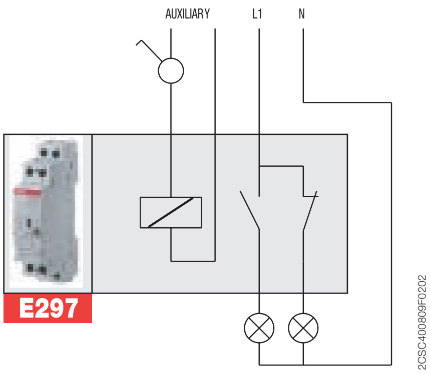
Command and signalling technical details
E297 installation relays

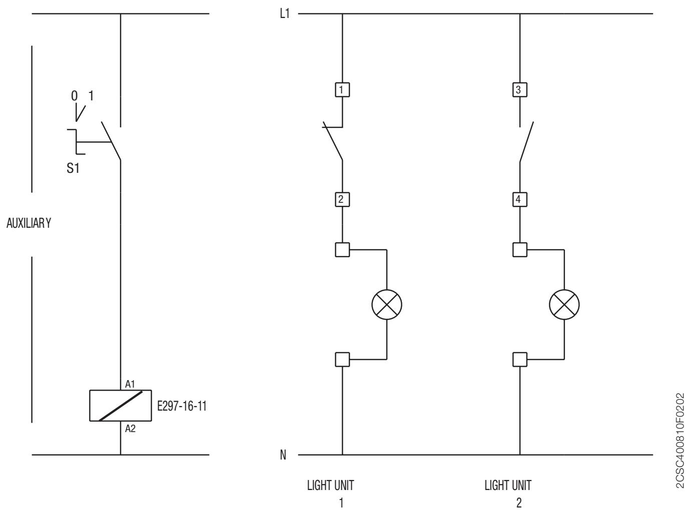
Operating principle
The E297 installation relays are 16 A contactors specifically engineered for residential and commercial applications and are available in a wide range of contact layouts and coil voltages.

Application environments
The E297 installation relays are particularly indicated in residential and commercial buildings for lighting control.

Example of installation
As shown in the diagrams, one of the possible applications is to mount the E297-16-11 installation relay with a NO and a NC contact inside the electric system of a hospital ward. The first control sent through a switch to the command circuit of the relay will turn off the ceiling lights and turn on the corridor lamps, while the second command returns to the previous state.



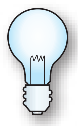
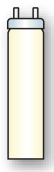
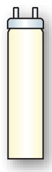
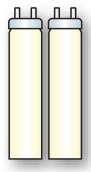
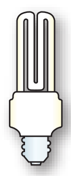


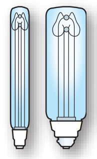
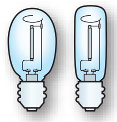
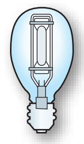
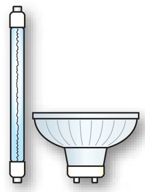
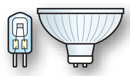


Command and signalling technical details
E290 latching relays

LATCHING RELAYS

Information about lamp insertion between phase and neutral

	Power	Number of switchable lamps	
	[W]	E290 - 16 A	E290 - 32 A
Incandescent lamps (230 V AC)			
	15	200	266
	25	120	160
	40	75	102
	60	50	65
	75	40	52
	100	30	40
	150	20	26
	200	15	20
	300	9	12
	500	5	7
Fluorescent lamps without power factor capacitors			
	18	81	110
	36	44	58
	40	38	53
	58	29	35
	65	26	34
Fluorescent lamps with power factor capacitors			
	18	103	132
	36	63	81
	40	40	77
	58	41	52
	65	37	48
Fluorescent twin-lamps			
	2 x 18	82	110
	2 x 36	41	55
	2 x 40	35	50
	2 x 58	23	30
	2 x 65	22	30
Lamps with electronic reactor			
	18	83	112
	36	46	61
	58	31	38
	2 x 18	40	56
	2 x 36	23	30
	2 x 58	14	19

	Power	Number of switchable lamps	
	[W]	E290 - 16 A	E290 - 32 A
Low pressure sodium vapor lamps (SOX)			
	55	27	36
	90	16	22
	135	11	14
	180	8	11
	185	8	10
High pressure sodium vapor lamps (NAV)			
	70	15	18
	150	8	10
	250	4	6
	400	3	4
	1000	1	1
Metal halide and high pressure mercury vapor lamps (HQL)			
	50	30	40
	80	18	25
	125	12	16
	250	6	8
	400	3	5
	1000	1	2
230 V halogen lamps (HQI)			
	150	20	27
	250	12	16
	300	10	13
	400	7	10
	500	6	8
	1000	3	4
Very low voltage halogen lamps (12 or 24 V AC)			
	20	116	160
	50	46	64
	75	31	42
	100	24	32
	150	15	21
	200	12	16
	300	7	10

Command and signalling technical details
E290 latching relays

Use of lighted pushbuttons

Latching relays can be controlled through lighted pushbuttons, without any limitations in terms of connection of three-terminal types.
In two-terminals pushbuttons the current that flows through pushbutton lamps can trigger an unwanted activation; in order to avoid this there is the E296-CP compensation module, installed in parallel on the coil.

Number of E296-CP compensation modules	Number of connectable lighted pushbuttons	
	1P – 2P types	3P – 4P types
0	8	9
1	18	22
2	45	38

6

E291S latching relays with sequential contacts

Operating principle

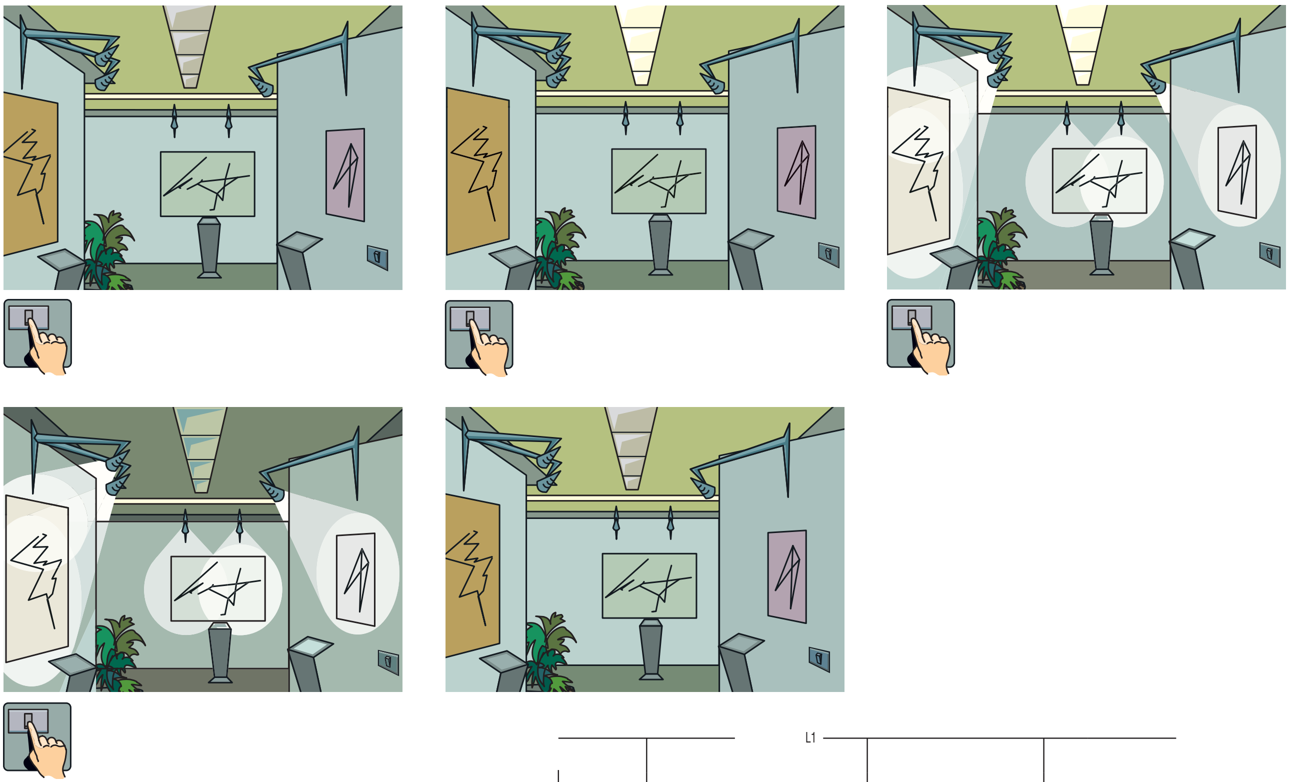
The two contacts of the E291S latching relays switch indipendently their position (open/closed) at each impulse according to a preset sequence in the control circuit.

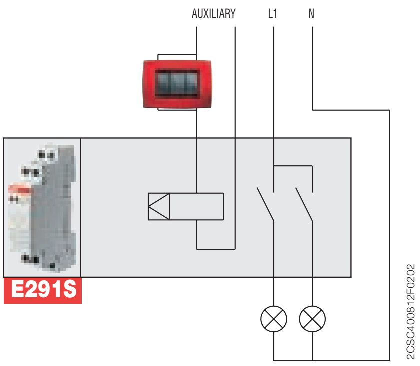
Application environments

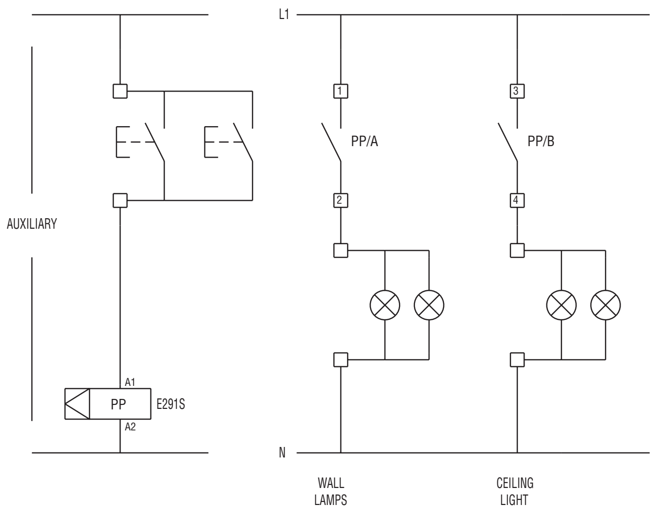
The E291S latching relays are particularly indicated in environments and situations requiring the load sequential control through a single pushbutton circuit (offices, restaurants, etc.).

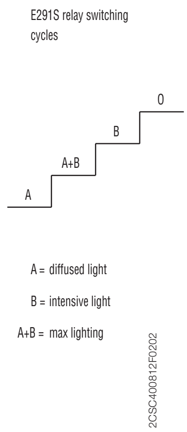
Example of installation

As shown in the diagrams, one of the possible applications is to mount the E291S latching relays inside the lighting system of an art gallery. The first pushbutton impulse will switch on the ceiling lights, the second triggers the wall lamps, the third switches off the ceiling lights and the fourth switches off the wall lamps.

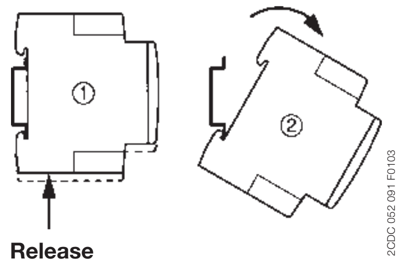


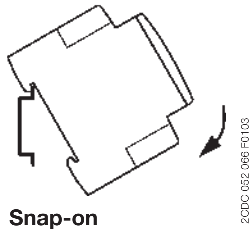






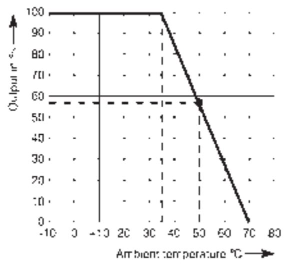
Command and signalling technical details
E 260 latching relays





See page 6/62 in Solutions for electrical distribution in building

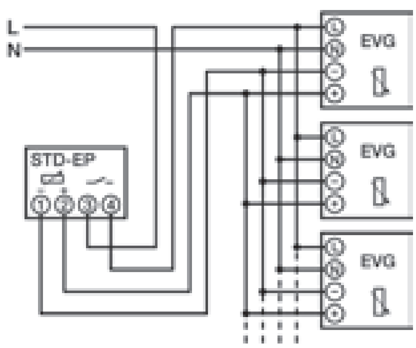
Control power STD 50-3: 20-500 W/VA
STD 50-4: 40-420 W/VA



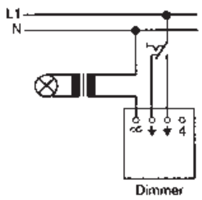
SK 0043 Z 96

Influence of ambient temperature on the control power
The certified rated power is indicated on the dimmer.
Where higher ambient temperatures occur, reduce values as is specified in the diagram.
At 50 °C /122°F ambient temperature, the permissible load drops to 57%.

Electronic potentiometer

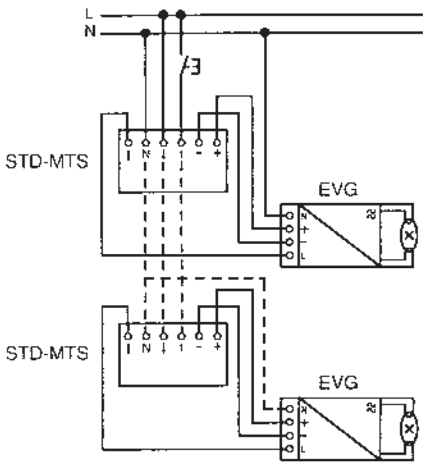


Dimmer STD 50-4 in two-way circuit, lv halogen lamps via electronic transformer



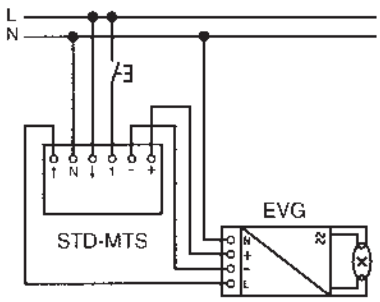
SK 0190 Z 99

Brightness control of fluorescent lamps with 1 -10 V control input. Control of more than one memory touch controller STD-MTS via one push-button.



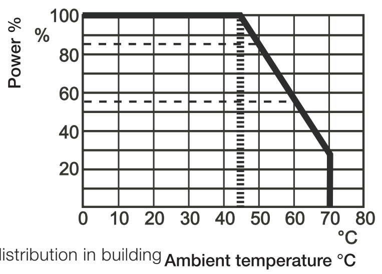
SK 0189 Z 99

Brightness control of a fluorescent lamp with 1 - 10 V DC control input with memory touch controller STD-MTS with external pushbutton, e.g. E 225

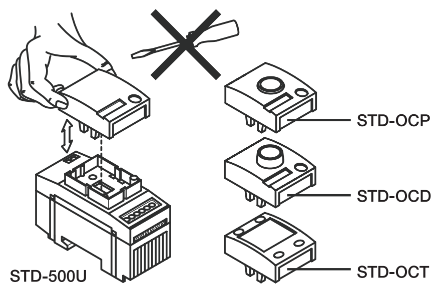


SK 0190 Z 99

Connected load / ambient temperature diagram



2CDC 052 081 F0207



STD-500 U

2CDC 052 138 F0006

See page 6/63 in Solutions for electrical distribution in building

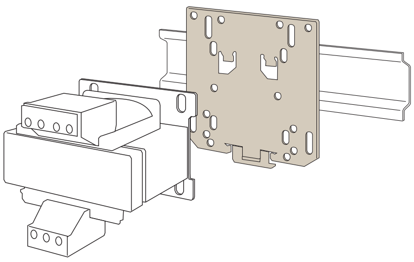
Command and signalling technical details
Modular transformers

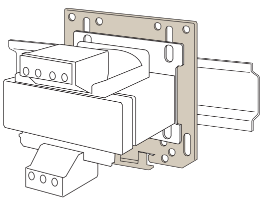
Modular transformers

The range of System pro *M* compact modular transformers consists of a series of safety transformers for general use, TS-C with 12-24 V secondary and powers of 25, 40 and 63 VA, the TM range of bell transformers, with secondary voltages of 12-24 V and a maximum rated power of 10-15-30-40 VA, and the TS range of bell transformers, with secondary voltages of 8-12-24 V and a rated secondary power of 8-16-24 VA (some TS types are available with an integrated switch ON/OFF).

Modular safety transformers for general use TS-C, continuous functioning
Standard: IEC EN 61558-2-6

The TS-C safety transformer is an insulation transformer for supplying SELV circuits (with extremely low safety voltage) or PELV circuits (with extremely low protection voltage). In contrast to the bell transformers, TS-C transformers can be used to continuously supply low voltage loads and they have a reduced voltage drop value. Even after a short-circuit they maintain their temperature below the specified limits. In addition they are equipped with a thermal sensitive restoring device which automatically restores power when the transformer is sufficiently cooled down or the overload has been removed.





Fail proof bell transformers TM series
Standard: IEC EN 61558-2-8

Following a short-circuit or an overload use the products may not continue to operate, but they continue assuring separation between primary and secondary circuits, safeguarding the user and adjacent electric parts: the serie includes 8 models with 10, 15, 30 and 40 VA power and 4, 8, 12 and 24 V output voltages.

Non-inherently short-circuit proof bell transformers TS series
Standard: IEC EN 61558-2-8

Even after a short-circuit they maintain their temperature below the specified limits. In fact they are equipped with a thermal protection device which automatically restores power when the transformer is sufficiently cooled down or the overload has been removed. The TS series includes 10 models with 8, 16, 24 VA power and output voltages of 4, 6, 8 and 12 and 24 V AC.
The TS8/SW series is equipped with an ON-OFF switch on the front side that allows the control of the load connected to transformer’s secondary circuit. It includes 5 models with 8 VA power and output voltages of 4, 6, 8 and 12 V.

Command and signalling technical details
Control, isolating and safety transformers

Control, isolating and safety transformers
The choice of supply voltage for a control circuit must take into account two factors: the safety of users, and the functional reliability of the circuits, which can be dependent on the voltage drop.

Control transformer
Reference standard: CEI EN 61558-2-2:
Transformer for supplying control circuits, for example commands, signalling, interlocks, etc.

Isolating transformer
Reference standard: CEI EN 61558-2-4:
Transformer in which the primary and secondary windings are electrically separated by a double or reinforced insulation, to protect the circuit supplied by the secondary against hazards due to accidental simultaneous contact with earth and live parts, or grounded parts that may become live in the event of an insulation fault.

Safety transformer
Reference standard: CEI EN 61558-2-6:
Isolation transformer for supplying safety extra low voltage circuits (<50 V on no load). Accidental contact with the secondary winding phases can be withstood without any danger.

Impregnation and tropicalization
ABB transformers are fully impregnated using a thermal class F resin. This treatment improves the characteristics of the insulating materials, making the transformers suitable for installation in harsh environments. It also augments heat exchanges, thereby lowering the transformer temperature, prevents moisture from penetrating the windings and core, and minimises vibrations and the resultant noise.

Insulation classes
The duration of the insulation in the products depends on many factors, and in cases where the insulating material electrically segregates live parts from accessible parts, any alteration in its characteristics may put the safety of the user at risk.
The standards prescribe maximum temperature limits for transformer windings as a function of the insulation class. ABB transformers are constructed using class B materials. The maximum permitted ambient temperature is specified on the transformer rating plate as well as on this catalog.

Insulation class	T MAX
A	100 °C
E	115 °C
B	120 °C
F	140 °C
H	165 °C

See page 6/70 in Solutions for electrical distribution in building

Command and signalling technical details
Control, isolating and safety transformers

Protection of transformers

Protection on primary

On the primary side, the transformer cannot generate any overload by itself. During power up, however, a very high inrush current (approx. 25-30 In) is generated. Protections should therefore be calibrated in order to prevent their tripping during the transformer connection phase. The most suitable types of protection are:

- aM fuses
- S202 miniature circuit breakers, D characteristic.

Minimum protection on primary

Transformer power (VA)		230 V single phase	400 V single phase
50	aM fuse	0.5 A	0.315 A
100	aM fuse	1 A	0.63 A
	Breaker capacity	1.6 A	1 A
	Trip characteristic	D	D
160	aM fuse	1.6 A	1 A
	Breaker capacity	3 A	2 A
	Trip characteristic	D	D
200	aM fuse	2 A	1.25 A
	Breaker capacity	3 A	2 A
	Trip characteristic	D	D
250	aM fuse	2.5 A	1.6 A
	Breaker capacity	4 A	3 A
	Trip characteristic	D	D
320	aM fuse	3.15 A	2 A
	Breaker capacity	5 A	3 A
	Trip characteristic	D	D
400	aM fuse	4 A	2.5 A
	Breaker capacity	8 A	5 A
	Trip characteristic	D	D
630	aM fuse	6.3 A	4 A
	Breaker capacity	13 A	8 A
	Trip characteristic	D	D
1000	aM fuse	10 A	6 A
	Breaker capacity	20 A	13 A
	Trip characteristic	D	D
1600	aM fuse	16 A	10 A
	Breaker capacity	32 A	20 A
	Trip characteristic	D	D
2000	aM fuse	20 A	12 A
	Breaker capacity	40 A	25 A
	Trip characteristic	D	D
2500	aM fuse	25 A	16 A
	Breaker capacity	50 A	32 A
	Trip characteristic	D	D

Notes:
The protection specified in the table is the minimum “recommended” for protecting the supply line.
The breaking capacity of the primary miniature circuit breakers is a function of the supply line.

Protection on secondary

The secondary circuit must be protected against overload and short-circuit. Moreover, additional protection may need to be adopted depending on the distribution system type.

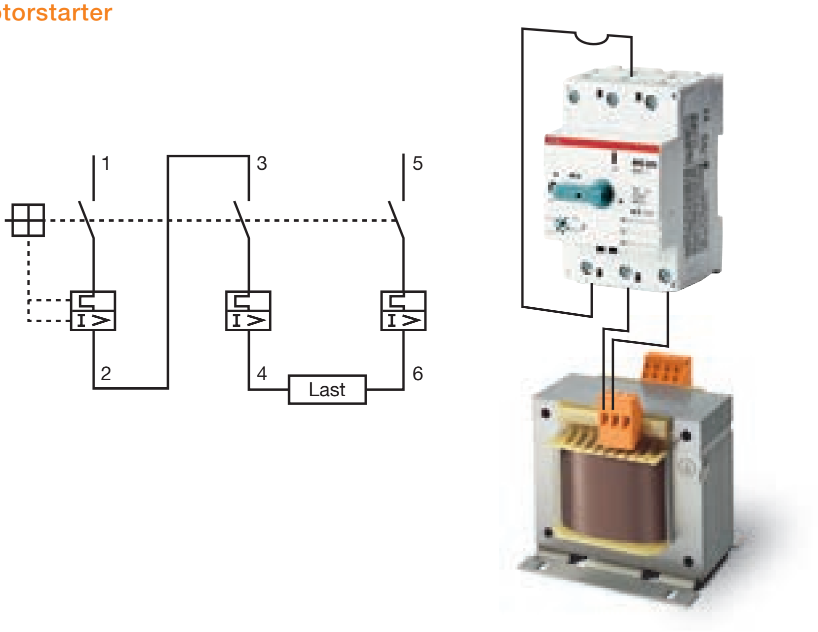
- Overload: The tripping current value of the protection used should be equal to or lower than the secondary current of the transformer.
- Short-circuit: Any short-circuit in the most distant point of the line should make the protection device trip in less than 5 seconds (IEC 60364). The protection of the transformer and the protection of the line may coincide when the transformer supplies power to a single line and a full compatibility has been ensured. The suitable secondary protection can be found on the selection tables.

Transformer			MS116 Motor starter			MS132 Motor starter		
Rated power (VA)	Input voltage (V)	Nominal Current (A)	Type	Ordering Code	Thermal curve setting	Type	Ordering Code	Thermal curve setting
50	230	0,22	MS116-1.0	1SAM250000R1005	0,63	MS132-1.0	1SAM350000R1005	0,63
100	230	0,43	MS116-1.6	1SAM250000R1006	1	MS132-1.6	1SAM350000R1006	1
160	230	0,7	MS116-2.5	1SAM250000R1007	1,6	MS132-2.5	1SAM350000R1007	1,6
200	230	0,87	MS116-4.0	1SAM250000R1008	2,5	MS132-4.0	1SAM350000R1008	2,5
250	230	1,09	MS116-4.0	1SAM250000R1008	2,5	MS132-4.0	1SAM350000R1008	2,5
320	230	1,39	MS116-6.3	1SAM250000R1009	4	MS132-6.3	1SAM350000R1009	4
400	230	1,74	MS116-10	1SAM250000R1010	4	MS132-6.3	1SAM350000R1009	4
630	230	2,74	MS116-10	1SAM250000R1010	6,3	MS132-10	1SAM350000R1010	6,3
1000	230	4,35	MS116-16	1SAM250000R1011	12,5	MS132-16	1SAM350000R1011	12,5
1600	230	6,96	MS116-20	1SAM250000R1013	20	MS132-25	1SAM350000R1014	20
50	400	0,13	MS116-0.63	1SAM250000R1004	0,4	MS132-0.63	1SAM350000R1004	0,4
100	400	0,25	MS116-1.0	1SAM250000R1005	0,63	MS132-1.0	1SAM350000R1005	0,63
160	400	0,4	MS116-2.5	1SAM250000R1007	1,6	MS132-2.5	1SAM350000R1007	1,6
200	400	0,5	MS116-2.5	1SAM250000R1007	1,6	MS132-2.5	1SAM350000R1007	1,6
250	400	0,63	MS116-2.5	1SAM250000R1007	1,6	MS132-2.5	1SAM350000R1007	1,6
320	400	0,8	MS116-4.0	1SAM250000R1008	2,5	MS132-4.0	1SAM350000R1008	2,5
400	400	1	MS116-6.3	1SAM250000R1009	2,5	MS132-4.0	1SAM350000R1008	2,5
630	400	1,58	MS116-10	1SAM250000R1010	4	MS132-6.3	1SAM350000R1009	4
1000	400	2,5	MS116-12	1SAM250000R1012	9	MS132-16	1SAM350000R1011	9
1600	400	4	MS116-12	1SAM250000R1012	12,5	MS132-16	1SAM350000R1011	12,5
2000	400	5	MS116-16	1SAM250000R1011	16	MS132-20	1SAM350000R1013	16
2500	400	6,25	MS116-20	1SAM250000R1013	20	MS132-25	1SAM350000R1014	20

Properties

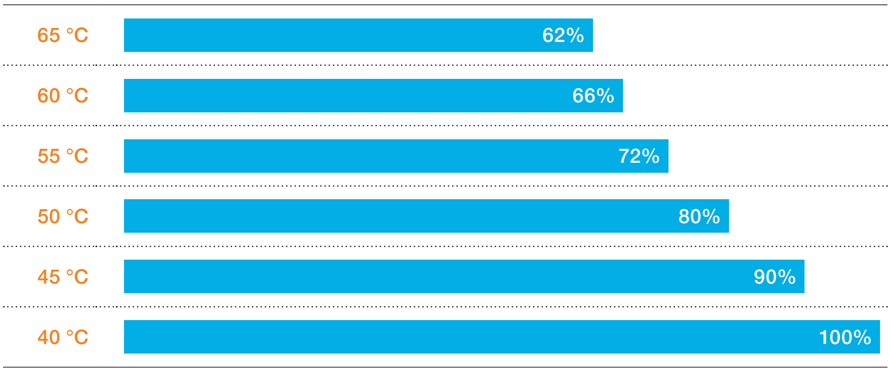
Each type of transformer detailed in the table above can be supplied on the primary side with a line protected by the corresponding Manual Motor Starter.
The indicated devices are calibrated to prevent from tripping during the transformer connection phase.
Caution: the motor starter do not protect the transformer, for this scope another compulsory protection must be installed on the secondary side as detailed on the transformers datasheet.

Wiring diagram with motorstarter



Command and signalling technical details
Control, isolating and safety transformers

Power draw according to temperature and altitude



Power draw % according to temperature

Power draw % according to altitude

TM-I

	Cable section			
	Primary		Secondary 115-230 V	
Power VA	Min. mm²	Min. mm²	Min. mm²	Min. mm²
50	0,5	4	0,5	4
100	0,5	4	0,5	4
160	0,5	1,5	0,5	1,5
200	0,5	1,5	0,5	1,5
250	0,5	1,5	0,5	1,5
320	0,5	1,5	0,5	1,5
400	0,5	1,5	0,5	1,5
630	0,5	2,5	0,5	2,5
1000	0,5	2,5	0,5	2,5
1600	0,5	2,5	0,5	2,5
2000	0,5	2,5	0,5	2,5
2500	0,5	2,5	0,5	2,5

TM-S

	Cable section					
	Primary		Secondary 12-24V		Secondary 24-48V	
Power VA	Min. mm²	Min. mm²	Min. mm²	Min. mm²	Min.	Max.
50	0,5	4	0,5	4	0,5	4
100	0,5	4	0,5	4	0,5	4
160	0,5	1,5	0,5	1,5	0,5	1,5
200	0,5	1,5	0,5	1,5	0,5	1,5
250	0,5	1,5	0,5	1,5	0,5	1,5
320	0,5	1,5	0,5	2,5	0,5	2,5
400	0,5	1,5	0,5	2,5	0,5	2,5
630	0,5	2,5	0,5	2,5	0,5	2,5
1000	0,5	2,5	4	10	-	-
1600	0,5	2,5	1,5	50	-	-
2000	0,5	2,5	1,5	50	-	-
2500	0,5	2,5	1,5	50	-	-

6

TM-C

	Cable section					
	Primary		Secondary 12-24V		Secondary 24-48V	
Power VA	Min. mm²	Min. mm²	Min. mm²	Min. mm²	Min.	Max.
50	0,5	4	0,5	4	0,5	4
100	0,5	4	0,5	4	0,5	4
160	0,5	1,5	0,5	1,5	0,5	1,5
200	0,5	1,5	0,5	1,5	0,5	1,5
250	0,5	1,5	0,5	1,5	0,5	1,5
320	0,5	1,5	0,5	1,5	0,5	2,5
400	0,5	1,5	0,5	1,5	0,5	2,5
630	0,5	2,5	0,5	2,5	0,5	2,5
1000	0,5	2,5	0,5	2,5	4	10
1600	0,5	2,5	0,5	2,5	1,5	50
2000	0,5	2,5	0,5	2,5	1,5	50
2500	0,5	2,5	0,5	2,5	1,5	50

Transformer leaks

Power (VA)	No-load loss (W)	Load loss (W)
50	4	8.5
100	6,5	14
160	9	21
200	9	22
250	12	25
320	13	30
400	15	32
630	23	45
1000	36	60
1600	50	75
2000	60	90
2500	65	105

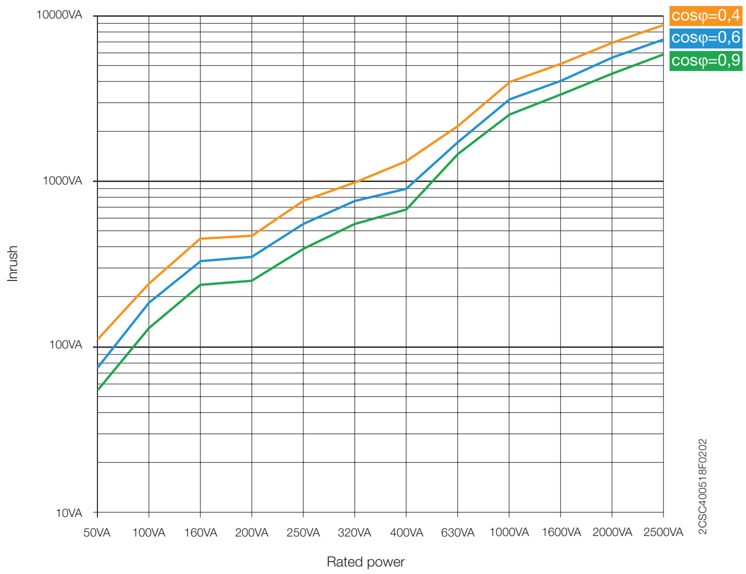
Command and signalling technical details
Control, isolating and safety transformers

Short circuit voltage, no-load output voltage variations

Power	(VA)	50	100	160	200	250	320	400	630	1000	1600	2000	2500
Vcc ①	(%)	10.6	7.5	5.2	4.8	9.5	6.9	6	4	3.5	3	2.8	2.3
ΔV ②	(%)	11	7.8	6	5.8	6.7	7	5.4	4.3	3.3	2.8	2	1.8

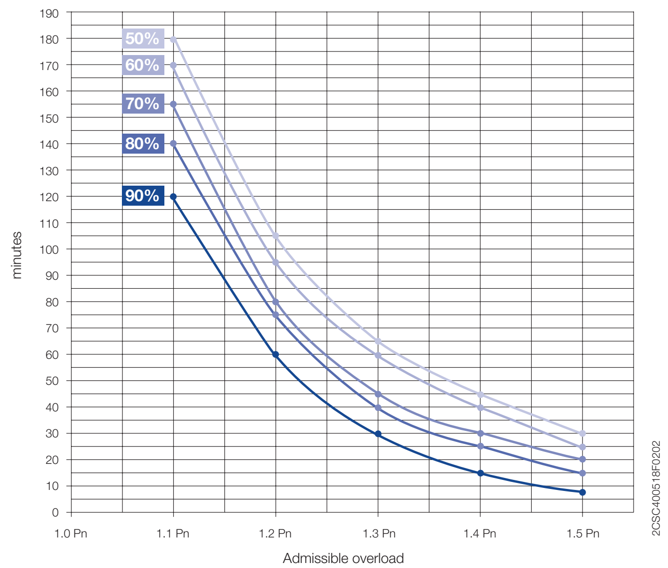
① Percent of rated supply voltage; ② Percent of rated output voltage

Inrush power trend



Admissible overload

If the transformer rated power is not drawn on a continuous basis, the transformer may be overloaded, according to the diagram below:



If a transformer is used with an intermittent duty cycle, it can be sized according to the formula:

$$\mathbf{P}_{\text{transformer}} = \mathbf{P}_{\text{intermittent}} * \sqrt{\frac{\text{operating time}}{\text{total cycle time (operating + pause time)}}}$$

with time expressed in minutes

In control equipment, can I use the two secondary outputs of a single transformer to supply two different auxiliary circuits?
It is possible to simultaneously use both the secondary outputs of an ABB transformer to supply two circuits with different voltage ratings. The sum of the power draw from each circuit must not exceed the power rating of the transformer.

What type of transformer should be used to supply safety extra low voltage (SELV) circuits?
To construct a SELV circuit it is necessary to use a safety transformer compliant with the IEC EN 61558-2-6 standard, which guarantees both electrical separation of the systems by means of double insulation and the required extra low voltage (12-24 V±5%).

Can the secondary windings of two or more ABB single-phase transformers be connected in parallel?
It is possible to connect in parallel up to a maximum of 3 ABB transformers of equal power, bearing in mind that the total power which can be drawn will be equal to 90% of the sum of the individual powers. Pay great attention to terminal connection and, if necessary, test the circuit first in series and then in parallel.

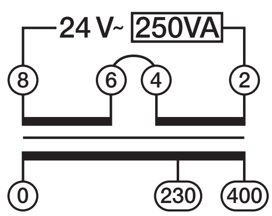
In a piece of equipment supplied at 24 V a.c., I need to supply a cooling fan with a voltage rating of 230 V a.c. Can I use a transformer, supplying it from the secondary?
It is possible to supply the transformers on the secondary side, but due to the nature of their construction, the voltage output from the primary may vary by 10-30% relative to the rated voltage.

How can I quickly size the power of a transformer?
$P = 0.8\ (\Sigma\ Pm + \Sigma\ Pr + Pa)$
$\Sigma\ Pm$ = Sum of all continuous power consumptions of contactors
$\Sigma\ Pr$ = Sum of all the resistive powers
Pa = Inrush power of the largest contactor

6

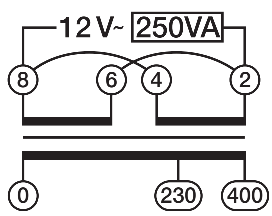
Use of two output voltages at the same time

Case A



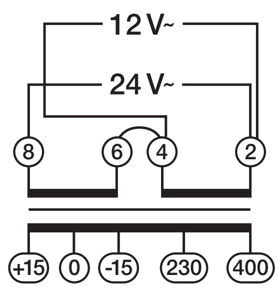
Use of one output voltage: 24 V

Case B



Use of one output voltage: in 12 V

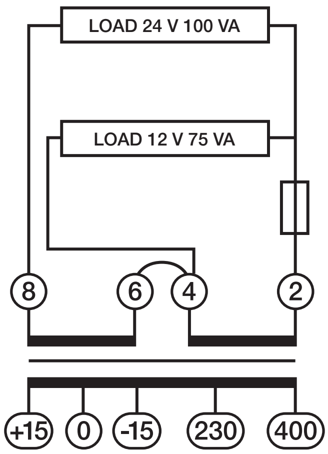
Case C



Use of two output voltages:
Output 1: 24 V
Output 2: 12 V

Wiring rules for case c:

- The combined power delivered of the two outputs must not exceed the rated power.
- The power delivered on the output with less voltage must be at most:
- lower voltageP ≤ 0,5 x (ratedP – higher voltageP)
- The protection device for the secondary must be positioned at the point of the passing current of the two outputs and selected based on the higher voltage of the two loads:



The fuse must be selected based on the higher voltage of the load and positioned in the point where the current of the two loads passes.

Example:
Transformer with ratedP 250 VA 12-24 V
Fuse 10 A gG or S 202 C10 automatic circuit breaker.

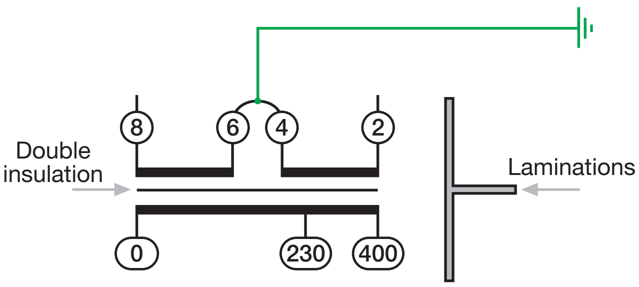
Examples:
Transformer with a rated power of 250 VA and 12/24 V secondary voltage:

	Power on 24 V output	Power on 12 V output	Comment
Es.1	250 VA	-	Case A is: the full power is delivered on the 24 V output
Es.2	-	250 VA	Case B is: the full power is delivered on the 12 V output
Es.3	100 VA	75 VA	Case C is: The power is delivered on the two outputs.
			Rule 1: Total power ≤ ratedP Total power ≤ 250 VA OK Rule 2: lower voltageP ≤ 0,5 x (ratedP – higher voltageP) lower voltageP ≤ 0,5 x (250 – 100) lower voltageP ≤ 75 VA OK

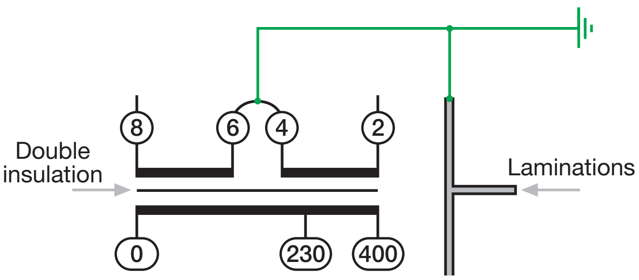
Connecting the transformer with the central point of the secondary to ground
Connection of the central point of the secondary of the transformer to ground makes it possible to decrease the potential of the secondary circuit in respect to ground, while maintaining the same output voltage.

Example:
with a transformer with 12/24 V output you can connect the central zero and deliver a voltage of -12 V / 0 V / +12 V. The voltage available to the secondary is always 24 V while the difference in potential in respect to the ground does not exceed 12 V, during normal operation.

Warning for grounding the central point for safety and insulating transformers:
If the lamination is grounded (with the Faston plug for example), the insulation properties of the safety and insulating transforms will be reduced: the insulation between the secondary and primary becomes one and not double/reinforced, thus decreasing the transformer properties.



Lamination not grounded
Connection 12-0-12 preserving double insulation



Lamination grounded
The insulation between the primary and secondary is reduced to that between the laminations and primary. Consequently, this assembly takes away the advantage of double insulation.

6

Command and signalling technical details
Modular sockets

Modular sockets

This table gives an indication of the voltage, frequency and modular socket solutions in each country.

Please consider that installation rules may change in each country, and control the local regulations before installing.

Country	Volt.		Freq.		Modular sockets					
	110-130 V	220-250 V	50 Hz	60 Hz	M1011	M1363	M1170	M1173	M1174	M1175
Afghanistan		■	■				■	■	■	■
Albania		■	■				■	■	■	■
Algeria	■	■	■				■	■	■	■
American Samoa	■	■		■			■	■	■	■
Andorra		■	■				■	■	■	■
Angola		■	■				■	■	■	■
Argentina		■	■				■	■	■	■
Armenia		■	■				■	■	■	■
Aruba	■	■		■			■	■	■	■
Australia		■	■							
Austria		■	■				■	■	■	■
Azerbaijan		■	■				■	■	■	■
Azores		■	■				■	■	■	■
Bahrain		■	■			■				
Balearic Islands		■	■				■	■	■	■
Bangladesh		■	■			■	■	■	■	■
Belarus		■	■				■	■	■	■
Belgium		■	■						■	
Belize	■	■		■		■				
Benin		■	■						■	
Bhutan		■	■			■	■	■	■	■
Bolivia	■	■	■				■	■	■	■
Bosnia & Herzegovina		■	■				■	■	■	■
Botswana		■	■			■				
Brazil	■	■		■			■	■	■	■
Brunei		■	■			■				
Bulgaria		■	■				■	■	■	■
Burkina Faso		■	■				■	■	■	■
Burundi		■	■				■	■	■	■
Cambodia		■	■			■	■	■	■	■
Cameroon		■	■				■	■	■	■
Canary Islands		■	■				■	■	■	■
Cape Verde		■	■				■	■	■	■
Central African Republic		■	■				■	■	■	■
Chad		■	■				■	■	■	■
Channel Islands		■	■			■				
Chile		■	■				■	■	■	■
Comoros		■	■				■	■	■	■
Congo Dem.Rep.(Zaire)		■	■				■	■	■	■
Congo, People's Rep. of		■	■				■	■	■	■
Cook Islands		■	■							
Croatia		■	■				■	■	■	■
Cuba	■	■		■			■	■	■	■
Cyprus		■	■			■	■	■	■	■
Czech Republic		■	■						■	
Denmark		■	■				■	■	■	■
Djibouti		■	■				■	■	■	■
Dominica		■	■			■				

Country	Volt.		Freq.		Modular sockets					
	110-130 V	220-250 V	50 Hz	60 Hz	M1011	M1363	M1170	M1173	M1174	M1175
East Timor		■	■				■	■	■	■
Egypt		■	■				■	■	■	■
Equatorial Guinea		■	■				■	■	■	■
Eritrea		■	■				■	■	■	■
Estonia		■	■				■	■	■	■
Ethiopia		■	■		■		■	■	■	■
Faeroe Islands		■	■				■	■	■	■
Falkland Islands		■	■			■				
Fiji		■	■							
Finland		■	■				■	■	■	■
France		■	■						■	
French Guyana	■	■	■				■	■	■	■
Gabon		■	■				■	■	■	■
Gambia		■	■			■				
Georgia		■	■				■	■	■	■
Germany		■	■				■	■	■	■
Ghana		■	■			■				
Gibraltar		■	■			■	■	■	■	■
Greece		■	■				■	■	■	■
Greenland		■	■				■	■	■	■
Grenada		■	■			■				
Guadeloupe		■	■				■	■	■	■
Guatemala	■	■		■		■				
Guinea		■	■				■	■	■	■
Guinea-Bissau		■	■				■	■	■	■
Guyana		■		■		■				
Hong Kong		■	■			■				
Hungary		■	■				■	■	■	■
Iceland		■	■				■	■	■	■
India		■	■				■	■	■	■
Indonesia	■	■	■			■	■	■	■	■
Iran		■	■				■	■	■	■
Iraq		■	■			■	■	■	■	■
Ireland		■	■			■				
Isle of Man		■	■			■	■	■	■	■
Israel		■	■				■	■	■	■
Italy		■	■				■	■	■	■
Ivory Coast		■	■				■	■	■	■
Jordan		■	■		■	■	■	■	■	■
Kazakhstan		■	■				■	■	■	■
Kenya		■	■			■				
Kiribati		■	■							
Korea, North		■		■			■	■	■	■
Korea, South	■	■		■			■	■	■	■
Kuwait		■	■			■	■	■	■	■
Kyrgyzstan		■	■				■	■	■	■
Laos		■	■				■	■	■	■
Latvia		■	■				■	■	■	■

Main countries are highlighted

Country	Volt.		Freq.		Modular sockets					
	110-130 V	220-250 V	50 Hz	60 Hz	M1011	M1163	M1170	M1173	M1174	M1175
Lebanon	■	■	■			■	■	■	■	■
Lithuania		■	■				■	■	■	■
Luxembourg		■	■				■	■	■	■
Macau		■	■			■				
Macedonia		■	■				■	■	■	■
Madagascar	■	■	■				■	■	■	■
Madeira		■	■				■	■	■	■
Malawi		■	■			■				
Malaysia		■	■			■				
Maldives		■	■		■	■	■	■		
Mali		■	■				■	■	■	■
Malta		■	■			■				
Martinique		■	■				■	■	■	■
Mauritania		■	■				■	■	■	■
Mauritius		■	■			■	■	■	■	■
Moldova		■	■				■	■	■	■
Monaco		■	■				■	■	■	■
Mongolia		■	■				■	■	■	■
Montenegro		■	■				■	■	■	■
Morocco	■	■	■				■	■	■	■
Mozambique		■	■				■	■	■	■
Myanmar (form. Burma)		■	■				■	■	■	■
Nauru		■	■							
Nepal		■	■				■	■	■	■
Netherlands		■	■				■	■	■	■
Netherlands Antilles	■	■	■	■			■	■	■	■
New Caledonia		■	■				■	■	■	■
New Zealand		■	■							
Niger		■	■				■	■	■	■
Nigeria		■	■			■				
Norway		■	■				■	■	■	■
Oman		■	■			■				
Pakistan		■	■				■	■	■	■
Papua New Guinea		■	■							
Paraguay		■	■				■	■	■	■
Peru		■		■			■	■	■	■
Philippines		■		■			■	■	■	■
Poland		■	■				■	■	■	■
Portugal		■	■				■	■	■	■
Qatar		■	■			■				
Réunion Island		■	■						■	
Romania		■	■				■	■	■	■

Country	Volt.		Freq.		Modular sockets					
	110-130 V	220-250 V	50 Hz	60 Hz	M1011	M1163	M1170	M1173	M1174	M1175
Russian Federation		■	■				■	■	■	■
Rwanda		■	■		■		■	■	■	■
Samoa		■	■							
San Marino		■	■				■	■	■	■
Saudi Arabia	■	■		■		■	■	■	■	■
Senegal		■	■				■	■	■	■
Serbia		■	■				■	■	■	■
Seychelles		■	■			■				
Sierra Leone		■	■			■				
Singapore		■	■			■				
Slovakia		■	■						■	
Slovenia		■	■				■	■	■	■
Somalia	■	■	■				■	■	■	■
Spain		■	■				■	■	■	■
Sri Lanka		■	■			■				
St. Kitts and Nevis		■		■		■				
St. Lucia		■	■			■				
St. Vincent		■	■			■	■	■	■	■
Sudan		■	■				■	■	■	■
Suriname	■	■		■			■	■	■	■
Sweden		■	■				■	■	■	■
Swiss		■	■		■		■	■	■	■
Syria		■	■				■	■	■	■
Tahiti	■	■		■			■	■	■	■
Tajikistan		■	■				■	■	■	■
Tanzania		■	■			■				
Thailand		■	■				■	■	■	■
Togo		■	■				■	■	■	■
Tonga		■	■							
Tunisia		■	■				■	■	■	■
Turkey		■	■				■	■	■	■
Turkmenistan		■	■				■	■	■	■
Uganda		■	■			■				
Ukraine		■	■				■	■	■	■
United Arab Emirates		■	■			■				
United Kingdom		■	■			■				
Uruguay		■	■				■	■	■	■
Uzbekistan		■	■				■	■	■	■
Vietnam	■	■	■			■	■	■	■	■
Yemen, Rep. of		■	■			■				
Zambia		■	■			■	■	■	■	■
Zimbabwe		■	■			■				

6

Fuse detail

2CSC400759F0001

Indicator light detail

2CSC400759F0001

Command and signalling technical details
Modular sockets

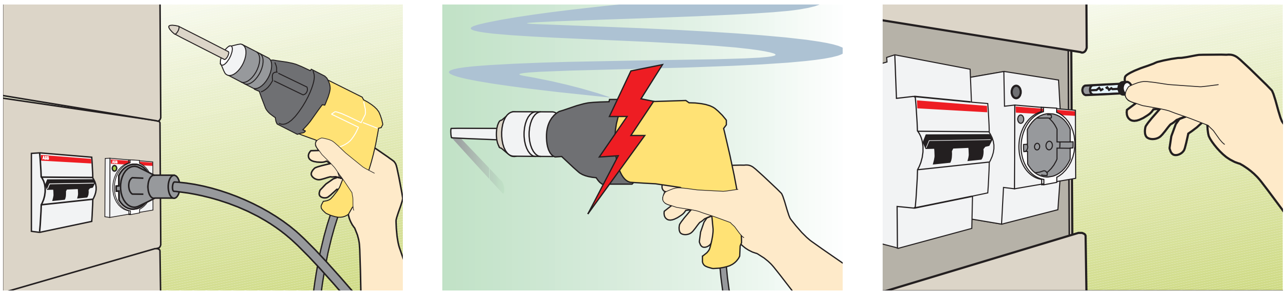
M1175-FL modular socket with fuse

Operating principle
The modular sockets with fuse are ideal wherever continuity of service is essential. The embedded fuse protecting the phase prevents tripping of the main protection switch in the event of a malfunction of the device plugged into the socket.

Application environments
The modular sockets are suitable for all electrical distribution or automation panels, to allow connection of non modular equipment such as measuring and maintenance instruments etc.

Example of installation
As illustrated in the figures, a modular socket allows to supply non modular devices directly from the electrical panel.
If the connected device malfunctions, there is the risk that the entire electrical system will be put out of service due to tripping of an MCB.
This is prevented by blowing of the fuse incorporated into the socket, thus assuring continuity of service.

6



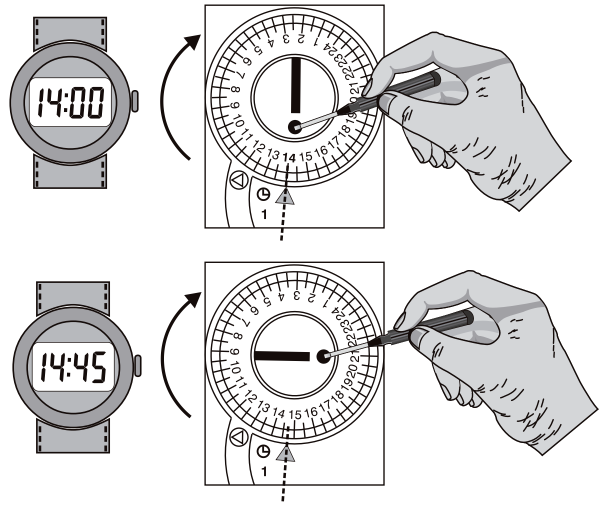
Solutions for electrical distribution in buildings - Technical details
Control and automation

Control and automation technical details

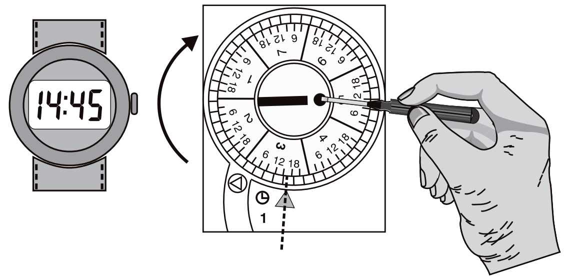
Control and automation technical details
AT and ATP electro-mechanical time switches

Time setting

AT2 - AT2-R



AT2-7R

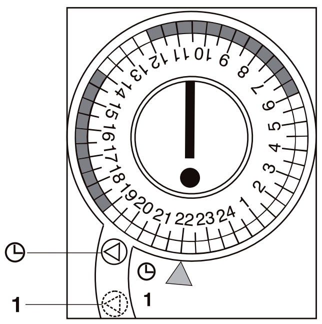


GB Example: 3 = Wednesday 14:45

1CSC400078F0202

Programming

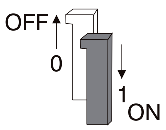
Type mode



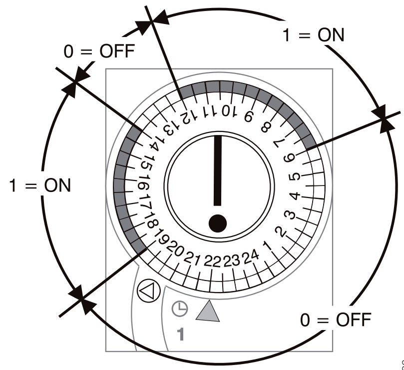
◷ = Working according to the scheduled program

1 = Permanent ON

Switching dial



06:00 ... 12:00	ON	
12:00 ... 14:00	OFF	
14:00 ... 19:00	ON	
19:00 ... 06:00	OFF	



1CSC400079F0202

See page 7/8 in Solutions for electrical distribution in building

Operating principle

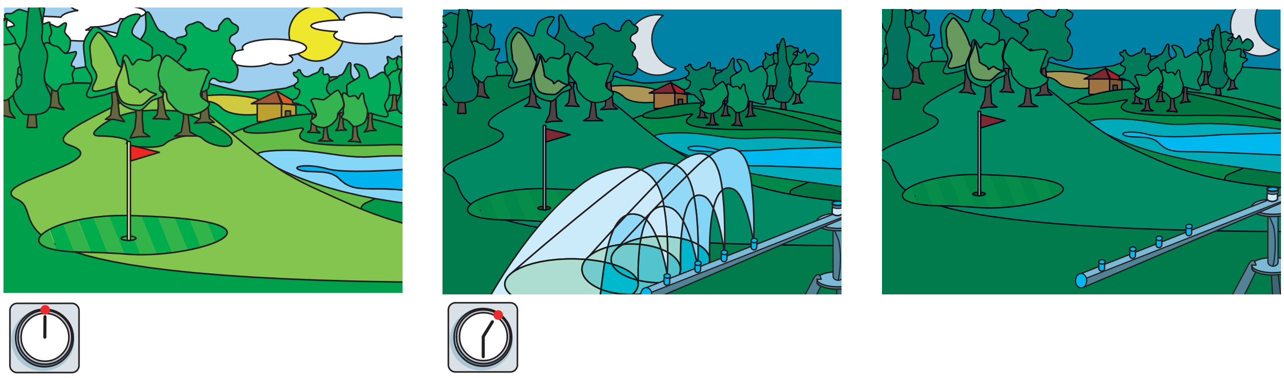
The AT electro-mechanical time switches enable to control the circuit opening/closing according to a daily or weekly program or to manually set permanent ON/OFF operation.

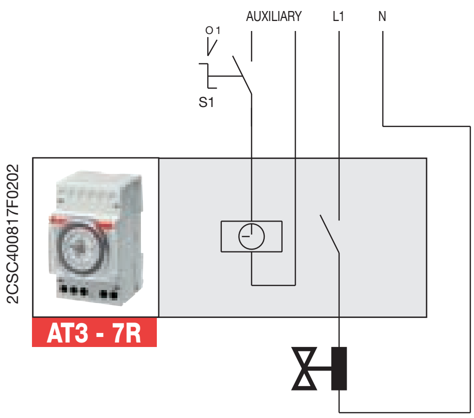
Application environments

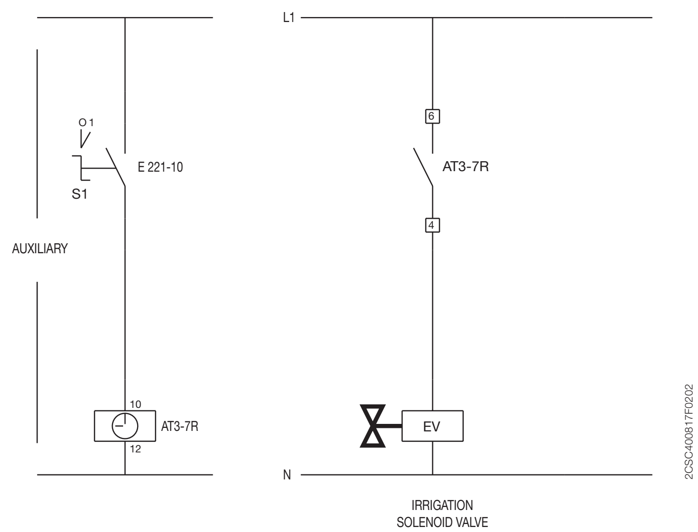
The AT electro-mechanical time switches are particularly indicated in any environment and situation where it is necessary to program system load operation according to a daily or weekly frequency (shop lighting system, public buildings, heating systems, irrigation systems, etc.).

Example of installation

As shown in the diagrams, one of the possible applications is to mount the AT3-7R electro-mechanical time switch inside the power supply circuit of a golf field. In this case the device programming enables the daily activation of the irrigation system at a preset time





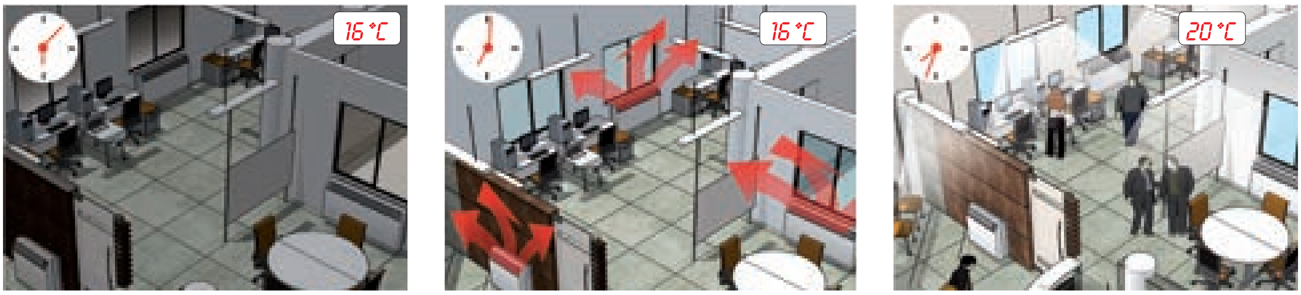


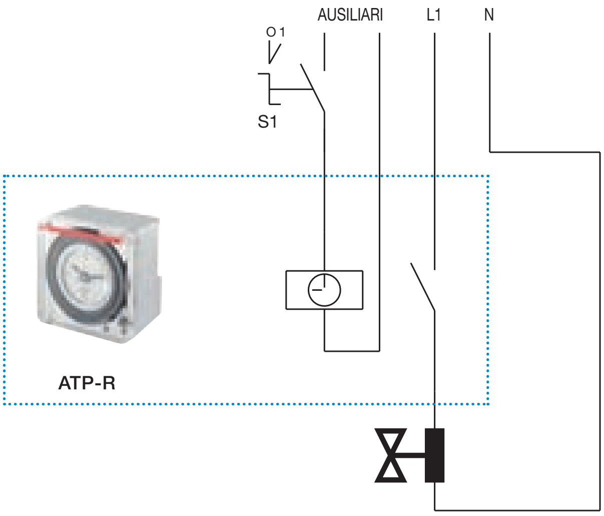
Control and automation technical details
AT and ATP electro-mechanical time switches

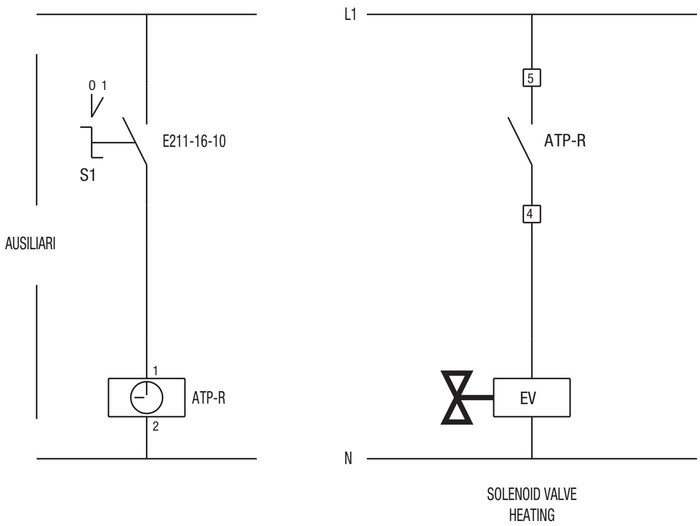
Operating principle
The ATP electro-mechanical switches enable to control the circuit opening/closing according to a daily or weekly program or to manually set permanent ON/OFF operation.

Application environments
The ATP electro-mechanical time switches are particularly indicated in any environment and situation where it is necessary to program system load operation according to a daily or weekly frequency (lighting system, heating systems, venting systems, etc.).

Example of installation
One of the possible applications is to mount the ATP-R near to the home boiler. In this case the device programming enables the heating activation at specific times during the day allowing a consisten energy saving.







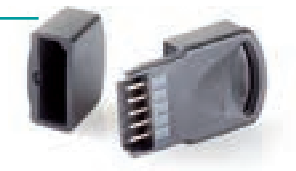
Control and automation technical details
D Line digital time switches

Innovations

- Holiday management with the possibility of programming them in various period throughout the year
- Product warranty management: the internal clock and battery start at the first installation
- Menu programming with 4 simple keys
- Minimum switch time is 1 second
- Multilingual menu with 11 language choices
- Connected load maintenance management: According to the “count down”, it sends an alert on the display after a set number of operating hours
- Zero load switching to guarantee higher load relay working life.
- Power reserves for 6 years from the first start-up guaranteed by the lithium battery

Furthermore, the PLUS and SYNCHRO

D KEY programming key to run programs saved on the key, program transfer from timer switch to key and vice versa to read programs on key.



D SW programming software lets you quickly, simply and easily create complex programs from your desktop. Once created, the program can be printed or saved to file.

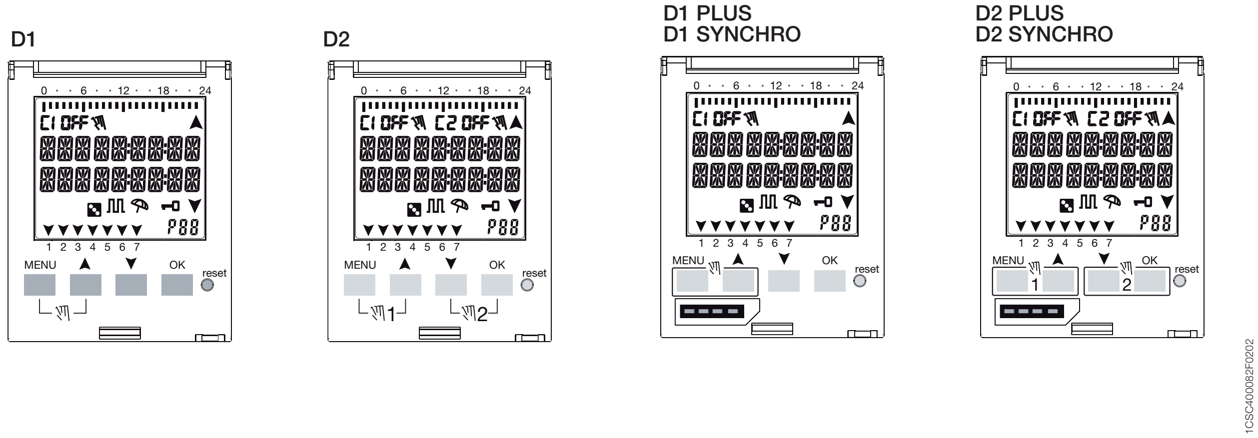
The D DCF77 antenna that receives the DCF77 radio synchronisation signal transmitted by the atomic clock installed c/o Mainflingen, near Frankfort, increases digital clock precision.

The GPS antenna that receives time from the Global Positioning System, that offers a more accurate value than land transmissions in addition to the possibility of receiving the signal anywhere in the world.

See page 7/6 in Solutions for electrical distribution in building

Control and automation technical details
D Line digital time switches

Displays



Programming menu without programming key

7

Languages
Italiano
English
Deutsch
Français
Español
Swedish
Portugues
Dutch
Polish
Russian
Greek

Menu
Standard prog
Random prog
Cyclic prog
Holiday prog
Prog list
Delete
Manual
Options

Standard/ Random progr.
Input
- program no.
- channel (dual channel only)
- day
- hour on HH:MM:SS
- hour off HH:MM:SS
- end/yearly
Verify
Edit
Copy

Cyclic program
Input
- program no.
- channel (dual channel only)
- day
- time on
- time off
- end/yearly
Verify
Edit
Copy
Cancel

Holiday program
Input
- program no.
- channel (dual channel only)
- hour off
- day and month off
- hour on
- day and month on
Verify
Edit
Copy
Cancel

Program list
Verify
Edit
Copy
Cancel

Delete
Single prog
All programs
Holiday

Manual overriding
Channel (dual channel only)
Auto
Permanent on/off
Temp on/off

Options
Language
Date/time
Aux input *
Maintenance
Hour counter
Backlight
Guaranty

Date/time
Year
Month
Day
Time HH:MM:SS
Summer/winter time

Auxiliary input
Channel (dual channel only)
Permanet on/off
Temp on/off
Timer on/off

Maintenance
C1 000000
C2 000000 (dual channel only)

Hour counter
C1 000000
C2 000000 (dual channel only)

Backlit
Permanent on
Permanent off
Timer 6 sec

Guaranty
Days 0000

* not allowed for SYNCHRO type

Programming menu with programming key

Languages
Italiano
English
Deutsch
Français
Español
Swedish
Portugues
Dutch
Polish
Russian
Greek

Menu
Standard prog
Random prog
Cyclic prog
Holiday prog
Prog list
Delete
Manual
Options

Standard/ Random progr.
Input
- program no.
- channel (dual channel only)
- day
- hour on HH:MM:SS
- hour off HH:MM:SS
- end/yearly
Verify
Edit
Copy

Cyclic program
Input
- program no.
- channel (dual channel only)
- day
- time on
- time off
- end/yearly
Verify
Edit
Copy
Cancel

Holiday program
Input
- program no.
- channel (dual channel only)
- hour off
- day and month off
- hour on
- day and month on
Verify
Edit
Copy
Cancel

Program list
Verify
Edit
Copy
Cancel

Delete
Single prog
All programs
Holiday

Manual overri-ding
Channel (dual channel only)
Auto
Permanent on/off
Temp on/off

Options
Language
Date/time
Aux input *
Maintenance
Hour counter
Backlight
Guaranty
EMD memory key

Date/time
Year
Month
Day
Time HH:MM:SS
Summer/winter time

Auxiliary input
Channel (dual channel only)
Permanet on/off
Temp on/off
Timer on/off

Maintenance
C1 000000
C2 000000 (dual channel only)

Hour counter
C1 000000
C2 000000 (dual channel only)

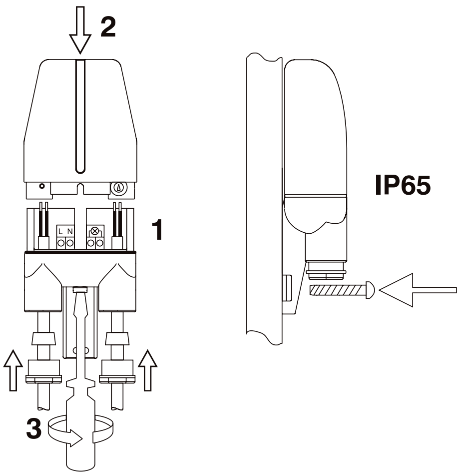
Backlit
Permanent on
Permanent off
Timer 6 sec

Guaranty
Days 0000

EMD memory key
Run on EMD
Save on EMD
Copy on clock
EMD read
Save holiday only
Copy holiday only
Erase EMD

* not allowed for SYNCHRO type

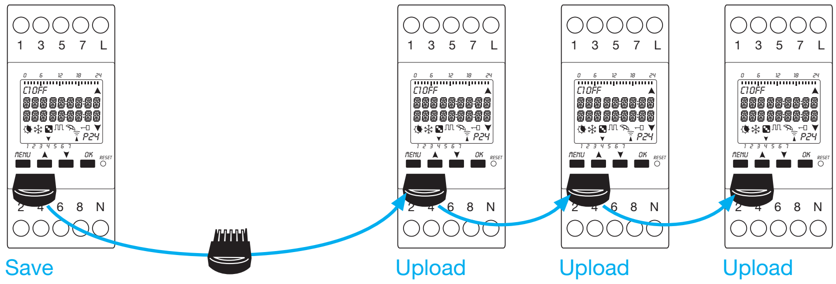
D DCF77 mounting diagram

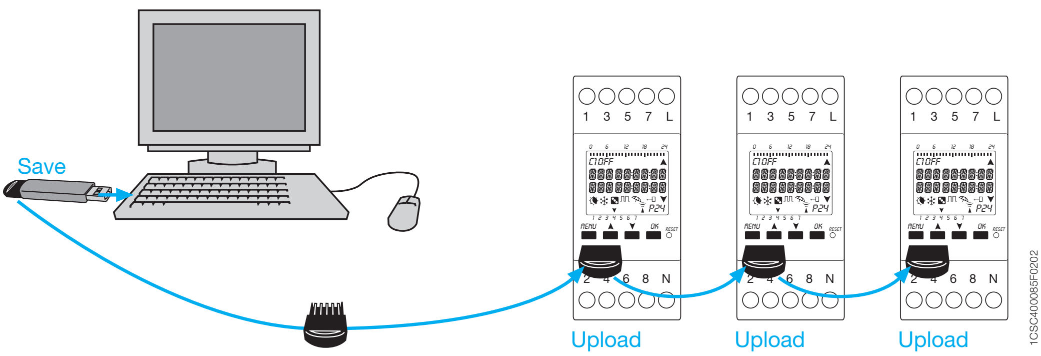


Control and automation technical details
D Line digital time switches

Programming key

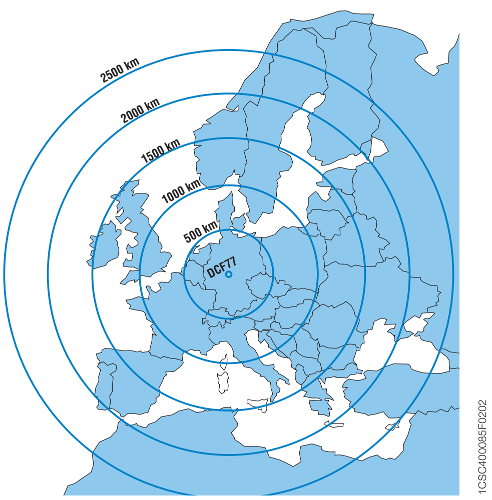
Allows to run a program in EMD external memory automatically, to save the programs in the clock or to create programs using the D SW software, on the EMD external memory or viceversa.
Furthermore, the holiday programs can be loaded and unloaded on D KEY.





DCF77 antenna

Operating principle:
This antenna receives scheduled messages broadcasted from the Frankfurt on Main (Germany) based DCF77 emitter.
Thanks to this signal, the time switches are automatically setted to: hour, date and proper daylight saving time.
The broadcast power is 50 kW and the range is approximately 2500 kilometers from Frankfurt on Main.
Sometimes the signal is received intermittently and not in all locations, especially in countries far enough from the D DCF77 emitter.
For optimal signal reception the arrow marked side of the antenna must be rotated towards Frankfurt on Main.



GPS antenna

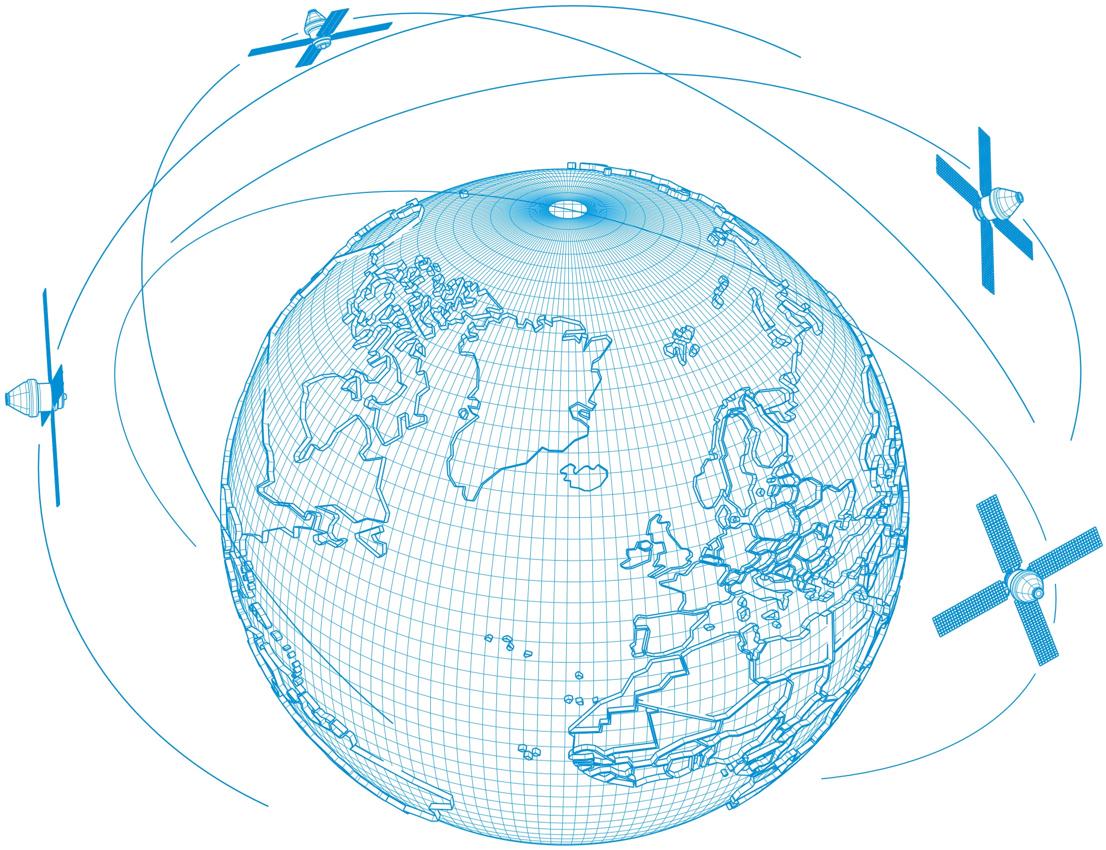
Operating principle:

The Global Positioning System provides an accurate location and time information for an unlimited number of people in all weather, day or night, anywhere in the world.

The synchronization received from GPS is far more precise regarding to terrestrial broadcast.

The GPS system relays upon time from satellite based atomic clocks, constantly controlled and corrected from a ground stations network.

The time is derived from different sources simultaneously, the digital time switches can automatically compensate for propagation delays and other problems by providing more precise values than terrestrial.



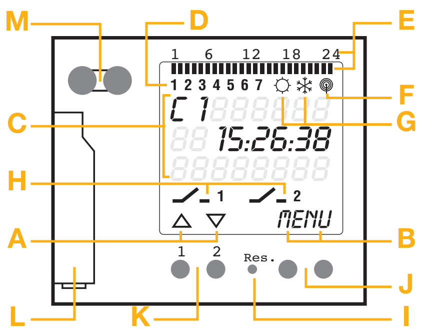
7

Control and automation technical details
D Line digital time switches

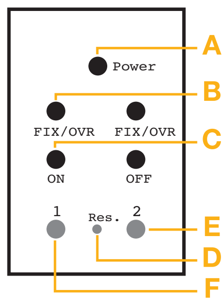
D 365

Display and functions

D 365



D 365 CE



Display

- **A** Functions of the two left keys
- **B** Functions of the two right keys
- **C** 3 line display
- **D** Days of the week, can be modified from the DATE/ HOUR menu, e.g. 1= Sunday
- **E** Programmed switching times
- **F** Radio antenna
- **G** Standard/ daylight savings time
- **H** Switching status (ON/OFF/OVR/ FIX)

Keys/interface

- **I** Reset
- **J** Right keys
- **K** Left keys, with manual function in automatic operation
- **L** Battery
- **M** Infrared interface

Display

- **A** ed Power LED
- **B** Yellow FIX/OVR LED
- **C** Green ON/OFF LED
- **D** Reset
- **E** Right key (FIX ON/FIX OFF/Override/Automatic operation)
- **F** Left key (FIX ON/FIX OFF/Override/Automatic operation)

LED meaning

	OFF	**ON**	**Blinking**
Red LED Power	Power OFF	Power ON	-
Yellow LED FIX/OVR - Channel function	Automatic operations	FIX ON/ FIX OFF	Override
Green LED ON/OFF - Channel state	Channel OFF	Channel ON	-

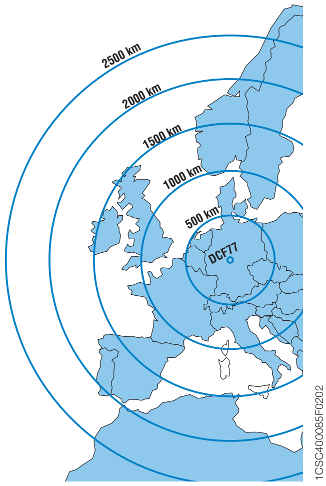
Programming key

The external memory D 365 KEY manages up to 4 programs, including holidays. It allows you to run a program, contained within it, on the D 365 yearly time switch, to save or copy the programs in the clock or created using the programming software.

CE channel extension

The D 365 CE channel expansion unit allows you to expand the number of channels of D 365 up to a maximum of 8. In fact thanks to the switching commands received through the PowerLine communication protocol, you can install D 365 and the related D 365 expansions in separate switchboards, for example on different floors, but you must always take care to respect the maximum distance of 50 m. On the front of the device you can view the state of the channels on a moment by moment basis by means of the LED lights.

DCF77 antenna



The D 365 DCF77 antenna receives scheduled messages broadcasted from the DCF77 emitter located in Mainflingen, Germany. The broadcast power is 50kW with a range of 2500 km. Sometimes the signal is received intermittently and not all locations may be covered due to shadows caused by the land, especially in countries far away from the emitter; in any case, Italy has full coverage.

D Line digital time switches

Operating principle

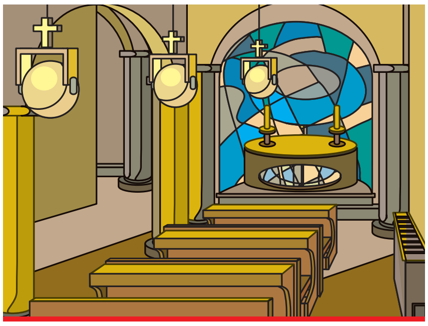
The D2 two-channel digital time switches enable to open and close circuits according to a daily or weekly program, controlling single loads or group of loads even when they require different time controls with a common time reference.
In this example, the digital time switch D2 allows the operation of heating as well as lighting systems of a church when services are performed; when no service is performed, the device only controls the heating system.

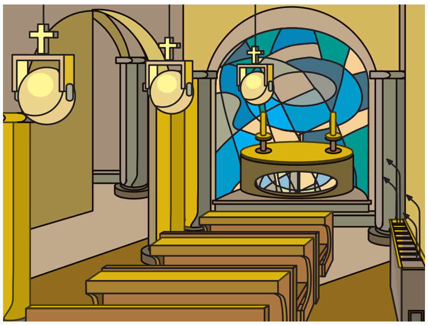
Application environments

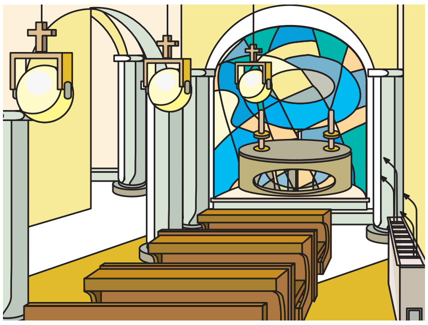
The D2 two-channel digital time switches are particularly indicated in environments and situations requiring the management of multiple loads according to a time program flexible enough to include or exclude their application based on the day of the week (offices, schools, public areas, etc.).

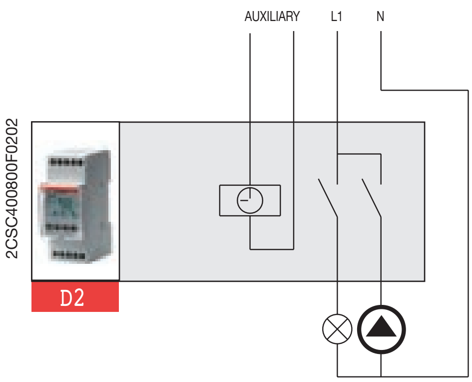
Example of installation

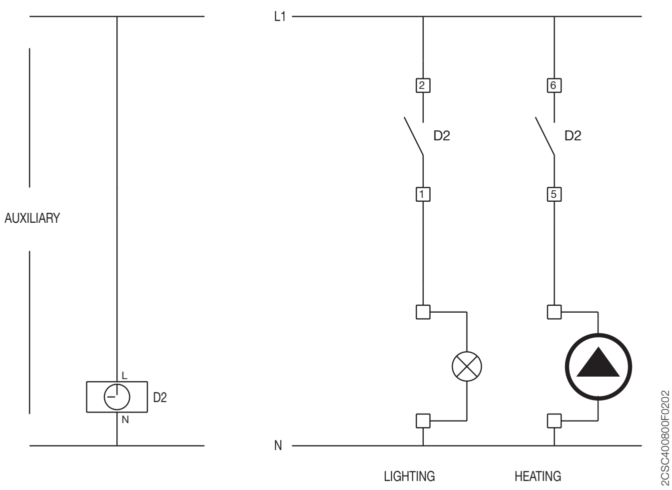
As shown in the diagrams, one of the possible applications is to mount the D2 two-channel digital time switch inside the power supply circuit of a church, where in the days when no service is performed only the heating system is activated (programmed on one of the two channels) at a preset time, while on Sundays and when services are performed the lighting system is also switched on (through a program on the second channel). According to the controlled system power, the activation is performed by an ESB contactor.











Operating principle

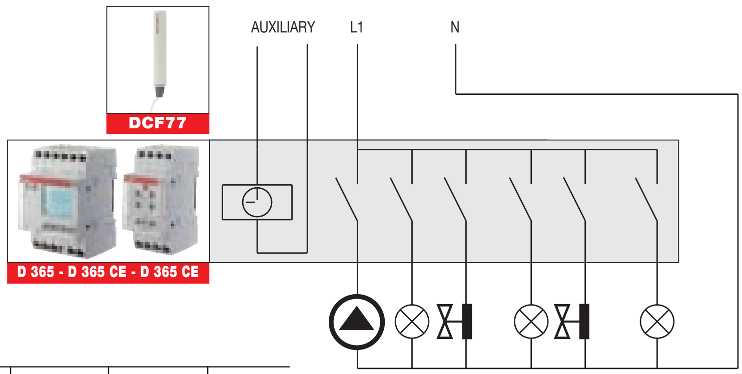
As illustrated in the diagrams, among one of the possible applications involves the installation of a D 365 yearly digital time switch with two D 365 CE channel extensions in the power supply circuit of an industrial building, where during workdays the lighting and heating system of the various levels of the building turn on in the morning and remain on until the evening, in addition to periodically enabling the shift change sirens. The large amount of memory space in the time switch makes it possible to automate the system for the entire current year and define all holiday periods where the loads remain shut off. This helps to save energy and prevent the risk of reprogramming errors. When associated with the D 365 DCF77 antenna, the time switch will always be synchronized with the exact time, thus avoiding having to make adjustments over time.

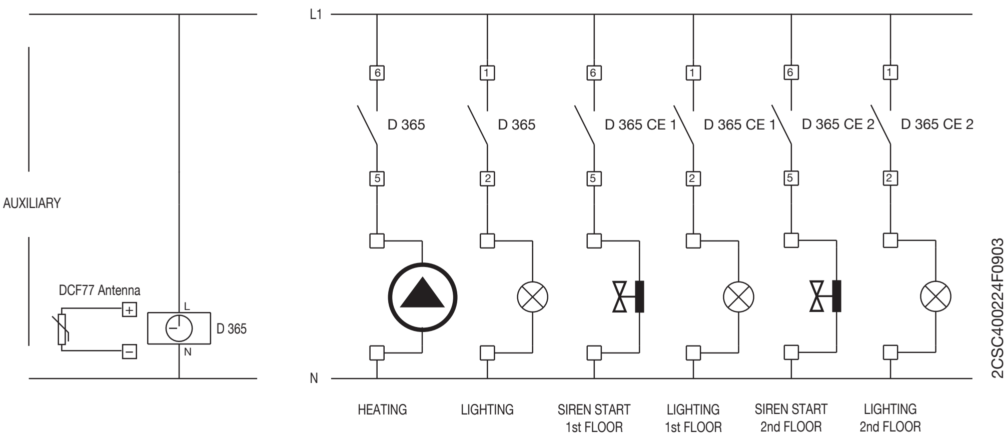
Application environments

The installation of a D 365 yearly digital time switch, is particularly suited for schools, hospitals, train stations, airports, industrial factories, public buildings, malls, etc. where the perfect operation of all devices are required at a set time.

Example of installation

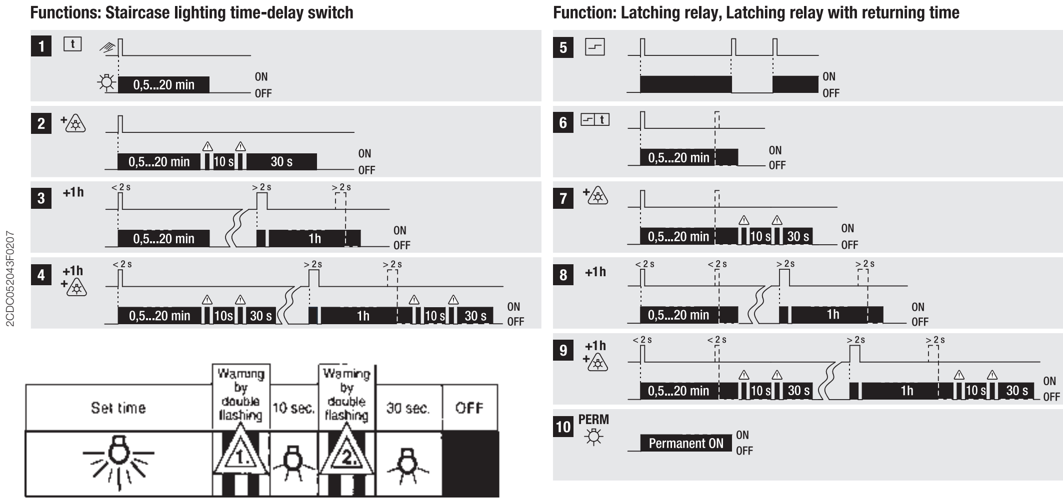
With yearly digital time switches you can automate one or more utilities according even complex and articulated programs with daily, weekly, monthly, and annual frequency. In addition to switching, programming includes impulsive controls, cyclical ON/OFF, and even astronomical functions. Under the constant control of the D365 model, lighting and heating, and even sirens, will start in the various floors at a set hour.





E 232 staircase lighting time-delay switches

E 232E-230 Multi 10, 8/230 Multi 10



E232E-230 Multi10 and E232E-8/230 Multi10

DIN 18015-2
provides that "that the automatic disconnection of lighting equipment fitted in staircases of apartment buildings must provide for warning signals, e.g. dimming, in order to avoid sudden unexpected darkness".

Operating principle

Activated by a pulse command through a pushbutton, the E 232 staircase light switch turns on the installation's lights for a time T1. In order to avoid an unexpected darkness, the Multi10 devices are equipped with a switch-off warning (double flash).

Application environments

Installation of the E 232 staircase lighting with switch-off warning functionality is ideal wherever the lighting must be timed and unexpected darkness must be avoided (staircases and passageways in public places, cellars, garages, etc.).

Example of installation

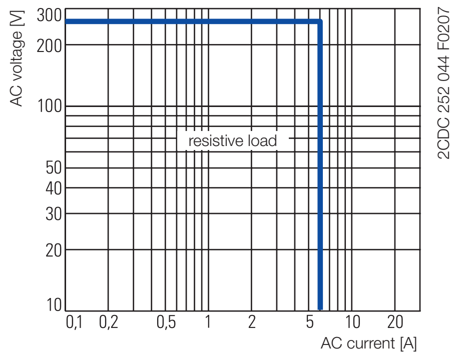
One of possible applications of the E 232E-230 Multi 10 staircase switch is in the staircase lighting plant of a multistory building. Pushing the push-button, the timer of the E 232E-230 Multi 10 switch turns on the lights for a settable T1 time. At the end of the time the device gives a prewarning by blinking that the set time expires. The user can restart the timer again by pressing the button.

See page 7/12 in Solutions for electrical distribution in building

Technical diagrams

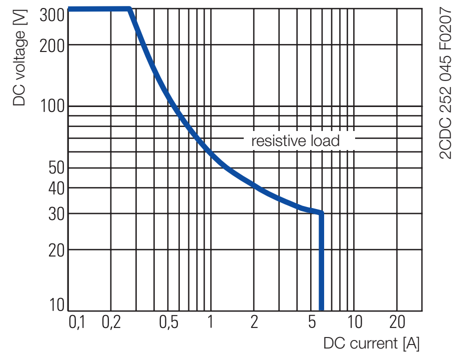
Load limit curves

AC load (resistive)

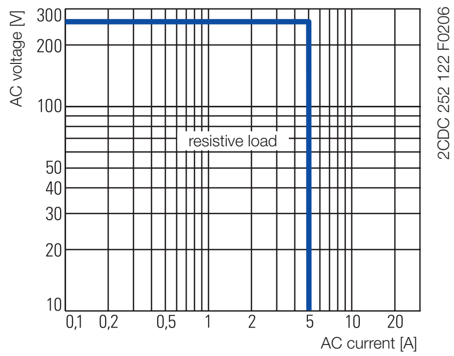


CT-D.1x

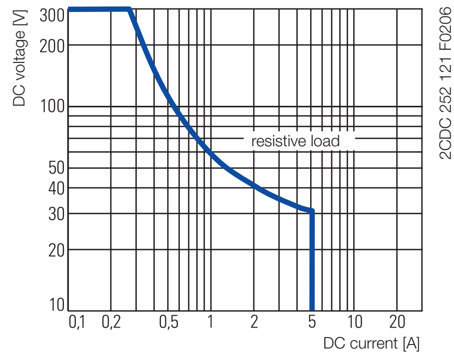
DC load (resistive)



CT-D.1x



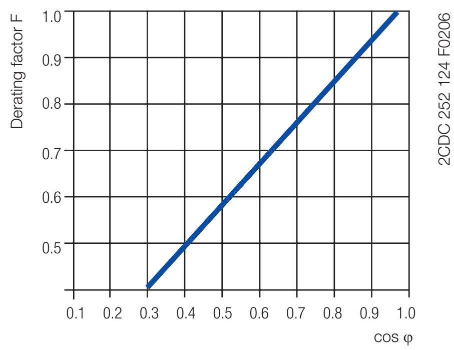
CT-D.2x



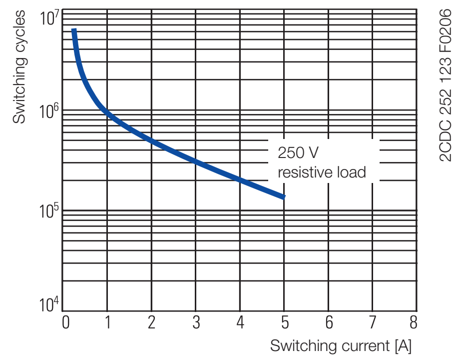
CT-D.2x

Derating factor F

for inductive AC load



Contact lifetime



See page 7/16 in Solutions for electrical distribution in building

Remarks

Legend

Control supply voltage not applied / Output contact open

Control supply voltage applied / Output contact closed

A1-Y1/B1 Control input with voltage-related triggering

Terminal designations on the device and in the diagrams

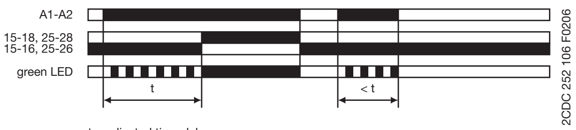
The 1st c/o contact is always designated **15-16/18**.
The 2nd c/o contact is designated **25-26/28.**
The n/o contacts of the star-delta timers are designated with **17-18** and **17-28**.
Control supply voltage is always applied to terminals **A1-A2**.

Function of the yellow LED

The yellow LED **R** glows as soon as the output relay energizes and turns off when the output relay de-energizes.

ON-delay
(Delay on make)
CT-ERD, CT-MFD

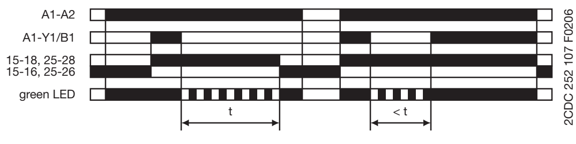
This function requires continuous control supply voltage for timing.
Timing begins when control supply voltage is applied. The green LED flashes during timing. When the selected time delay is complete, the output relay energizes and the flashing green LED turns steady. If control supply voltage is interrupted, the output relay de-energizes and the time delay is reset. Control input **A1-Y1/B1** of the CT-MFD is disabled when this function is selected.



t = adjusted time delay

OFF-delay with auxiliary voltage
(Delay on break)
CT-AHD, CT-MFD

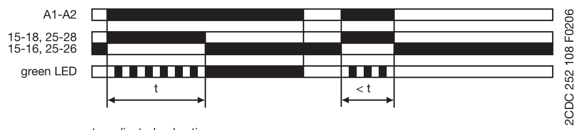
This function requires continuous control supply voltage for timing. If control input **A1-Y1/B1** is closed, the output relay energizes immediately. If control input **A1-Y1/B1** is opened, the time delay starts. The green LED flashes during timing. When the selected time delay is complete, the output relay de-energizes and the flashing green LED turns steady. If control input **A1-Y1/B1** recloses before the time delay is complete, the time delay is reset and the output relay does not change state. Timing starts again when control input **A1-Y1/B1** re-opens. If control supply voltage is interrupted, the output relay de-energizes and the time delay is reset.



t = adjusted time delay

Impulse-ON (Interval) CT-VWD, CT-MFD

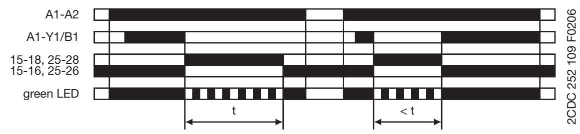
This function requires continuous control supply voltage for timing. The output relay energizes immediately when control supply voltage is
applied and de-energizes after the set pulse time is complete. The green LED flashes during timing. When the selected pulse time is complete, the flashing green LED turns steady. If control supply voltage is interrupted, the output relay de-energizes and the time delay is reset. Control input **A1-Y1/B1** of the CT-MFD is disabled when this function is selected.



t = adjusted pulse time

Impulse-OFF with auxiliary voltage (Trailing edge interval) CT-MFD

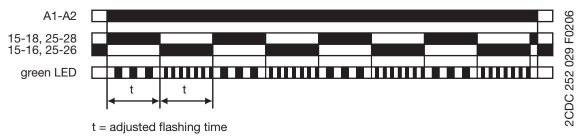
This function requires continuous control supply voltage for timing.
If control supply voltage is applied, opening control input **A1-Y1/B1** energizes the output relay immediately and starts timing. The green LED flashes during timing. When the selected pulse time is complete, the output relay de-energizes and the flashing green LED turns steady.
Closing control input **A1-Y1/B1**, before the time delay is complete, de-energizes the output relay and resets the time delay. If control supply voltage is interrupted, the output relay de-energizes and the time delay is reset.



t = adjusted pulse time

Flasher, starting with the ON time (Recycling equal times, ON first) CT-EBD, CT-MFD

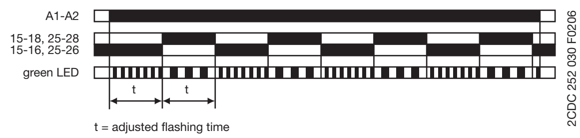
Applying control supply voltage starts timing with symmetrical ON & OFF times. The cycle starts with an ON time first. The ON & OFF times are displayed by the flashing green LED, which flashes twice as fast during the OFF time. If control supply voltage is interrupted, the output relay de-energizes and the time delay is reset. Control input **A1-Y1/B1** of the CT-MFD is disabled when this function is selected.



t = adjusted flashing time

Flasher, starting with the OFF time (Recycling equal times, OFF first) CT-MFD

Applying control supply voltage starts timing with symmetrical ON & OFF times. The cycle starts with an OFF time first. The ON & OFF times are displayed by the flashing green LED, which flashes twice as fast during the OFF time. If control supply voltage is interrupted, the output relay de-energizes and the time delay is reset. Control input **A1-Y1/B1** of the CT-MFD is disabled when this function is selected.

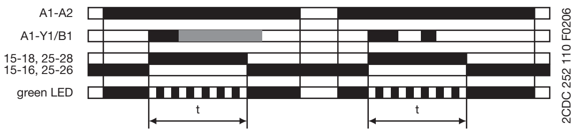


t = adjusted flashing time

Control and automation technical details
E 234 CT-D electronic timers

Pulse former (Single shot)
CT-MFD

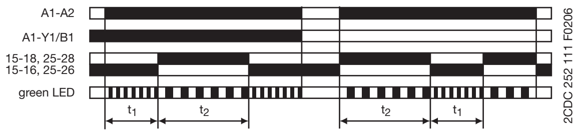
This function requires continuous control supply voltage for timing.
Closing control input **A1-Y1/B1** energizes the output relay immediately and starts timing. Operating the control contact switch **A1-Y1/B1** during the time delay has no effect. The green LED flashes during timing. When the selected ON time is complete, the output relay de-energizes and the flashing green LED turns steady. After the ON time is complete, it can be restarted by closing control input **A1-Y1/B1**. If control supply voltage is interrupted, the output relay de-energizes and the time delay is reset.



t = adjusted pulse time

Pulse generator, starting with the ON or OFF time
(Recycling unequal times, ON or OFF first)
CT-TGD

This function requires continuous control supply voltage for timing.
Applying control supply voltage, with open control input **A1-Y1/B1**, starts timing with an ON time first. Applying control supply voltage, with closed control input **A1-Y1/B1**, starts timing with an OFF time first. The ON & OFF times are displayed by the flashing green LED, which flashes twice as fast during the OFF time. The ON & OFF times are independently adjustable. If control supply voltage is interrupted, the output relay de-energizes and the time delay is reset.

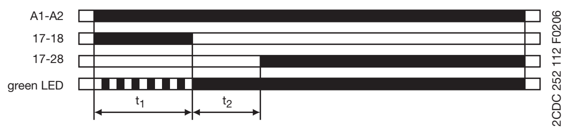


t_1 = adjusted OFF time
t_2 = adjusted ON time

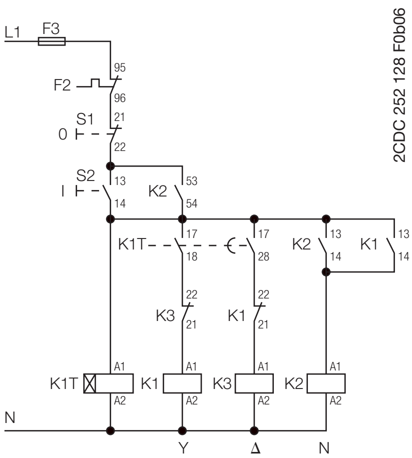
Star-delta change-over
(Star-delta starting)
CT-SDD, CT-SAD

This function requires continuous control supply voltage for timing.
Applying control supply voltage to terminals **A1-A2**, energizes the star contactor connected to terminals **17-18** and begins the set starting time t_1. The green LED flashes during timing. When the starting time is complete, the first output contact de-energizes the star contactor.

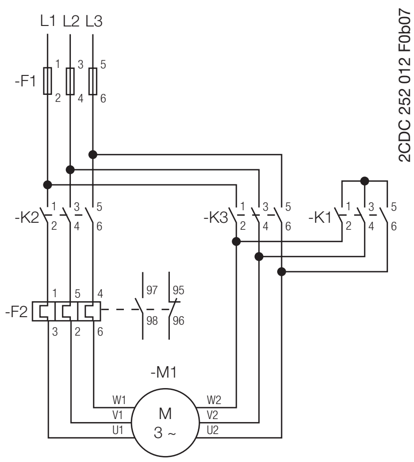
Now, the transition time t_2 starts. When the transition time is complete, the second output contact energizes the delta contactor connected to terminals **17-28**. The delta contactor remains energized as long as control supply voltage is applied to the unit.



t_1 = adjusted starting time
t_2 = transition time
CT-SDD: t_2 = 50 ms
CT-SAD: t_2 adjustable



Control circuit diagram



Power circuit diagram

Control and automation technical details
T1, T1 PLUS, T1 POLE, TWA-1 and TWA-2 twilight switches

Main features

DIN-Rail version
- 2 indication leds: one for contact status and one for threshold
- Four different type of Lux range adjustment
- Adjustable switching delay
- Preset a 10 Lux from factory
- Screw-less version
- 1 module width
- RoHS compliant

Pole/wall version
- Innovative design for direct installation on a pole/wall
- Quick and easy to install, thanks to the simple wiring and ease of adjustment
- Laser etched connection diagram on the back of the product
- Integrated brightness sensor preset at 10 Lux from factory
- Adjustable threshold value from 2 to 200 Lux
- Switching delay of 30 sec. ±10% for ON and 40 sec. ±10% for OFF
- Unlosable screw terminals
- Protection degree IP65
- Preset a 10 Lux
- RoHS compliant

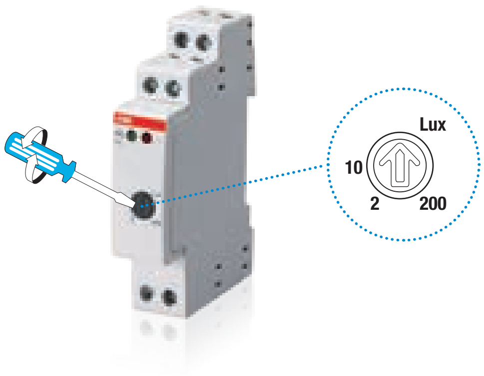
Astronomical version
- Astronomical and time programming
- Holiday program
- Automatic summer and winter time change
- 56 stored memory locations
- Opportunity to correct the astronomical time up to ±120 min
- 1 or 2 changeover contacts
- latitude adjustment range from +90° North to -90° South.
- longitude adjustment range from 180° East to 180 ° West.
- Manual and permanent override, activated with one touch on the front of the device
- Clear display of contact status
- Unlosable hinged window
- Keypad security lock with PIN code to prevent interference by unauthorised persons
- PC software for quick and easy programming
- Wiring diagram printed on the side of the product
- Complies with RoHS directives

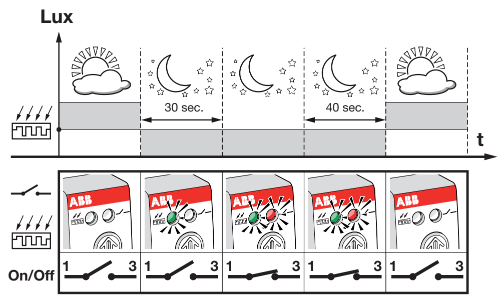
See page 7/18 in Solutions for electrical distribution in building

Control and automation technical details
T1, T1 PLUS, T1 POLE, TWA-1 and TWA-2 twilight switches

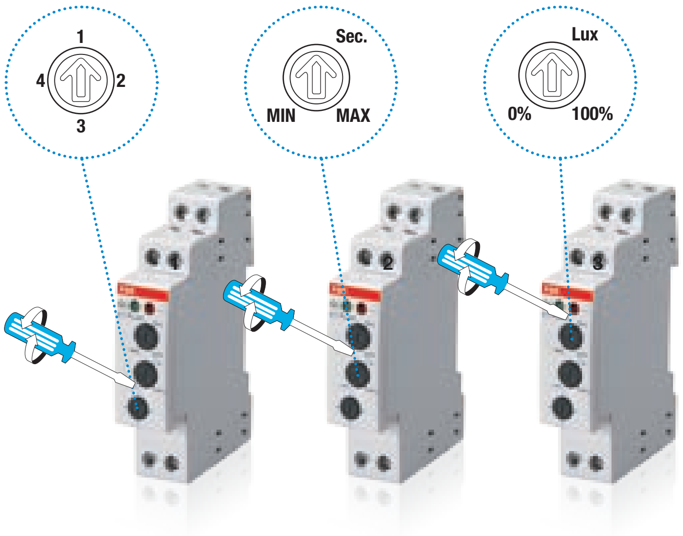
T line

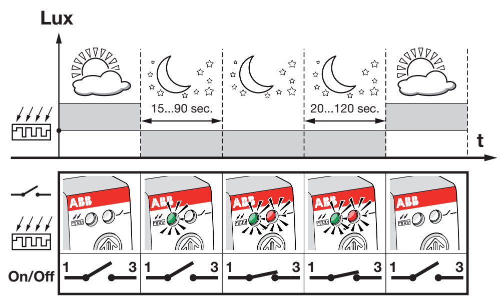
T1 operating principle



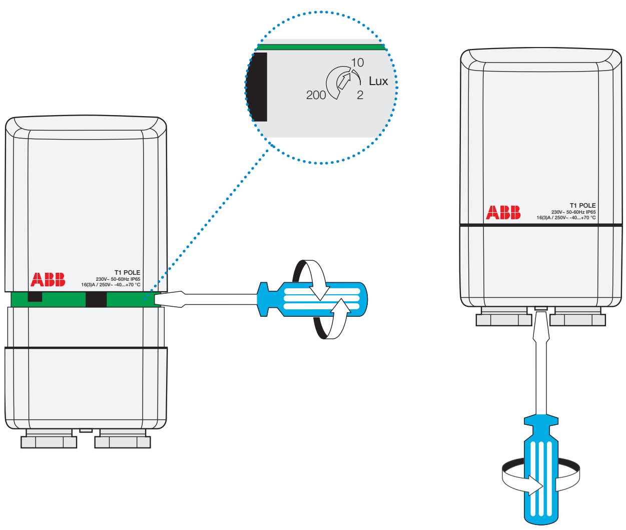


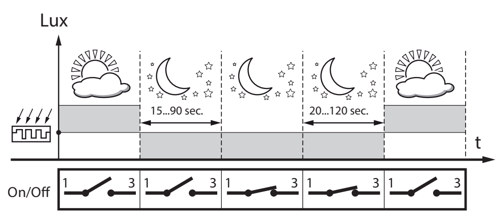
T1 PLUS operating principle





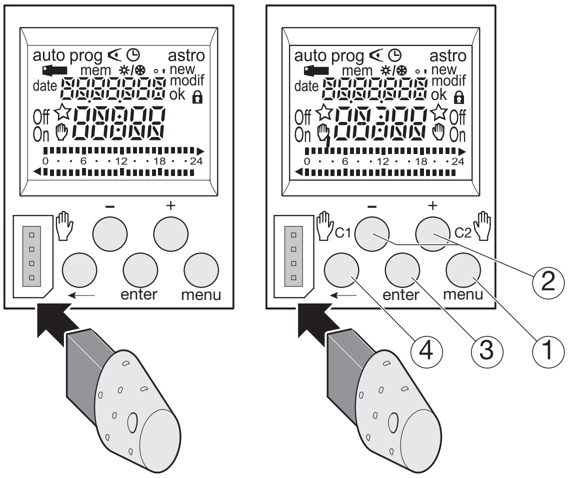
T1 POLE





TWA-1 and TWA-2

TWA-1 **TWA-2**



Keys

① **menu** : selection of operating mode.

auto : mode of running according to the program selected.

prog : **new** for programming mode.

prog : **modif** to modify an existing program.

⊲ : checking of the program.

◷ : modification of time, date and selection of the winter/summer timechange mode ☼/❄

astro : astronomical mode.

☆ : indicates that the channel is in astronomical mode.

② + and – : navigation or setting of values.

✋ – (TWA-1)

C1 ✋ , C2 ✋ (TWA-2) : in auto mode, selection of overrides, or waivers.

③ **enter** : to validate flashing information on display.

④ ← : to return to the previous step.

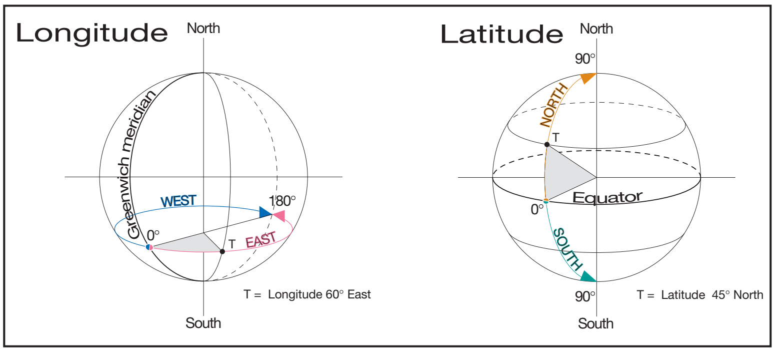
Programming example

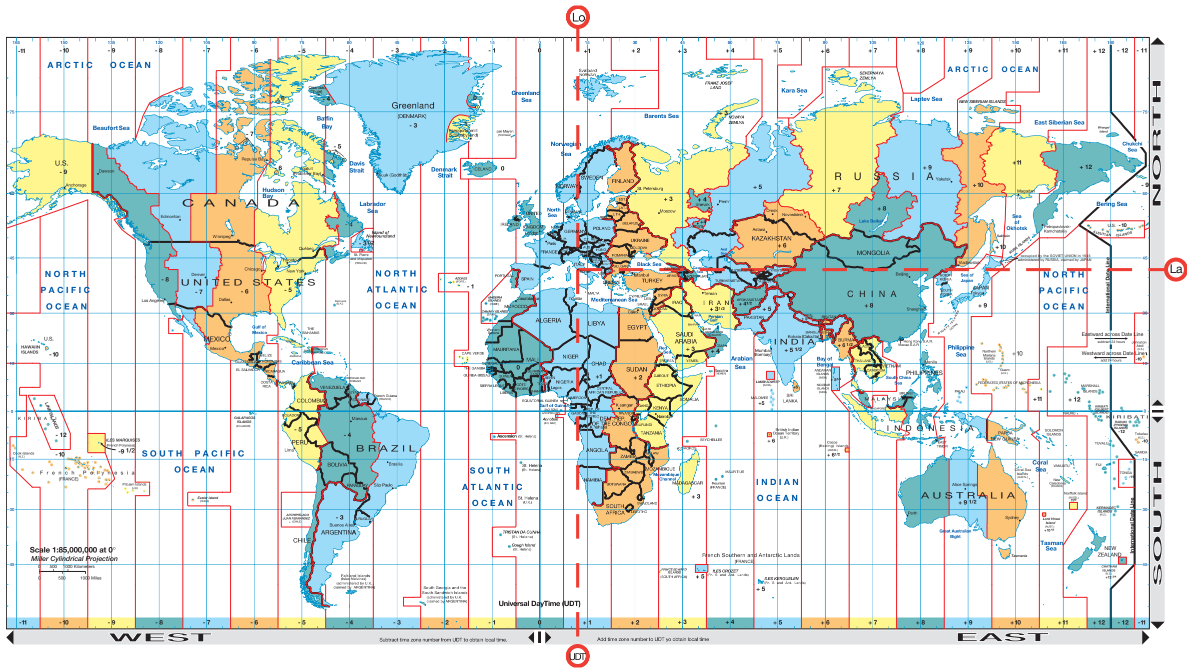
Ex: Rome

Lo Longitude 12° EAST

La Latitude 41° NORTH

UDT + 1 Universal Date Time = +1 hour





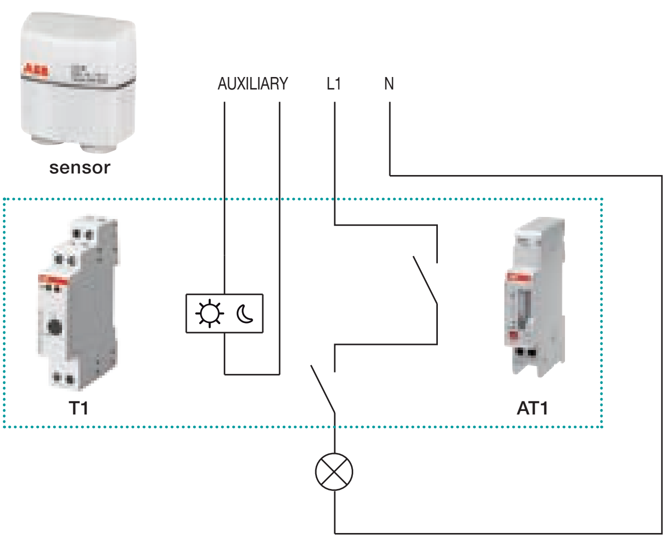
Control and automation technical details
T1 twilight switch

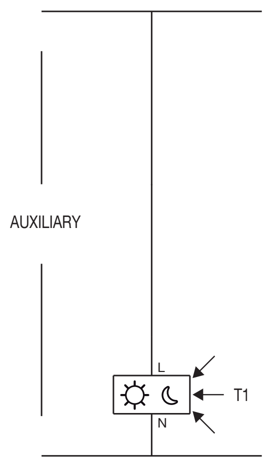
Operating principle
The diagram shows an example of the installation of the T1 twilight switch in the lighting system of a commercial establishment. When the external light falls below a certain level (e.g. during the evening when the shop is closed), the device switches on the window lights and the shop sign. The lights can be switched off late evening to reduce power consumption thanks to the AT1 switch timer.

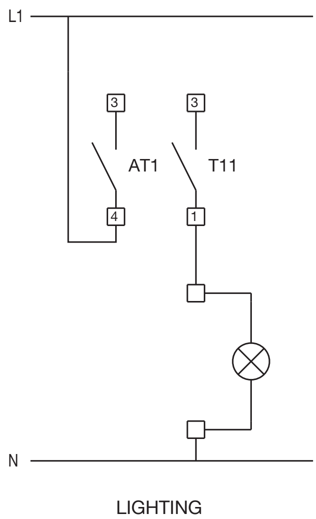
Application environments
The installation of the T1 twilight switch with an AT electromechanical timer is particularly useful in settings and situations where energy saving is a prime concern (shops, office corridors and public passageways, car parks, parks, etc.).

Example of installation
As shown in the diagrams, one of the possible applications is the installation of a T1 twilight switch in the lighting system of a commercial establishment.
When the external light falls below a certain level (e.g. when the shop is closed), the twilight switch switches on the window lights and the sign. The lights can be switched off late evening to reduce power consumption thanks to the AT1 switch timer which keeps the circuit open until the next morning. When the external light returns to above the threshold value, the twilight switch relay returns to the open position.









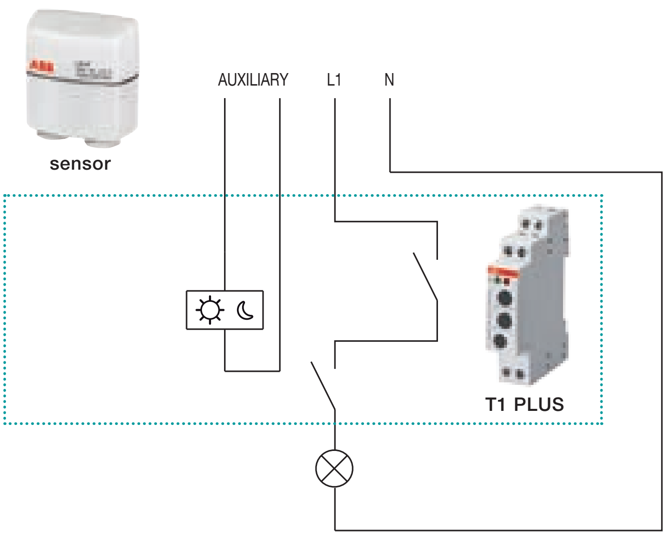
Control and automation technical details
T1 PLUS twilight switch

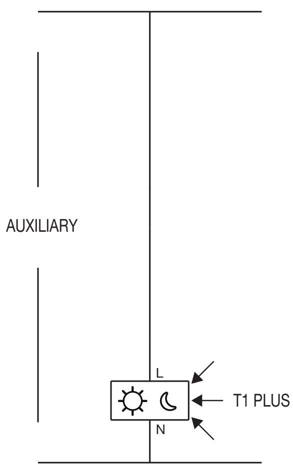
Operating principle
The diagram shows an example of the installation of the T1 PLUS twilight switch in the lighting system of a greenhouse. When the external light exceeds a certain level (e.g. during the warmest hours of the day, i.e. early afternoon), the device activates the shading system, e.g. roller blinds. Thanks to the option to advance or delay the activation-deactivation time, the T1 PLUS can also maintain the roller blinds closed in the case of passing clouds.

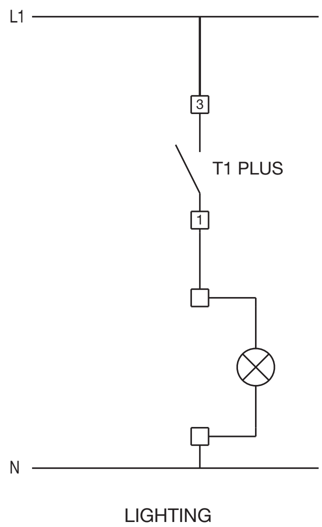
Application environments
The installation of the T1 PLUS twilight switch is particularly useful in settings and situations where lighting control is required for locations where there are consistently high brightness values, thus guaranteeing substantial savings in energy consumption (greenhouses, arcades, photovoltaic plants, etc.).

Example of installation
As shown in the diagrams, one of the possible options is to install a T1 PLUS twilight switch in the lighting system of a greenhouse.
When the external light exceeds a certain level (for example during peak hours in the early afternoon) the twilight switch activates the roller blinds, protecting the plants in the greenhouse against burning by the strong sunlight.
When the external light returns to below the threshold value, the twilight switch relay opens the blinds to allow the sunlight to pass through.

7





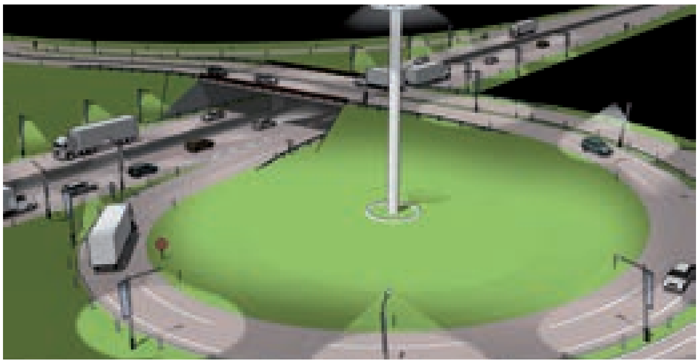


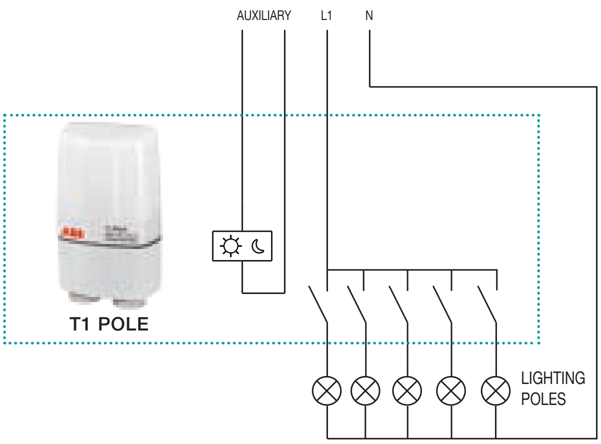
Control and automation technical details
T1 POLE twilight switch

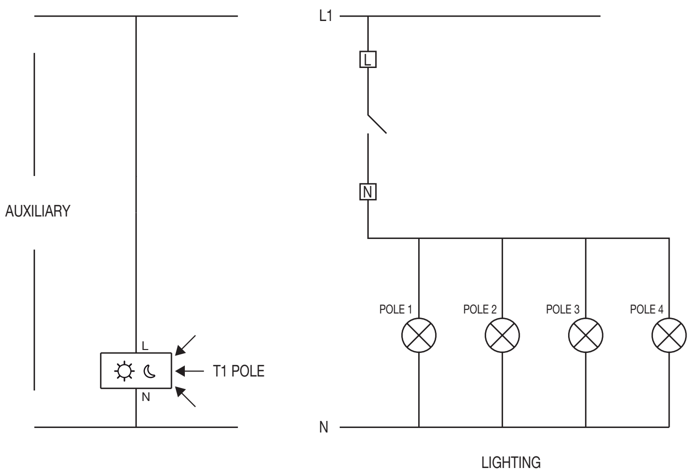
Operating principle
The diagram shows an example of the installation of the pole-mounted T1 POLE twilight switch for motorway lighting systems. When the external light falls below a certain level, 10 lux for example, the device switches on the lights present in tunnels, service areas, near to junctions, etc. The lights are then switched off by the T1 POLE in the morning when the 10 lux value is exceeded.

Application environments
The installation of the T1 POLE twilight switch is particularly suitable for controlling public street lighting, thanks to the fact that they can be installed on poles, lamp standards, etc.

Example of installation
As shown in the diagrams, one of the possible applications is the installation of a T1 POLE twilight switch in the motorway lighting system.
When the external light falls below a certain level (for example at sunset), the pole-mounted twilight switch switches on the lights to provide the correct lighting for the setting. At sunrise, the external brightness exceeds the threshold value and the twilight relay returns to the open position.





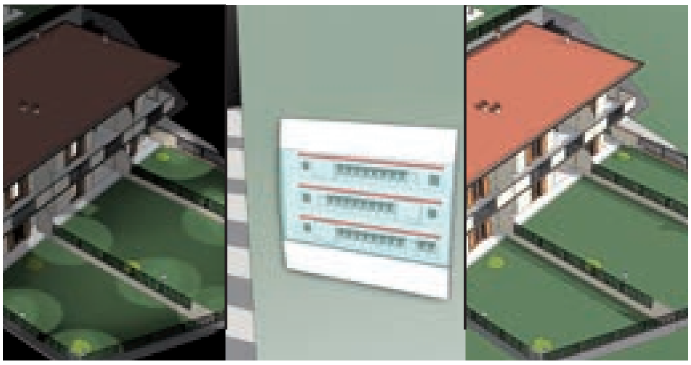


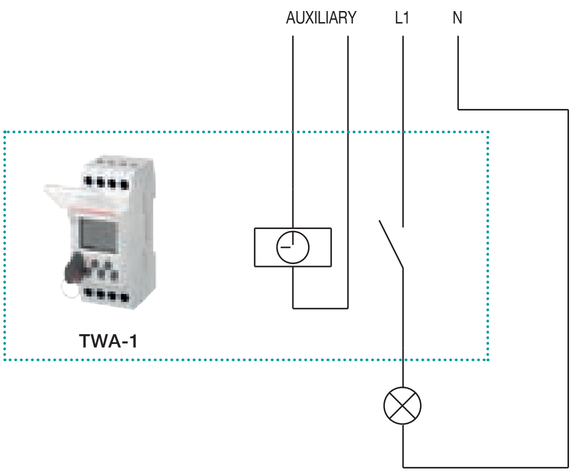
Control and automation technical details
TWA astronomical twilight switch

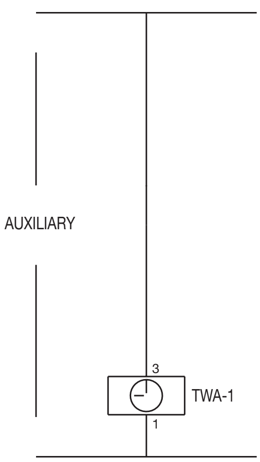
Operating principle
The installation of an astronomical twilight switch in a system is a particularly useful addition for settings and situations in which light sources, or other environmental conditions, can cause changes in the brightness level and falsify the reading. In these cases, the TWA-1 and TWA-2 astronomical switches can control the lighting system according to the sunrise and sunset times of the geographic zone in which the system is installed.

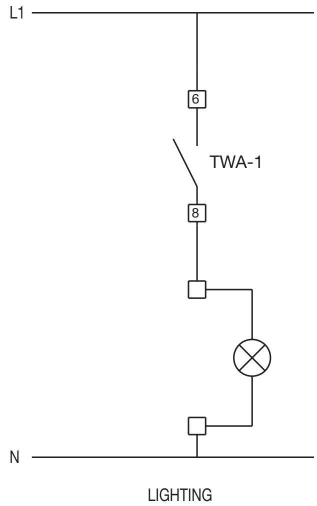
Application environments
The installation of the TWA-1 and TWA-2 astronomical twilight switches is particularly suitable for applications in which the operation of a twilight switch with external probe can be falsified or compromised by external agents (such as environmental pollution, overexposure to light, vandalism, etc.).

Example of installation
Atmospheric pollution is one of the causes of a reductions in the level of environmental light. Dust deposits on the external probe of a traditional twilight switch can compromise the operation of the device, preventing it from automatically switching off the controlled lighting system in the presence of external light.
As shown in the example, this problem can be resolved by installing a TWA-1 astronomical twilight switch that controls the lighting system according to the level of light calculated from the preset longitude and latitude parameters.





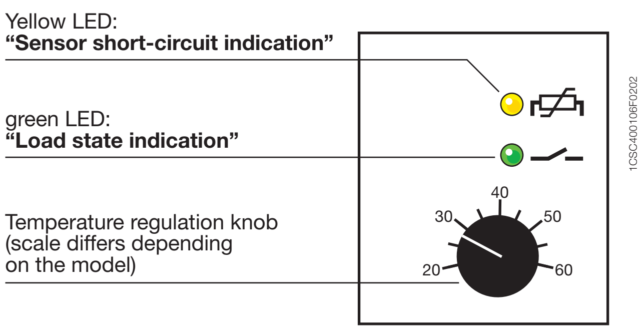




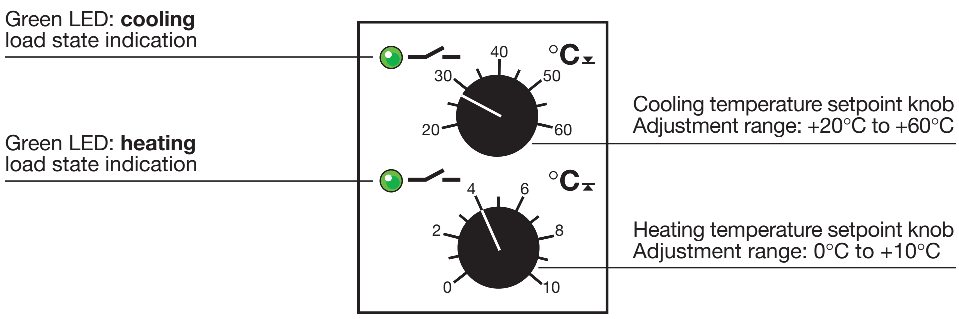
Control and automation technical details
THS modular thermostats

Controls and indicators

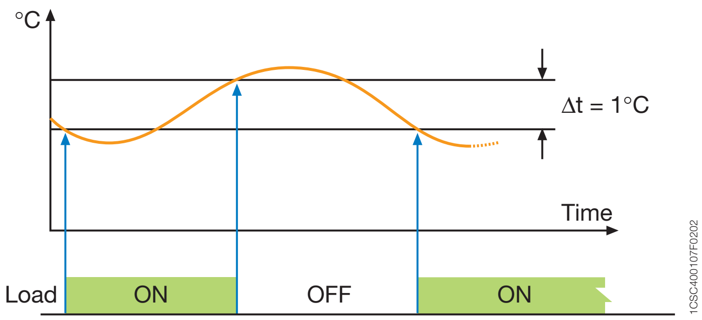
THS-C, THS-W



THS-S



Mode of operation



When the THS-C detects a temperature below the programmed setpoint, it closes contact 1 until the temperature returns above the setpoint. It then reopens the contact, and when the temperature again drops below the differential, the cycle is repeated.
THS-W operates in a similar manner, but the relay closes contact 5 when the temperature exceeds the programmed setpoint.
Sensor installation
The THS-1 and THS-4 remote temperature sensors (supplied separately) are waterproof and encapsulated in silicone rubber. They have an operating temperature range between -30°C and +130°C and are respectively 1.5 and 4 meters long.

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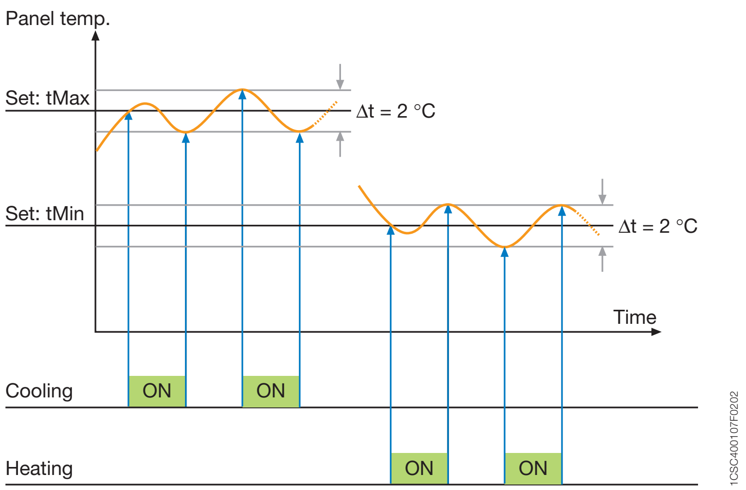


As shown in the figure, the THS-S switches on:

- The fan or air conditioner when the temperature in the panel exceeds the maximum setpoint programmed with the upper knob.
- The heating device when the panel temperature falls below the minimum setpoint programmed with the lower know

7

Sensor installation

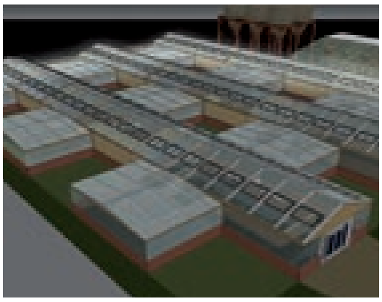
The remote temperature sensor is waterproof and able to withstand temperatures in the range from -30°C to +85°C; it has a maximum connection length of 100m.

Control and automation technical details
THS modular thermostats

Operating principle
Modular thermometers let you control and keep a heating or cooling element at a set temperature, comparing the value read by the sensor with the one set by the user.
The THS range can thus guarantee switchboard operating reliability, perfect product conservation in refrigerated counters or cells, promote greenhouse production, optimise drying cycles, etc.

Application environments
THS thermostat installation is thus the best way to regulate temperature in automation and distribution switchboards, in heating systems, in industrial applications or to control refrigerator systems, greenhouses, dryers or isothermal folding portals.

Example of installation
As shown in the diagrams, one of the possible applications consists in the installation of a THS-S modular thermostat inside an automation or distribution switchboard where the temperature must be kept at a set value. Thanks to the THS-S thermostat, you can thus control the temperature, permitting cooling regulations between +20 ÷ +60 °C and anti-condensation between 0 ÷ +10 °C. Furthermore, you can manage up to 3kW of point heaters without having to use any external contactors to manage the load.



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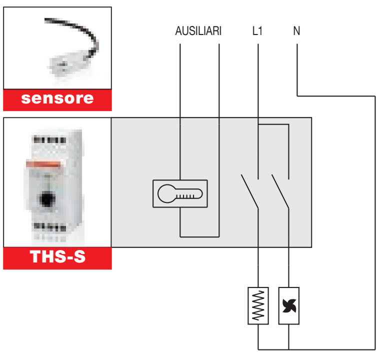

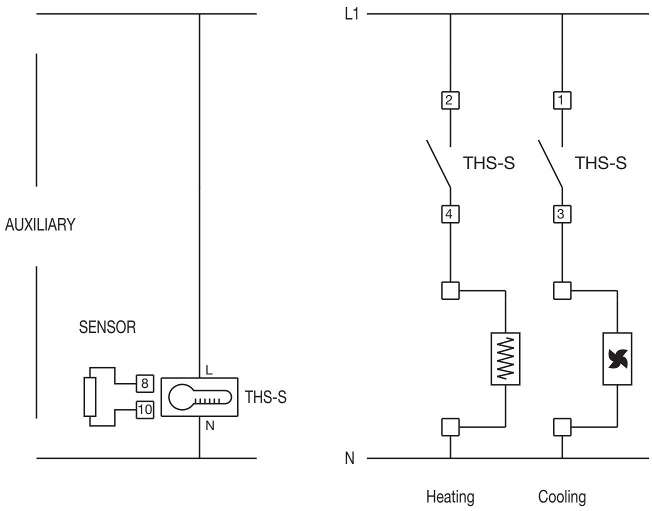

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ATT-Tool

ATT-Tool configuration and programming software allows users to fully customise GSM ATT telephone module to their specific requirements. ATT-Tool has a simple and intuitive interface that allows ATT to be quickly configured without having to remember complicated programming strings or consult a manual to learn the programming syntax. ATT-Tool, available in all the main languages, makes it possible to:

- Add/remove up to 250 users authorised for complete or conditional use of ATT module.
- Add/remove up to 100 recipients of call rings, sms messages, faxes or emails.
- Configure the analog or digital activation mode of the inputs.
- Configure the activation mode of the outputs.
- Define actions to be performed at pre-established intervals.
- Remotely track users and events.
- Customise commands and alerts.
- Perform program debugging.

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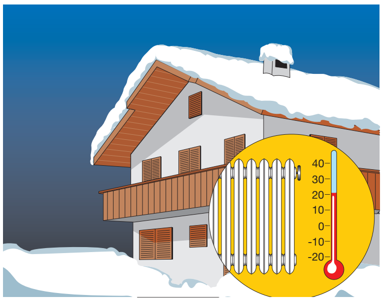
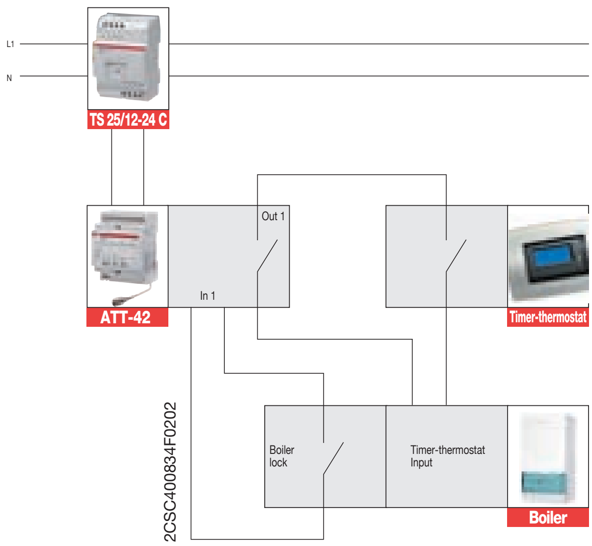
Control and automation technical details
ATT GSM modules

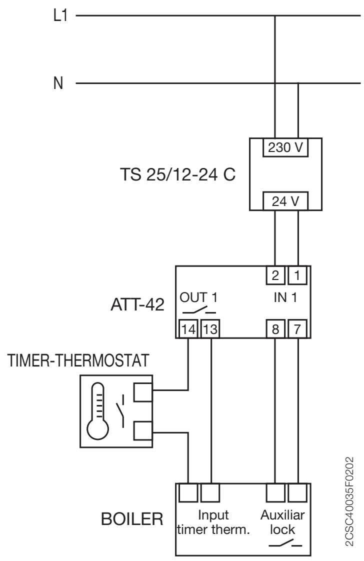
Operating principle
ATT-42 module is a GSM terminal with 2 outputs and 4 inputs for transmitting commands and alarms via SMS message, free phone call ring, fax or e-mail. Configuration is accomplished by means of SMS messages, or using the ATT-Tool software with ATT-42 connected to a PC.

Application environments
The ATT-42 module is especially suited for residential and services-sector installations in which loads need to be remotely monitored or controlled. ATT-42 can be equipped with a pre-wired external antenna, indispensable when the module is installed in places that do not guarantee adequate GSM coverage.

Example of installation
The figures illustrate an example application in which ATT-42 module is installed in the control panel of a second home in the mountains.
With a cell phone call ring to ATT-42, it is possible to switch on the boiler just before arriving at the house, or to keep it continually in operation. In the event of a problem with the boiler, ATT-42 sends a notification SMS.







Operating principle

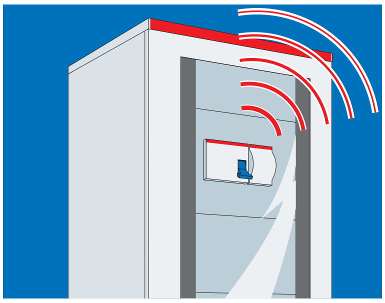
ATT-122 module is a GSM terminal with 12 inputs and 2 outputs for transmitting commands and alarms via SMS message, free phone call ring, fax or e-mail. Configuration is accomplished by means of SMS messages, or using the ATT-Tool software with ATT-122 connected to a PC.

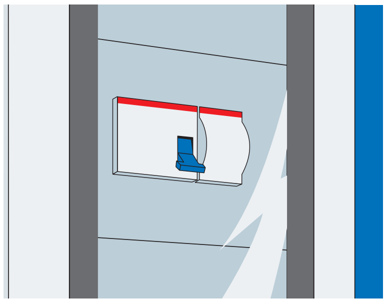
Application environments

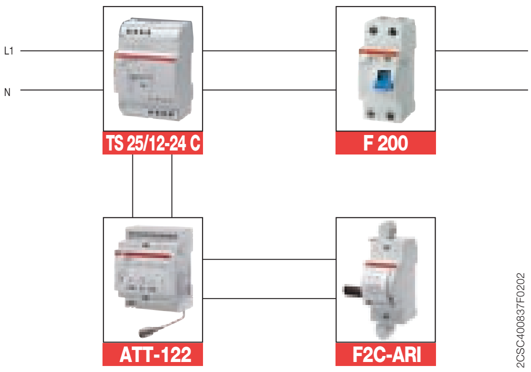
ATT-122 module is ideally suited to industrial and services-sector installations which require loads to be remotely monitored or controlled. ATT-122 can be equipped with a pre-wired external antenna, indispensable when the module is installed in places that do not assure adequate GSM coverage.

Example of installation

The figures illustrate an example application in which ATT-122 is installed in the circuit of an unsupervised facility.
In the event of a power outage, ATT-122 sends an alarm notification to the list of authorised users, while at the same time actuating the motor-driven command which reinstates the power supply.







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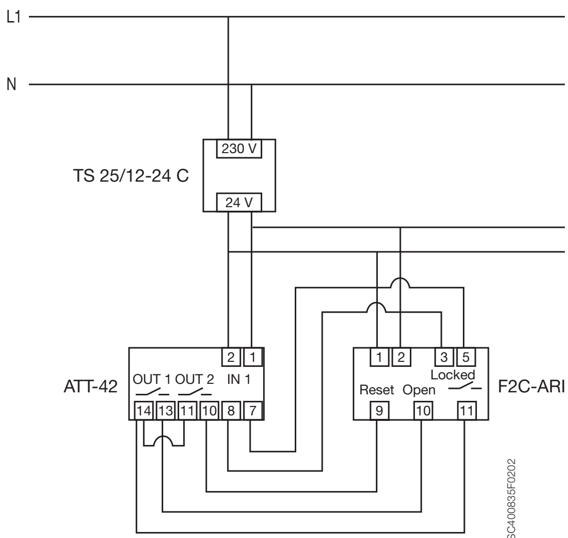

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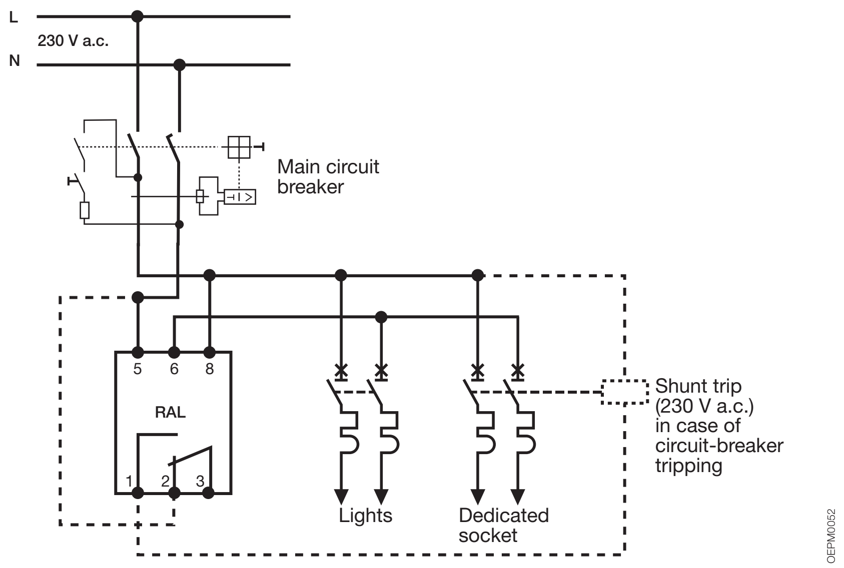
Load release



See page 7/34 in Solutions for electrical distribution in building

Operating principle

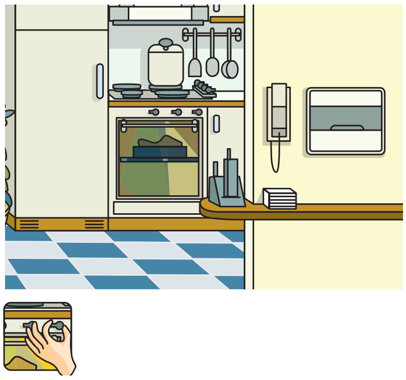
The RAL overload alarms constantly compare the maximum preset power consumption value to effective system power consumption.
Approaching allowed threshold, they signal to disconnect one of the loads through acoustic alarm avoiding the main circuit breaker tripping.
Connecting the undervoltage release to the appropriate contact, the RAL overload alarms provide an acoustic alarm and simultaneously opens the circuit-breaker protecting one or more not primary loads.

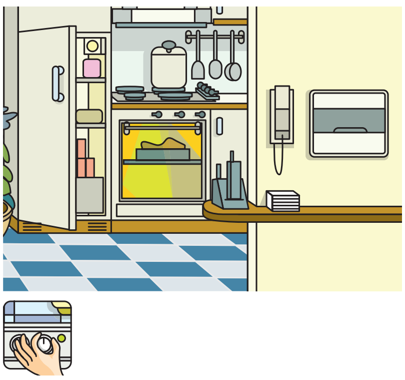
Application environments

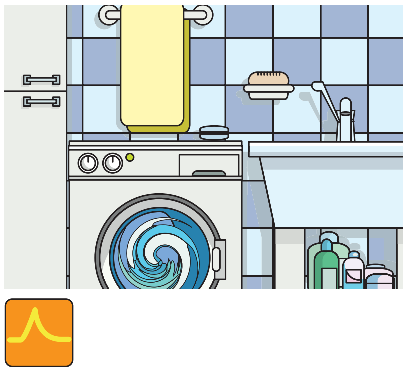
The installation of the RAL overload alarms is suitable for any environment and situation in order to avoid power consumption which could trip the limiting circuit breaker of the system.

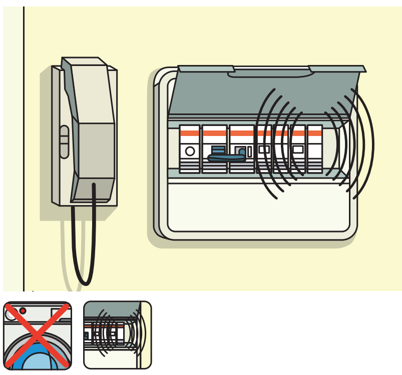
Example of installation

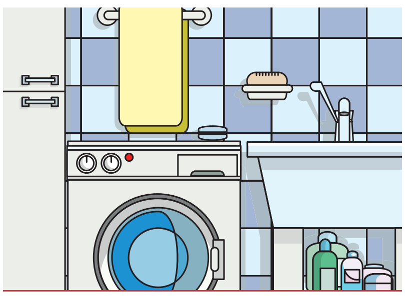
As shown in the diagrams, one of the possible applications is the installation of the RAL overload alarms in the domestic system where the electric oven and washing machine are simultaneously switched on increasing the power consumption. When the power consumption approaches the preset threshold values, an acoustic alarm is activated and the washing machine switches off automatically through an undervoltage release.



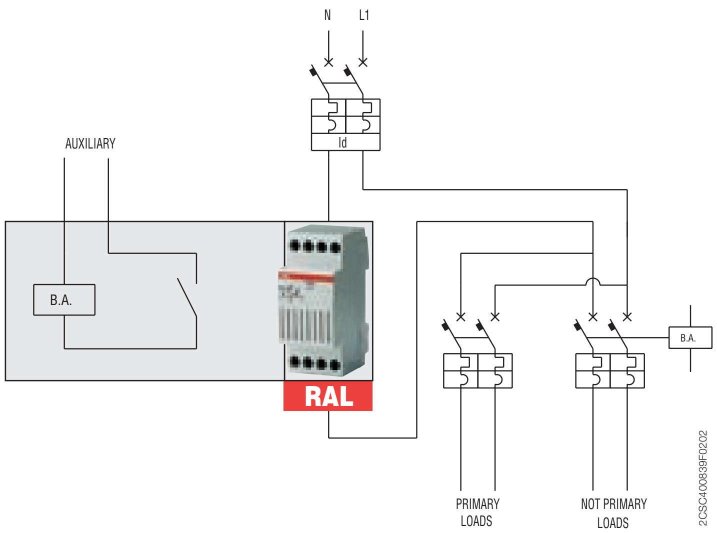


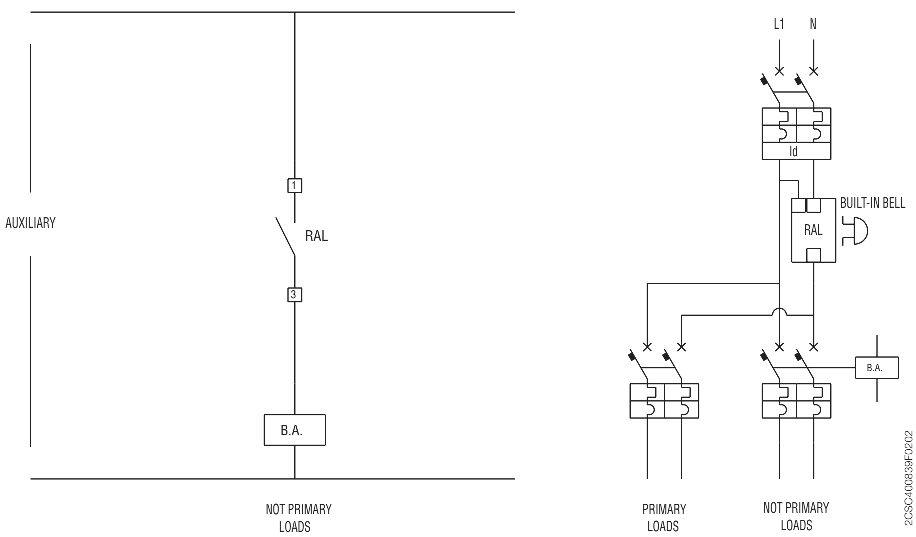






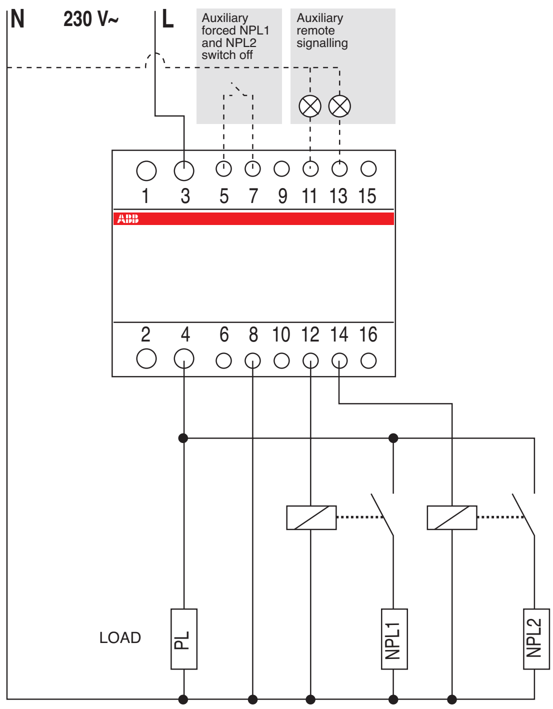
Control and automation technical details
RAL overload relays



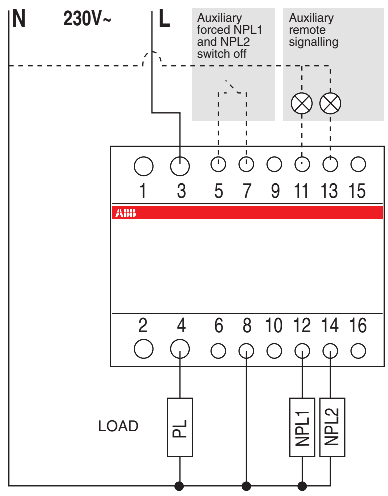


Control and automation technical details
LSS1/2 load shedding switch

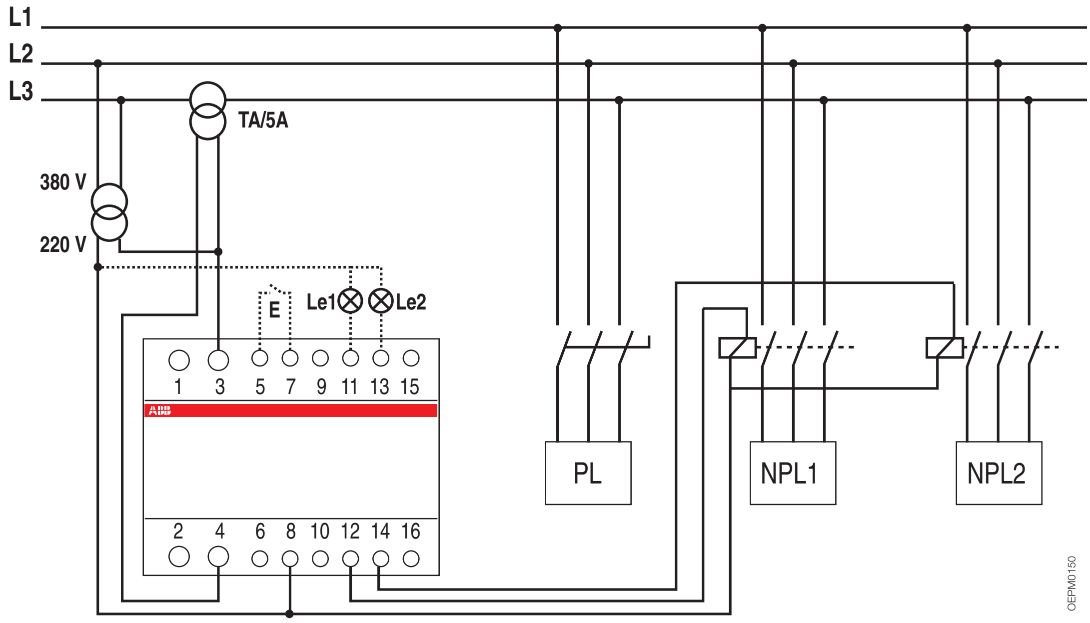
Single-phase wiring diagram for non prioritary loads with 16 A or more current consumption



Single-phase wiring diagram



Balanced three-phase wiring diagram



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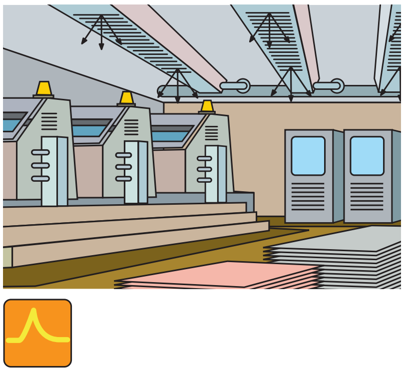
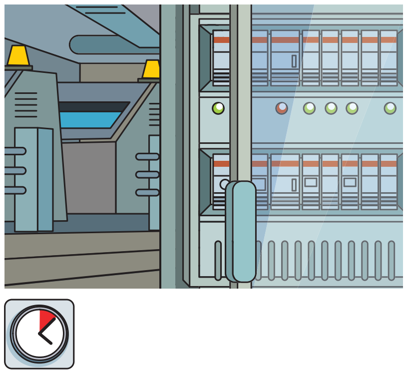
Control and automation technical details
LSS1/2 load shedding switch

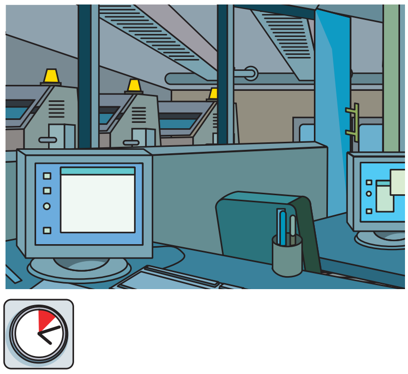
Operating principle
LSS1/2 load shedding switches are used in case of exceeding of consumption threshold allowed in the system by switching off in sequence one or two loads, if necessary. At preset intervals and until current consumption is not below the reference level, the switch tries to reset the disconnected loads.

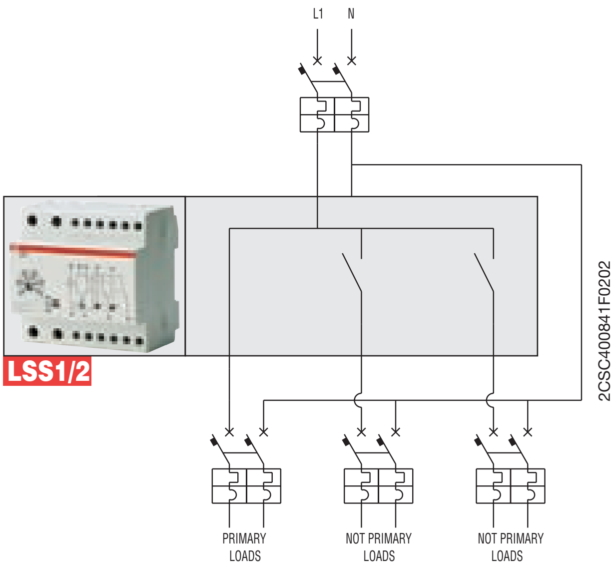
Application environments
The installation of the LSS1/2 load shedding switches is suitable for any environment and situation where it is necessary to control electric energy consumption within consumption limits allowed in the system.

Example of installation
As shown in the diagrams, one of the possible applications is the installation of the LSS1/2 load shedding switches in a printing office system, where the conditioning switch-on causes the exceeding of the energy consumption threshold defined with the supplying company by contract. The LSS1/2 load shedding switch preserves printing machines operation by switching off one or two primary loads automatically (i.e. night conditioning and lighting), where ON red leds indicate temporary OFF. After a preset interval, the switch checks that current consumption values fall within the limits again trying to reset the previously disconnected loads.








L1
N
LSS1/2
PRIMARY LOADS
NOT PRIMARY LOADS
NOT PRIMARY LOADS
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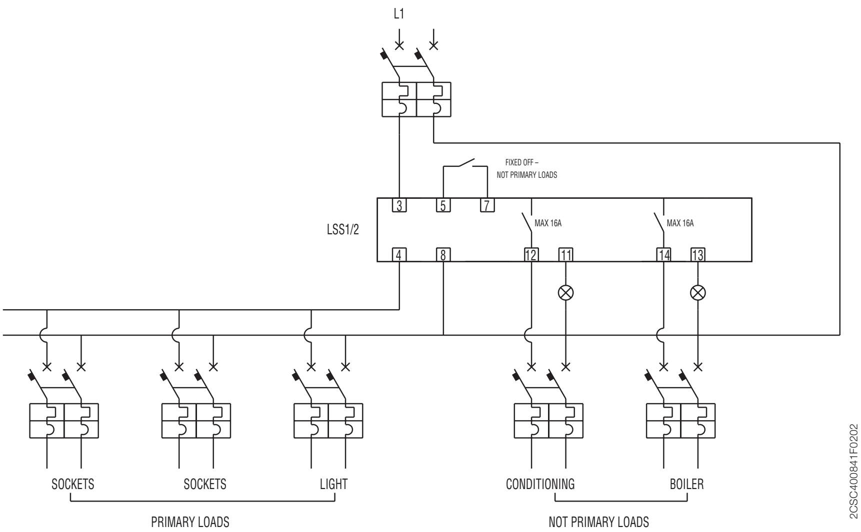
L1
FIXED OFF - NOT PRIMARY LOADS
LSS1/2
3
5
7
MAX 16A
MAX 16A
4
8
12
11
14
13
SOCKETS
SOCKETS
LIGHT
PRIMARY LOADS
CONDITIONING
BOILER
NOT PRIMARY LOADS
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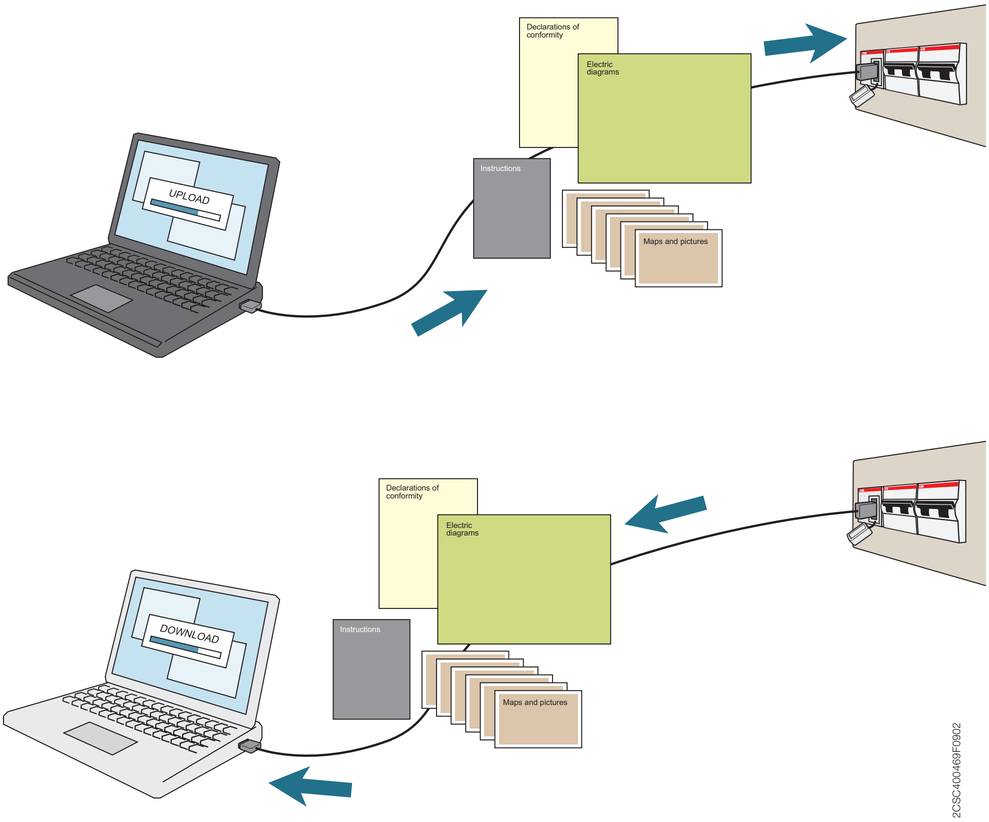
Control and automation technical details
MeMo USB modular DIN rail device



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Operating principle
MeMo2 is USB device for DIN rail in two modules width to store and keep handy useful electronic information, such as files and applications, directly in the switchboards.
No electrical wiring is required, just mount the device on DIN rail choosing a convenient position to easily connect it to the PC.
MeMo2 is provided with a bidirectional roll cable to connect the device to all USB ports of your PC.
The PC or laptop automatically recognizes the device as an external memory allowing the transfer of files - no additional software is required.
The 60 cm roll cable is compliant with USB 2.0 standard to ensure maximum speed and reliability in uploading and downloading data.

You can easily protect your files by installing any encryption software on MeMo.

Application environments
MeMo is a useful device to get all your information inside switchboards or consumer units

Industrial applications:
- electric diagrams
- declarations of conformity
- products certifications
- test reports
- instructions
- warranties

See page 7/39 in Solutions for electrical distribution in building

Domestic applications:
- declaration of conformity for the installations (electric/ thermal-hydraulic)
- maps and pictures of pipes of the building
- anti-intrusion system programming
- cadastral documentation if available in electronic format

Plus
- 2 GB and 4 GB versions
- information always available in the switchboard
- no more paper documentation
- save time: instant, easy and free update of documentation
- set up a master for serial switchboard
- easily find and edit your documentation
- customize information
- OEMs could save useful information such as spare parts list, technical assistance contacts, scheduled maintenance calendar.

Example of installation
Mounted in a convenient position inside the switchboard MeMo can save crucial information, files and applications concerning the plant.
Data stored inside MeMo are always available for regular maintenance or in case of emergency.

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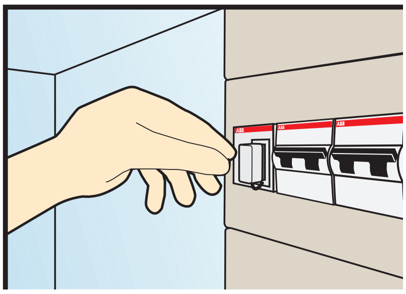
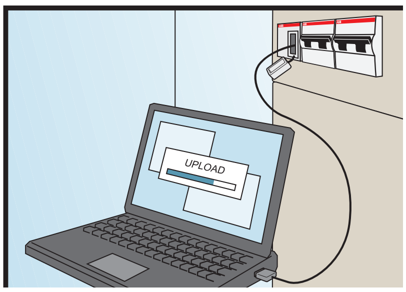




7

Solutions for electrical distribution in buildings - Technical details
Energy efficiency

Energy efficiency technical details

Energy efficiency technical details
Multimeters and network analyser

Communication networks with Modbus RTU protocol
Modbus is a serial communication protocol created for use with programmable logic controllers (PLC). It has become an industry standard and is the most widely used protocol for connecting of industrial electronic devices.

Its principal benefits are:
- Ease of use
- Low resource requirements
- Openly published and royalty-free
- Allows communication between many devices connected to the same network

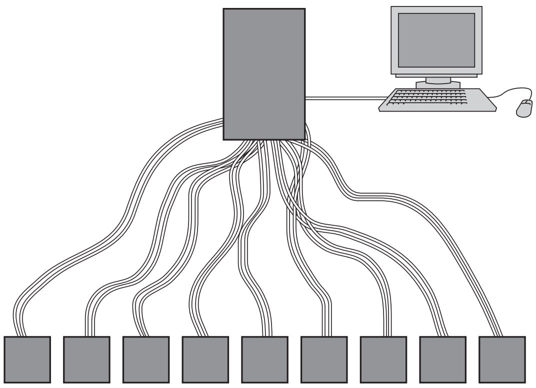
The Modbus support was created for controlling transfer on the line and pipeline monitoring. The system’s flexibility and reliability make it suitable for a wide variety of processes and operations in nearly every industry.

Modbus determines how many MASTERS and SLAVES to recognise and connect together, how many senders and receivers are identified, how many messages are exchanged in an orderly manner and how many errors occur.
Every peripheral that needs to communicate via Modbus is assigned a unique address.
Any one of them can then send a Modbus command, although generally (necessarily, in the case of serial) only one peripheral acts as a master.
A Modbus command contains the Modbus address of the peripheral it is intended for, and only that peripheral will act on the command, even though all the others receive it as well.
All Modbus commands incorporate control information to ensure that the received command is correct.

Conventional I/O system

Plus
Field devices unaffected from wiring error caused by other devices thanks to indipendend wiring
Devices are cheaper
Well known technology

Minus
Higher installation complexity caused by:
point to point wiring
many terminal blocks, need additional rack space or more cabinets
troubleshouting on complex wiring
increased number of point of failure
longer initial check and start up
Expensive installation



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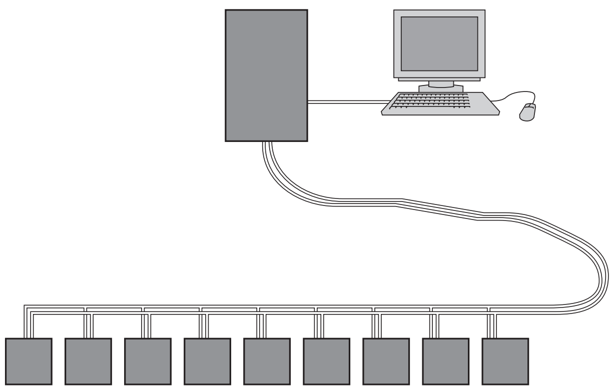
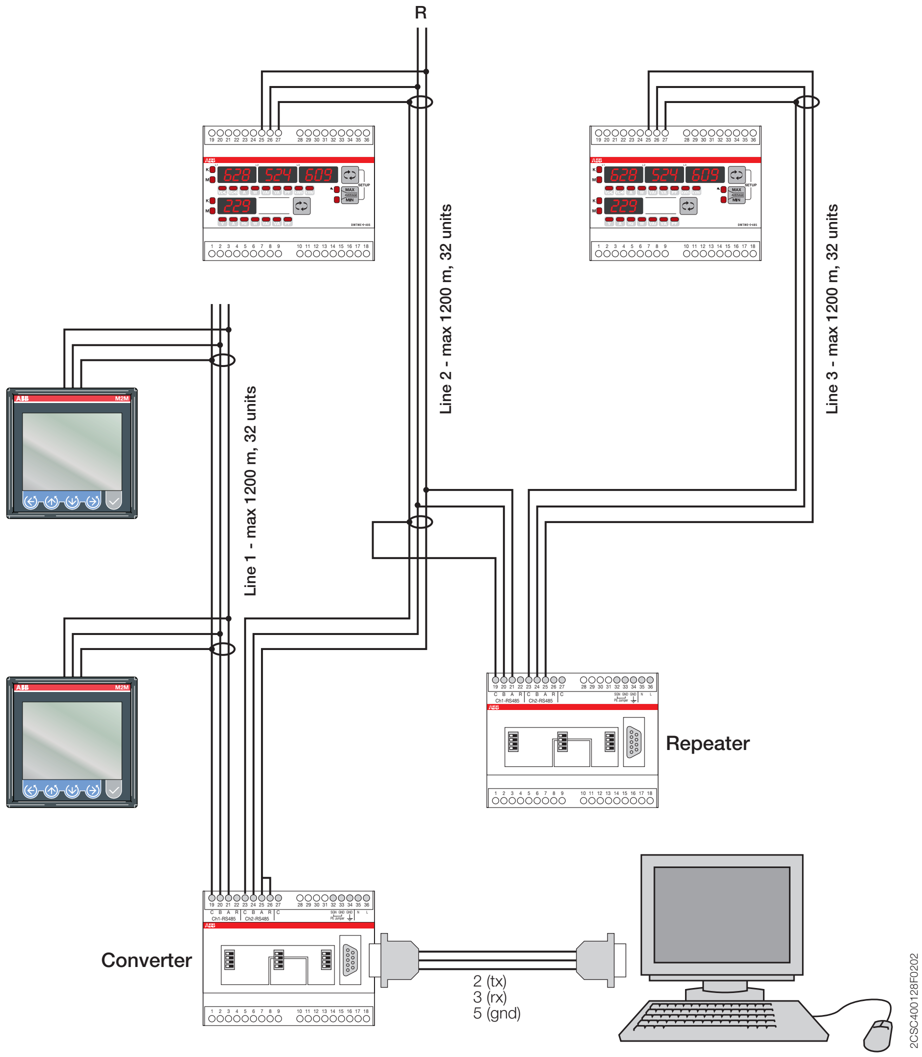
Modbus Network

Plus
Well known protocol, fully documented
Many PLC, DCS and process systems are supporing this protocol
Many facilities already use it
Optimum choice when:
Modbus network or devices are being used
Modbus protocol is already used as a facility standard

Minus
Device operations require separate power
Limited diagnostic capabilities (device applications)
Limited use as a device bus



Application example



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Energy efficiency technical details
Multimeters and network analyser

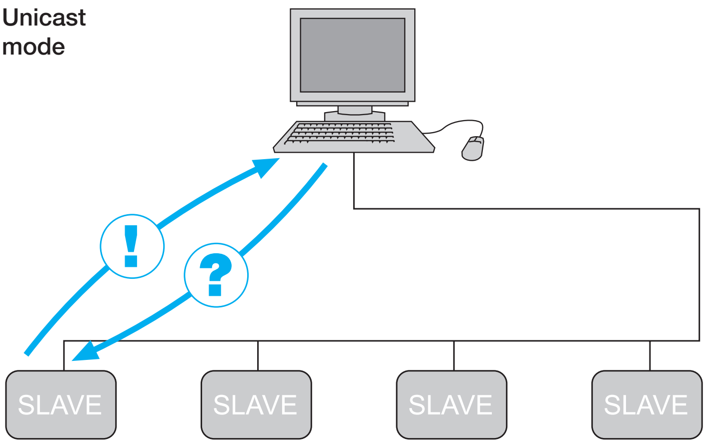
Connection among the devices

The protocol has one Master and up to 247 Slaves on a common line covering a maximum distance of 1200 metres. Only the Master initiates transactions. The transactions are of the request/reply type (addressed to a single Slave) or of the broadcast/reply type (addressed to all Slaves).

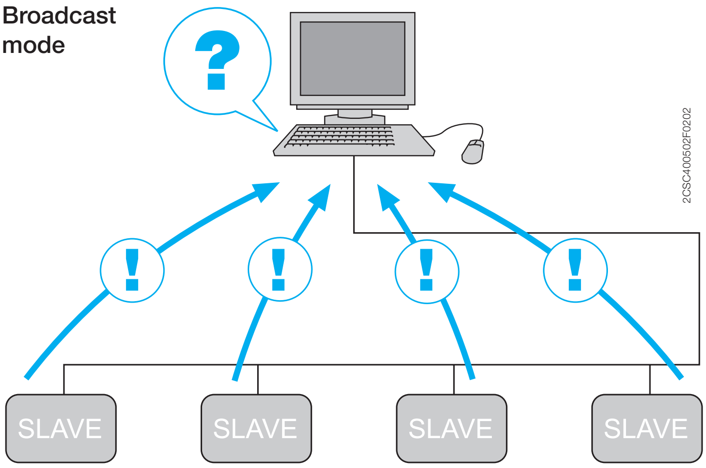
Modbus is often used for connecting a supervisory computer with a remote terminal unit (RTU) in supervisory control and data acquisition systems (SCADA). There are two versions of the protocol: one for serial ports (RS232 by default, but also RS485) and one for Ethernet.

Modbus uses a compact hexadecimal data representation. The RTU format appends to commands/data a cyclic redundancy checksum (CRC) field, while the ASCII format uses an LRU type (longitudinal redundancy check) checksum.

Unicast mode



Broadcast mode



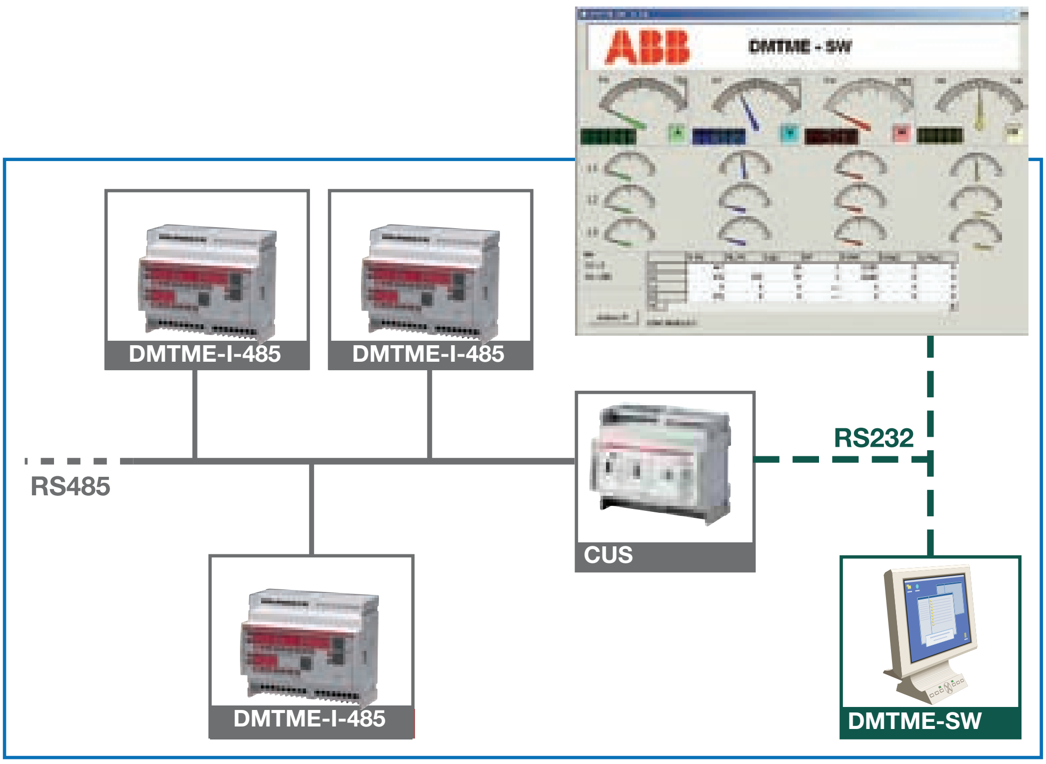
DMTME multimeters

The DMTME series instruments are digital multimeters that measure the true rms value of the principal electrical quantities in 230/400 V a.c. networks, with the ability to store in memory the maximum/minimum/average measured values, and meter active and reactive energy.
Four red LED displays provide a clear local readout of multiple measurements simultaneously.
The DMTME multimeters perform the functions of a voltmeter, ammeter, power factor meter, wattmeter, varmeter, frequency meter, active and reactive energy meter in a single instrument, thus substantially reducing installation space requirements and wiring time.

The DMTME-I-485 version is additionally equipped with a pulse output and RS485 port for communicating the measured parameters via a Modbus network.
All versions come with a mini CD containing the instruction manuals, technical documentation, communication protocol and the DMTME-SW software.
The main innovations of the range are:

- Automatic recognition of the C.T. connection polarity, which simplifies installation of the instrument, making it error-proof.
- An hour counter for scheduled maintenance and an instrument life time display, to assist the installer with routine activities.
- Separate auxiliary 115/230 V a.c. power supply on all models, with extractable terminal blocks.

The DMTME-SW software can perform real-time acquisition of all the readings of a multimeter or network of DMTME multimeters, with the values displayed in a single on-screen window.
The measurements are shown in both numeric and “analog instrument” format.
DMTME-SW also functions as a simple Modbus communication test instrument, allowing the installer to check the correct operation of the network prior to testing by the system integrator.
Configuration example of networked DMTME multimeters



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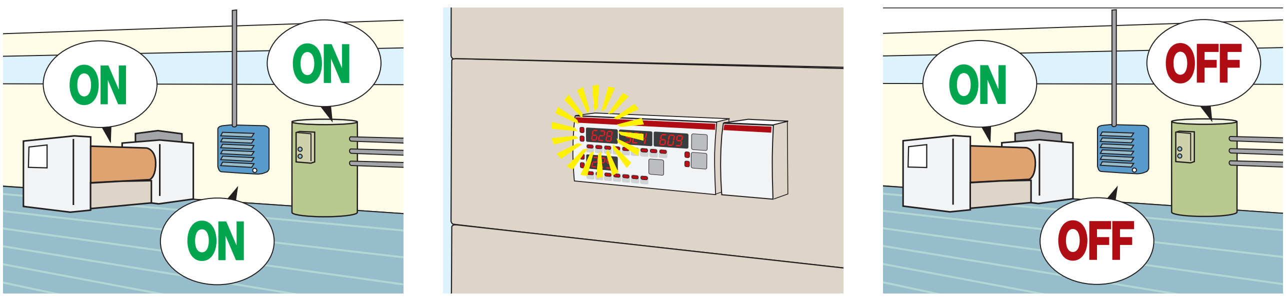
Energy efficiency technical details
DMTME multimeters

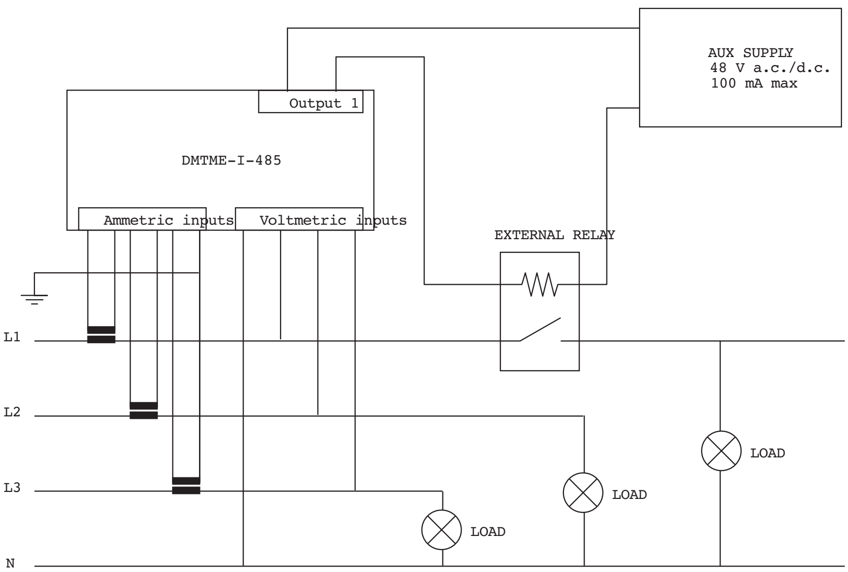
Operating principle
Beyond the custom functions of electric measure, the DMT-ME-I-485 multimeter is equipped with two programmable relays used as output alarms.
The setting of the alarm thresholds of all the network electrical parameters allows the customer to hold always under control its own system.

Application environments
The installation of DMTME-I-485 multimeter is adapt in all those cases in which the customer must hold under remote control its own system.
The use of the multimeter allows to set up system automation, to prevent malfunctions, dued to overloads and undervoltages, to manage maintainance and to prevent overcoming of the contractual power, avoiding penal from the energy supplyer.
The multimeter can carry out the same functions of the LSS1/2 load shedding switch, with the advantage of allowing installation in three-phase systems, instead of only single phase systems.

Example of installation
A possible application is the installation of DMTME-I-485 inside an electrical distribution switchboard of an industrial system.
It's possible to set up an alarm based on the total absorbed power from the system. When the power exceeds the set up threshold, the switching of the multimeter inner contact excitates the coil of an auxiliary external relay.
The switching of the external relay, a ESB contactor or a E234 electronic timer, detaches a non primary load to lower the absorption levels of the entire system.

This application can be performed also by using M2M and ANR network analyser.





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Operating principle

In addition to measuring the main electrical quantities, the DMTME-I-485-96 digital front panel multimeter has a serial port for implementing a communication network, and two digital outputs which can be configured as alarm outputs. Programmable alarm thresholds on all the electrical parameters of the network allow the user to continually monitor the entire installation.

Application environments

The DMTME-I-485-96 multimeter is ideal for those situations where users must remotely monitor their installation. The multimeter makes it possible to implement system automation, prevent malfunctions due to overloads and undervoltages, manage maintenance, and monitor the functioning of the installation.

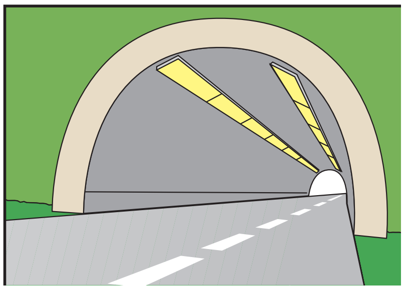
Example of installation

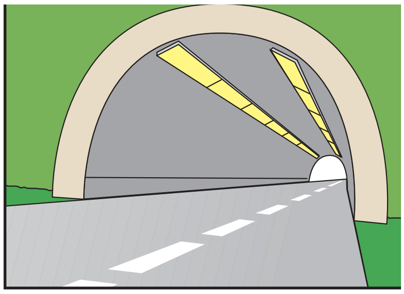
The figures show an application example in which the DMTME-I-485-96 is installed in a motorway tunnel panel, with an alarm threshold programmed on the total power consumption of the row of lights.

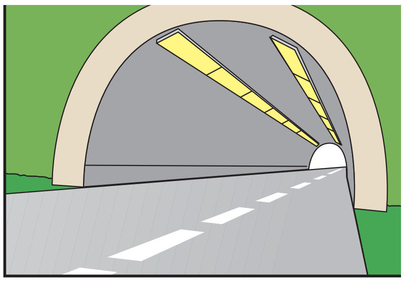
If one or more lamps burn out, the total power consumption drops and triggers an alarm.

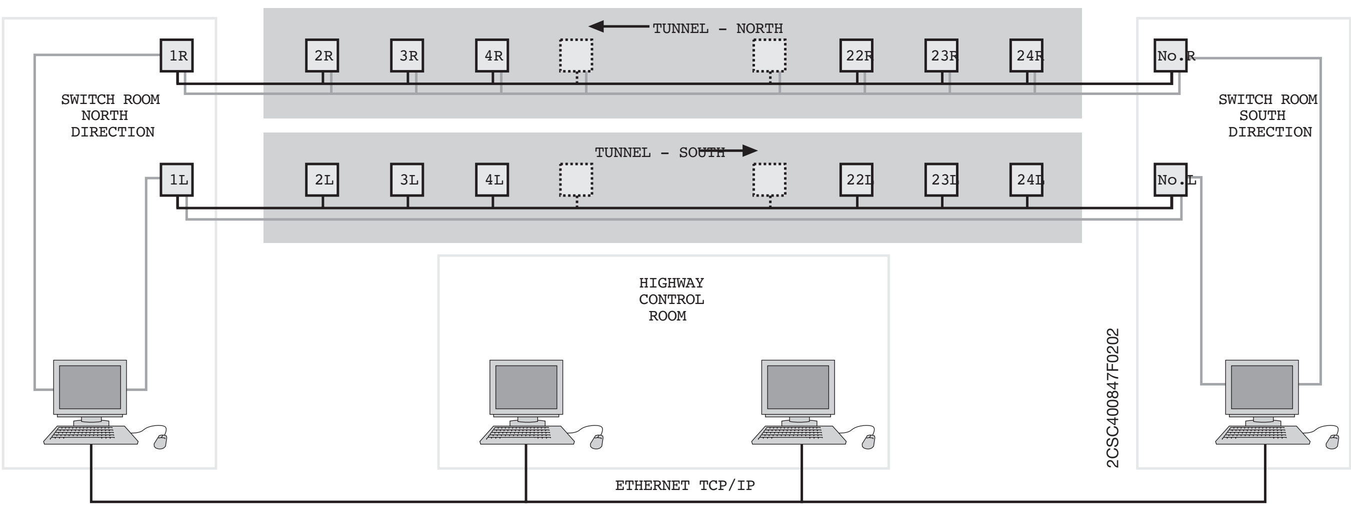
Remote acquisition of this data thus allows a maintenance technicians to be sent out only when effectively needed.

This application can be performed also by using M2M and ANR network analyser.









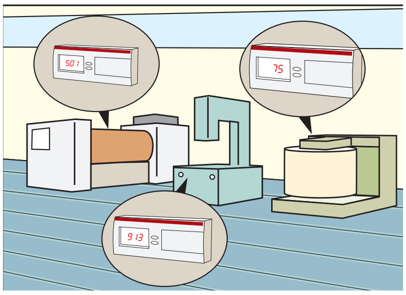
Energy efficiency technical details
ANR Network analyser

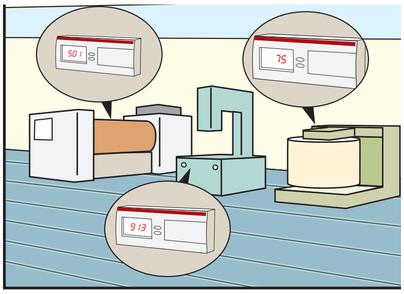
Operating principle
The ANR network analyser can perform a variety of functions. In this example the ANR is used as a data concentrator, acquiring incoming data from other measuring devices and energy meters, and as a load manager.
The digital outputs in fact allow alarm thresholds to be programmed which, if breached, will trigger audible and visible alarm signals, or command the energising of a relay coil or switch to disconnect a particular load, thereby implementing effective automated management of energy consumption to comply with the maximum power draw permitted under the contract with the energy supplier.

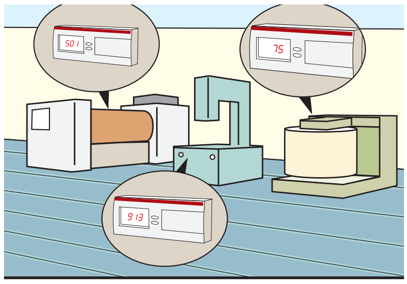
Application environments
ANR is suitable for industrial and services sector applications which require implementing control of energy consumption, optimising service continuity and managing the quality of the network.

Example of installation
As illustrated in the figures, the ANR can be used to allocate power consumption among production cycles and track the share of energy costs in the total product cost.
Through its digital inputs, the ANR is able to acquire the pulse signals output by various energy meters and thus keep track of their totals.

This application can be performed also by using M2M and DMTME network analyser.







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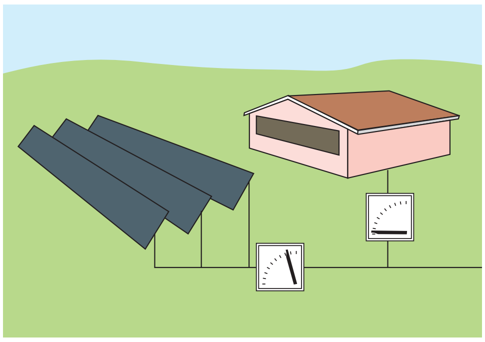
Energy efficiency technical details
M2M Network analyser

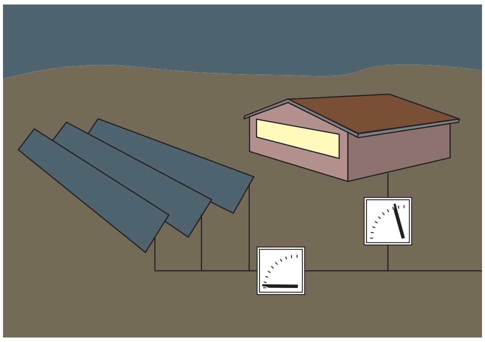
Operating principle
Among its several functionalities, M2M performs bidirectional metering of energy and power on the 4 quadrants, allowing both production and consumption of energy to be monitored with a single device.
With the M2M analyser it is possible to keep the electrical consumption of all types of system under control, measuring them in real time both in economic and environmental impact terms, thanks to the immediate conversion of the energy balance into Euros and CO_2 kg.

Application environment
M2M bidirectional reading allows the amount of produced and consumed energy, saved money and avoided pollution to be displayed, optimal in systems generating energy from renewable sources. At the same time the possibility of keeping the quality of electrical parameters under control helps in achieving positive results on safety and operating costs.

Example of installation
A typical application where to use these M2M functionalities is a photovoltaic plant. By activating the GENERATION option, the energy counts will be carried out on 4 quadrants separating energy and absorbed power. Through the monitoring of network THD and Power factor, M2M can control harmonic distortion introduced in the system by non-linear loads such as inverter, computers, etc.
The integration of electrical consumption measurement in a supervision system can be done via the most advanced communication protocols (Modbus RTU, Modbus TCP/IP and Profibus DP) allowing 360° analysis of system performances.

This application can be performed also by using ANR network analyser.



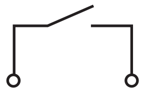
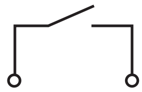
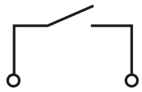
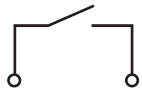


8

See page 8/5 in Solutions for electrical distribution in building

Energy efficiency technical details
Digital instruments

Alarm activation logic

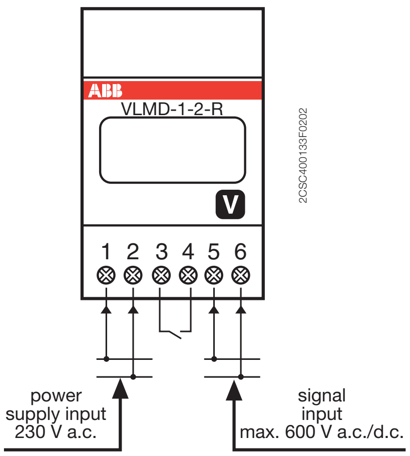
Device status	NO polarity (default)	NC polarity
Instrument not supplied		
Instrument supplied - no alarm		
Instrument supplied - alarm condition		

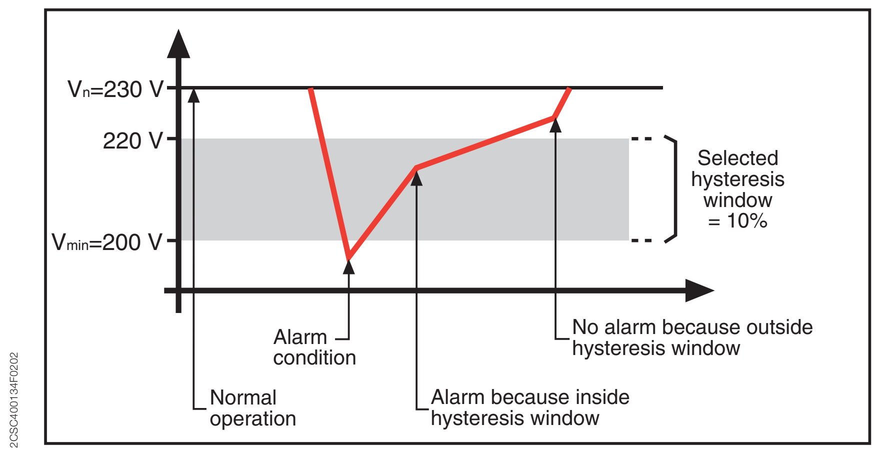
Digital measurement instruments with relays

Control of a load with the following characteristics:
In = 5 A (rated normal operating current)
Vn = 230 V a.c. (rated normal operating voltage)
Vmin = 200 V a.c. (RLV relay trip)

To scroll through the menu items press briefly (<3sec); to confirm press and hold (>3sec).

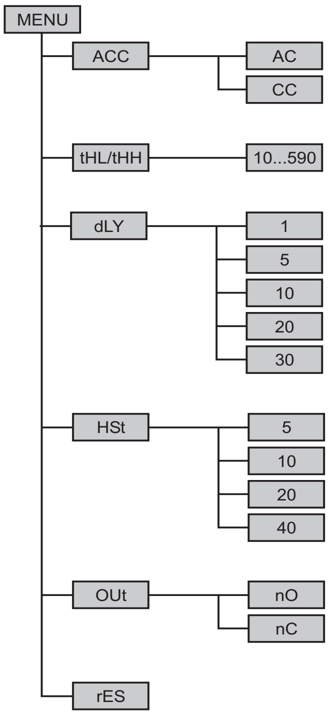
1 Connect as shown in the diagram (Vmin = 200 V).
2 Press and hold the key to enter the programming menu.
3 Scroll to the ACC menu item and confirm, then choose CC to select direct current operation, and confirm.
4 Set the full scale value to 300 V
5 Set the alarm threshold at 70 and confirm.
6 Adjust the Delay trimmer: scroll to the dLY menu item and confirm, then select the relay tripping delay (1…30 sec).
7 Program the alarm reset hysteresis (HySTeresis) at 10% of the threshold: scroll to the HSt menu item, confirm, and select the value 10. This results in a trip window between 200 and 220 V. The relay will be tripped at 200 V and return to normal operation at 220 V.
8 Set the alarm output polarity: scroll to the OUt menu item and confirm, then choose whether the contact opens or closes when an alarm is triggered (N.O. by default).



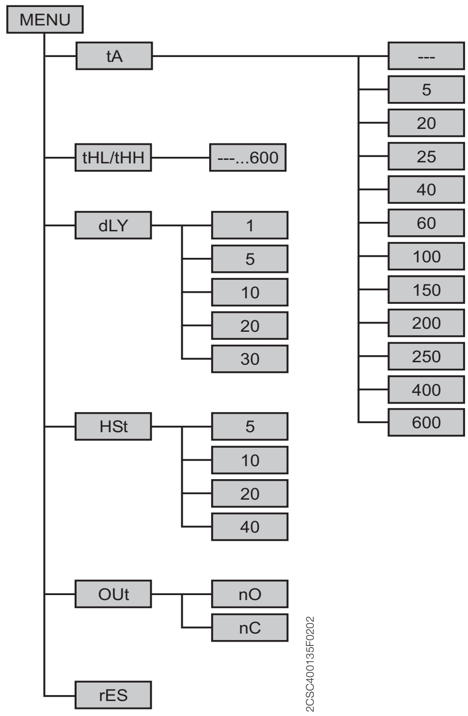


See page 8/42 in Solutions for electrical distribution in building

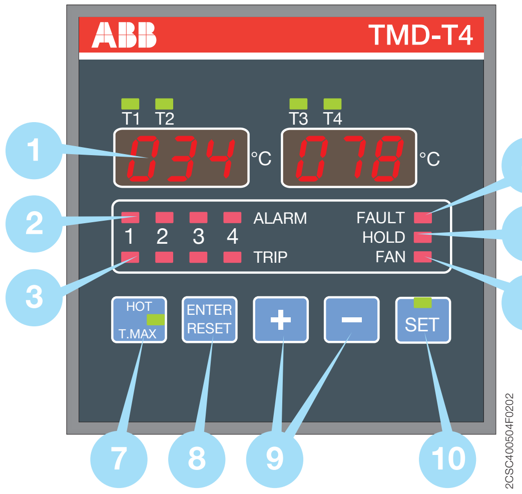
Voltmeters menu layout



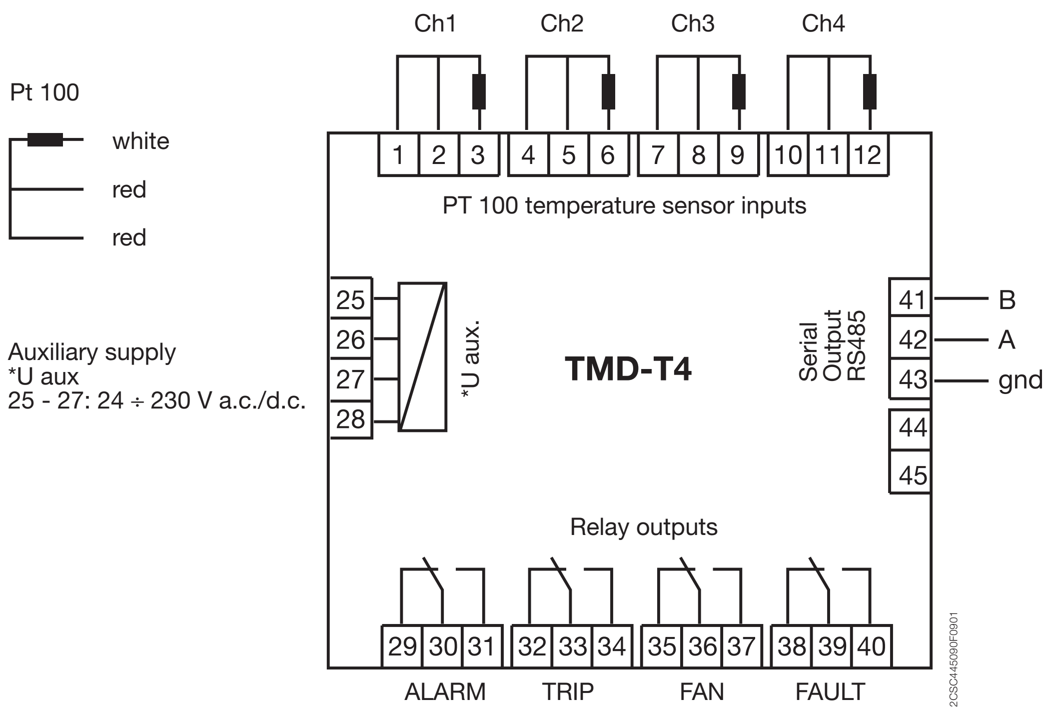
Ammeters menu layout



TMD temperature control units



1 Display for viewing temperature values and settings
2 ALARM LED for viewing alarm status of measuring channels
3 TRIP LED for viewing trip status (second-level alarm) of measuring channels
4 FAULT LED for indicating temperature control unit and sensor faults
5 HOLD LED for indicating whether manual reset function is enabled
6 FAN LED for indicating whether fan output is enabled
7 MAX T. pushbutton for selecting to view the max temperature level
8 ENTER/RESET pushbutton for confirming the programmed settings and for manually resetting any alarms that have been tripped
9 +/- pushbuttons for selecting the measuring channels and for adjusting the programming parameters
10 SET pushbutton with status LED for accessing and programming the device’s settings



See page 8/67 in Solutions for electrical distribution in building

Energy efficiency technical details
Measurement current transformers with through primary

Power consumption of copper cables between the device and the transformer

For 5 A secondary

Cable section mm²	Power (two-pole cable) VA VA					
	Distance					
	1 m	2 m	4 m	6 m	8 m	10 m
1.5	0.58	1.15	2.31	3.46	4.62	5.77
2.5	0.36	0.71	1.43	2.14	2.86	3.57
4	0.22	0.45	0.89	1.34	1.79	2.24
6	0.15	0.30	0.60	1.89	1.19	1.49
10	0.09	0.18	0.36	0.54	0.71	0.89

Maximum load (A) on copper bars according to DIN 43670 and 43671

Bar dimensions mm	Rated current (In) A 1 bar	2 bars	3 bars
20x5	325	560	
20x10	427	925	1180
30x5	379	672	896
30x10	573	1060	1480
40x5	482	836	1090
40x10	715	1290	1770
50x10	852	1510	2040
60x10	985	1720	2300
80x10	1240	2110	2790
100x10	1490	2480	3260

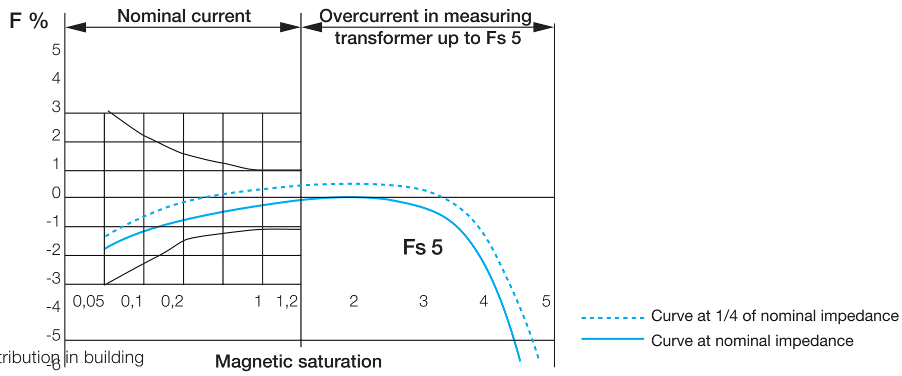
Rating	Ratio fault limit in % 0.05 In	0.2 In	In	1.2 In
0.5	±1	±0.75	±0.5	±0.5
1	±2	±1.5	±1	±1
3	From 0.5 In to 1.2 In = ± 3			

Rating	Angle fault limit in % 0.05 In	0.2 In	In	1.2 In
0.5	±1.8	±1.35	±0.9	±0.9
1	±3.6	±2.7	±1.8	±1.8
3	No prescriptions			

Accuracy rating

- 0.5 rating is required for power meters.
- 1 rating is required for unofficial power measures and power meters (measurements within the firm).
- 3 rating is required for relays and protection devices.

Error Curves



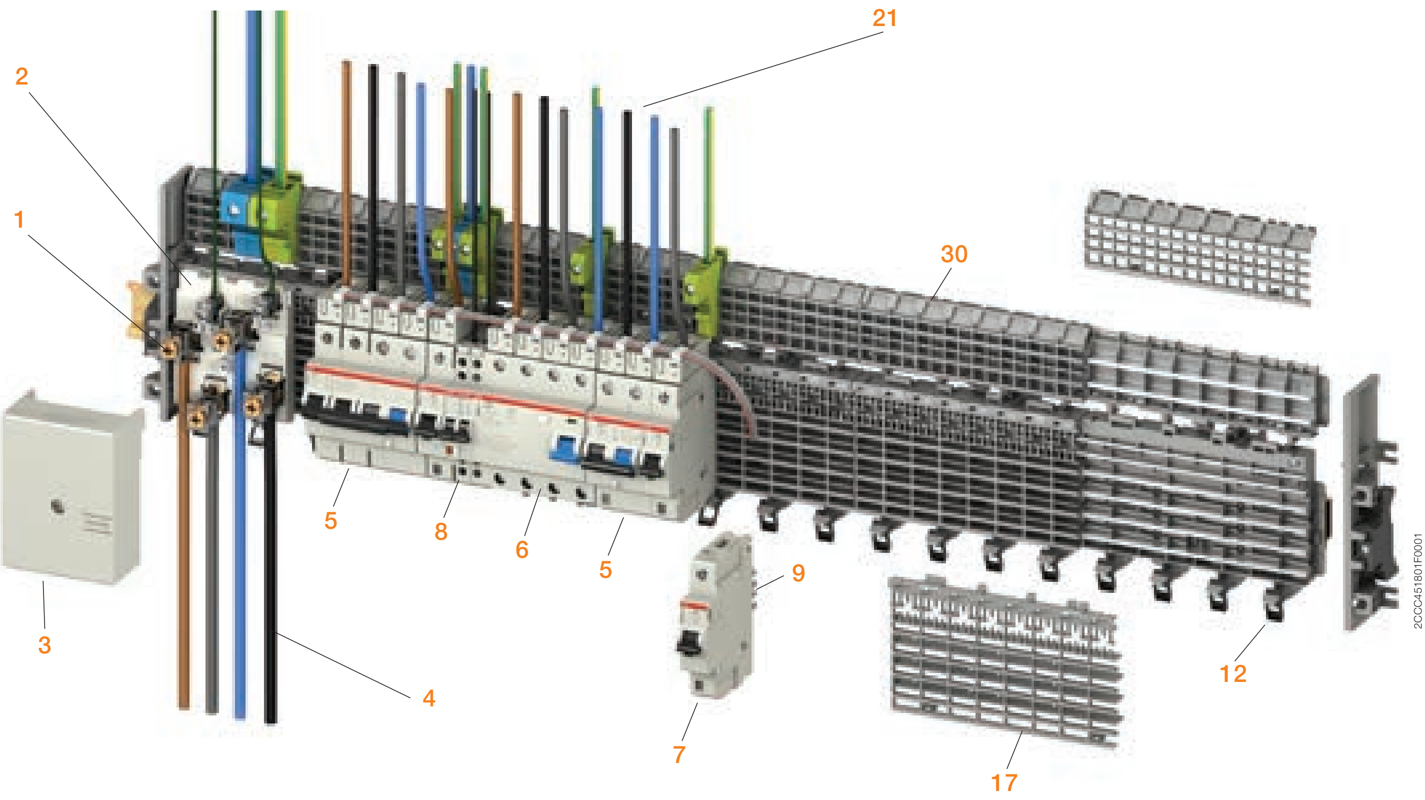
See page 8/72 in Solutions for electrical distribution in building

8

Solutions for electrical distribution in buildings - Technical details
SMISSLINE TP plug-in system

Smissline technical details

SMISSLINE TP technical details
Overview devices with a busbar system



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 DS401/DS402 and FS403

6 Residual-current circuit breaker F404

7 Miniature circuit breaker S401 M

8 Signal contact

9 Plug contacts

10 DIN adapter

11 Spare way cover

12 Device latch

13 Busbar L3 or DC +, –

14 Busbar L2 or DC +, –

15 Busbar L1 or DC +, –

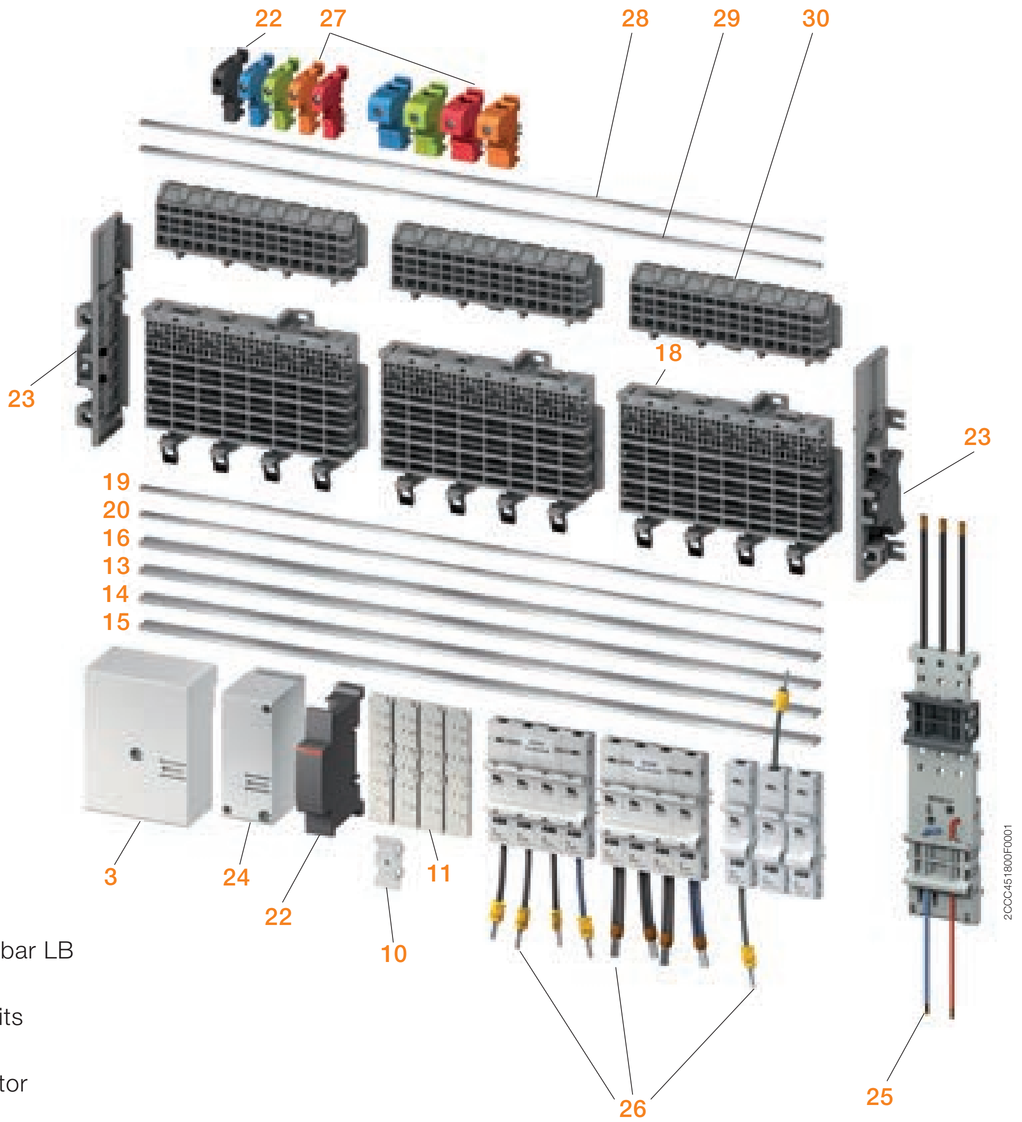
16 Busbar N

17 Cover for socket

18 Sockets

19 Auxiliary busbar LA

SMISSLINE TP technical details
Overview of busbar system



20 Auxiliary busbar LB

21 Output circuits

22 Busbar isolator

23 Socket end piece on left and right

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

25 Combi module with a current rating of 32 A

26 Adapter for DIN rail components

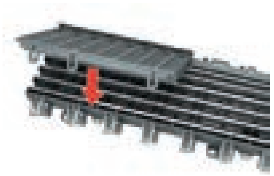
27 N- and PE Terminals, red and orange Terminals for d.c. Application

28 Busbar PE, additional socket

29 Busbar N, additional socket

30 Additional socket

SMISSLINE TP technical details
Socket/additional socket/busbars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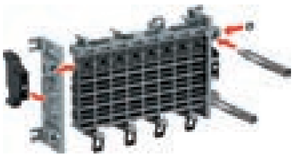
Socket bases ZLS906, ZLS908

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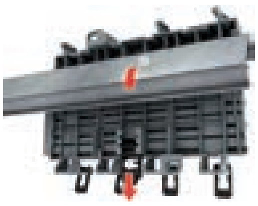
The socket sections and the wide range of accessories make it possible to plan with the capability for expansion and to construct distribution systems of any desired size in a short period of time.

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.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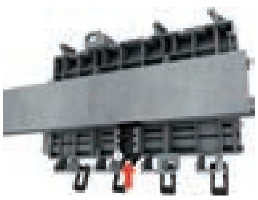
Snap mounting

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

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


2CCC451119F0001

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

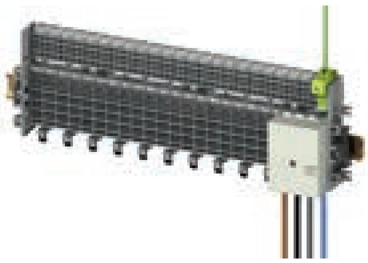
The 5 x 2 mm auxiliary busbars are intended for a common power supply of auxiliary switches and signal contacts. They are also plated and their max. delivery length is 1979 mm.
Like the main busbars, the auxiliary busbars are inserted in holders LA and LB from the front.
Of course, only on auxiliary 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 100 A.



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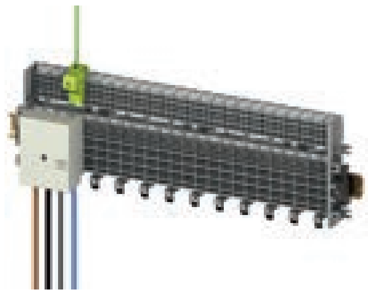

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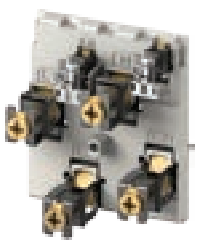
Power supply in centre, maximum 160 A.
A maximum of 100 A is permitted on either side. A total of 160 A must not be exceeded.

2CCC451232F0001



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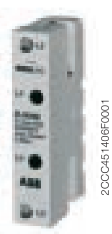
Incoming terminal blocks ZLS224, 225

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.

Incoming terminal blocks, low ZLS228, 229

Incoming terminal block with construction height of 36 mm.

SMISSLINE TP technical details
Incoming terminal block/Incoming terminal components



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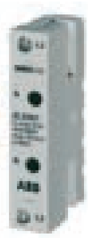

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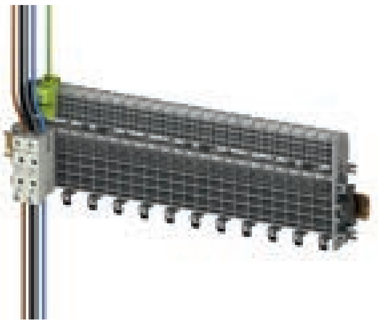
Incoming terminal blocks ZLS260 to 262

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.



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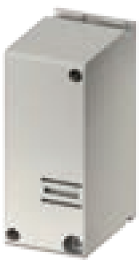
Incoming maximum 63 A.

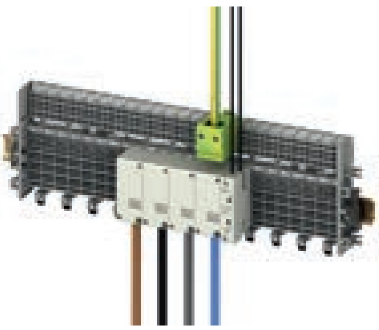
9



451041F0001

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 mm^2 can be connected to the incoming terminal component.



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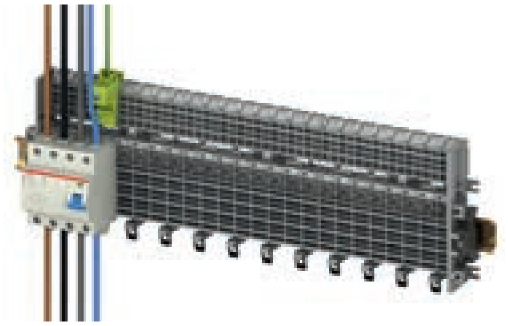
Incoming terminal component, in centre, maximum 200 A.
But on each side not more than 100 A.

SMISSLINE TP technical details
Power supply



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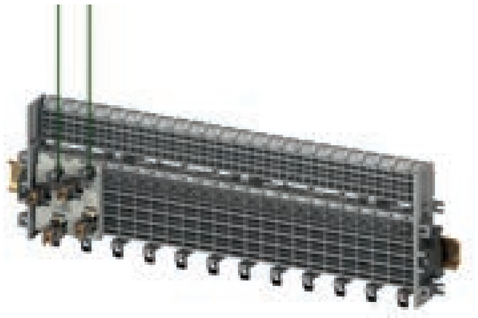
Indirect supply via residual current operated circuit breaker (RCCB) (or switch disconnector)

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.



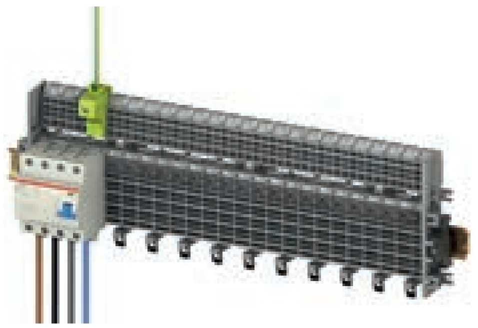
2CCC451231F0001

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.



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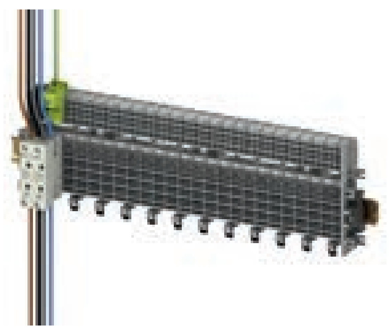
Supply of auxiliary busbars LA and LB

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.



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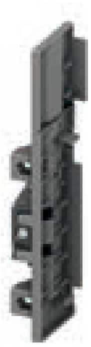
Incoming block for two auxiliary busbars LA, LB

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

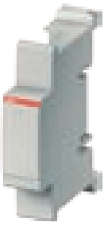
SMISSLINE TP technical details
Busbar system accessories



2CCC451094F0001

2CCC451096F0001

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.

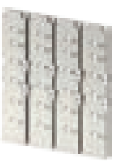


2CCC451048F0002

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

2CCC451666F0001

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.



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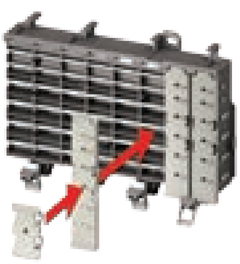
Busbar cover ZLS100
If component modules or spare modules are not requiered, the busbar cover ensures electrically protected covering of the main and auxiliary busbars. The cover (4 modules) can be divided anywhere. The openings allow voltage measurements on the busbars without removing the cover.



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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

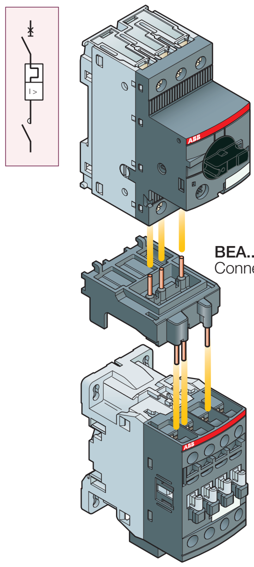
MS132 > 10 A
+ BEA38-4
+ AF26, AF30, AF38

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

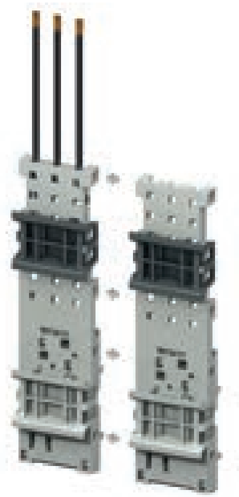
MS116 up to 16 A
+ BEA26-4, BER38-4, VEM4
+ AF26, AF30, AF38

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

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

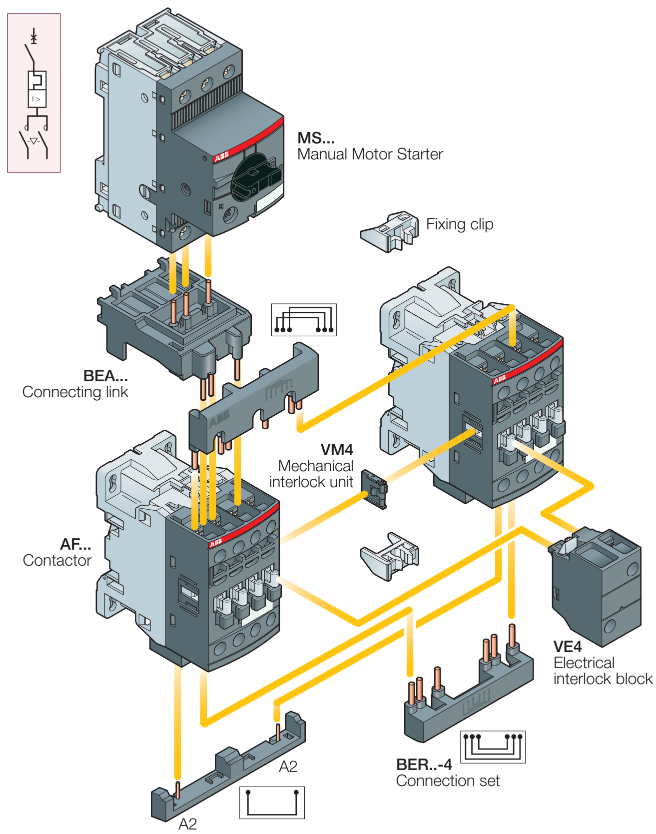
MS132 up to 10 A
+ BEA26-4, BER38-4, VEM4
+ AF26, AF30, AF38

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 over-voltages) 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

Busbar system touch proof:
Use only for wall mounted application (horizontal or vertical). With a expert working the requirements of EN/IEC 61439-2 are as well covered

Number of poles:	max. 6 to 110 3p+N / 2 additional bars PE+N
Rated operational voltage (U_e):	690 VAC, 1000 VDC (400 VAC, 250 VDC when used for load-free snap on and off under power)
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 insulation voltage (Ui):	690 V a.c., 1000 V d.c.
Rated impulse voltage (Uimp) :all systems:	8 kV (all circuits)
Rated current of the assembly (InA) :	Max. 100 A (side feeding)
	Max. 200 A (center feeding)
Auxiliary circuit:	max. 40 A
Rated current of a circuit (Inc) :	Main circuit: Max. 100 A
Rated current of Auxiliary circuit:	40 A
Rated short-time withstand current (Icw):	10 kA / 300 ms
Auxiliary circuit:	4 kA / 50 ms
Rated peak withstand current (Ipk):	Main circuit: 35 kA
Auxiliary circuit:	6 kA
Rated diversity factor (RDF) :	1
Rated frequency (f):	50/60 Hz
Rated conditional short-circuit current (Icc):	50 kA
Ambient air temperature:	max. 60°C
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)

Rated conditional short-circuit current (I_{cc})	Incoming current of main busbars (L1, L2, L3, N)	Short circuit protection device (SCPD)	
		Fuse	MCCB
50 kA	200 A	NH1 gG 690 V/200 A	ABB T_{max} 250 A
	160 A	NH1 gG 690 V/160 A	ABB T_{max} 250 A
	63 A	NH00 gG 690 V/63 A	ABB Type S803S in combination with Type S803S-SCL63-SR
	Incoming current of auxiliary busbars (LA LB)		
	40 A	NH00 gG 690 V/40 A	ABB Type S803S in combination with Type S803S-SCL40-SR

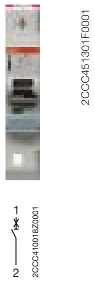
SMISSLINE TP technical details
Bus bar system Technical data and UL data's

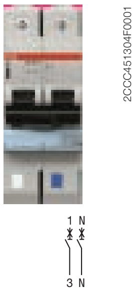
	Maximum rated voltage	Maximum rated current	Cross-section of conductors
Incoming terminal block ZLS224/225/228/229	690 VAC 1000 VDC	160 A 3LN, 40 A LA, LB	6 mm²–50 mm², 2 x 25 mm² 3LN, 10 mm² LA, LB
Incoming terminal block ZLS250–253	690 VAC 1000 VDC	200 A	10 mm²–95 mm² max. 1 wire
Incoming terminal block ZLS260–262	690 VAC 1000 VDC	63 A 3LN, 6 A LA, LB	2 mm²–25 mm² 3LN, LA, LB max. 1 wire
Busbar ZLS200	690 VAC 1000 VDC	100 A	
Busbar ZLS202	690 VAC 600 VDC	40 A	
Universal adapters 32 A	690 VAC 600 VDC	32 A Line or neutral	
Universal 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)			
Governing standard: IEC 60068-2-6 Environmental testing – Part 2–6: Test Fc. Vibration (sinusoidal)			

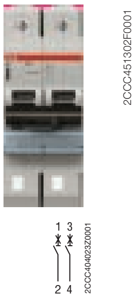
Technical data according cULus

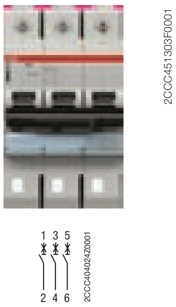
	Busbar	Incoming terminal block ZLS224, 224R, 225, 225R	Incoming terminal component ZLS250, 251, 252, 253	Universal adapter 30 A	Universal adapter 60 A	Combi module
Maximum rated voltage:		600 VAC	600 VAC	600 VAC	600 VAC	
Maximum rated current:	100 A	150 A	200 A	30 A	60 A	30 A
Rated current for supply, left or right:	100 A	100 A	100 A	–	–	–
Rated current for supply, center:	100 A	150 A	200 A	–	–	–
Resistance to Short circuits:			50 kA	with 200 A back-up fuse		
Supply cable size:		14 to 0, 1/0 AWG	8 to 3/0 AWG	–	–	–

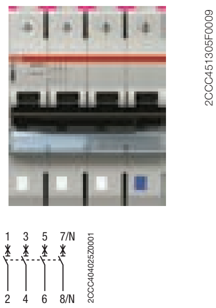
SMISSLINE TP technical details
Miniature circuit breaker Properties











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 10 kA or 6 kA
- 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.

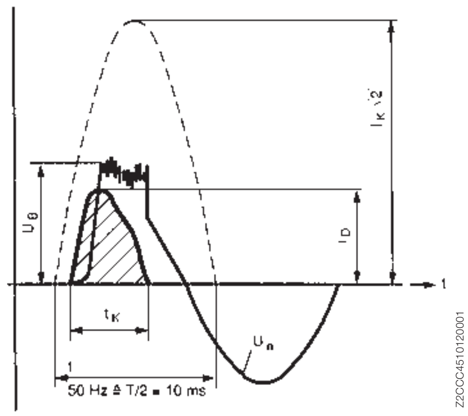
Brief description of tripping

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

SMISSLINE TP technical details
S400E, S400M

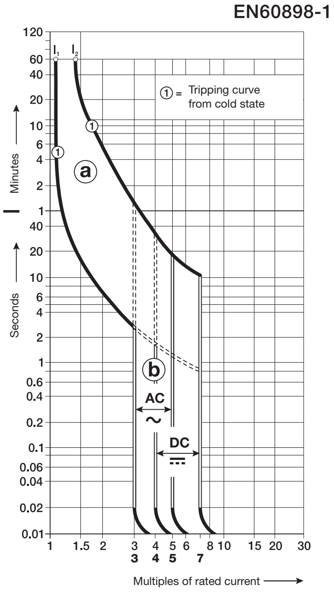
With a expert working the requirements of EN/IEC 61439-2 are as well covered

		S400E, S400M
General data		
Tripping characteristics		B,C,D,K
Standards		IEC/EN 60898-1 IEC/EN 60947-2
Poles		1P, 1P+NP, 2P, 3P, 3P+NP
Rated current $\mathbf{I_n}$		0.5 A … 63 A
Rated frequency **f**		50/60 Hz
Rated insulation voltage $\mathbf{U_i}$ acc. to DIN EN 60664-1		440 VAC
Rated impulse withstand voltage $\mathbf{U_{imp.}}$ (1.2/50 µs)		4 kV
Overvoltage category		III
Pollution degree		2
Data acc. to IEC/EN 60898-1		
Rated operational voltage $\mathbf{U_e}$		1P: 230/400 V AC; 1P+N: 230 V AC; 2 … 4P: 400 V AC; 3P+N: 400 V AC
Min. operating voltage		12 V AC–12 V DC
Rated short-circuit capacity $\mathbf{I_{cn}}$		6 kA S400E 10 kA S400M
Energy limiting class		3
Reference Ambient Air Temperature for Overload Tripping		B, C, D: 30 °C K: 40 °C
Electrical and Mechanical Endurance		$\mathbf{I_n}$ < 32 A: 20 000 ops (AC) $\mathbf{I_n}$ ≥ 32 A: 10 000 ops. (AC)
Data acc. to IEC/EN 60947-2		
Rated operational voltage $\mathbf{U_e}$		1P: 240 V AC; 1P+N: 240 V AC; 2 … 4P: 415 V AC; 3P+N: 415 V AC
Min. operating voltage		12 V AC–12 V DC
Rated ultimate short-circuit capacity $\mathbf{I_{cu}}$		25 kA (0,5 up to 16 A, 240/415 V) 15 kA (20 up to 63 A, 240/415 V) 15 kA (0,5 up to 16 A, 254/440 V) 6 kA (20 up to 63 A, 254/440 V)
Rated service short-circuit capacity $\mathbf{I_{cs}}$		15 kA (0,5 up to 16 A, 240/415 V) 7,5 kA (20 up to 63 A, 240/415 V) 6 kA (0,5 up to 16 A, 254/440 V) 3 kA (20 up to 63 A, 254/440 V
Reference Ambient Air Temperature for Overload Tripping		B, C, D: 30 °C K: 40 °C
Electrical and Mechanical Endurance		$\mathbf{I_n}$ < 32 A: 20 000 operating cycles $\mathbf{I_n}$ ≥ 32 A: 10 000 operating cycles
Mechanical Data		
Housing		RAL 7035
Toggle		black
Classification acc. To NF F 126-101, NF F 16-102		acc. to I2/F3
Protection degree acc. to EN 60529		IP20, IP40 in enclosure with cover
Mechanical endurance		20 000 ops.
Shock resistance acc. to IEC/EN 60068-2-30		30 g–3 shocks–11 ms
Vibration resistance acc. to IEC/EN 60068-2-6		5 g–20 cycles at 5 … 150 … 5 Hz with load 0.8 I_n
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 … +55 °C
Storage temperature		–40 … +70 °C
Installation		
Standed Cross-section of conductors (top/bottom)		upper terminal section: 0,75–25 mm^2 lower terminal section: 0,75–10 mm^2
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

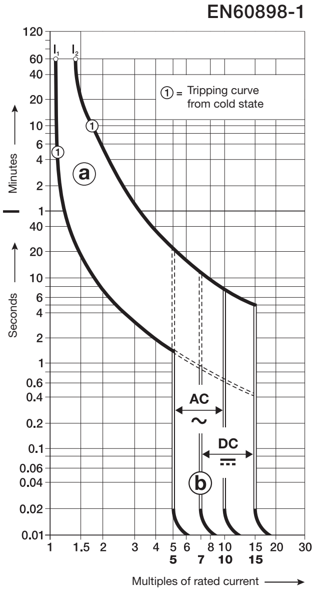
SMISSLINE TP technical details
Miniature circuit breaker S400UC

	S400UC
General data	
Tripping characteristics	UCC, UCZ
Standards	IEC/EN 60947-2
Poles	1P, 2P
Rated current $\mathbf{I_n}$	0.5 A … 63 A
Rated frequency **f**	50/60 Hz
Rated insulation voltage $\mathbf{U_i}$ acc. to DIN EN 60664-1	440 V AC
Rated impulse withstand voltage $\mathbf{U_{imp.}}$ (1.2/50 µs)	4 kV
Overvoltage category	III
Pollution degree	2
Data acc. to IEC/EN 60947-2	
Rated operational voltage $\mathbf{U_e}$	110 V d.c. (1pole) 220 V d.c. (poles 1; 2) 440 V d.c. (2pole) 230/400 V (poles 1;2)
Min. operating voltage	12 V AC–12 V DC
Rated ultimate short-circuit capacity $\mathbf{I_{cu}}$	10 kA (0,5 up to 63 A, 220 V d.c. 1pole) 20 kA (0,5 up to 63 A, 110 V d.c. 1pole) 25 kA (0,5 up to 63 A, 220 V d.c. 2pole) 10 kA (0,5 up to 63 A, 440 V d.c. 2pole) 10 kA (0,5 up to 63 A, 230/400 V) a.c.
Rated service short-circuit capacity $\mathbf{I_{cs}}$	10 kA (0,5 up to 63 A, 220 V d.c. 1pole) 10 kA (0,5 up to 63 A, 110 V d.c. 1pole) 20 kA (0,5 up to 63 A, 220 V d.c. 2pole) 10 kA (0,5 up to 63 A, 440 V d.c. 2pole) 6 kA (0,5 up to 63 A, 230/400 V a.c.
Reference Ambient Air Temperature for Overload Tripping	30 °C
Electrical and Mechanical Endurance	$\mathbf{I_n}$ < 32 A: 20 000 operating cycles $\mathbf{I_n}$ ≥ 32 A: 10 000 operating cycles
Mechanical Data	
Housing	RAL 7035
Toggle	black
Protection degree acc. to EN 60529	IP20*, IP40 in enclosure with cover
Mechanical endurance	20 000 ops.
Shock resistance acc. to IEC/EN 60068-2-30	30 g–3 Shocks–11 ms
Vibration resistance acc. to IEC/EN 60068-2-6	5 g–20 cycles at 5 … 150 … 5 Hz with load 0.8 I_n
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 … +55 °C
Storage temperature	–40 … +70 °C
Installation	
Standed Cross-section of conductors (top/bottom)	upper terminal section: 0,75–25 mm² lower terminal section: 0,75–10 mm²
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

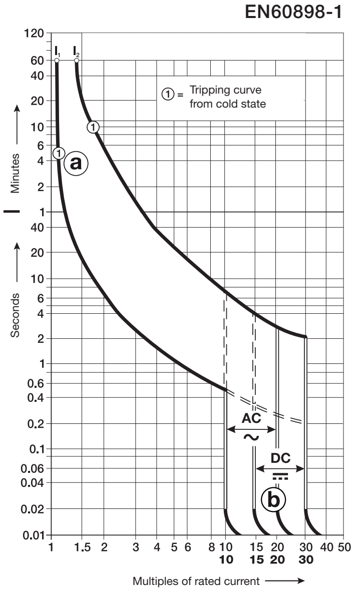
SMISSLINE TP technical details
Miniature circuit breaker Trip characteristics



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



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



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

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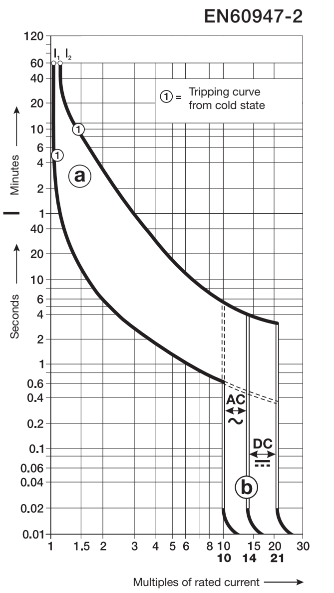
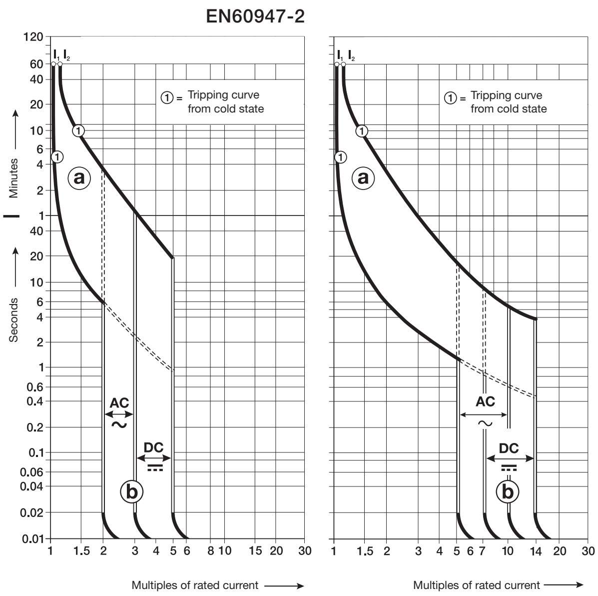


Trip characteristics: K
Thermal trip
1.05...1.2 x I_n
Electromagnetic trip
10...20 x I_n AC
15...20 x I_n DC
Calibration temperature 40 °C



Trip characteristics: UC

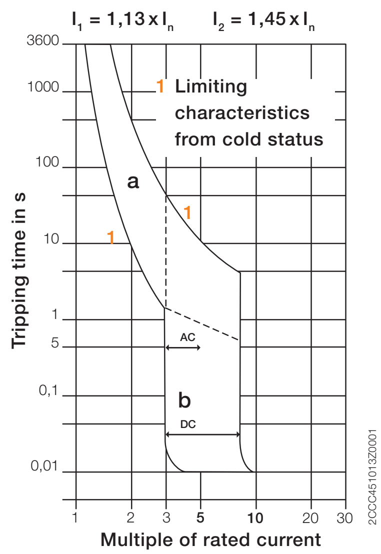
Z	C
1.05...1.35 x I_n	1.13...1.45 x I_n
3...5 x I_n DC	7...14 x I_n DC
2...3 x I_n AC	5...10 x I_n AC

Calibration temperature 30 °C

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 h	3 x I_n		> 0.1 s
			1.45 x I_n	< 1 h		5 x I_n	< 0.1 s
C	0.5 to 63 A	1.13 x I_n		> 1 h	5 x I_n		> 0.1 s
			1.45 x I_n	< 1 h		10 x I_n	< 0.1 s
D	6 to 63 A	1.13 x I_n		> 1 h	10 x I_n		> 0.1 s
			1.4 x I_n	< 1 h		20 x I_n	< 0.1 s
K	0.5 to 63 A	1.05 x I_n		> 2 h	8 x I_n		> 0.2 s
			1.2 x I_n	< 2 h		12 x I_n	< 0.2 s
			1.5 x I_n	< 2 min			
			6.0 x I_n	> 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)

Rated current	S400 M B, C, D[1]		S400 M K		S400 M-UCC		S400 M-UCZ	
I_n A	R_i Ω	P_v W	R_i Ω	P_v W	R_i Ω	P_v W	R_i Ω	P_v W
0.5	5.5	1.4	4.906	1.2	6.34	1.6	6.34	2.6
1	1.44	1.5	1.505	1.5	1.55	1.6	1.55	3.5
1.6	0.63	1.6	0.594	1.5	0.695	1.8	0.695	2.9
2	0.460	1.8	0.415	1.7	0.46	1.9	0.46	3.9
3	0.150	1.4	0.181	1.6	0.165	1.5	0.165	4.5
4	0.123	1.9	0.150	2.4	0.12	1.9	0.12	2.4
6	0.051	1.8	0.080	2.9	0.052	1.9	0.052	3.5
8	0.029	1.9	0.043	2.7	0.038	2.4	0.038	3.5
10	0.012	1.2	0.0165	1.7	0.0126	1.3	0.013	1.3
13	0.0112	1.9	0.0153	2.6	0.0101	1.7	0.010	2.2
16	0.0074	1.9	0.0095	2.4	0.0077	1.8	0.007	1.8
20	0.004	1.6	0.0073	2.9	0.0067	2.7	0.0067	2.5
25	0.0032	2	0.0053	3.3	0.0046	2.9	0.005	3.1
32	0.0026	2.7	0.0034	3.4	0.0025	3.6	0.0025	3.7
40	0.0026	4.2	0.0028	4.5	0.0028	4.5	0.003	4.8
50	0.0017	4.3	0.0021	5.3	0.0012	3.0	0.0012	3.0
63	0.0014	5.6	0.0015	5.9	0.0007	2.8	0.0007	3.6

[1] Currents 0.5–4 A only apply to C and K characteristics.

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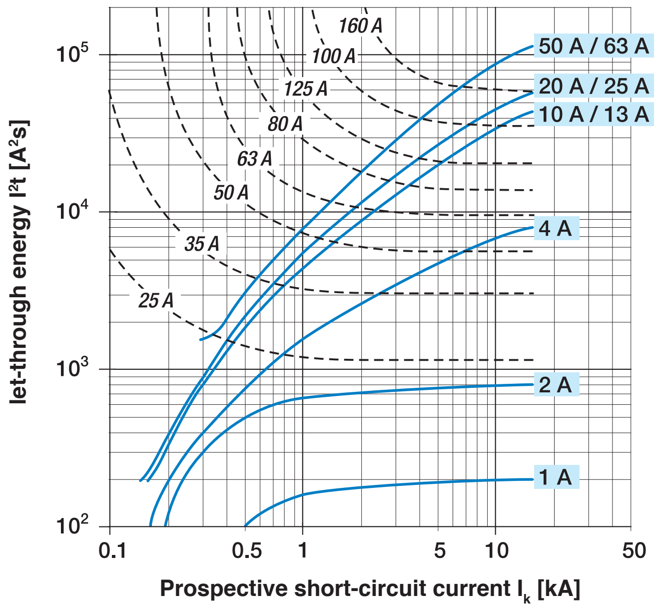
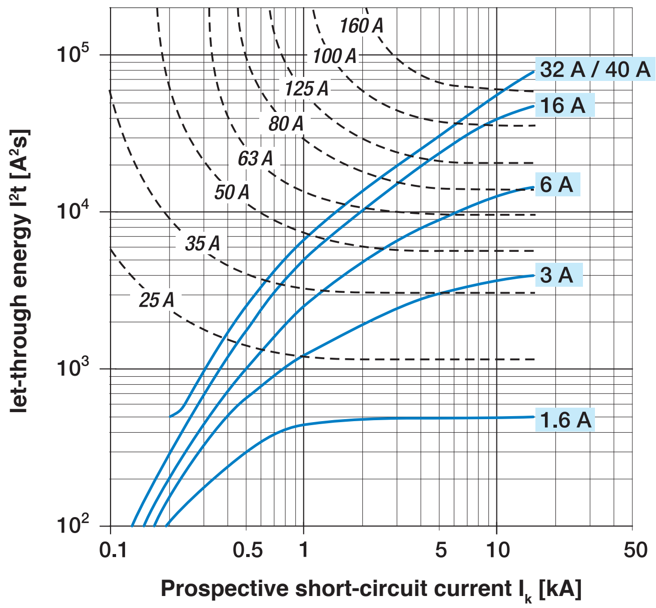
SMISSLINE TP technical details
Miniature circuit breaker
Limitation of specific let-through energy I^2t

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

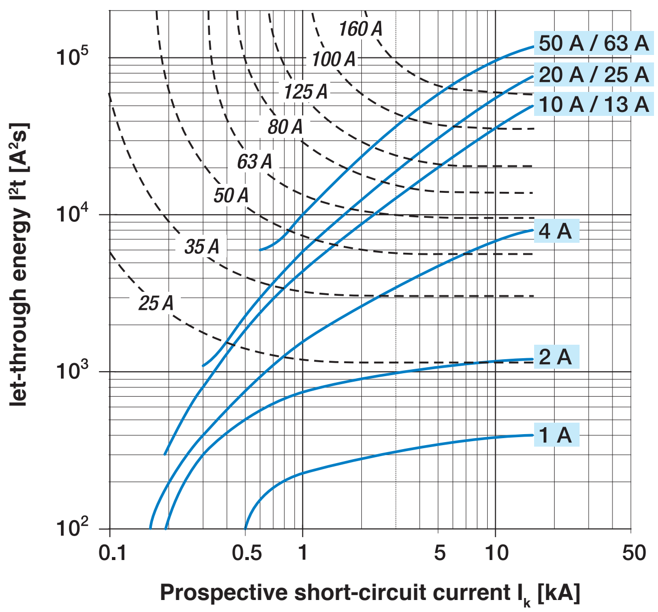
The I^2t curves give the values of the specific let-through energy expressed in A^2s (A=amps; s=seconds) in relation to the perspective short-circuit current (I_{rms}) in kA.

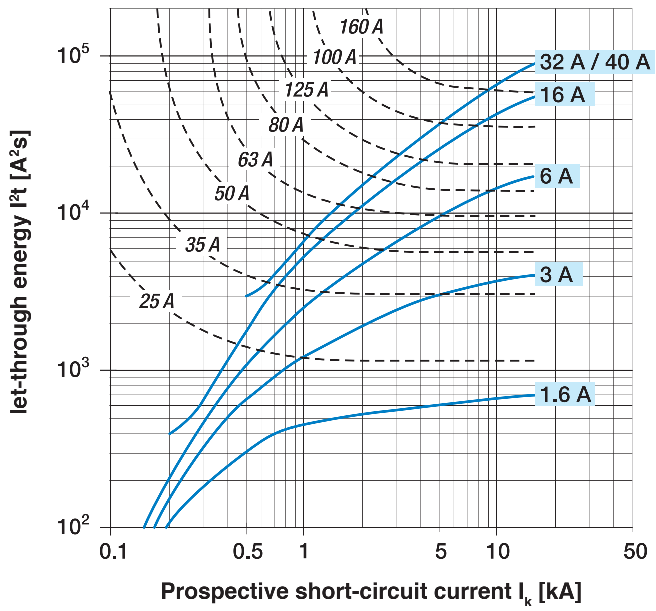
S400 characteristics B–C





S400 characteristics D–K

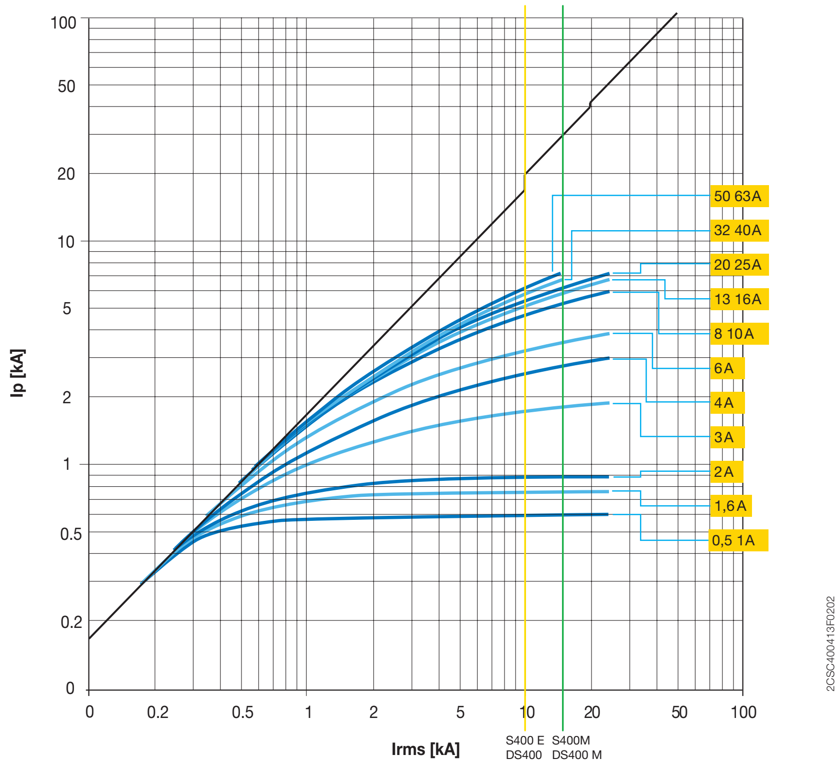




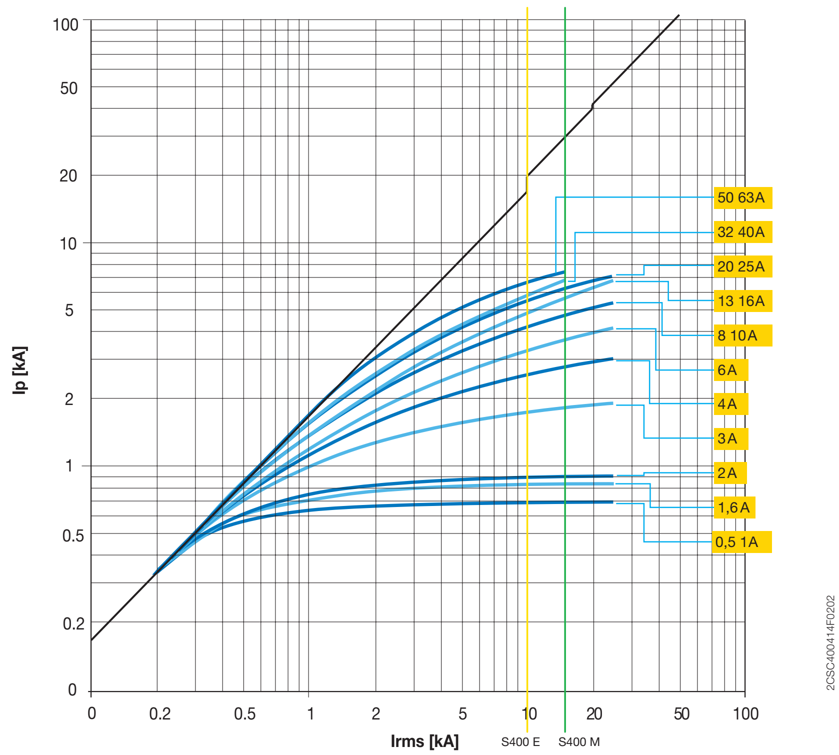
SMISSLINE TP technical details
Miniature circuit breaker
Peak current Ip

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

Characteristics B–C



Characteristics K–D



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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 upstream 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. 160 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

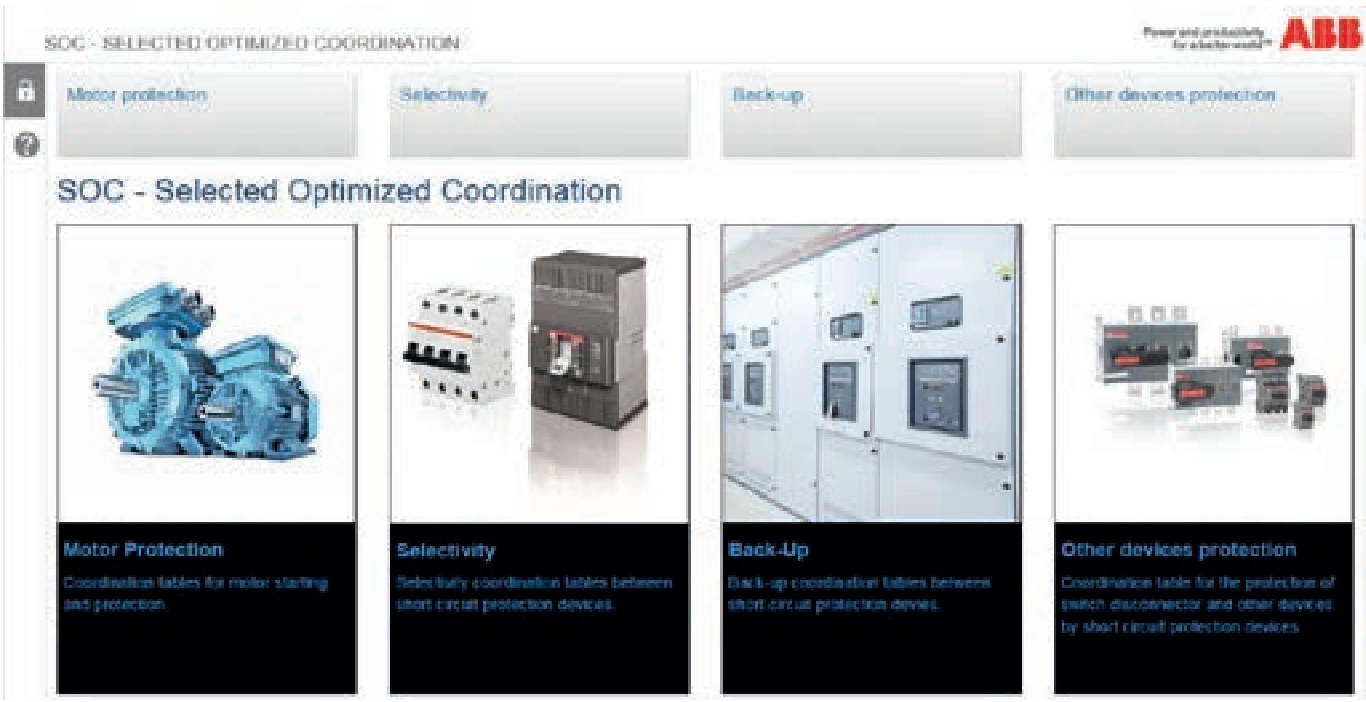
In principle, the same requirements apply as for directly plugged-in devices.

SMISSLINE TP technical details
Back-up and selectivity dates

More Back-up and Selectivity tables:
see www.abb.ch

– Catalogue 2CCC451039L0209

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



SMISSLINE TP technical details
Miniature circuit breaker
Back-up protection with fuses, S800

a) If the short-circuit current at the point of installation of the circuit breaker is not greater than the nominal breaking capacity of the MCB, an upstream fuse is not needed. If a fuse is fitted upstream for installation reasons, any nominal current may be selected for the fuse.
b) If the short-circuit current at the point of installation of the circuit breaker is greater than its nominal breaking capacity, the nominal currents of the upstream fuses must not exceed the values specified in the table (back-up protection of the circuit breaker).

Upstream: Fuse NH..gL/gG

			S.	NH gL/gG							
L.		I_{cu} [kA]									
			I_n [A]	25	40	63	80	100	125	160	200
S400M/S450M FS401M/FS451M FS403M/FS453M		I_{cn} [kA] 10	all types	100	100	100	100	80	50	30	20
S400E/S450E FS401E/FS451E FS403E/FS453E		I_{cn} [kA] 6	all types	100	100	70	40	25	15	10	–

E. = Upstream
L. = Downstream
Selectivity limits are specified in kA

S800S – S400M (SMISSLINE) @ 230/400 V

			S.	S800S							
	Char.			B, C, D, K							
L.		I_{cu} [kA]		50							
			I_n [A]	25	32	40	50	63	80	100	125
S400M FS401M FS403M	B, D	I_{cn} [kA] 10	4*…16	50	50	50	50	50	50	50	50
			20		50	50	50	50	50	50	50
			25			50	50	50	50	50	50
			32				50	50	50	50	50
			40					50	50	50	50
			50						50	50	50
			63							50	50

			S.	S800S							
	Char.			B, C, D, K							
L.		I_{cu} [kA]		50							
			I_n [A]	25	32	40	50	63	80	100	125
S400M	C, K	50	0.5…2	50	50	50	50	50	50	50	50
		25	3…20	50	50	50	50	50	50	50	50
		15	25			50	50	50	50	50	50
			32				50	50	50	50	50
			40					50	50	50	50
			50						50	50	50
			63							50	50

S800N – S400M (SMISSLINE) @ 230/400 V

			S.	S800N							
	Char.			B, C, D							
L.		I_{cu} [kA]		36							
			In [A]	25	32	40	50	63	80	100	125
S400M FS401M FS403M	B, D	I_{cn} [kA] 10	4*…16	36	36	36	36	36	36	36	36
			20		36	36	36	36	36	36	36
			25			36	36	36	36	36	36
			32				36	36	36	36	36
			40					36	36	36	36
			50						36	36	36
			63							36	36

			S.	S800 N							
	Char.			B, C, D							
L.		I_{cn} [kA]		36							
			I_n [A]	25	32	40	50	63	80	100	125
S400M	C, K	50	0.5…2	36	36	36	36	36	36	36	36
		25	3…20	36	36	36	36	36	36	36	36
		15	25			36	36	36	36	36	36
			32				36	36	36	36	36
			40					36	36	36	36
			50						36	36	36
			63							36	36

E. = Upstream
L. = Downstream
Selectivity limits are specified in kA

9

Consulting the back-up table
This table provides the value (in kA) for which the back-up protection is ensured between a given combination of circuit breakers. The table covers possible combinations between the S800 or SACE series Tmax and between SMISSLINE miniature circuit breakers 400 M.

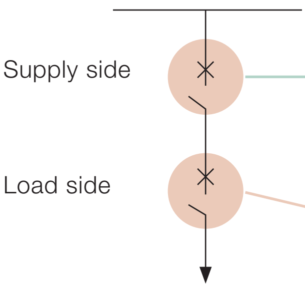
SMISSLINE TP technical details
Miniature circuit breaker
Back-up protection with Tmax and XT

Sace Tmax – S400 @ 230/400 V

Downstream	Version	I_n [A]	Up-Stream / Version / I_{cu} [kA]	T1	T1	T1	T2	T3	T4	T2	T3	T4	T2	T4	T2	T4	T4
			Version	B	C	N	N	N	N	S	S	S	H	H	L		V
			I_{cu} [kA]	16	25	36	36	36	36	50	50	50	70	70	85	120	200
S400E FS401E/403E	B, C	6…10	6	16	25	30	36	36	36	36	40	40	40	30	40	40	40
		13…63						16	16		16	16	16	16	16	16	16
S400M FS401M/403M	C, K	0.5…10	10	16	25	30	36	36	36	40	40	40	50	40	50	40	40
		13…63						25	36		25	40	50	40	50	40	40
S400M FS401M/403M	B, D	6…10	10	16	25	30	36	36	36	40	40	40	50	40	50	40	40
		13…63						25	36		25	40	50	40	50	40	40

Sace XT – S400 @ 230/400 V

Downstream	Version	I_n [A]	Up-Stream	XT1	XT1	XT1	XT2	XT3	XT4	XT1	XT2	XT3	XT4	XT1	XT2	XT4	XT2	XT4	XT2	XT4
			Version	B	C	N				S				H			L		V	
			I_{cu} [kA]	18	25	36				50				70			120		150	
FS400E S400E S450E	B, C	6…10	6	18	25	30	36	36	36	30	36	40	40	30	40	40	40	40	40	40
		13…63						16				16								
FS400M S400M S450M	C, K	0.5…10	10	18	25	30	36	36	36	30	50	40	40	30	70	40	85	40	85	40
		13…63						25				25			60		60		60	
FS400M S400M S450M	B, D	6…10	10	18	25	30	36	36	36	30	50	40	40	30	70	40	85	40	85	40
		13…63						25				25			60		60		60	



S800N - S400E @ 230/400 V

L.	Char.	I_{cu} [kA]	E.	S800N B, C, D							
			I_{cu} [kA]	36							
			I_n [A]	25	32	40	50	63	80	100	125
S400E	B	6	6	36	36	36	36	36	36	36	36
			10	36	36	36	36	36	36	36	36
			13	36	36	36	36	36	36	36	36
			16	36	36	36	36	36	36	36	36
			20		36	36	36	36	36	36	36
			25			36	36	36	36	36	36
			32				36	36	36	36	36
			40					36	36	36	36
			36						36	36	36
			63							36	36

Example 1: With a S800 nominal current 50 A is a Back-up protection till a nominal current of 25 A to a S400 given. The Back-up protection ist till 36 kA.

Example 2: There is no Back-up protection between supply side and the load side given.

Back-up protection

The tables given provide the value (in kA, referring to the breaking capacity) for which the back-up protection among the combination of selected circuit breakers is verified. The tables cover the possible combinations between S800 and those between the above mentioned circuit breakers and the ABB series of modular circuit breakers S400.

The values indicated in the tables refer to the voltage:

– Vn of 230/400VAC

SMISSLINE TP technical details
Miniature circuit breaker
Influence of ambient temperature

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 whitch of these is the lower value.
2. Consideration of thermal factors
   – for an ambient temperature of 40°C: $I_B \leq 0{,}9 \times I_n$
   – for thermal influence of row mounted circuit breakers subject to the same loads: $I_B \leq 0{,}75 \times I_n$
3. This results in the rated current of the circuit breaker to be selected for $I_n \leq 1{,}5$ times the relevant current according to point 1.

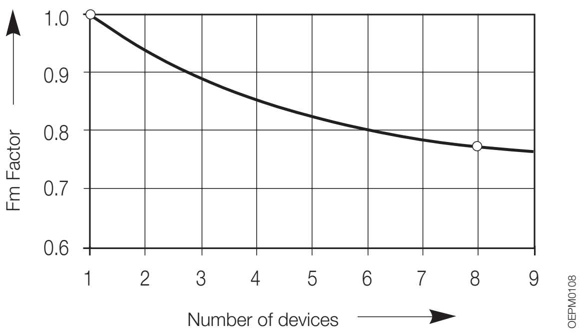
This procedure considers all thermal influence factors and results in an optimum choice of the rated current for the circuit breaker.
Example: Current carrying capacity required of the cable: 4 A. Selected rated current of circuit breaker taking thermal influence into consideration: $I_n \geqslant 1{,}5 \times 4\,A \geq 6\,A$.

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 change by around 6 % per 10 °C difference in temperature.
For more accurate calculations and very high or very low ambient temperatures, the following tables apply:

9

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 devices S400



Influence of adjacent devices Correction factor Fm	
No. of adjacent devices	correction factor
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
0.5*	0.58	0.55	0.53	0.52	0.51	**0.50**	0.48	0.47	0.46	0.44	0.43
1.0*	1.15	1.09	1.07	1.04	1.02	**1.0**	0.97	0.94	0.91	0.89	0.86
1.6*	1.85	1.75	1.71	1.67	1.63	**1.6**	1.55	1.50	1.46	1.42	1.38
2.0*	2.31	2.19	2.13	2.08	2.03	**2.0**	1.93	1.88	1.83	1.77	1.72
3.0*	3.5	3.32	3.24	3.16	3.09	**3.0**	2.93	2.85	2.77	2.69	2.61
4.0*	4.6	4.37	4.27	4.17	4.07	**4.0**	3.86	3.76	3.66	3.56	3.45
6.0	6.9	6.59	6.44	6.29	6.14	**6.0**	5.83	5.68	5.53	5.37	5.22
8.0	9.2	8.84	8.63	8.42	8.22	**8.0**	7.81	7.6	7.39	7.19	6.98
10.0	11.5	10.9	10.7	10.4	10.2	**10.0**	9.65	9.39	9.14	8.88	8.63
13.0	15.0	14.4	14.0	13.7	13.3	**13.0**	12.7	12.3	12.0	11.6	11.3
16.0	18.5	17.6	17.2	16.8	16.4	**16.0**	15.6	15.2	14.7	14.3	13.9
20.0	23.1	22.1	21.6	21.0	20.5	**20.0**	19.5	19.0	18.5	18.0	17.5
25.0	28.9	27.5	26.9	26.3	25.6	**25.0**	24.3	23.7	23.0	22.4	21.8
32.0	37.0	35.3	34.5	33.7	32.8	**32.0**	31.2	30.4	29.5	28.7	27.9
40.0	46.2	44.1	43.0	42.0	41.0	**40.0**	39.0	37.9	36.9	35.9	34.9
50.0	57.7	55	53.7	52.4	51.1	**50.0**	48.6	47.3	46.0	44.7	43.4
63.0	72.7	69.3	67.7	66.1	64.5	**63.0**	61.3	59.7	58.1	56.4	54.8

* only applies to C

Max. operating currents depending on ambient temperature for S400 miniature circuit breakers of trip characteristic K

I_n(A)	Ambient temperature T (°C)									
	10	15	20	25	30	35	**40**	45	50	55
0.5	0.54	0.52	0.51	0.50	0.49	0.47	**0.5**	0.45	0.43	0.42
1.0	1.14	1.12	1.09	1.07	1.0	1.02	**1.0**	0.96	0.94	0.91
1.6	1.85	1.81	1.77	1.73	1.7	1.65	**1.6**	1.56	1.52	1.48
2.0	2.29	2.23	2.18	2.13	2.1	2.03	**2.0**	1.93	1.87	1.82
3.0	3.48	3.40	3.32	3.25	3.2	3.09	**3.0**	2.93	2.85	2.77
4.0	4.58	4.48	4.38	4.28	4.2	4.07	**4.0**	3.87	3.77	3.66
6.0	6.91	6.76	6.61	6.46	6.3	6.15	**6.0**	5.85	5.69	5.54
8.0	9.24	9.03	8.82	8.62	8.4	8.21	**8.0**	7.79	7.59	7.38
10.0	11.5	11.2	11.0	10.7	10.5	10.2	**10.0**	9.69	9.43	9.18
13.0	15.1	14.7	14.4	14.0	13.7	13.4	**13.0**	12.7	12.3	12.0
16.0	18.4	18.0	17.6	17.2	16.8	16.4	**16.0**	15.6	15.2	14.8
20.0	23.0	22.5	22.0	21.5	20.9	20.4	**20.0**	19.4	18.9	18.4
25.0	28.9	28.3	27.6	27.0	26.3	25.7	**25.0**	24.4	23.8	23.1
32.0	36.9	36.1	35.3	34.4	33.6	32.8	**32.0**	31.1	30.3	29.5
40.0	46.2	45.1	44.1	43.1	42.1	41.1	**40.0**	39.0	38.0	37.0
50.0	57.7	56.4	55.1	53.8	52.5	51.3	**50.0**	48.7	47.4	46.1
63.0	72.5	70.9	69.3	67.7	66.1	64.5	**63.0**	61.3	59.6	58.0

SMISSLINE TP technical details
Miniature circuit breaker
Protection of circuits with fluorescent lamps

Protection of circuits with fluorescent lamps

The following table gives the maximum permissible number of fluorescent lamps which can be protected by a single-pole circuit breaker of characteristic. The figure for multi-pole circuit breakers is reduced by 20%.

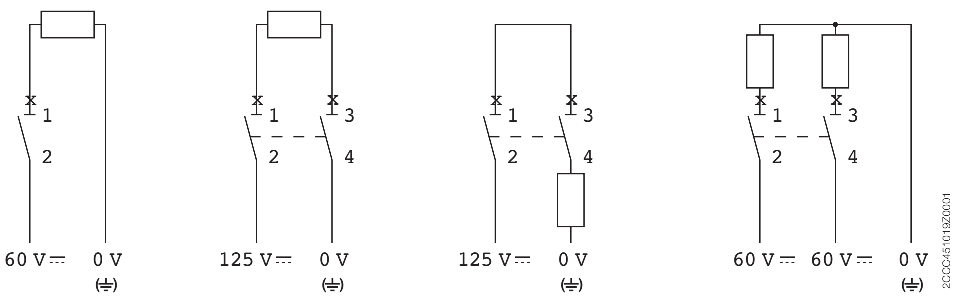
Rated current	FL not compensated KVG			FL compensated in parallel KVG			FL with electronic ballast EVG[1]		
	18/20 W	36/40 W	58/65 W	18/20 W	36/40 W	58/65 W	18/20 W	36/40 W	58/65 W
13	35	30	19	41	41	27	21	21	10
16	43	37	24	51	51	33	26	26	12
20	53	46	30	64	64	41	33	33	15
25	66	58	37	82	82	53	42	42	19

[1] EVG: Two-lamp version, lamps switched together, electronic ballast
KVG: Conventional ballast

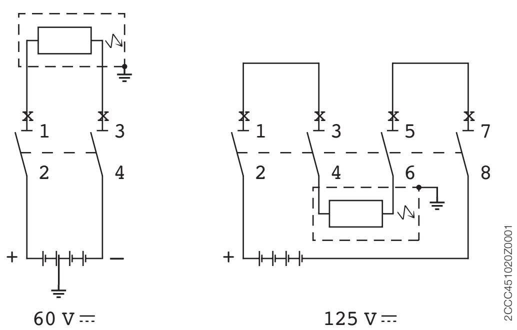
Use of miniature circuit breakers S400 M for DC systems

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. 60 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

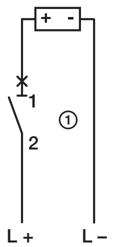
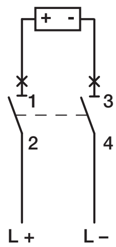
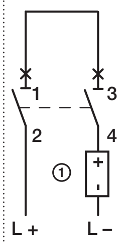
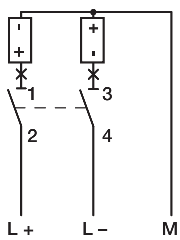
UC = Universal Current = AC/DC

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..

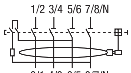
For DC incoming supply from above

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

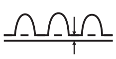
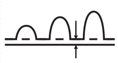
The residual current operated circuit breaker prevents personal injury and damage to property caused by electric current. Use of this circuit breaker is required in various national and international standards for electrical installations.
Modern residual current operated circuit breakers respond to 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 and 500 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:
- A type (for alternating and/or pulsating current with DC components
- AC type (for alternating current only)

ABB SMISSLINE RCD's are all type A.

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		

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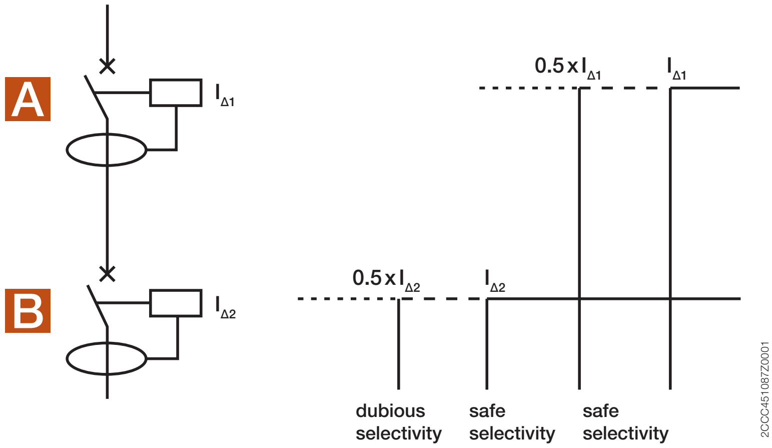
Selectivity

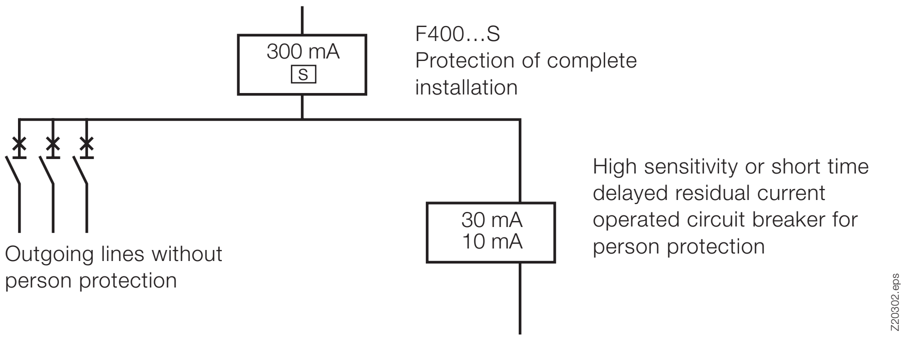
RCDs raise similar issue to those surrounding the installation of MCBs, and in particular the need to reduce to a minimum the parts of the system out of order in the event of a fault.
For RCBOs the problem of selectivity in the case of short-circuit currents may be handled with the same specific criteria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

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 64-8/563.3, 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 8/20 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 8/20 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.

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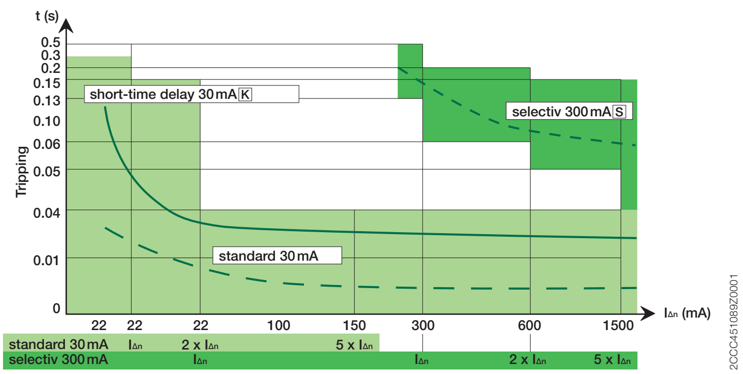
Three different types of Residual current operated circuit breaker
– standard RCD 30 mA
– selective RCD 300 mA $\boxed{S}$
– short-time delay RCD 30 mA $\boxed{K}$



– 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.

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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	inst		□	□	□	■	□	■
30	inst			□	□	■	□	■
100	inst				□	■		■
300	inst							
300	S							
500	inst							
500	S							

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

SMISSLINE TP technical details
Residual current operated circuit breaker F402, F404
Technical data

	F402	F404
Rated voltage U_n:	230 V	230/400 V
Number of poles:	2	4
Rated frequency f_n:	50/60 Hz	50/60 Hz (for Type LF 16²/₃ Hz)
Rated breaking capacity I_m:		1000 A
Total trip time (average value)		
– at $I_{\Delta n}$	≤ 300 ms	≤ 300 ms
– at 5 $I_{\Delta n}$	≤ 40 ms	≤ 40 ms
Delay time at 5 $I_{\Delta n}$:	–	–
Resistance to short circuits (kA):	10 kA in conjunction with an upstream fuse gL / gG 100 A or a high performance MCB S800, 100 A	10 kA in conjunction with an upstream fuse gL / gG 100 A or a high performance MCB S800, 100 A
Connection load side terminal	Double lift terminal touch finger-proof, suitable for connecting single-, multi- and fine-wire conductors of up to 25 mm²	
Degree of protection:	IP20 inside panel IP40	IP20 inside panel IP40
Endurance:	> 5000 operating cycles	> 5000 operating cycles
Resistance to climate acc. to:	EN 61008	EN 61008
Mounting position:	any	any
Ambient temperature:	–25 °C … +40 °C	–25 °C … +55 °C acc. to EN 61009
Vibration resistance:	5 g 5 … 150 … 5 Hz	5 g 5 … 150 … 5 Hz
Plastic parts:	halogen-free	halogen-free
Contacts:	cadmium-free	cadmium-free

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	F402…K	F404…K	F404…S
Rated voltage U_n:	230 V	230/400 V	230/400 V
Number of poles:	2	4	4
Rated frequency f_n:	45 … 60 Hz	45 … 60 Hz	45 … 60 Hz
Resistance to surge current:	3 kA 8/20 µs	3 kA 8/20 µs	5 kA 8/20 µs
Total trip time (average value)			
– at $I_{\Delta n}$	240 ms	120 … 300 ms	150 … 500 ms
– at 5 $I_{\Delta n}$	≤ 40 ms		40 …150 ms
Delay time at 5 $I_{\Delta n}$:	10 ms	10 ms	90 ms
Resistance to short circuits (kA):	10 kA in conjunction with an upstream fuse gL / gG 100 A or or a high performance MCB S800 100 A	10 kA	10 kA
Connection load side terminal	Double lift terminal touch finger-proof, suitable for connecting single-, multi- and fine-wire conductors of up to 25 mm²		
Degree of protection:	IP20 in panel IP40	IP20 in panel IP40	IP20 in panel IP40
Endurance:	> 5000 operating cycles	> 5000 operating cycles	> 5000 operating cycles
Resistance to climate acc. to:	EN 61008	EN 61008	EN 61008
Mounting position:	any	any	any
Ambient temperature:	–25 °C … +40 °C	–25 °C … +55 °C	–25 °C … +40 °C
Vibration resistance:	5g 5 … 150 … 5 Hz	5g 5 … 150 … 5 Hz	5g 5 … 150 … 5 Hz
Plastic parts:	halogen-free	halogen-free	halogen-free
Contacts:	cadmium-free	cadmium-free	cadmium-free

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

Internal resistances and power losses of RCCBs and RCBOs
Internal resistances and power losses per pole (cold resistance at room temperature)

4-pole RCCB F404

in A	R_i mΩ	P_v W
25	2.1	1.3
40	2.0	3.2
63	1.1	4.4

2-pole RCCB F402

Type	R_i mΩ	P_v W
25 A/10 mA	8.8	5.5
25 A/30 mA	6.1	3.8
40 A/30 mA	5.8	9.3

SMISSLINE TP technical details
Residual current operated circuit breaker FS401


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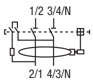

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Residual current operated circuit breakers with overcurrent protection (RCBO)

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.

	FS401	**FS401K**
Rated voltage Un:	230 V ~	230 V ~
Upstream fuses and	For backup and selectivity, the details for the miniature circuit breakers S400 E	
Selectivity limits:	and S400 M Page 2/19 to 2/36	
Number of poles:	2-pole (1PN)	2-pole (1PN)
Rated frequency f_n:	50/60 Hz	50/60 Hz
Rated breaking capacity I_{cn}:	10 kA – 230 V ~ (10–16 A nominal current) 6 kA – 230 V ~ (20–32 A nominal current)	10 kA – 230 V ~ (10–16 A nominal current) 6 kA – 230 V ~ (20 A nominal current)
Current limitation class:	3	3
Total cut-off time (average value) acc. to – at I_n – at 5 $I_{\Delta n}$	EN 61009-1 40 ms 25 ms	EN 61009-1 240 ms 35 ms
Delay time at 5 $I_{\Delta n}$:	–	10 ms
Connection cross-sections Terminal at load end	Opposing action stroke clamp on cylinder, touch finger-proof. Suitable for connecting single, multi- and fine-wire conductors of up to 25 mm²	
Degree of protection:	IP20 inside panel IP40	IP20 inside panel IP40
Endurance:	> 5000 operating cycles	> 5000 operating cycles
Resistance to climate, acc. to:	EN 61009	EN 61009
Mounting position:	any	any
Ambient temperature:	–25 °C ... +40 °C	–25 °C ... +40 °C
Vibration resistance:	5 g 5 ... 150 ... 5 Hz	5 g 5 ... 150 ... 5 Hz
Plastic parts:	halogen-free	halogen-free
Contacts:	cadmium-free	cadmium-free

Please notice:
For the influence of the ambient temperature and the thermal influences of row mounted RCBO's it is necessary to calculate with the same correction factors like with MCB's.

SMISSLINE TP technical details
Residual current operated circuit breaker FS401
Internal resistances and power losses, Derating

Max. operating currents depending on ambient temperature for RCBO of tip characteristics B and C.

Influence of adjacent devices

B,C	Ambient temperature T (°C)								No. of adjacent devices	correction factor
In (A)	**–25**	**–20**	**–10**	**0**	**10**	**20**	**30**	**40**	1	1
2	2.6	2.5	2.4	2.3	2.2	2.1	2	1.9	2	0.95
4	4.9	4.8	4.6	4.5	4.3	4.2	4	3.8	3	0.9
6	7.95	7.8	7.4	7.1	6.7	6.4	6	5.6	4	0.86
8	10.3	10.1	9.7	9.3	8.8	8.4	8	7.6	5	0.82
10	11.8	11.6	11.3	11	10.7	10.3	10	9.7	6	0.8
13	15.65	15.4	14.9	14.4	14	13.5	13	12.5	7	0.78
16	18.65	18.4	17.9	17.4	17	16.5	16	15.5	8	0.77
20	23.1	22.8	22.2	21.7	21.1	20.6	20	19.4	9	0.76
25	30.8	30.3	29.2	28.2	27.1	26.1	25	23.9	10	0.76
32	39.3	38.6	37.3	36	34.7	33.3	32	30.7		
40	50.7	49.7	47.8	45.8	43.9	41.9	40	38.1		

2-pole RCBO FS401

Type	R_i mΩ	P_v W
C10/0.03	17.0	1.71
C13/0.01	21.0	3.58
C13/0.03	15.0	2.55
C16/0.01	13.0	3.33
C16/0.03	10.4	2.67
B16/0.03	10.9	2.45
B13/0.03	15.0	3.33
C20/0.03	8.0	3.20
C25/0.03	7.0	4.38
C32/0.03	5.4	5.53

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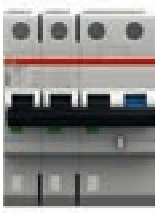
SMISSLINE TP technical details
Residual current operated breaker RCBO FS403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4-pole RCBO from the ABB SMISSLINE protective devices range
The combination of circuit protection and a residual current protection in one device as 4-pole RCBO simplifies both – 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.

	FS403
Rated voltage U_n:	240/415 V
Number of poles:	3PN
Rated frequency f_n:	50/60 Hz
Rated breaking capacity I_{cn}:	10 kA bzw. 6 kA
Current limitation class:	3
Total cut-off time (avarage time) acc. to IEC/EN 61009-1 – at $I_{\Delta n}$ – at $5I_{\Delta n}$	EN61009 40 ms 25 ms
Standed Cross-section of conductors (top/bottom)	Upper terminal part 0,75 – 35 mm² Lower terminalpart 0,75 – 10 mm²
Tightening torque:	2.8 Nm
Degree of protection:	IP20
Endurance:	> 5000
Resistance to climate:	according to EN61009
Ambient temperature:	–25 °C … +40 °C
Vibration resistance:	EN 61009-1
Plastic parts: contacts:	halogen free, according IEC 61-249-2-21 cadminum free
Approvals and standards:	EN/IEC 61009-1, SEV

Accessory:
Auxiliary- and signal contacts are to attach on to the left of the device through the customer.

SMISSLINE TP technical details
Residual current operated circuit breaker FS403
Internal resistances and power losses, Derating

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

FS403

Typ	R_i mΩ für L	R_i mΩ für N	P_v W
6A B, C	48.1	1.9	3
10A B, C	15.5	2.1	2.69
13A B, C	10.1	1.8	2.96
16A B, C	7.9	1.9	3.52
20A B, C	5.6	1.7	3.94
25A B, C	4.8	1.7	5.19
32A B, C	3.6	1.5	6.38

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Performances at different ambient temperatures Max. operating current depending on the ambient temperature of a circuit-breaker in load circuit of characteristics type B, C

B,C	Ambient temperature T (°C)							
In (A)	**–25**	**–20**	**–10**	**0**	**10**	**20**	**30**	**40**
6	7.95	7.8	7.4	7.1	6.7	6.4	6	5.6
10	11.8	11.6	11.3	11	10.7	10.3	10	9.7
13	15.65	15.4	14.9	14.4	14	13.5	13	12.5
16	18.65	18.4	17.9	17.4	17	16.5	16	15.5
20	23.1	22.8	22.2	21.7	21.1	20.6	20	19.4
25	30.8	30.3	29.2	28.2	27.1	26.1	25	23.9
32	39.3	38.6	37.3	36	34.7	33.3	32	30.7

Influence of adjacent devices Correction factor Fm

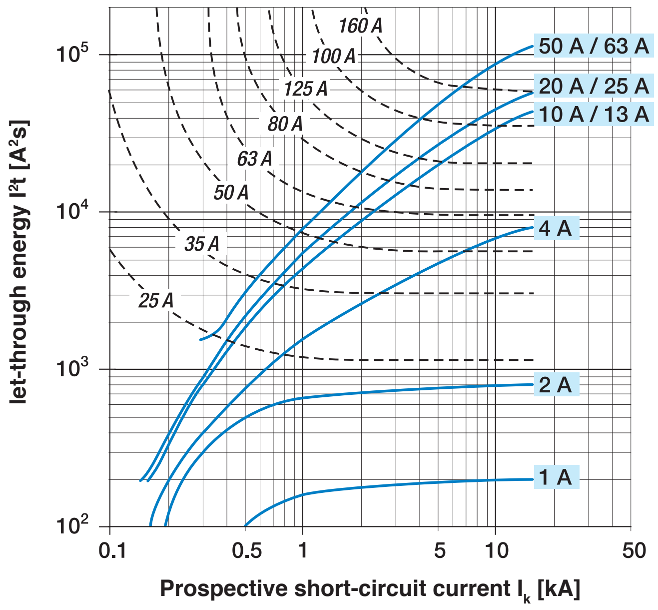
No. Of adjacent devices	correction factor
1	1
4	0.86
6	0.8
7	0.78
8	0.77
9	0.76
10	0.76

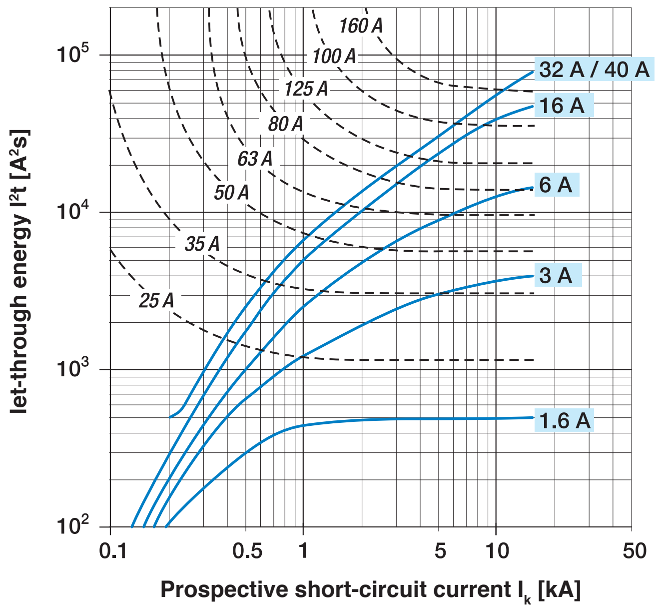
SMISSLINE TP technical details
RCBO FS401, FS403
Limitation of specific let-through energy I^2t, peak current Ip

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.

FS400M characteristics B–C





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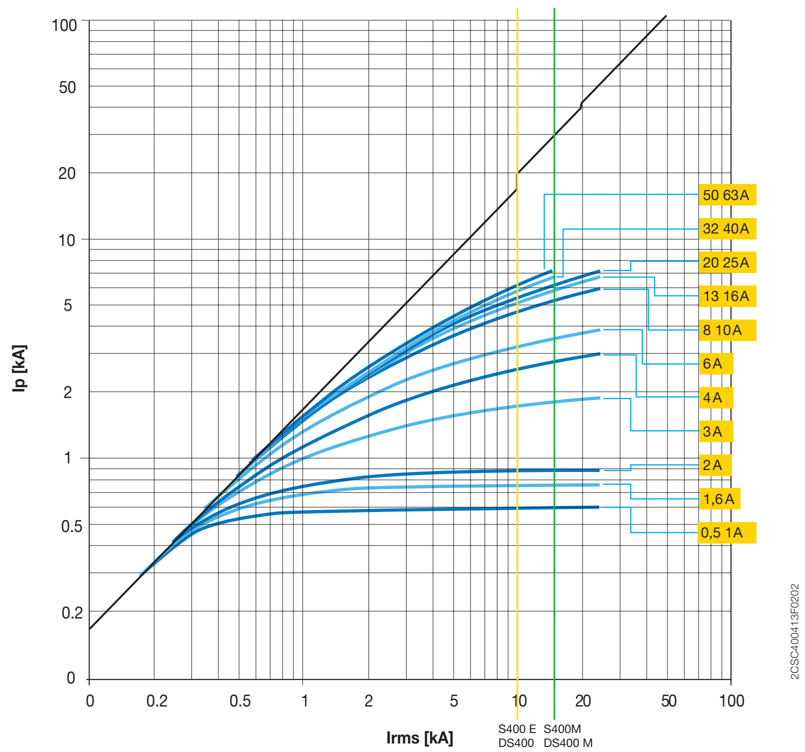
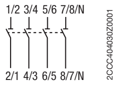
Limitation curves – Peak current values

The Ip 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



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
Approvals:	SEV
Weight (approx.):	250 g
Switching duty:	AC-22A
Plastic parts:	halogen-free
Contacts:	cadmium-free

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SMISSLINE TP technical details
Surge arrester OVR

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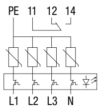

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Description of product

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.

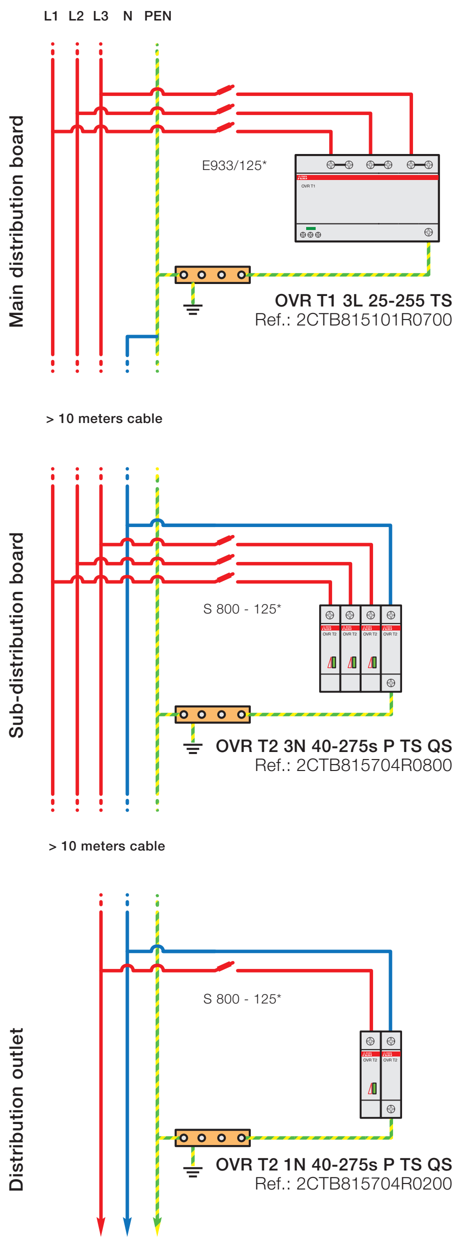
Running cables

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.

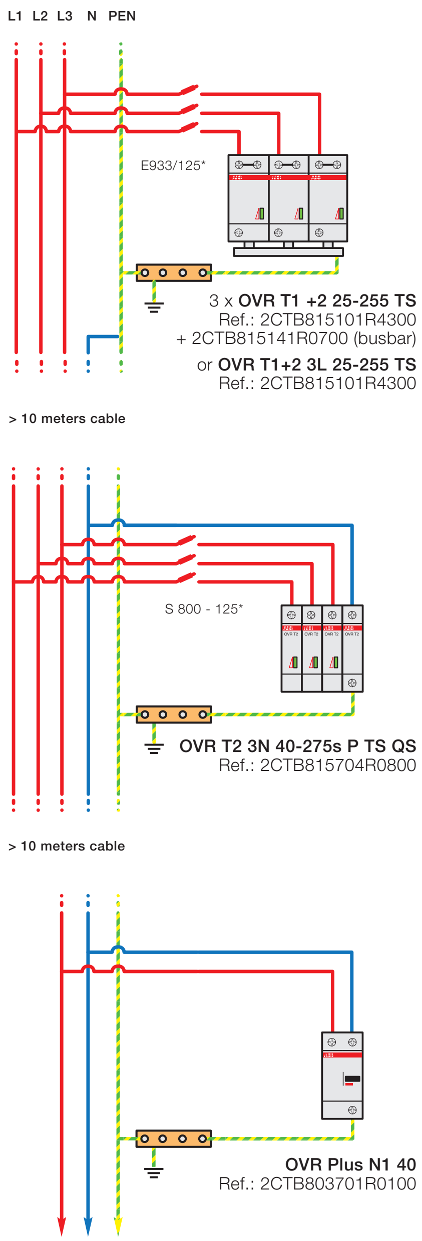
SMISSLINE TP technical details
Surge arrester OVR

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
$15\,kA \le I_p \le 50\,kA$



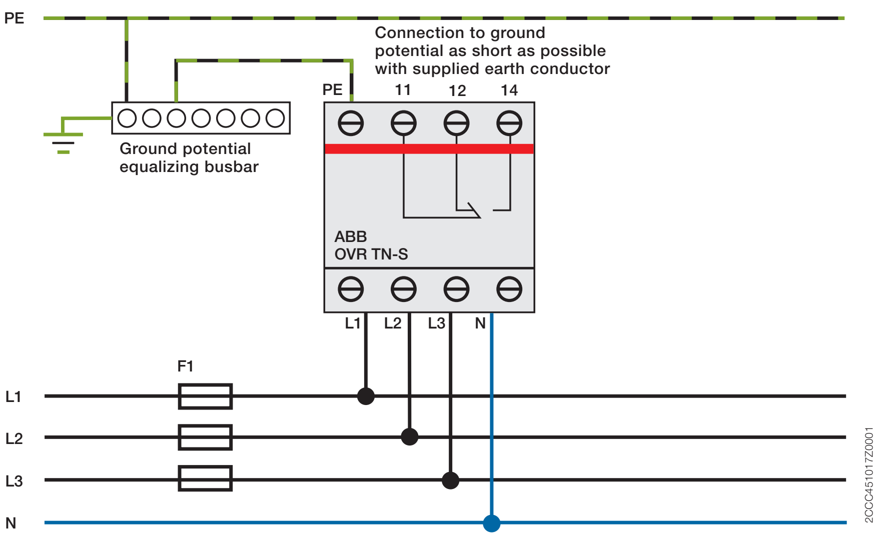
Configuration 2
$7\,kA \le I_p \le 15\,kA$



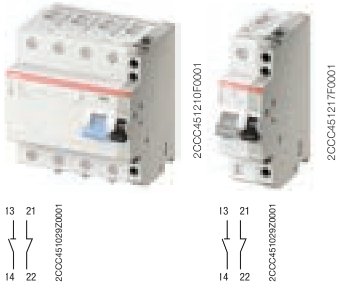
Rated voltage U_n:	230/400 V AC
Max. Continuous voltage U_c:	275 V AC
Number of poles:	4 (TN-S system)
Power consumption at U_n:	1.2 W per device
Requirement class according to IEC 61643-1:	Type 2
Rated leakage surge current I_n (8/20 µs):	15 kA
Max. leakage surge current I_{smax} (8/20 µs):	30 kA
Protection level U_p at I_{sn}: U_p at I_s = 5 kV:	≤ 1.5 kV ≤ 1 kV
Max. leakage surge current I_{sg} (8/20 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:	halogen-free
Contacts:	cadmium-free

9

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

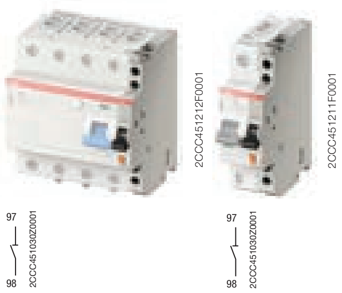
Normally open contact 21
NC (normally close) 22 opposing operation with protective device

9

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

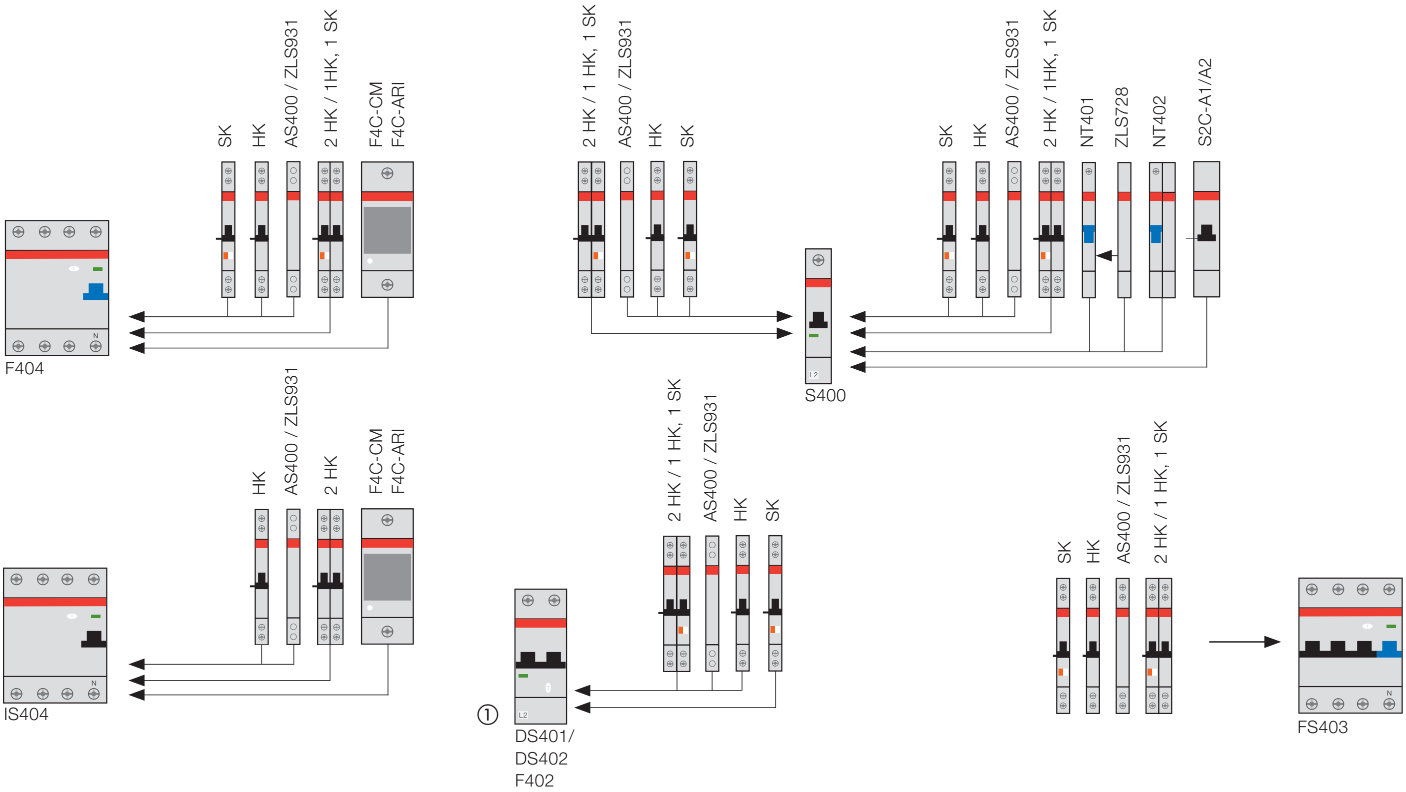
Normally closed contact 05
NC (normally close) 06 opens during automatic trip



Technical data for auxiliary switch and signal contact

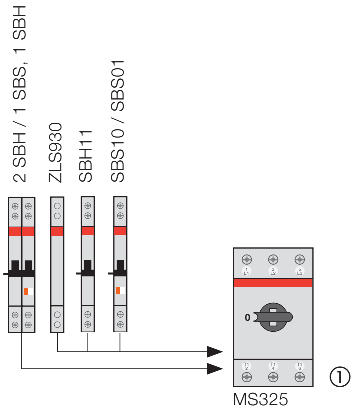
	Signal contact SK400	Auxiliary switch HK400
Rated voltage U_n:	400 V	400 V
Rated impulse withstand voltage:	4 kV	4 kV
Rated current:		
– I_{th}:	6 A	6 A
– AC15	2 A/230 V / 1 A/400 V	2 A/230 V / 1 A/400 V
– DC13	0.55 A/125 V=	0.55 A/125 V=
– DC13	0.27 A/250 V=	0.27 A/250 V=
Minimum current/voltage: (to ensure reliable electrical operation)	10 mA 12 V=	10 mA 12 V=
Connection cross-sections:	2 x 1.5 mm² strand with sleeve	2 x 1.5 mm² strand with sleeve
Plastic parts:	Free of halogen und cadmium	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

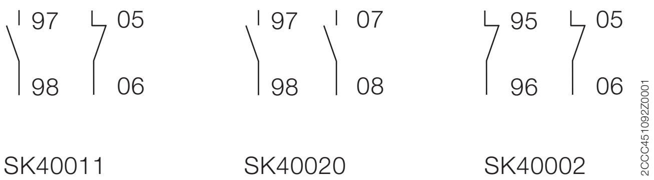


On each protective device can be mounted:

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

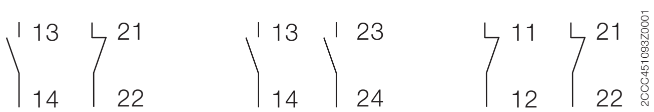


Contact description signal contact



SK40011 SK40020 SK40002

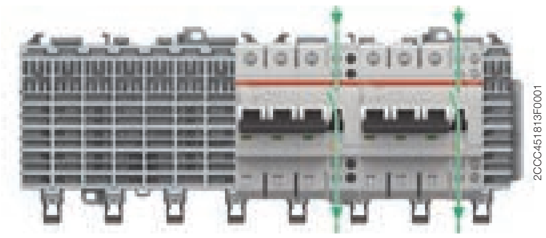
Contact description auxiliary switch



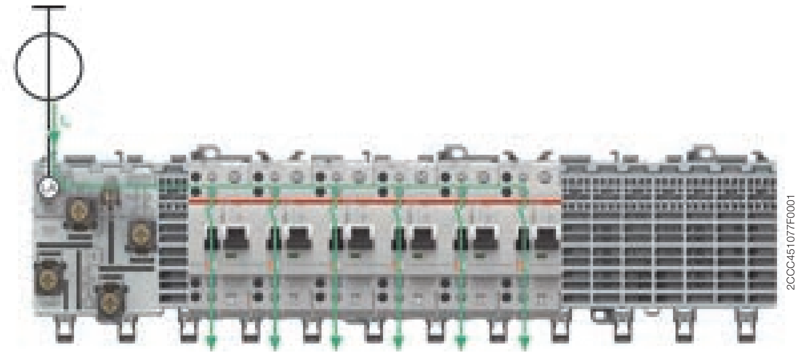
① If you use an auxiliary switch and a signal contact you must connect first the signal contact on the MS325

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.



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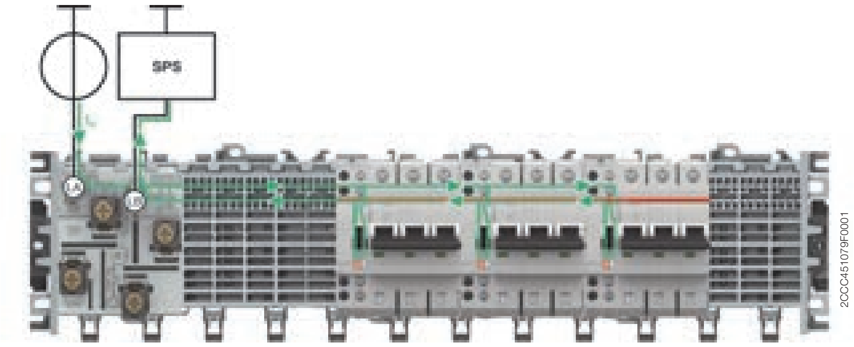
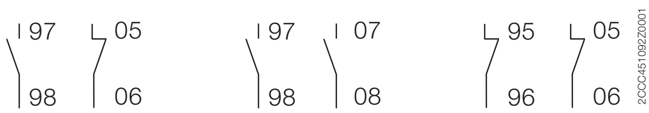
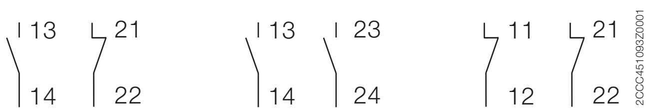
3. Collective alarm, signal contact contacts the auxiliary busbars LA, LB
A cost-effective collective alarm solution can be implemented without additional wiring by using this arrangement.



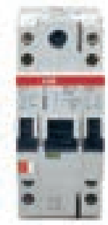
Contact description signal contact



Contact description auxillary contact



SMISSLINE TP technical details
Auxiliary switches and signal contacts
Contact arrangements to auxiliary busbars



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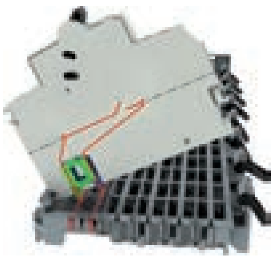

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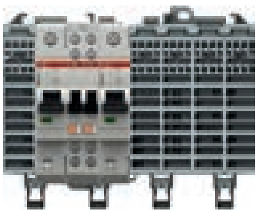
Left/right mounting of auxiliary switch/signal contact for miniature circuit breaker

Space-saving on the socket system

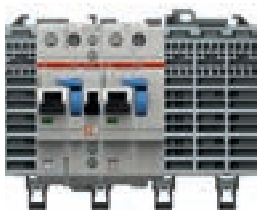
By mounting the auxiliary switches/signal contacts alternately on the left and right, the installation width on the SMISSLINE socket system can be reduced. A dummy housing is therefore not needed when just using auxiliary switches or signal contacts.

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



2CCC451809F0001

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



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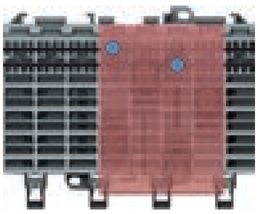
Supply options for auxiliary busbars LA and LB



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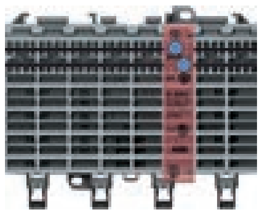
Supply option for auxiliary busbars using incoming terminal block.



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Supply option for auxiliary busbars using incoming terminal block.

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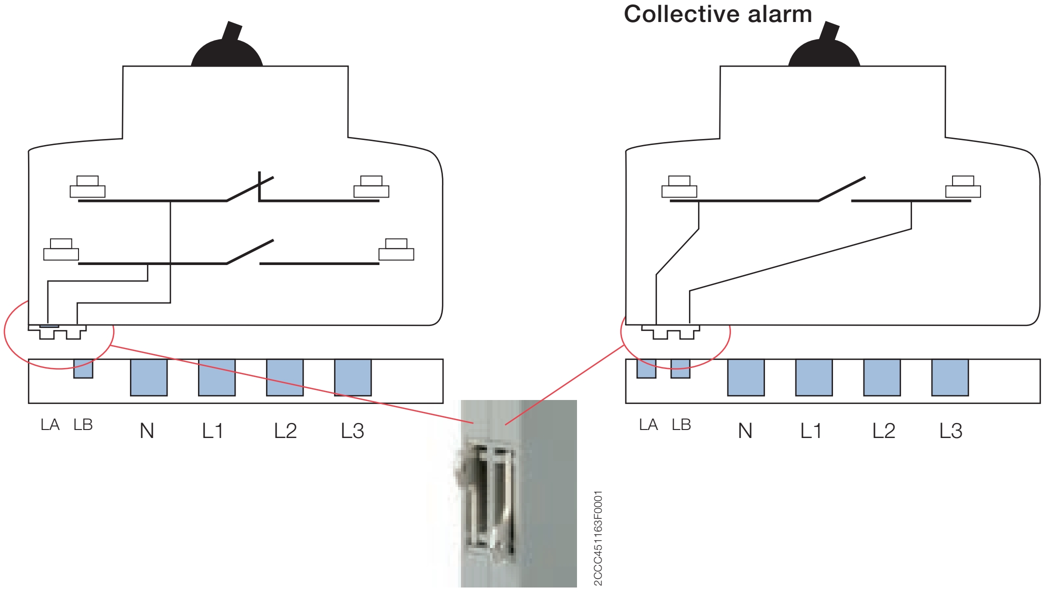
Positioning of contacting piece ZLS632 on auxiliary switch and signal contact

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



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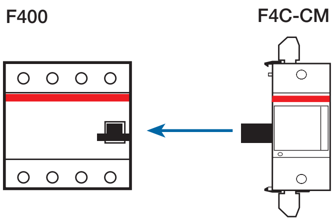
SMISSLINE TP technical details
S4C-CM motor operating devices

- On the front of the device there is a moveable element for allowing or locking out remote commands. This element may be used when performing maintenance with the residual current circuit breaker in the OFF position, in order to avoid remote-activated closing operations.
- The operation can be performed via an impulse command. Manual operation is performed by moving the motorized command lever which, in the absence of an operation, allows the circuit breaker lever to be freely moved.
- The lower section of the device contains an integrated 1NO+1NC auxiliary change-over contact, which indicates the position of the contacts of the associated circuit breaker.
- The red LED on the front of the device gives a local visual indication of the intervention of the associated device.

SMISSLINE TP technical details
F4C-CM motor operating devices

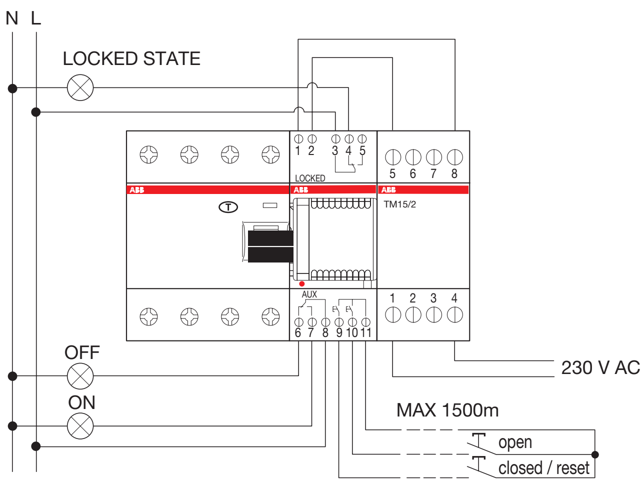


Supply voltage:	12 ... 30 V AC + 10 % – 15 % (50 – 60 Hz); 12 ... 48 V DC + 10 % – 15 %
Insulation voltage:	2500 V for 1 minute
Power consumption:	
12 V AC	< 15 VA
24 V AC	< 22 VA
30 V AC	< 25 VA
12 ... 48 V DC	< 20 VA
Power consumption at rest:	≤ 1,5 VA
Remote command*:	via free voltage contacts
Closing time at ambient temperature:	≤ 1 second
Opening time at ambient temperature:	≤ 0,5 seconds
Delay time for remote resetting after opening due to fault:	8 seconds
Number of operations:	≤ 20 000
Operating temperature:	– 25 °C … + 55 °C
Storage temperature:	– 40 °C … + 70 °C
Fixing:	on EN 60715 rails (35 mm) with rapid fixing system
Protection degree (EN 60529):	terminals: IP2X
	housing: IP4X
Cables length of control circuit:	≤ 1500 m
Cable cross-section:	≤ 2,5 mm²
Auxiliary contact (terminals 6, 7, 8):	1NO + +NC change-over
Rated current:	3 A (250 V AC), resistive load
Command terminals:	terminal 9 = closing contact
	terminal 10 = opening contact
	terminal 11 = common reference for control contacts + 5 V DC (supplied by motor operating device)

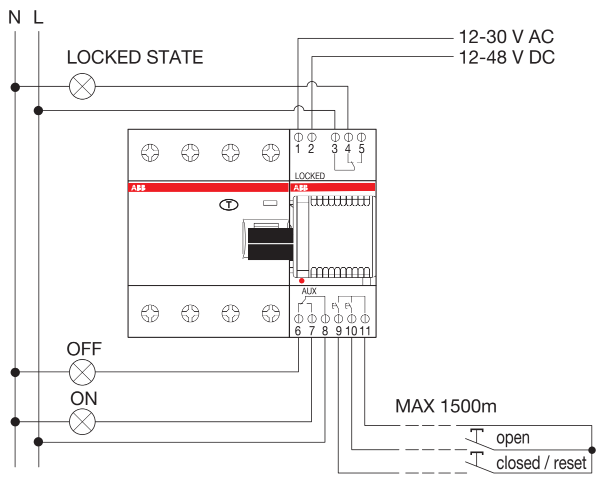
* 1) After powering up the device, wait 5 seconds before activating the command functions.
2) After opening due to a fault, wait 8 seconds before performing the remote resetting.

Wiring diagrams for F4C-ARI motor operating devices

Use at 230 V AC via a TM15/12 bell transformer



Low voltage use: 12 … 30 V AC, 12 … 48 V DC



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SMISSLINE TP technical details
F4C-ARI auto-reclosing unit

The F4C-ARI auto-reclosing device, installed to the right side of the residual current circuit breakers, automatically performs three reclosing attempts in the event of a fault. If the result of the three reclosing attempts is negative, the device enters a locked state.

The luminous two- colors red/green LED shows the operating state of the auto-reclosing device.

– Blinking green LED: this is displayed for five seconds after the device is powered up. When the LED stops blinking, the device is ready to operate.
– Steady green LED: the remote control is activated and the device is powered.
– LED is off: no power supply.
– Blinking red LED: reclosing cycle in progress.
– Steady red LED: the remote control is excluded on the device or is in a locked state following three unsuccessful reclosing attempts, or as a result of a remote opening command.

The lower section of the device contains an integrated 1NO+1NC auxiliary change-over contact, which indicates the position of the contacts of the associated circuit breaker.

The locked state can be reset:

– locally, by manually moving the mobile element on the front of the device to the OFF position and subsequently to the ON position. The device will reset and automatically reclose the circuit breaker;
– remotely, by means of a close command (NO contact) which resets the device and close the circuit breaker.

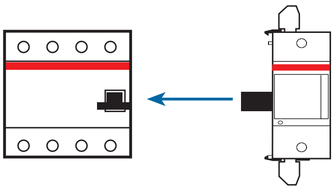
Using both of the resetting methods, the cycle of three reclosing attempts can be repeated.

The associated residual current circuit breaker can be remotely opened via a command with the NO contact. The remote open command locks out the resetting logic and brings the auto-reclosing device into a locked state.

Operation of the close/reset and open commands can be performed via an impulse command.

Remote commands and reclosing logic may be deactivated locally by means of the mobile element on the front of the device. This is desirable during maintenance interventions with the device in the OFF position, in order to avoid remote-activated closing operations or automatic reclosing. In this case, with the selector and the circuit breaker in the OFF position, the device may be physically locked by threading a padlock through the with draw able element on the front.

SMISSLINE TP technical details
F4C-ARI motor operating devices



Supply voltage:	12 ... 30 V AC + 10 % – 15 % (50 – 60 Hz); 12 ... 48 V DC + 10 % – 15 %
Number of automatic reclosing attempts:	3
Counter reset time:	16 seconds
Insulation voltage:	2500 V for 1 minute
Power consumption:	
12 V AC	< 15 VA
24 V AC	< 22 VA
30 V AC	< 25 VA
12 ... 48 V DC	< 20 VA
Power consumption at rest:	≤ 1,5 VA
Delay time for activation of automatic reclosing:	3 seconds
Reclosing time at ambient temperature:	≤ 1 second
Opening time at ambient temperature:	≤ 0,5 seconds
Number of operations:	≤ 20 000
Operating temperature:	– 25 °C … + 55 °C
Storage temperature:	– 40 °C … + 70 °C
Fixing on EN 60715 rails (35 mm) with rapid fi xing system	
Protection degree (EN 60529):	terminals: IP2X
	housing: P4X
Cables length of control circuit:	≤ 1500 m
Cable cross-section:	≤ 2,5 mm²
Auxiliary contact (terminals 6, 7, 8):	1 change-over
Rated current:	3 A (250 V AC), resistive load
Remote command*:	via dry contacts
Command terminals:	terminal 9 = contact for closing and for remote reset of locked state
	terminal 10 = opening contact
	terminal 11 = common reference for control contacts, + 5 V DC (supplied by motor operating device)

* After powering up the device, wait 5 seconds before activating the command functions.

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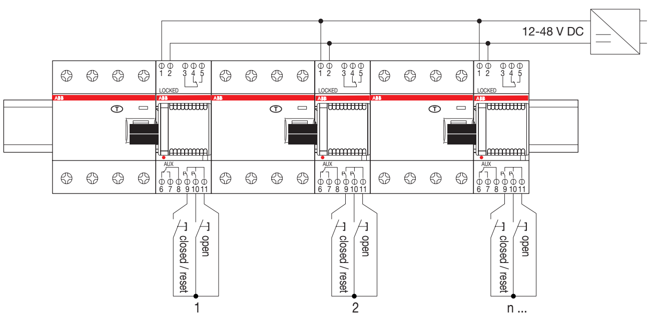
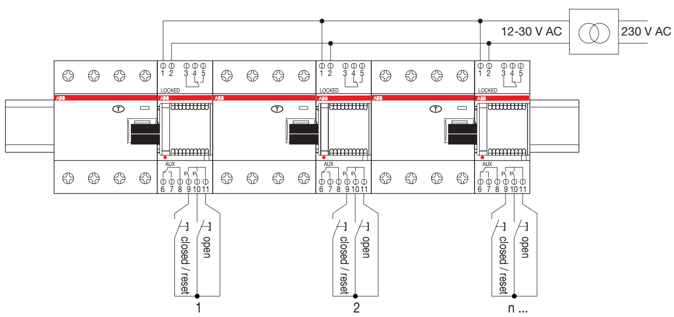
Wiring diagrams for F4C-ARI motor operating devices

Low voltage use of several motor operating devices: 12 ... 30 V AC, 12 ... 48 V DC



Use of several motor operating devices at 230 V AC via a single safety transformer



Solutions for electrical distribution in buildings - Technical details
Industrial plugs and sockets

Industrial plugs and sockets technical details

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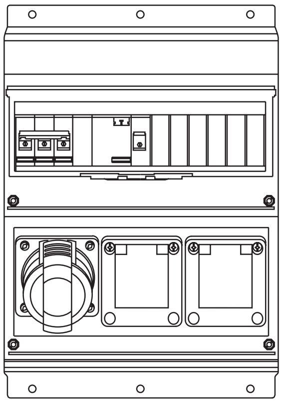
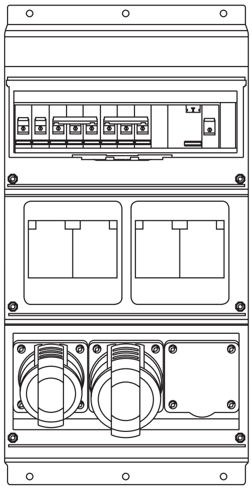
Technical details
Industrial plugs and sockets

Front pictures

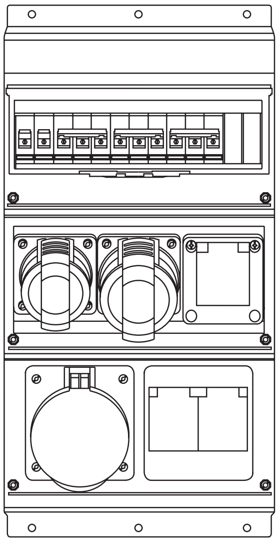
MPR16



MPR32



MP63



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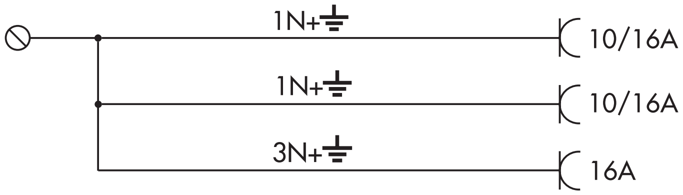
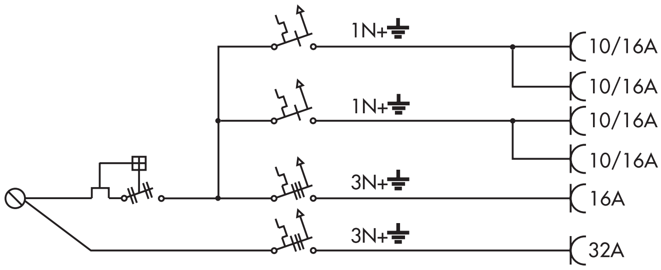
Wiring diagrams

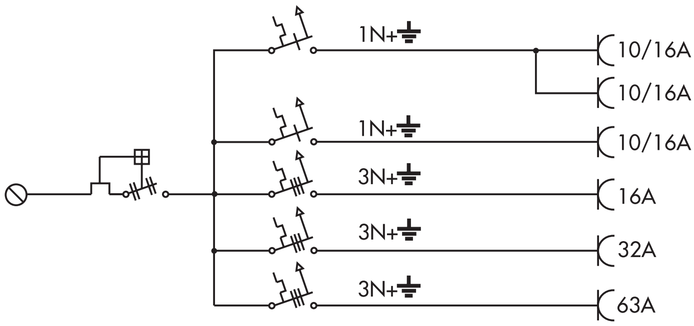
MP16



MPR32



MPR63/1



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Solutions for electrical distribution in buildings - Technical details
Intelligent Building Solutions

Intelligent Building Solutions technical details

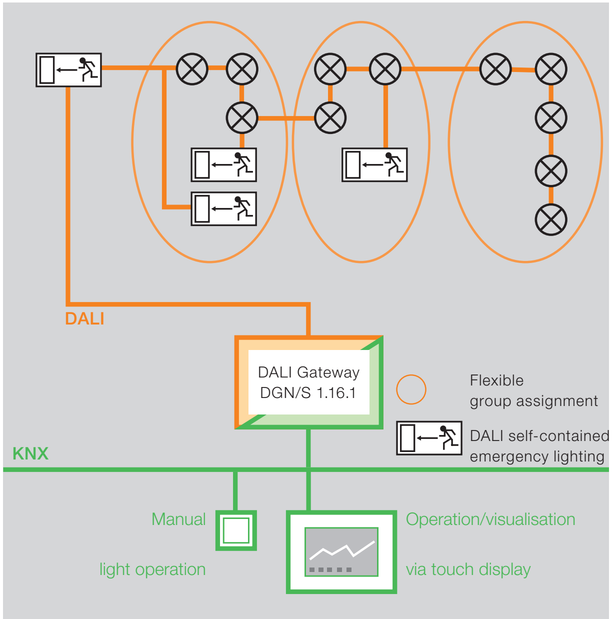
Technical details
Illumination and Light Sensors – DALI

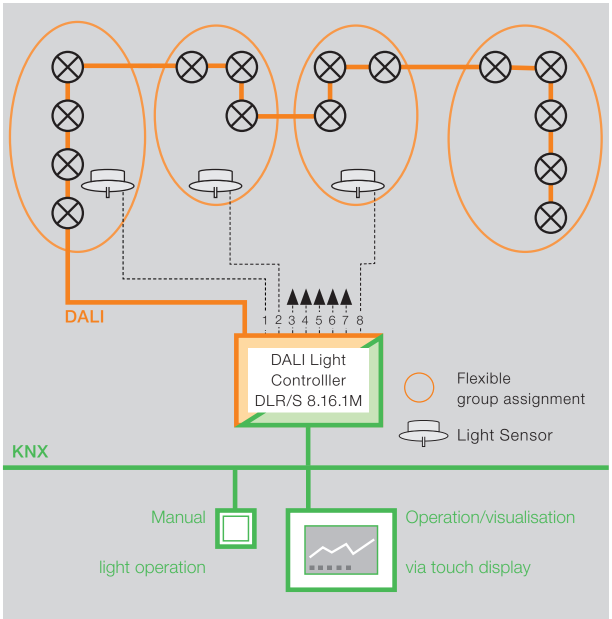
DALI Gateway DGN/S 1.16.1
Lighting control and emergency lighting functions combined

Control via 16 lighting groups
Conventional lighting and individual emergency lighting battery combined

DALI Light Controller DLR/S 8.16.1M
Energy through constant lighting control

Control via 16 lighting groups. Up to 8 lighting groups can be controlled with 8 light sensors. Master-slave, staircase light and Scene mode round off the functions.





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DALI Light Controller DLR/A 4.8.1.1

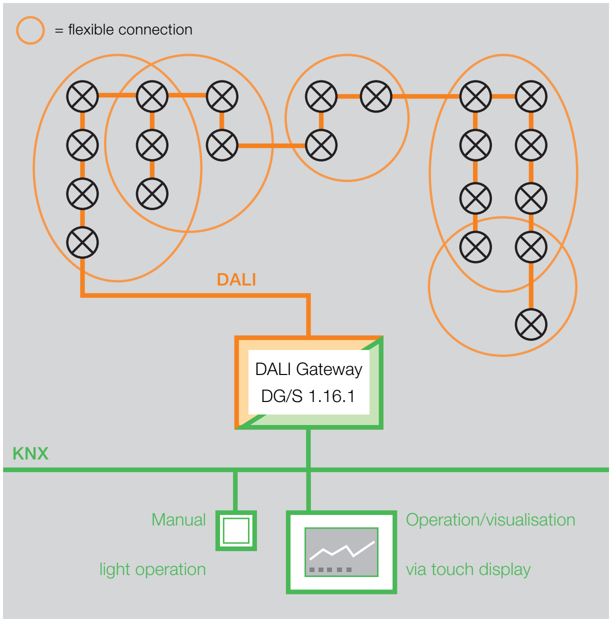
Decentralized Constant Lighting Control

Control via 8 lighting groups in compact surface mounting housing. Up to 4 lighting groups can be controlled with 4 light sensors. Master-slave, staircase light and Scene mode round off the functions.

DALI Gateway DG/S 1.16.1

Flexibility in a good light

Large lighting groups can be controlled via flexible DALI groups. 1 x 64 DALI devices in 16 lighting groups. Overlapping groups are possible.



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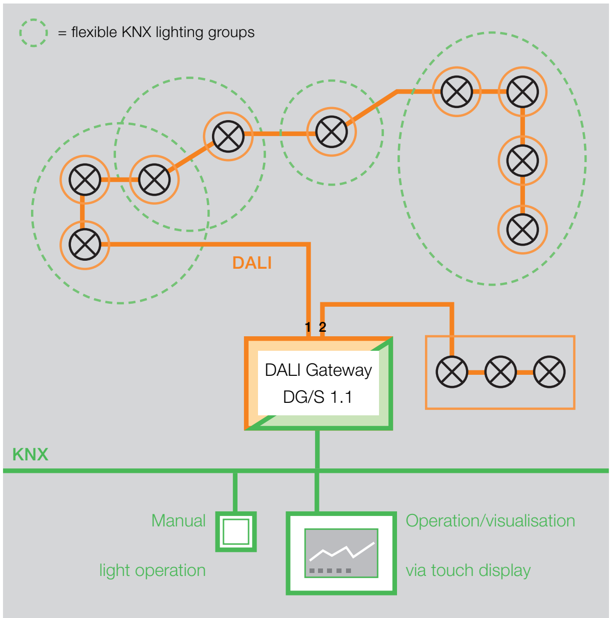
Technical details
Illumination and Light Sensors – DALI

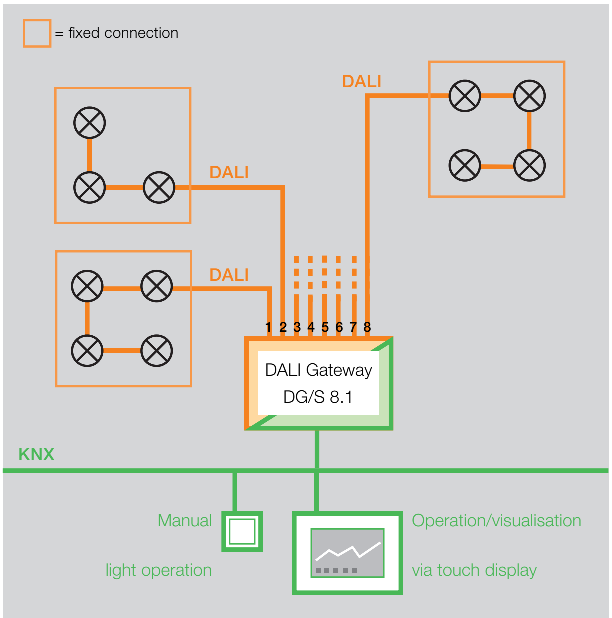
DALI Gateway DG/S 1.1
Individual lighting control

Lighting groups are formed in KNX. Individual lamps are indicated on the KNX. 1 x 64 DALI devices in unlimited lighting groups.



DALI Gateway DG/S 8.1
The proven technology

Lighting groups are formed via “rigid” hardware wiring. Fast commissioning as no addressing is necessary.
No readdressing when a ballast is exchanged. 8 x 16 DALI devices.



Technical details
Heating and Cooling

Influencing Variables on Room Climate

Influencing Variables on Room Temperature

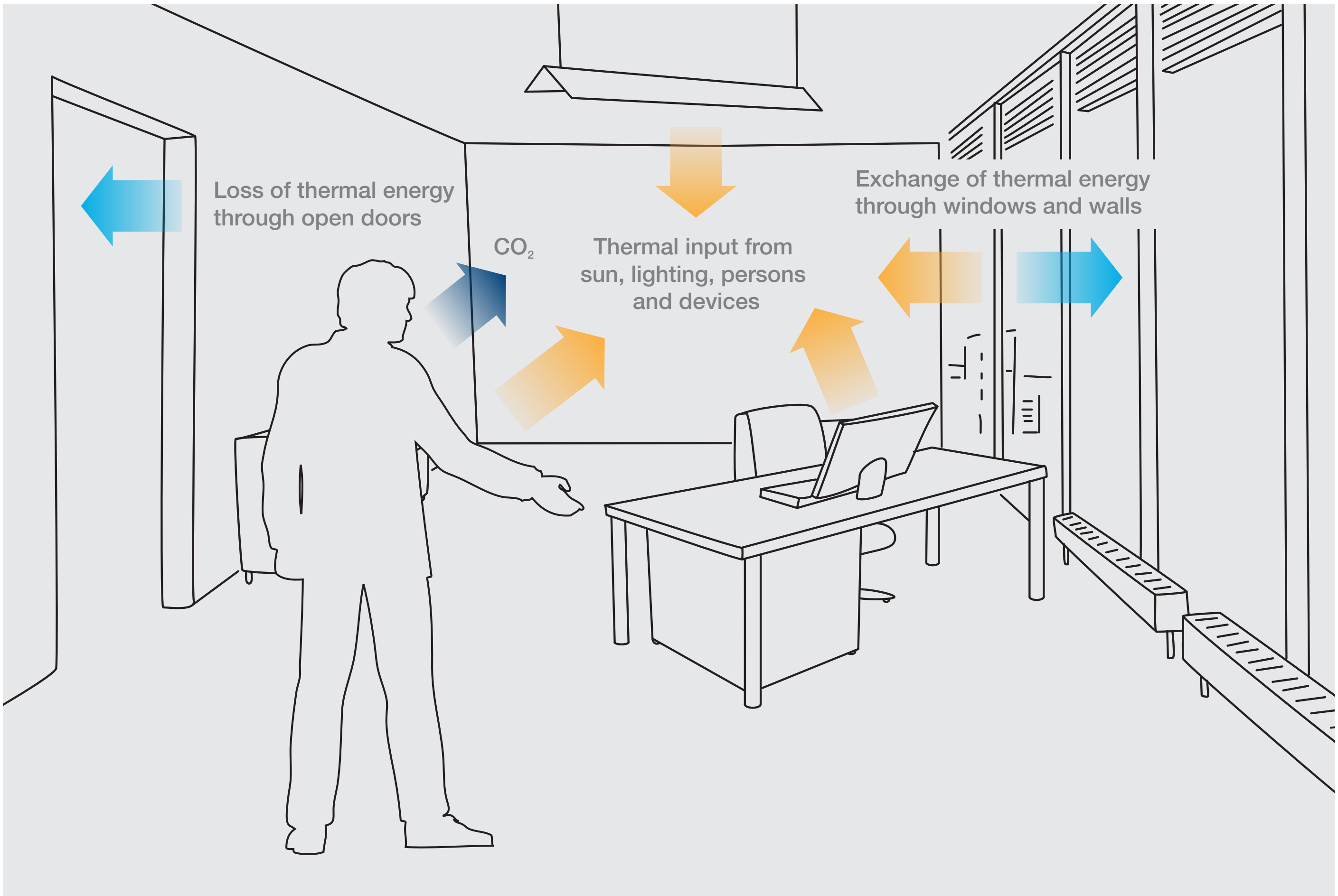
Internal and external factors have an effect on the thermal conditions in a room or a building. As an external factor the solar radiation is important for the indoor temperature – particularly with regard to modern architecture with glass fronts. Besides this, the room temperature is strongly affected by the exchange of thermal energy through windows and walls as well as the loss of thermal energy through open doors and windows.

Depending on the intensity, all this interactions influence also the energy efficiency of a building and have therefore to be optimised.
Internal thermal inputs from lighting, devices or persons have also an influence on the room climate. By planning a heating, ventilation or air conditioning system all this internal and external factors have to be considered.

Influencing Variables on Air Quality

The indoor climate in living and working areas has a scientifically proven impact on health, job performance and well-being of people. A suitable indicator for determination of the room air quality is the CO_2 concentration. In addition the values for room temperature and air humidity must be controlled to meet the requirements for a comfortable room climate.

Studies have shown, that high CO_2 concentration in the air influences the well-being as well as the performance and learning ability of people. Besides the normal CO_2 concentration in the air, human respiration is an important factor increasing the CO_2 concentration in a room. Therefore it is important to measure the CO_2 concentration in rooms where many persons are present (schools, conference rooms, open-plan offices). Monitoring of thresholds enables fans to be switched via ABB i-bus KNX allowing automatic control of the CO_2 concentration and sufficient supply of fresh air.



11

Technical details
Busch-*priOn*®

Operation – Planning aid for Busch-*priOn*®

End strips without function

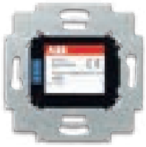

studio white,
Article-No. 6348-24G-101-500

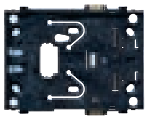

glass black,
Article-No. 6348-825-101-500


white glass,
Article-No. 6348-811-101-500


stainless steel,
Article-No. 6348-860-101-500

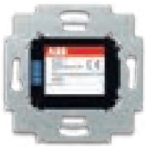
Support frame, bus coupler

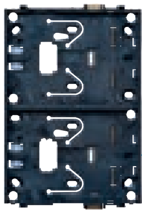

Bus coupler Busch-*priOn*®,
Article-No. 6120/12-101

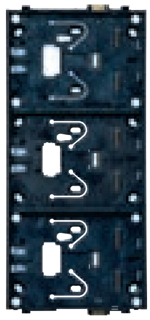

1gang,
Article-No.
6346/10-101-500

Note:
This power adaptor can supply up to 15 power bus couplers with current.


Power adaptor
REG,
Article-No.
CP-D 24/2.5

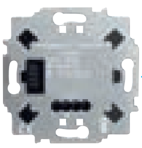

Bus coupler Busch-*priOn*®,
Article-No. 6120/13-500

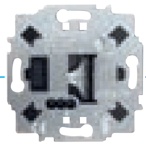

2gang,
Article-No.
6346/11-101-500

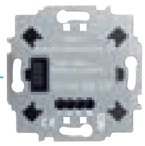

3gang,
Article-No.
6346/12-101-500

FM actuators

Without end strip incl. temperature reading


Switch actuator,
1gang, FM
2.300 w/VA,
Article-No.
6354 U-500


Universal dimming
actuator, 1gang, FM
10–450 w/VA,
Article-No.
6355 U-500


Serial/blind actuator,
2/1gang, FM
2.300 w/VA,
Article-No.
6356 U-500

11

End strip

Commissioning adaptor,
Article-No. 6149/21-500

End strips without function

studio white,
Article-No. 6349-24G-101-500

white glass,
Article-No. 6349-811-101-500


glass black,
Article-No. 6349-825-101-500

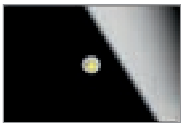

stainless steel,
Article-No. 6349-860-101-500

End strip with IR proximity function

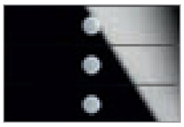
glass black,
Article-No.
6350-825-101-500

Note:
only combinable with
3gang control element

Single-line display and
room thermostat,
Article-No.
6351-825-101-500

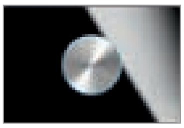


Control element,
1gang,
Article-No.
6340-825-101-500

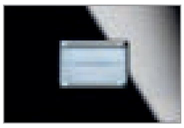


Control element,
3gang, Article-No.
6342-825-101-500

Colour display with rotary control element, Article-No. 6344-825-101-500



Rotary control element,
1gang,
Article-No.
6341-825-101-500



Busch-Watchdog,
180 FM,
Article-No.
6345-825-101-500

End strips with temperature sensor.

Not combinable with FM actuators.

studio white,
Article-No. 6352-24G-101-500

white glass,
Article-No. 6352-811-101-500

glass black,
Article-No. 6352-825-101-500

stainless steel,
Article-No. 6352-860-101-500

Colour range

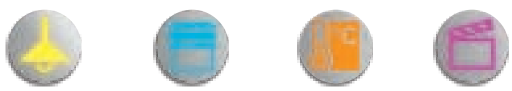
Busch-*priOn*®
glass black

Busch-*priOn*®
white glass

Busch-*priOn*®
stainless steel

Busch-*priOn*®
studio white, gloss

Labelling symbols

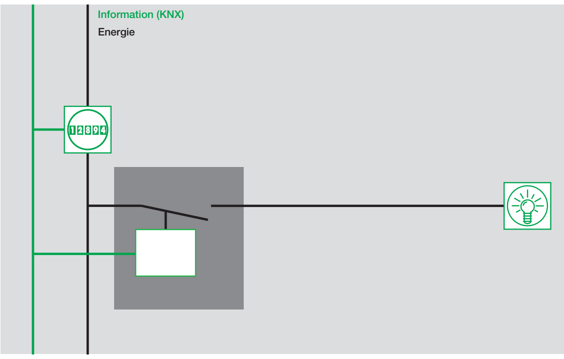


Labelling inserts for blinds, lighting, RTC and scene. The colours are repeated in the Busch-Jaeger colour concept.

Technical details
Energy measurement

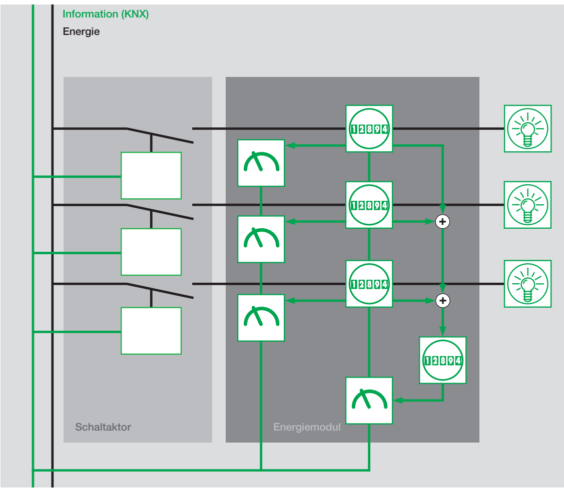
ABB offers various solutions for decentral energy measurement on the basis of the KNX standard.

Version 1



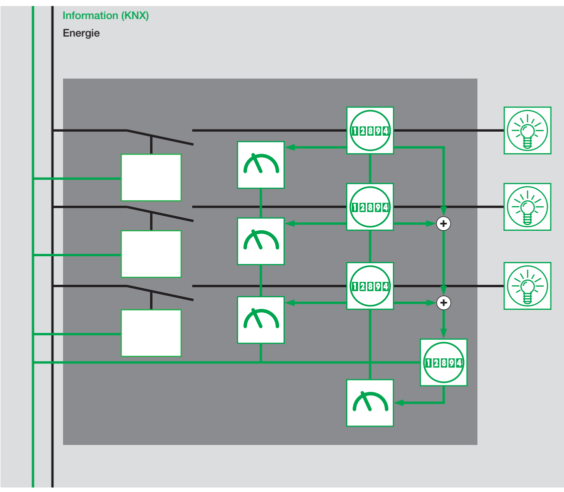
Electronic energy meters make the current energy values available on the KNX bus system in conjunction with a KNX interface. The measured data can be intermediately stored, evaluated and visualized from here.

Version 2



The Energy Module can record the energy consumption for the individual devices. It is used particularly when upgrading existing KNX systems and wherever energy measurement is required without switch functions.
It facilitates a detailed and transparent insight into the energy consumption of a building.
The current meter values can be sent and evaluated.

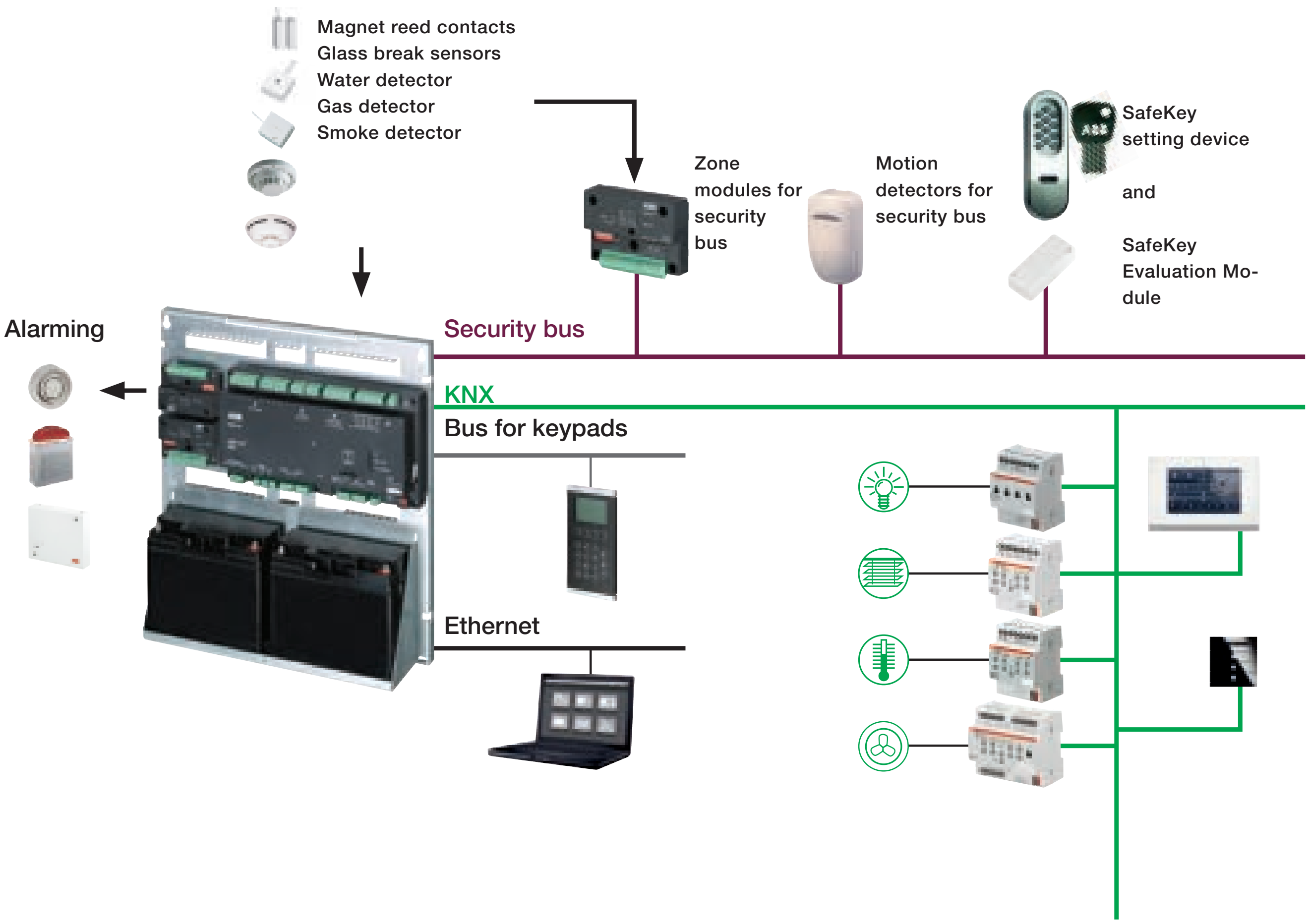
Version 3



The Energy Actuator facilitates control of the connected consumer loads via the ABB i-bus® KNX. For each of the three switch channels, the individual consumption can be measured in the same way as for the Energy Module. For every channel, the proven functionality of the ABB i-bus® KNX Switch Actuators are available.

Intermediate meter for electrical energy **Electrical consumer (load)** **Energy meter**

Security and Surveillance – The new KNX Security Panel



A complete product product portfolio: One system – all interfaces

To fulfill the project requirements ABB provides the user besides the new panel and keypad a complete product portfolio for professional alarm technology as well as known solutions for all trades of KNX building automation.

The KNX Security Panel is for universal usage for all kinds of hazardous situations in buildings like intrusion, personal attack, smoke, gas- and water leakage.

Technical details

Security and Surveillance – The new KNX Security Panel

KNX Security Panel without cover, integrated zone modules and batteries

Ethernet connection for programming, diagnostics and operation via a standard webbrowser

Direct inputs for security sensors

Keypads

Internal, external or remote alarming

Security bus for security sensors, zone modules and setting devices

KNX interface to display alarm states via displays of building automation and to control automatic building functions with support of security sensors.

The KNX Security Panel provides all needed system interfaces: An ethernet connection is used for programming, diagnostics and operation via a standard webbrowser as well as integration into the building network. The security sensors will be connected directly to the panel inputs or via the security bus, where the setting device for the system is also connected. Furthermore the panel provides interfaces for the also newly developed keypads and for internal, external or remote alarming. Finally the integrated KNX interface allows on the one hand to display alarm states via displays of building automation and on the other to control automatic building functions with support of security sensors.

Solutions for electrical distribution in buildings - Technical details
Enclosures

Enclosures technical details

Enclosures technical details
UK500 Series

Consumer units UK500 mounting

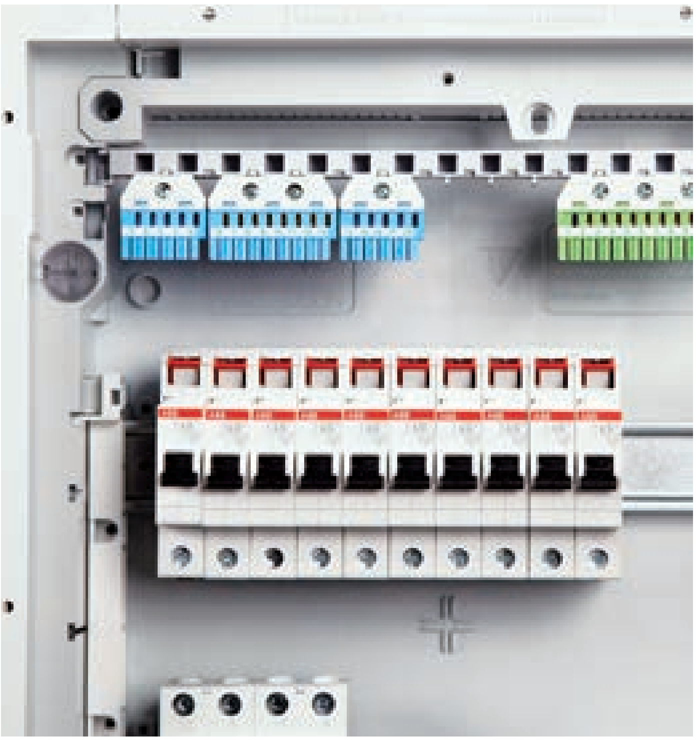
Installation - uncompromisingly simple, quick and well thought-out
The wall grips, included as standard, have a dual purpose. On the one hand, they allow the mounting in two additional depths. On the other, they can be used as spacers where several consumer units are to be placed side by side.
The removable cable inlet allows easy insertion of incoming and outgoing cables and uses a quick, singlehand-operated push-and-stay design.

Simple push-and-stay technology and all-round ease of installation
The wall box is non-warp, non-breakable and non-flammable. It offers a large wiring space. The strain-relief comb for neat cabling is an integral part of the wall box.

There are ample further preformed cable entry points on the sides and back of the wall box.

The device support can be snapped in and is installed quickly without tools. Here too, a variety of common installation techniques have been catered for - the device support can also be fixed in position using screws. The DIN rail is double-insulated as standard in all variants.

Professional cable entry in the wall box. Cable strain relief comb.



See page 14/12 in Solutions for electrical distribution in building

If required, the slots in the cover can be extended from 12 to accommodate 14 devices. The cover is fixed into position by two 90° quick-action screws which can be sealed.

All UK500 series consumer units are suitable for hollow-wall mounting. To do this, you only need the UZ90P4 hollow wall mounting set. No special hollow wall consumer unit is required. Upgrading is incredibly simple - just as easy as the hollow-wall mounting itself.

No screws, yet nothing can slip. Fastening is as easy as fastening cable ties. The hollow wall set can also be released if needed. The pull-strap will be twisted off after the work is completed.

Trim frame and door are easy to remove. Adjustable for uneven surfaces, sealable cover with 90° quick-action screws.

The quickest way for hollow-wall mounting

The hollow-wall set is placed inside the consumer unit.

1. Turn the tab to put the wall grip into position.
2. Then just pull
3. and it's done.

Enclosures technical details
UK500 Series

UK500 IP30 Flush-mounting consumer units with and without door

Code	UK512N2 UK510E UK510ETT UK512BN2	UK524N3 UK520E UK520ETT UK524BN3	UK536N3 UK530E UK530ETT UK536BN3	UK548N3 UK540E UK540ETT UK548BN3
Number of Modules	12	24	36	48
Colour	RAL 9016 white	RAL 9016 white	RAL 9016 white	RAL 9016 white
Without door	YES	YES	YES	YES
With opaque door	YES	YES	YES	YES
With transparent door	YES	YES	YES	YES
Double Insulation	YES	YES	YES	YES
Resistance to Heat	GWT 850°	GWT 850°	GWT 850°	GWT 850°
Type of Material	Thermo-plastic, Sheet steel	Thermo-plastic, Sheet steel	Thermo-plastic, Sheet steel	Thermo-plastic, Sheet steel
Shock Resistance	2 Joule (IK 07)	2 Joule (IK 07)	2 Joule (IK 07)	2 Joule (IK 07)
Installation Temperature	-5°C ÷ +40°C	-5°C ÷ +40°C	-5°C ÷ +40°C	-5°C ÷ +40°C
Protection degree	IP 30	IP 30	IP 30	IP 30
Max Dissipation Power	13W	15W	19W	21W
Cable Holding System by hollow wall mounting	YES	YES	YES	YES
Designed for Input	push and stay design	push and stay design	push and stay design	push and stay design
Extractable Frame	YES	YES	YES	YES

Power loss

DIN 43871 by over temperature ΔT

Type	Power loss (W)		
	ΔT 20K	ΔT 25K	ΔT 30K
UK512N2, UK510E, UK510ETT, UK512BN2	10,0	13,0	16,0
UK524N3, UK520E, UK520ETT, UK524BN3	11,5	15,0	19,0
UK536N3, UK530E, UK530ETT, UK536BN3	14,5	19,0	24,0
UK548N3, UK540E, UK540ETT, UK548BN3	16,5	21,5	27,0

Enclosures technical details
System pro *E* comfort MISTRAL®

System pro *E* comfort MISTRAL41F

Codes	1SLM004100A1100 1SLM004100A1200	1SLM004100A1101 1SLM004100A1201	1SLM004102A1102 1SLM004101A1202 1SLM004100A1102 1SLM004100A1202	1SLM004102A1103 1SLM004101A1203 1SLM004100A1103 1SLM004100A1203	1SLM004102A1104 1SLM004101A1204 1SLM004100A1104 1SLM004100A1204	1SLM004102A1105 1SLM004101A1205 1SLM004100A1105 1SLM004100A1205
Number of modules	4	6	8	12	18	24
Dimensions (WxHxD) in mm	152x202x105	192x202x105	232x250x108	320x250x108	430x250x108	320x435x108
Colour	RAL 9016 white	RAL 9016 white	RAL 9016 white	RAL 9016 white	RAL 9016 white	RAL 9016 white
Door type	transparent / opaque	transparent / opaque	transparent / opaque	transparent / opaque	transparent / opaque	transparent / opaque
Protection class	II ⧈	II ⧈	II ⧈	II ⧈	II ⧈	II ⧈
Fire resistance	GWT 650°C	GWT 650°C	GWT 650°C	GWT 650°C	GWT 650°C	GWT 650°C
Material	Thermoplastic	Thermoplastic	Thermoplastic	Thermoplastic	Thermoplastic	Thermoplastic
Resistance to mechanical impacts	IK08	IK08	IK08	IK08	IK08	IK08
Installation temperature	-15°C / + 60 °C	-15°C / + 60 °C	-15°C / + 60 °C	-15°C / + 60 °C	-15°C / + 60 °C	-15°C / + 60 °C
Resistance to heat	BPT 70°C	BPT 70°C	BPT 70°C	BPT 70°C	BPT 70°C	BPT 70°C
IP rating	IP41	IP41	IP41	IP41	IP41	IP41
Max. dissipation power	11 W	14 W	18 W	22 W	27 W	41 W
Extractable frame	yes	yes	yes	yes	yes	yes
Maximum current	63A	63A	63A	63A	125A	63A
DIN-Rail centre distance						150mm
Halogen free	yes	yes	yes	yes	yes	yes
Cable entry	Knockout	Knockout	Flange multi pre-cuts	Flange multi pre-cuts	Flange multi pre-cuts	Flange multi pre-cuts

Codes	1SLM004102A1106 1SLM004101A1206 1SLM004100A1106 1SLM004100A1206	1SLM004102A1107 1SLM004101A1207 1SLM004100A1107 1SLM004100A1207	1SLM004102A1108 1SLM004101A1208 1SLM004100A1108 1SLM004100A1208	1SLM004102A1109 1SLM004101A1209 1SLM004100A1109 1SLM004100A1209	1SLM004102A1110 1SLM004101A1210 1SLM004100A1110 1SLM004100A1210
Number of modules	36(2x18)	36(3x12)	48	54	72
Dimensions (WxHxD) in mm	430x435x108	320x600x108	320x735x108	430x600x128	430x735x128
Colour	RAL 9016 white	RAL 9016 white	RAL 9016 white	RAL 9016 white	RAL 9016 white
Door type	transparent / opaque	transparent / opaque	transparent / opaque	transparent / opaque	transparent / opaque
Protection class	II ⧈	II ⧈	II ⧈	II ⧈	II ⧈
Fire resistance	GWT 650°C	GWT 650°C	GWT 650°C	GWT 650°C	GWT 650°C
Material	Thermoplastic	Thermoplastic	Thermoplastic	Thermoplastic	Thermoplastic
Resistance to mechanical impacts	IK08	IK08	IK08	IK08	IK08
Installation temperature	-15°C / + 60 °C	-15°C / + 60 °C	-15°C / + 60 °C	-15°C / + 60 °C	-15°C / + 60 °C
Resistance to heat	BPT 70°C	BPT 70°C	BPT 70°C	BPT 70°C	BPT 70°C
IP rating	IP41	IP41	IP41	IP41	IP41
Max. dissipation power	47 W	50 W	59 W	59 W	82 W
Extractable frame	yes	yes	yes	yes	yes
Maximum current	125A	100A	100A	125A	125A
DIN-Rail centre distance	150mm	150mm	150mm	150mm	150mm
Halogen free	yes	yes	yes	yes	yes
Cable entry	Flange multi pre-cuts	Flange multi pre-cuts	Flange multi pre-cuts	Flange multi pre-cuts	Flange multi pre-cuts

Note: the versions with box and frontal splitted have the same characteristics of standard product

See page 14/2 in Solutions for electrical distribution in building

Enclosures technical details
System pro *E* comfort MISTRAL®

System pro *E* comfort MISTRAL41F

Codes	1SLM004100A1300 1SLM004100A1400	1SLM004100A1301 1SLM004100A1401	1SLM004100A1302 1SLM004100A1402	1SLM004100A1303 1SLM004100A1403	1SLM004100A1304 1SLM004100A1404	1SLM004100A1305 1SLM004100A1405
Number of modules	4	6	8	12	18	24
Dimensions (WxHxD) in mm	152x202x105	192x202x105	232x250x108	320x250x108	430x250x108	320x435x108
Colour	RAL 9016 white	RAL 9016 white	RAL 9016 white	RAL 9016 white	RAL 9016 white	RAL 9016 white
Door type	transparent / opaque	transparent / opaque	transparent / opaque	transparent / opaque	transparent / opaque	transparent / opaque
Protection class	II ⧈	II ⧈	II ⧈	II ⧈	II ⧈	II ⧈
Fire resistance	GWT 850°C	GWT 850°C	GWT 850°C	GWT 850°C	GWT 850°C	GWT 850°C
Material	Thermoplastic	Thermoplastic	Thermoplastic	Thermoplastic	Thermoplastic	Thermoplastic
Resistance to mechanical impacts	IK08	IK08	IK08	IK08	IK08	IK08
Installation temperature	-15°C / + 60 °C	-15°C / + 60 °C	-15°C / + 60 °C	-15°C / + 60 °C	-15°C / + 60 °C	-15°C / + 60 °C
Resistance to heat	BPT 70°C	BPT 70°C	BPT 70°C	BPT 70°C	BPT 70°C	BPT 70°C
IP rating	IP41	IP41	IP41	IP41	IP41	IP41
Max. dissipation power	11 W	14 W	18 W	22 W	27 W	41 W
Extractable frame	yes	yes	yes	yes	yes	yes
Maximum current	63A	63A	63A	63A	125A	63A
DIN-Rail centre distance						150mm
Halogen free	no	no	no	no	no	no
Cable entry	Knockout	Knockout	Flange knockout	Flange knockout	Flange knockout	Flange knockout

Codes	1SLM004100A1306 1SLM004100A1406	1SLM004100A1307 1SLM004100A1407	1SLM004100A1308 1SLM004100A1408	1SLM004100A1309 1SLM004100A1409	1SLM004100A1310 1SLM004100A1410
Number of modules	36(2x18)	36(3x12)	48	54	72
Dimensions (WxHxD) in mm	430x435x108	320x600x108	320x735x108	430x600x128	430x735x128
Colour	RAL 9016 white	RAL 9016 white	RAL 9016 white	RAL 9016 white	RAL 9016 white
Door type	transparent / opaque	transparent / opaque	transparent / opaque	transparent / opaque	transparent / opaque
Protection class	II ⧈	II ⧈	II ⧈	II ⧈	II ⧈
Fire resistance	GWT 850°C	GWT 850°C	GWT 850°C	GWT 850°C	GWT 850°C
Material	Thermoplastic	Thermoplastic	Thermoplastic	Thermoplastic	Thermoplastic
Resistance to mechanical impacts	IK08	IK08	IK08	IK08	IK08
Installation temperature	-15°C / + 60 °C	-15°C / + 60 °C	-15°C / + 60 °C	-15°C / + 60 °C	-15°C / + 60 °C
Resistance to heat	BPT 70°C	BPT 70°C	BPT 70°C	BPT 70°C	BPT 70°C
IP rating	IP41	IP41	IP41	IP41	IP41
Max. dissipation power	47 W	50 W	59 W	59 W	82 W
Extractable frame	yes	yes	yes	yes	yes
Maximum current	125A	100A	100A	125A	125A
DIN-Rail centre distance	150mm	150mm	150mm	150mm	150mm
Halogen free	no	no	no	no	no
Cable entry	Flange knockout	Flange knockout	Flange knockout	Flange knockout	Flange knockout

Note: the versions with box and frontal splitted have the same characteristics of standard product

System pro *E* comfort MISTRAL41W

Codes	**1SPE007717F0100**	**1SPE007717F0200** **1SPE007717F0210** **1SPE007717F0220**	**1SLM004102A3102** **1SPE007717F0300** **1SPE007717F0310** **1SPE007717F0320**	**1SLM004102A3103** **1SPE007717F0400** **1SPE007717F0410** **1SPE007717F0420**	**1SLM004102A3104** **1SPE007717F0800** **1SPE007717F0810** **1SPE007717F0820**	**1SLM004102A3105** **1SPE007717F0500** **1SPE007717F0510** **1SPE007717F0520**
Number of modules	2	4	8	12	18	24
Dimensions (WxHxD) in mm	68x210x93	96x210x93	202x257x120	292x257x120	382x257x120	292x382x120
Colour	RAL 9016 white	RAL 9016 white	RAL 9016 white	RAL 9016 white	RAL 9016 white	RAL 9016 white
Door type	no door	no door/transparent/ opaque	no door/transparent/ opaque	no door/transparent/ opaque	no door/transparent/ opaque	no door/transparent/ opaque
Protection class	II ⧈	II ⧈	II ⧈	II ⧈	II ⧈	II ⧈
Fire resistance	GWT 650°C	GWT 650°C	GWT 650°C	GWT 650°C	GWT 650°C	GWT 650°C
Material	Thermoplastic	Thermoplastic	Thermoplastic	Thermoplastic	Thermoplastic	Thermoplastic
Resistance to mechanical impacts	IK08	IK08	IK08	IK08	IK08	IK08
Installation temperature	-15°C / + 60 °C	-15°C / + 60 °C	-15°C / + 60 °C	-15°C / + 60 °C	-15°C / + 60 °C	-15°C / + 60 °C
Resistance to heat	BPT 70°C	BPT 70°C	BPT 70°C	BPT 70°C	BPT 70°C	BPT 70°C
IP rating	IP41	IP41	IP41	IP41	IP41	IP41
Max. dissipation power	9,2W	9,3W	17,7W	23,8W	29,8W	30,2W
Maximum current	63A	63A	63A	63A	63A	63A
DIN-Rail centre distance	-	-	-	-	-	125mm
Halogen free	yes	yes	yes	yes	yes	yes
Cable entry	smooth	smooth	smooth	smooth	smooth	smooth

Codes	**1SLM004102A3106** **1SPE007717F0900** **1SPE007717F0910** **1SPE007717F0920**	**1SLM004102A3107** **1SPE007717F0600** **1SPE007717F0610** **1SPE007717F0620**	**1SLM004102A3108** **1SPE007717F0700** **1SPE007717F0710** **1SPE007717F0720**	**1SLM004102A3109** **1SPE007717F1000** **1SPE007717F1010** **1SPE007717F1020**	**1SLM004102A3110** **1SPE007717F1100** **1SPE007717F1110** **1SPE007717F1120**
Number of modules	36(2x18)	36(3x12)	48	54	72
Dimensions (WxHxD) in mm	382x382x120	292x507x120	292x656x120	382x507x120	382x656x120
Colour	RAL 9016 white	RAL 9016 white	RAL 9016 white	RAL 9016 white	RAL 9016 white
Door type	no door/transparent/ opaque	no door/transparent/ opaque	no door/transparent/ opaque	no door/transparent/ opaque	no door/transparent/ opaque
Protection class	II ⧈	II ⧈	II ⧈	II ⧈	II ⧈
Fire resistance	GWT 650°C	GWT 650°C	GWT 650°C	GWT 650°C	GWT 650°C
Material	Thermoplastic	Thermoplastic	Thermoplastic	Thermoplastic	Thermoplastic
Resistance to mechanical impacts	IK08	IK08	IK08	IK08	IK08
Installation temperature	-15°C / + 60 °C	-15°C / + 60 °C	-15°C / + 60 °C	-15°C / + 60 °C	-15°C / + 60 °C
Resistance to heat	BPT 70°C	BPT 70°C	BPT 70°C	BPT 70°C	BPT 70°C
IP rating	IP41	IP41	IP41	IP41	IP41
Max. dissipation power	37,5W	36,8W	44,8W	45,2W	54,4W
Maximum current	63A	63A	63A	63A	63A
DIN-Rail centre distance	125mm	125mm	125mm	125mm	125mm
Halogen free	yes	yes	yes	yes	yes
Cable entry	smooth	smooth	smooth	smooth	smooth

Enclosures technical details
System pro *E* comfort MISTRAL®

System pro *E* comfort MISTRAL41W

Codes	1SPE007717F1500	1SPE007717F1600 1SPE007717F1610 1SPE007717F1620	1SPE007717F1700 1SPE007717F1710 1SPE007717F1720	1SPE007717F1800 1SPE007717F1810 1SPE007717F1820	1SPE007717F2200 1SPE007717F2210 1SPE007717F2220	1SPE007717F1900 1SPE007717F1910 1SPE007717F1920
Number of modules	2	4	8	12	18	24
Dimensions (WxHxD) in mm	68x210x93	96x210x93	202x257x120	292x257x120	382x257x120	292x382x120
Colour	RAL 9016 white	RAL 9016 white	RAL 9016 white	RAL 9016 white	RAL 9016 white	RAL 9016 white
Door type	no door	no door/transparent/ opaque	no door/transparent/ opaque	no door/transparent/ opaque	no door/transparent/ opaque	no door/transparent/ opaque
Protection class	II ⧈	II ⧈	II ⧈	II ⧈	II ⧈	II ⧈
Fire resistance	GWT 750°C	GWT 750°C	GWT 750°C	GWT 750°C	GWT 750°C	GWT 750°C
Material	Thermoplastic	Thermoplastic	Thermoplastic	Thermoplastic	Thermoplastic	Thermoplastic
Resistance to mechanical impacts	IK08	IK08	IK08	IK08	IK08	IK08
Installation temperature	-15°C / + 60 °C	-15°C / + 60 °C	-15°C / + 60 °C	-15°C / + 60 °C	-15°C / + 60 °C	-15°C / + 60 °C
Resistance to heat	BPT 70°C	BPT 70°C	BPT 70°C	BPT 70°C	BPT 70°C	BPT 70°C
IP rating	IP41	IP41	IP41	IP41	IP41	IP41
Max. dissipation power	9,2W	9,3W	17,7W	23,8W	29,8W	30,2W
Maximum current	63A	63A	63A	63A	63A	63A
DIN-Rail centre distance	-	-	-	-	-	125mm
Halogen free	no	no	no	no	no	no
Cable entry	smooth	smooth	smooth	smooth	smooth	smooth

Codes	1SPE007717F2300 1SPE007717F2310 1SPE007717F2320	1SPE007717F2000 1SPE007717F2010 1SPE007717F2020	1SPE007717F2100 1SPE007717F2110 1SPE007717F2120	1SPE007717F2400 1SPE007717F2410 1SPE007717F2420	1SPE007717F2500 1SPE007717F2510 1SPE007717F2520
Number of modules	36(2x18)	36(3x12)	48	54	72
Dimensions (WxHxD) in mm	382x382x120	292x507x120	292x656x120	382x507x120	382x656x120
Colour	RAL 9016 white	RAL 9016 white	RAL 9016 white	RAL 9016 white	RAL 9016 white
Door type	no door/transparent/ opaque	no door/transparent/ opaque	no door/transparent/ opaque	no door/transparent/ opaque	no door/transparent/ opaque
Protection class	II ⧈	II ⧈	II ⧈	II ⧈	II ⧈
Fire resistance	GWT 750°C	GWT 750°C	GWT 750°C	GWT 750°C	GWT 750°C
Material	Thermoplastic	Thermoplastic	Thermoplastic	Thermoplastic	Thermoplastic
Resistance to mechanical impacts	IK08	IK08	IK08	IK08	IK08
Installation temperature	-15°C / + 60 °C	-15°C / + 60 °C	-15°C / + 60 °C	-15°C / + 60 °C	-15°C / + 60 °C
Resistance to heat	BPT 70°C	BPT 70°C	BPT 70°C	BPT 70°C	BPT 70°C
IP rating	IP41	IP41	IP41	IP41	IP41
Max. dissipation power	37,5W	36,8W	44,8W	45,2W	54,4W
Maximum current	63A	63A	63A	63A	63A
DIN-Rail centre distance	125mm	125mm	125mm	125mm	125mm
Halogen free	no	no	no	no	no
Cable entry	smooth	smooth	smooth	smooth	smooth

System pro *E* comfort MISTRAL65

Codes	1SLM006501A1101 1SL1100A00 1SL1200A00	1SLM006501A1102 1SL1101A00 1SL1201A00 1SLM006501A1201	1SLM006501A1103 1SL1102A00 1SL1202A00 1SLM006501A1202	1SLM006502A1103 1SL1103A00 1SL1203A00 1SLM006501A1203 1SLM006502A1203	1SLM006502A1104 1SLM006501A1104 1SL1104A00 1SL1204A00 1SLM006501A1204 1SLM006502A1204
Number of modules	4	8	12	18	24
Dimensions (WxHxD) in mm	152 x 202 x 117	232 x 250 x 154	320 x 250 x 155	430 x 250 x 155	320 x 435 x 155
Colour	RAL 7035 grey	RAL 7035 grey	RAL 7035 grey	RAL 7035 grey	RAL 7035 grey
Door type	Opaque / Transparent	Opaque / Transparent	Opaque / Transparent	Opaque / Transparent	Opaque / Transparent
Protection class	II ⧈	II ⧈	II ⧈	II ⧈	II ⧈
Fire resistance	GWT 650°C	GWT 650°C	GWT 650°C	GWT 650°C	GWT 650°C
Material	Thermoplastic	Thermoplastic	Thermoplastic	Thermoplastic	Thermoplastic
Resistance to mechanical impacts	IK09	IK09	IK09	IK09	IK09
Knockout resistance to mechanical impacts	IK08	IK08	IK08	IK08	IK08
Installation temperature	-25°C / +60°C	-25°C / +60°C	-25°C / +60°C	-25°C / +60°C	-25°C / +60°C
Resistance to heat	BPT 70°C	BPT 70°C	BPT 70°C	BPT 70°C	BPT 70°C
IP rating	IP65	IP65	IP65	IP65	IP65
Max. dissipation power	12 W	20 W	27 W	32 W	34 W
Maximum current	63A	63A	63A	125A	125A
Extractable frame	no	no	no	no	yes
Additional module	no	no	yes	yes	yes
Installation of MCCBs	no	yes	yes	yes	yes
DIN-Rail centre distance	-	-	-	-	150 - 125 (mm)
Halogen free	yes	yes	yes	yes	yes
Cable entry finish	Smooth	Smooth	Smooth	Smooth	Smooth

Codes	1SLM006501A1105 1SL1105A00 1SL1205A00 1SLM006501A1205	1SLM006501A1106 1SL1106A00 1SL1206A00 1SLM006501A1206	1SLM006501A1107 1SL1107A00 1SL1207A00 1SLM006501A1207	1SLM006501A1108 1SL1108A00 1SL1208A00 1SLM006501A1208	1SLM006501A1109 1SL1109A00 1SL1209A00 1SLM006501A1209
Number of modules	36	36	48	54	72
Dimensions (WxHxD) in mm	430 x 435 x 155	320 x 435 x 155	320 x 735 x 155	430 x 600 x 155	430 x 735 x 155
Colour	RAL 7035 grey	RAL 7035 grey	RAL 7035 grey	RAL 7035 grey	RAL 7035 grey
Door type	Opaque / Transparent	Opaque / Transparent	Opaque / Transparent	Opaque / Transparent	Opaque / Transparent
Protection class	II ⧈	II ⧈	II ⧈	II ⧈	II ⧈
Fire resistance	GWT 650°C	GWT 650°C	GWT 650°C	GWT 650°C	GWT 650°C
Material	Thermoplastic	Thermoplastic	Thermoplastic	Thermoplastic	Thermoplastic
Resistance to mechanical impacts	IK09	IK09	IK09	IK09	IK09
Knockout resistance to mechanical impacts	IK08	IK08	IK08	IK08	IK08
Installation temperature	-25°C / +60°C	-25°C / +60°C	-25°C / +60°C	-25°C / +60°C	-25°C / +60°C
Resistance to heat	BPT 70°C	BPT 70°C	BPT 70°C	BPT 70°C	BPT 70°C
IP rating	IP65	IP65	IP65	IP65	IP65
Max. dissipation power	43 W	51 W	64 W	63 W	81 W
Maximum current	125A	125A	125A	125A	125A
Extractable frame	yes	yes	yes	yes	yes
Additional module	yes	yes	yes	yes	yes
Installation of MCCBs	yes	yes	yes	yes	yes
DIN-Rail centre distance	150 - 125 (mm)	150 - 125 (mm)	150 - 125 (mm)	150 - 125 (mm)	150 - 125 (mm)
Halogen free	yes	yes	yes	yes	yes
Cable entry finish	Smooth	Smooth	Smooth	Smooth	Smooth

Enclosures technical details
System pro *E* comfort MISTRAL®

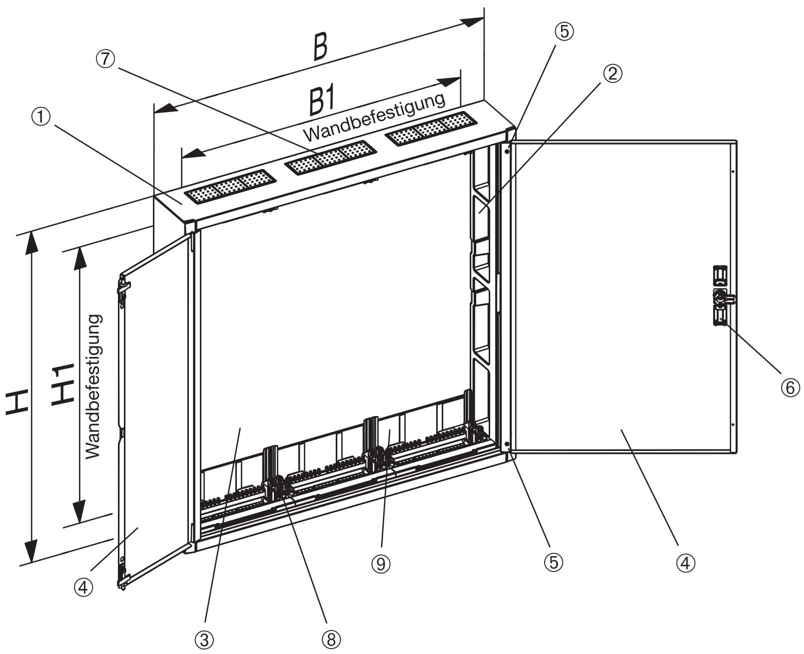
System pro *E* comfort MISTRAL65

Codes	1SL1210A00	1SL1211A00	1SL1212A00	1SL1213A00	1SL1214A00
Number of modules	4	8	12	18	24
Dimensions (WxHxD) in mm	152 x 202 x 117	232 x 250 x 154	320 x 250 x 155	430 x 250 x 155	320 x 435 x 155
Colour	RAL 7035 grey	RAL 7035 grey	RAL 7035 grey	RAL 7035 grey	RAL 7035 grey
Door type	Transparent	Transparent	Transparent	Transparent	Transparent
Protection class	II ▣	II ▣	II ▣	II ▣	II ▣
Fire resistance	GWT 750°C	GWT 750°C	GWT 750°C	GWT 750°C	GWT 750°C
Material	Thermoplastic	Thermoplastic	Thermoplastic	Thermoplastic	Thermoplastic
Resistance to mechanical impacts	IK09	IK09	IK09	IK09	IK09
Knockout resistance to mechanical impacts	IK08	IK08	IK08	IK08	IK08
Installation temperature	-25°C / +60°C	-25°C / +60°C	-25°C / +60°C	-25°C / +60°C	-25°C / +60°C
Resistance to heat	BPT 70°C	BPT 70°C	BPT 70°C	BPT 70°C	BPT 70°C
IP rating	IP65	IP65	IP65	IP65	IP65
Max. dissipation power	12 W	20 W	27 W	32 W	34 W
Maximum current	63A	63A	63A	125A	125A
Extractable frame	no	no	no	no	yes
Additional module	no	no	yes	yes	yes
Installation of MCCBs	no	yes	yes	yes	yes
DIN-Rail centre distance	-	-	-	-	150 - 125 (mm)
Halogen free	no	no	no	no	no
Cable entry finish	Precut	Precut	Precut	Precut	Precut

Codes	1SL1215A00	1SL1216A00	1SL1217A00	1SL1218A00	1SL1219A00
Number of modules	36	36	48	54	72
Dimensions (WxHxD) in mm	430 x 435 x 155	320 x 435 x 155	320 x 735 x 155	430 x 600 x 155	430 x 735 x 155
Colour	RAL 7035 grey	RAL 7035 grey	RAL 7035 grey	RAL 7035 grey	RAL 7035 grey
Door type	Transparent	Transparent	Transparent	Transparent	Transparent
Protection class	II ▣	II ▣	II ▣	II ▣	II ▣
Fire resistance	GWT 750°C	GWT 750°C	GWT 750°C	GWT 750°C	GWT 750°C
Material	Thermoplastic	Thermoplastic	Thermoplastic	Thermoplastic	Thermoplastic
Resistance to mechanical impacts	IK09	IK09	IK09	IK09	IK09
Knockout resistance to mechanical impacts	IK08	IK08	IK08	IK08	IK08
Installation temperature	-25°C / +60°C	-25°C / +60°C	-25°C / +60°C	-25°C / +60°C	-25°C / +60°C
Resistance to heat	BPT 70°C	BPT 70°C	BPT 70°C	BPT 70°C	BPT 70°C
IP rating	IP65	IP65	IP65	IP65	IP65
Max. dissipation power	43 W	51 W	64 W	63 W	81 W
Maximum current	125A	125A	125A	125A	125A
Extractable frame	yes	yes	yes	yes	yes
Additional module	yes	yes	yes	yes	yes
Installation of MCCBs	yes	yes	yes	yes	yes
DIN-Rail centre distance	150 - 125 (mm)	150 - 125 (mm)	150 - 125 (mm)	150 - 125 (mm)	150 - 125 (mm)
Halogen free	no	no	no	no	no
Cable entry finish	Precut	Precut	Precut	Precut	Precut

Enclosures technical details
Compact distribution boards

1. The cabinet is made of sheet steel (1 mm) and is powder-coated (RAL 9016). Its extraordinary stability is achieved by the profiled cabinet frame. Problem-free surface mounting is therefore also possible.
2. The protective insulation is guaranteed by an inserted plastic profile.
3. An additional plastic rear wall is inserted in order to maintain the protective insulation.
4. The door provides great stability thanks to its special shape in the hinge area and on the closing side.
5. The door can be readjusted with the special hinge.
6. The standard lock offers not only a new design but also secure closure, both as "standard" and as "security design".
7. The flange openings on top are closed ex-factory with the membrane flange.
8. The cabinet provides an optimum connection space thanks to the individual panel holders.
9. Prepunched knockouts are provided for inserting cables from the rear.



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Enclosures technical details
AT Series

Wall-mounting Compact Distribution Board IP43 AT Series with door

Code	AT31	AT22E AT41 AT41TE AT42M AT41TE	AT51 AT51TE	AT32 AT32TE AT61 AT61TE	AT42 AT42/2
Number of Modules	36	48	60	72	96
Colour	RAL 9016 white	RAL 9016 white	RAL 9016 white	RAL 9016 white	RAL 9016 white
Without door	NO	NO	NO	NO	NO
With metal door	YES	YES	YES	YES	YES
With transparent door	YES	YES	YES	YES	YES
Double Insulation	YES	YES	YES	YES	YES
Resistance to Heat	750°C	750°C	750°C	750°C	750°C
Type of Material	Thermo-plastic, Sheet steel	Thermo-plastic, Sheet steel	Thermo-plastic, Sheet steel	Thermo-plastic, Sheet steel	Thermo-plastic, Sheet steel
Shock Resistance	10 Joule (IK 09)	10 Joule (IK 09)	5 Joule (IK 08)	5 Joule (IK 08)	5 Joule (IK 08)
Installation Temperature	-5°C ÷ +40°C	-5°C ÷ +40°C	-5°C ÷ +40°C	-5°C ÷ +40°C	-5°C ÷ +40°C
Protection degree	IP43	IP43	IP43	IP43	IP43
Max Dissipation Power	38 W	48 W	60 W	68 W	73 W
Cable Holding System	NO	NO	NO	NO	NO
Designed for Input	Membrane flange	Membrane flange	Membrane flange	Membrane flange	Membrane flange

AT compact distribution board with doors

Type	Weight in kg	Power loss in W
AT22E	9,7	47
AT31	7,5	38
AT32	12,5	60
AT32R2	12	60
AT32TE	12	60
AT32TR2	11,5	60
AT41	9,5	48
AT41R3	10	48
AT41TE	9	48
AT41TR3	9	48
AT42	15	73
AT42/2	15,5	73
AT42M	17,5	73
AT42R3	15	73
AT42TE	13	73

Type	Weight in kg	Power loss in W
AT42TR3	13,5	73
AT43	21,5	96
AT43R3	21,5	96
AT43TR3	18	96
AT51	11,5	58
AT51R4	11,5	58
AT51TE	11,5	58
AT51TR4	11	58
AT52	17	85
AT52/2	18	85
AT52K	17,5	85
AT52R4	18	85
AT52TE	18	85
AT52TR4	16	85
AT53	25	120

	AT52 AT52/2 AT52TE AT53M	AT43 AT62 AT62TE	AT72	AT53	AT63E	AT54E
	120	144	168	180	216	240
	RAL 9016 white	RAL 9016 white	RAL 9016 white	RAL 9016 white	RAL 9016 white	RAL 9016 white
	NO	NO	NO	NO	NO	NO
	YES	YES	YES	YES	YES	YES
	YES	YES	YES	YES	YES	YES
	YES	YES	YES	YES	YES	YES
	750°C	750°C	750°C	750°C	750°C	750°C
	Thermo-plastic, Sheet steel	Thermo-plastic, Sheet steel	Thermo-plastic, Sheet steel	Thermo-plastic, Sheet steel	Thermo-plastic, Sheet steel	Thermo-plastic, Sheet steel
	5 Joule (IK 08)	5 Joule (IK 08)	5 Joule (IK 08)	5 Joule (IK 08)	5 Joule (IK 08)	5 Joule (IK 08)
	-5°C ÷ +40°C	-5°C ÷ +40°C	-5°C ÷ +40°C	-5°C ÷ +40°C	-5°C ÷ +40°C	-5°C ÷ +40°C
	IP43	IP43	IP43	IP43	IP43	IP43
	85 W	96 W	111 W	120 W	130W	140 W
	NO	NO	NO	NO	NO	NO
	Membrane flange	Membrane flange	Membrane flange	Membrane flange	Membrane flange	Membrane flange

Type	Weight in kg	Power loss in W
AT53K	25	120
AT53M	28	120
AT53R4	25,5	120
AT53TR4	21,5	120
AT54E	32	140
AT54K	31	140
AT54R4	32,5	140
AT54TR4	26,5	140
AT61	13,5	68
AT61R5	13,5	68
AT61TE	11,5	68
AT61TR5	12	68
AT62	21	100
AT62K	20,5	100
AT62R5	20	100

Type	Weight in kg	Power loss in W
AT62TE	20	100
AT62TR5	20	100
AT63E	29,5	130
AT63K	29	130
AT63R5	29	130
AT63TR5	24	13
AT64K	36	176
AT72	23,5	111
AT72K	23,5	111
AT72R6	23,5	111
AT72TR6	20	111
AT73K	33,5	153
AT73R6	34	153
AT73TR6	30,5	153

> Maße in mm

Enclosures technical details
U Series

Flush-mounting Compact Distribution Board IP30 U Series with door

Code	U41 U41TE U42M	U51 U51TE	U32 U32TE U61 U61TE	U42D U42FPT	U42 U42/2 U42TE
Number of Modules	48	60	72	96	96
Colour	RAL 9016 white	RAL 9016 white	RAL 9016 white	RAL 9016 white	RAL 9016 white
Without door	NO	NO	NO	NO	NO
with metal door	YES	YES	YES	YES	YES
With transparent door	YES	YES	YES	YES	YES
Double Insulation	YES	YES	YES	YES	YES
Resistance to Heat	850°C	850°C	850°C	850°C	850°C
Type of Material	Thermo-plastic, Sheet steel	Thermo-plastic, Sheet steel	Thermo-plastic, Sheet steel	Thermo-plastic, Sheet steel	Thermo-plastic, Sheet steel
Shock Resistance	10 Joule (IK 09)	10 Joule (IK 09)	5 Joule (IK 08)	5 Joule (IK 08)	5 Joule (IK 08)
Installation Temperature	-5°C ÷ +40°C	-5°C ÷ +40°C	-5°C ÷ +40°C	-5°C ÷ +40°C	-5°C ÷ +40°C
Protection degree	IP31	IP31	IP31	IP31	IP31
Max Dissipation Power	47 W	43 W	50 W	60 W	60 W
Cable Holding System by hollow wall mounting	YES	YES	YES	YES	YES
Designed for Input	Nipple flange	Nipple flange	Nipple flange	Nipple flange	Nipple flange
Extractable Frame	YES	YES	YES	YES	YES

U compact distribution board with doors

Type	Weight in kg	Power loss in W
U32	13,5	50
U32R2	13	50
U32TE	12,5	50
U32TR2	11	50
U41	10,5	36
U41R3	10,5	36
U41TE	9	36
U41TR3	9,5	36
U42	15,5	60
U42/2	16,5	60
U42D	16,5	60
U42FPT	17	60
U42M	18,5	60
U42R3	16	60
U42TE	14	60

Type	Weight in kg	Power loss in W
U42TR3	14	60
U43	22,5	80
U43R3	23	80
U43TR3	19,5	80
U51	12,5	43
U51R4	12	43
U51TE	12	43
U51TR4	10,5	43
U52	18,5	69
U52/2	19	69
U52K	18,5	69
U52R4	18	69
U52TE	16	69
U52TR4	16	69
U53	26,5	93

U52 U52/2 U52TE U53M	U43 U62 U62TE	U72	U53	U63E	U54E
120	144	168	180	216	240
RAL 9016 white	RAL 9016 white	RAL 9016 white	RAL 9016 white	RAL 9016 white	RAL 9016 white
NO	NO	NO	NO	NO	NO
YES	YES	YES	YES	YES	YES
YES	YES	YES	YES	YES	YES
YES	YES	YES	YES	YES	YES
850°C	850°C	850°C	850°C	850°C	850°C
Thermo-plastic, Sheet steel	Thermo-plastic, Sheet steel	Thermo-plastic, Sheet steel	Thermo-plastic, Sheet steel	Thermo-plastic, Sheet steel	Thermo-plastic, Sheet steel
5 Joule (IK 08)	5 Joule (IK 08)	5 Joule (IK 08)	5 Joule (IK 08)	5 Joule (IK 08)	5 Joule (IK 08)
-5°C ÷ +40°C	-5°C ÷ +40°C	-5°C ÷ +40°C	-5°C ÷ +40°C	-5°C ÷ +40°C	-5°C ÷ +40°C
IP31	IP31	IP31	IP31	IP31	IP31
69 W	80 W	89 W	93 W	110 W	120 W
YES	YES	YES	YES	YES	YES
Nipple flange	Nipple flange	Nipple flange	Nipple flange	Nipple flange	Nipple flange
YES	YES	YES	YES	YES	YES

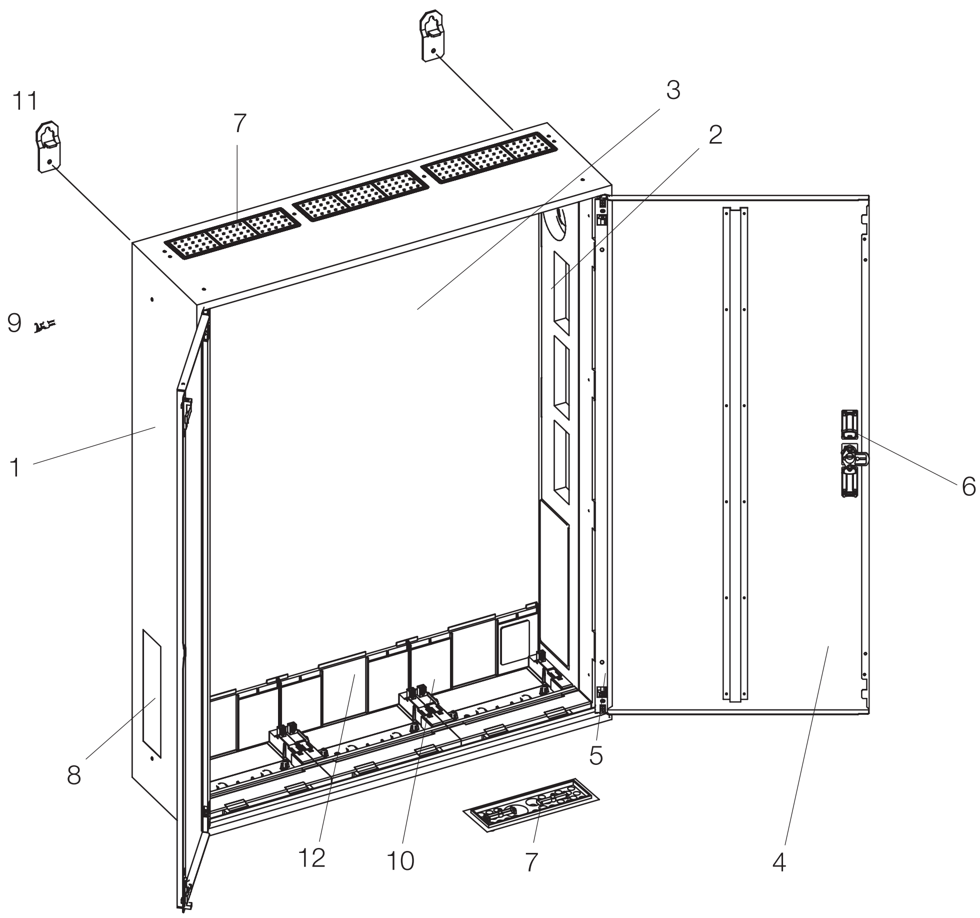
Type	Weight in kg	Power loss in W
U53K	26	93
U53M	29	93
U53R4	26,5	93
U53TR4	22	93
U54E	33	120
U54K	32,5	120
U54R4	33,5	120
U61	14,5	50
U61R5	14,5	50
U61TE	12,5	50
U61TR5	12,5	50
U62	22	80
U62K	22	80
U62R5	22	80
U62TE	19	80

Type	Weight in kg	Power loss in W
U62TR5	19	80
U63E	31	110
U63K	30,5	110
U63R5	31,5	110
U63TR5	26	110
U64K	38	137
U72	25	89
U72K	25	89
U72R6	26	89
U72TR6	21,5	89
U73K	35	125
U73R6	35,5	125
U73TR6	28,5	125

> Maße in mm

Enclosures technical details
A wall-mounting cabinets IP43

1. The A wall-mounting cabinet is made of sheet steel and is powder-coated (RAL 9016). The exceptional stability of the cabinet is achieved by the profiled cabinet frame. This enables easy installation (surface mounting, partially recessed or flush mounting).
2. The protective insulation is guaranteed by an inserted plastic profile.
3. Plastic rear wall.
4. The sheet steel door provides a high level of stability thanks to its special shape in the hinge area and on the closing side.
5. The door can be readjusted using the special hinge.
6. Using a special set of accessories, the standard closure can be converted into a three-point espagnolette closure or into a swivel handle for semi-cylinder.
7. The flange openings on top are closed ex-factory with the membrane flange. The scope of delivery includes a ZB40 nipple flange for the cable entry from the bottom.
8. Knockouts are prepunched to the sides for busbar connections from cabinet to cabinet and to the bottom.
9. The cabinet sides have knockouts on the left and right for connecting the cabinets next to each other. Captive cover caps maintain double insulation (accessories).
10. Thanks to the individual panel holders, the cabinet provides an optimal connection space.
11. The cabinet can be installed with internal fastenings or external mounting brackets (accessories).
12. Prepunched knockouts are provided for inserting cables from the rear.



14

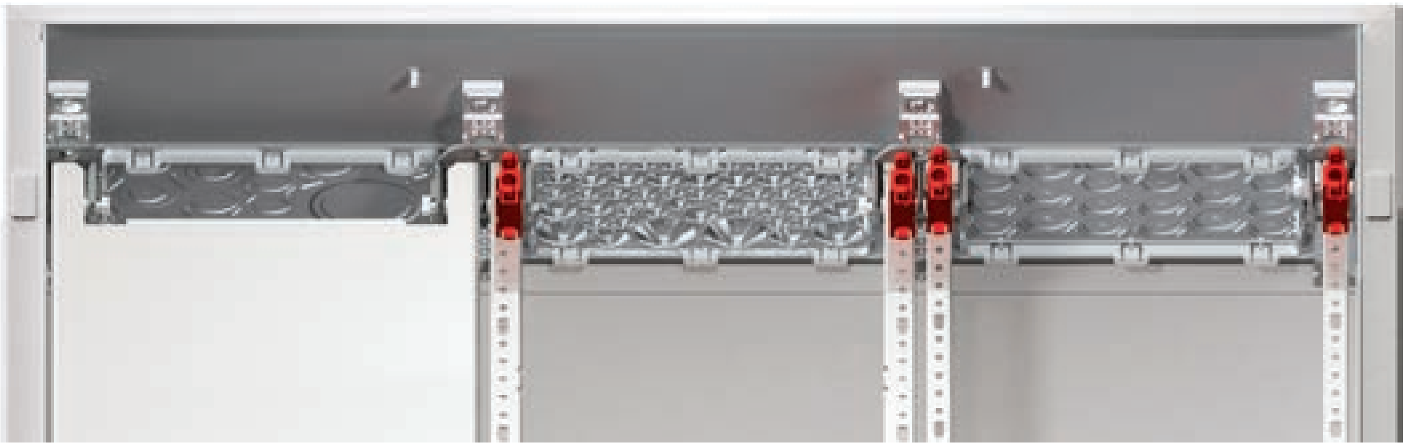
Enclosures technical details
TwinLine N 55 Series

TwinLine N 55 wall-mounting and floor-standing cabinets IP55
Uniform fastening for all internal configurations

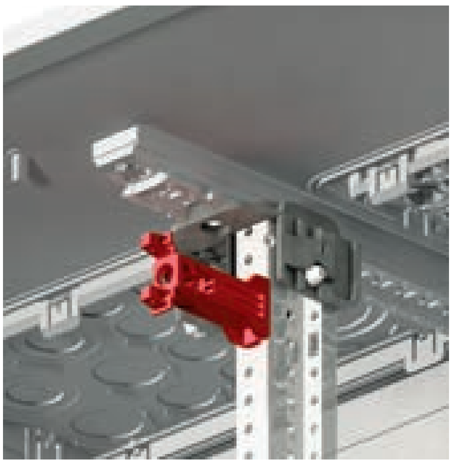
TwinLine N 55 makes internal configuration fun, with a standardized system of wall-mounting and floor-standing cabinets for the CombiLine N standardized distribution panel system. The new holders for the EDF and WR mounting frame and mounting plates have adjustable depths which can be set in 12.5 mm increments. The standard holder reduces the number of mounting components required and allows both types of mounting frame to be installed in a wall-mounting cabinet with a homogeneous installation level. TwinLine N 55 makes simplified, flexible installation a snap and helps ensure a perfect internal configuration with CombiLine N modules.

- Time-saving installation thanks to uniform fastening of mounting plates and EDF and WR mounting frames
- Mounting plates and WR mounting frames: fast mounting using holding pins
- EDF mounting frames: flexible mounting using holder adapter
- Combination of EDF and WR mounting frames in a wall-mounting cabinet
- Drastic reduction in the number of mounting components for economical warehousing
- Depth adjustment position can be read on the mounting rail in increments of 12.5 mm

Internal configuration with mounting plate, WR and EDF mounting frames



Fastening of EDF mounting frame



Fastening of WR mounting frame

Fastening of mounting plate

14

See page 14/106 in Solutions for electrical distribution in building

Enclosures technical details
TwinLine N 55 Series

TwinLine N 55 wall-mounting and floor-standing cabinets IP55
Optimal accessibility and ease of installation

The new series of cabinets also offers impressive accessibility with their 180-degree door opening angle.
The door hinges with exterior pivots enable optimum access during operation or for expansion, maintenance and function monitoring. The locking system also provides you with excellent flexibility, since the door hinge can be installed or replaced with a flick of the wrist.

- The door opening angle is 180 degrees for both, individual cabinets and cabinets connected in series
- The innovative locking system is easy to install and allows you to quickly modify the door hinge
- Significantly reduced installation time
- High IP55 degree of protection for all models thanks to foam door seal around the perimeter
- Additional features for improved stability and device arrangement in the doors

TwinLine N 55 Wall-mounting and floor-standing cabinets IP55
Transparent doors

With the new transparent doors of the TwinLine series, STRIEBEL & JOHN introduces another highlight to modern electrical environments. If used with the TwinLine N 55 basic cabinets (enclosures without door), the high degree of protection of IP55 is also guaranteed with transparent doors. Thanks to its attractive design, this distribution board combination fits perfectly into every environment.

Your benefits at a glance

- Transparent glass for an appealing look of the distribution board assembly
- Safety glass offering superb shock and impact protection
- Visual inspection of the device status also with the door closed
- Optimal accessibility and ease of installation thanks to 180 degree door opening angle

With its door opening angle of 180 degree, the door also excels
in terms of accessibility. The door hinges with exterior pivots enable optimum access during operation or for expansion, maintenance and function monitoring.
A visual inspection of the status of individual devices is possible without opening the door. The window allows to conveniently monitor signal lights. for example. With its 4 mm thickness, this safety glass provides amazing shock and impact protection.
It goes without saying that all lock parts of the TwinLine N 55 series
can also be used for the new transparent doors. A simplified accessories concept guarantees full flexibility with reduced inventory levels.

TG206GB

+

TZT206

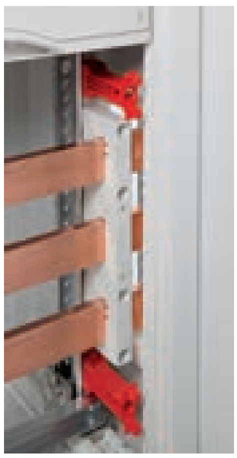
=

Enclosures technical details
TwinLine N 55 Series

TwinLine N 55 wall-mounting and floor-standing cabinets IP55
Simple connection in series of all cabinets

For easy series connection, you will literally be on the safe side with the TwinLine N 55 cabinets. Large flange openings and knockouts give you plenty of space, and the generously dimensioned busbar openings ensure convenient installation.

- All cabinets can be easily connected in series both, vertically and horizontally
- Two side knockouts for feeding busbars through or connecting cabinets in series
- Cabinet connection set for IP55 and additional insulating frames are available as accessories



Generously dimensioned busbar opening

TwinLine N 55 wall-mounting and floor-standing cabinets IP55
Time-saving plinth assembly and safe transport

The new, innovate cabinet plinth literally forms the foundation of the TwinLine N 55 floor-standing cabinets while providing the perfect answer to the requests from the field for greater ease of installation. The plinth consists of four parts: the already connected corner and side parts and the front and back trim covers.

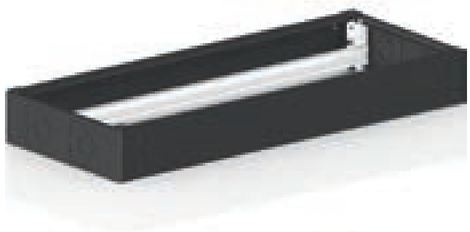
Removing the front and back trim covers makes transport more secure. You want to connect a cabinet in series? Not a problem with this cabinet plinth, since cable ducts and M-screw fittings can be fed through knockouts in the side parts. To ease cross wiring it is also possible to integrate cable ducts into the plinths from the switchgear manufacturer. The plinths are available in heights of 50 and 100 mm and can be stacked or combined.

Plinth with 50 and 100 mm height

- Innovative cabinet plinth for extremely easy installation
- Quick plinth installation from inside the cabinet
- Up to three plinths can be “stacked” on top of each other (no additional accessories needed)
- The plinths of 50 and 100 mm height can be combined

Plinth with 100 mm height

- Optimal feed-through of cables using the side knockouts for cable ducts or cable screw fittings
- Simple cable fastening rail installation
- Quick cable duct installation in the plinth



Plinth with
cable fastening rail

Plinth with
cable fastening duct

14

Enclosures technical details
TwinLine N 55 Series

TwinLine N 55 Wall-mounting and floor-standing cabinets IP55
Innovative packaging concept

As quality provider of electrical distribution systems, STRIEBEL & JOHN strives for solutions which combine ease of use and protection of the environment.
The new innovative packaging concept for the TwinLine N 55 cabinet system perfectly meets this objective.

Your benefits at a glance
- Practical opening and closing mechanism for fast packing and unpacking
- Direct unpacking of the TwinLine N 55 cabinet without additional tools
- Optimum protection during transport and at the construction site
- Repackaging of the cabinet without tools
- Simple transportation by hand truck
- Stable packaging for transportation safety

1. Delivery condition of the packaged cabinet

2. Simply tilt the upper and lower cardboard flaps

3. Removal of the front cardboard panel without the need to cut off the packing strap

4. Optimum protection during assembly and simple reuse for further transportation

TwinLine N 55 wall-mounting and floor-standing cabinets IP55
Project planning made simple with Panel Design Configurator

Panel Design Configurator – Planning and configuring software

On our website you will find the latest version of the Panel Design Configurator software that enables you to professionally plan the TwinLine N 55 cabinets including the distribution panel system CombiLine N and the rail mounting devices from ABB STOTZ-KONTAKT. A large variety of functions such as automatic enclosure proposals supported by the calculation of profile rails for the CombiLine N modules will be of excellent help for you.Panel Design Configurator-Basis
The free basic version allows you to conveniently create offers and views and much more. The extension modules do offer additional features for you.

Panel Design Configurator-SLP

CAD module for creating wiring diagrams and overview plans, including symbol and macro libraries, and for transferring parts lists to and from Panel Design Configurator

Panel Design Configurator-GEN

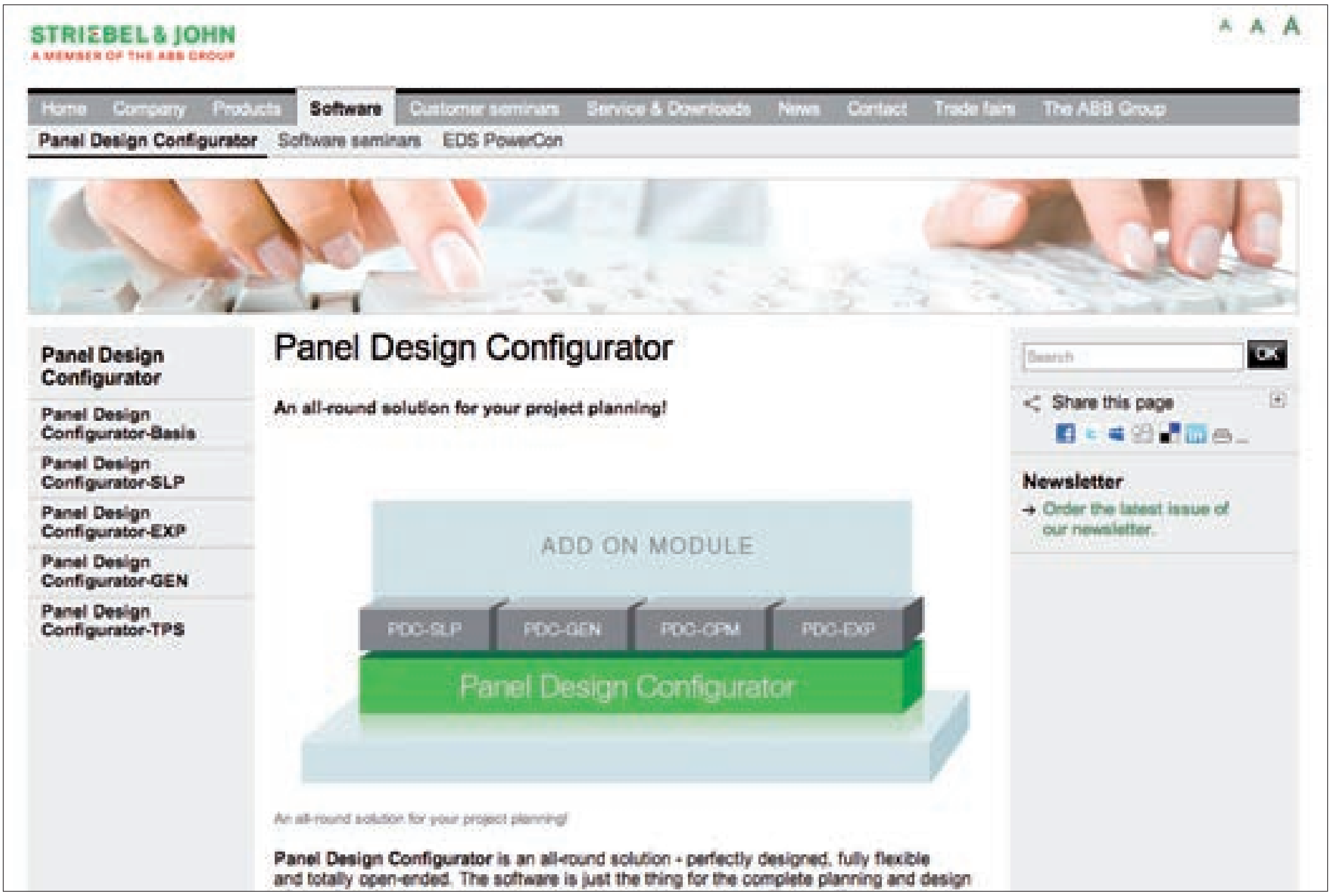
Symbol generator module for creating your own symbol libraries for overview plans and graphic layouts

Panel Design Configurator-CPM

Module for managing customer and project data

Panel Design Configurator-EXP

Export module for exporting DXF drawings and project lists to PDF, RTF, TXT or XLS formats



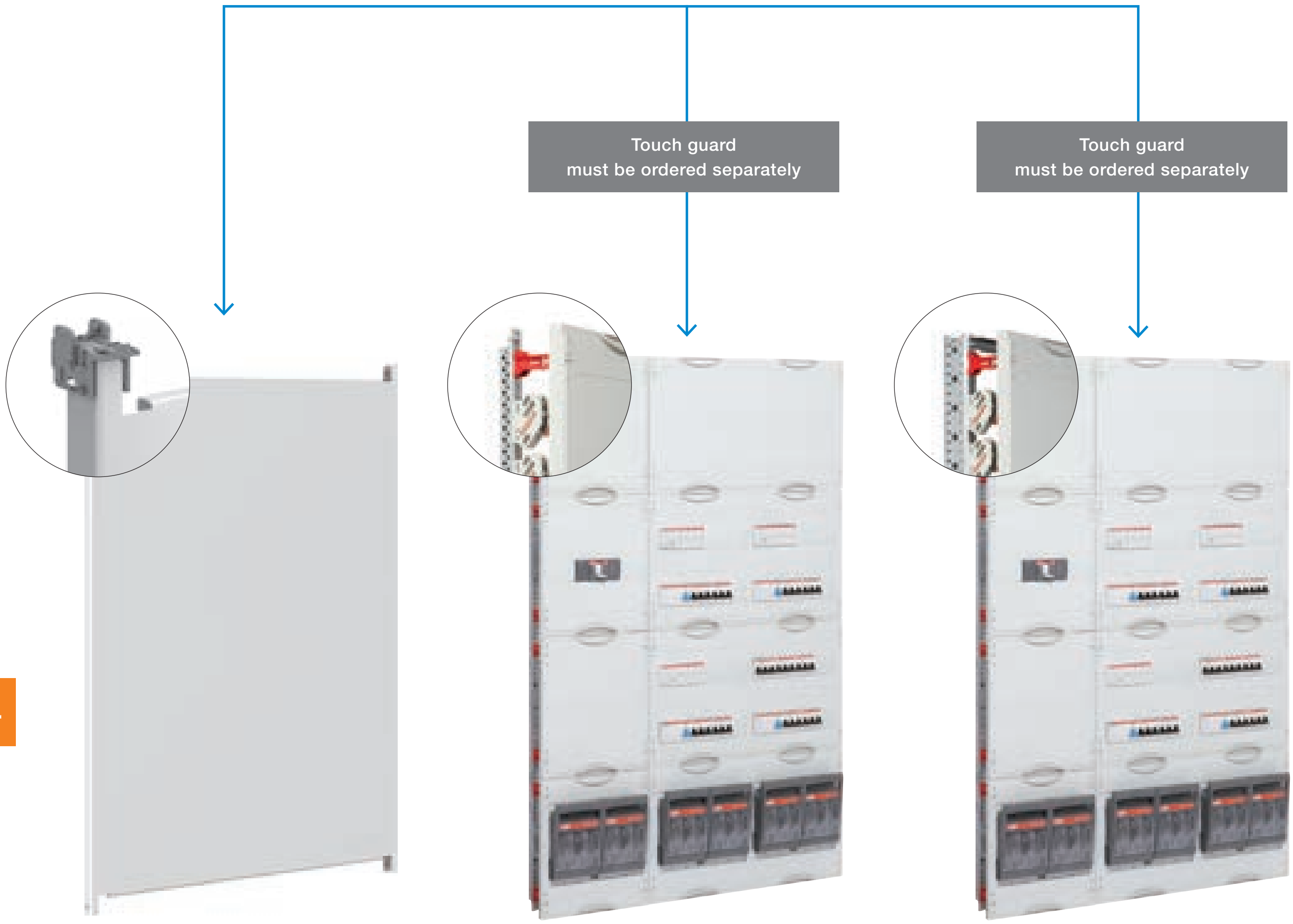
Free download of the software and further information at:

www.striebelundjohn.com

Enclosures technical details
TwinLine N 55 Series

TwinLine N 55 wall-mounting and floor-standing cabinets IP55
Wall-mounting cabinets / Extension options ⏚

TG306G



Assembly of a mounting plate
Option for control systems with mounting plate, with removed EDF adapters

Assembly with EDF mounting frame
Assembly as meter distribution board with distribution board panels, combination sets or CombiLine N modules on EDF mounting frame

Assembly with WR mounting frame
Assembly as distribution board with CombiLine N modules on WR mounting frame with removed EDF adapters

TwinLine N 55 wall-mounting and floor-standing cabinets IP55
Wall-mounting cabinets / Extension options

TG306S

Touch guard included in the scope of delivery

Touch guard included in the scope of delivery

Assembly with EDF mounting frame
Assembly as distribution board with distribution board panels, combination sets or CombiLine N modules on EDF mounting frame

Assembly with WR mounting frame
Assembly as meter distribution board CombiLine N modules on WR mounting frame with removed EDF adapters

Enclosures technical details
TwinLine N 55 Series

TwinLine N 55 wall-mounting and floor-standing cabinets IP55
Floor-standing cabinets / extension options
⏚

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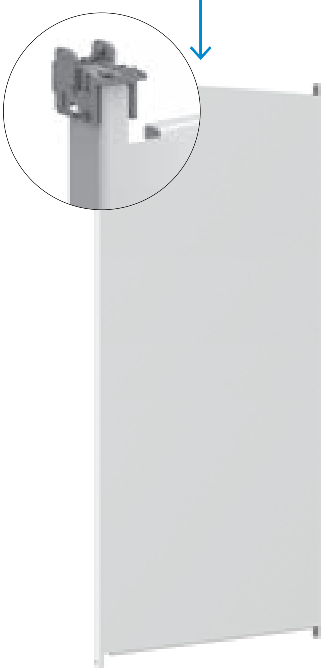
TW312G

Touch guard must be ordered separately
EDF adapter must be ordered separately
Support rail. centre must be ordered separately

Touch guard must be ordered separately



Assembly of a mounting plate
Assembly for control technologies with mounting plate

Assembly with EDF mounting frame
Assembly as meter distribution board with distribution board panels, combination sets or or CombiLine N modules on EDF mounting frame

Assembly with WR mounting frame
Assembly as meter distribution board with CombiLine N modules on WR mounting frame

TwinLine N 55 wall-mounting and floor-standing cabinets IP55 Floor-standing cabinets / extension options ⊡

TW312S

Touch guard included in the scope of delivery

EDF adapter must be ordered separately

Support rail. centre must be ordered separately

Assembly with EDF mounting frame

Assembly as meter distribution board with distribution board panels, combination sets or CombiLine N modules on EDF mounting frame

Touch guard included in the scope of delivery

Assembly with WR mounting frame

Assembly as meter distribution board with CombiLine N modules on WR mounting frame

14

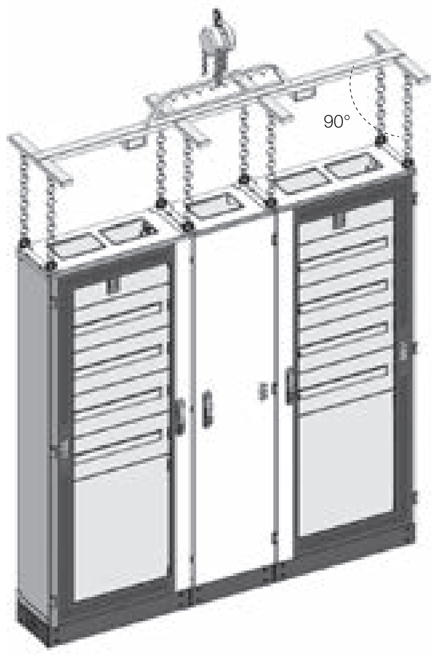
Enclosures technical details
TwinLine S 43

Transport by crane
Lifting of the TwinLine enclosures is possible as indicated.
Always use the STRIEBEL & JOHN transportation lugs type ESAC3003P4
and for side-by-side structures lifting reinforcement ESAC3004P2.
Also consider the weight limits of the cabinets.

max. 190 kg

max. 300 kg

max. 360 kg

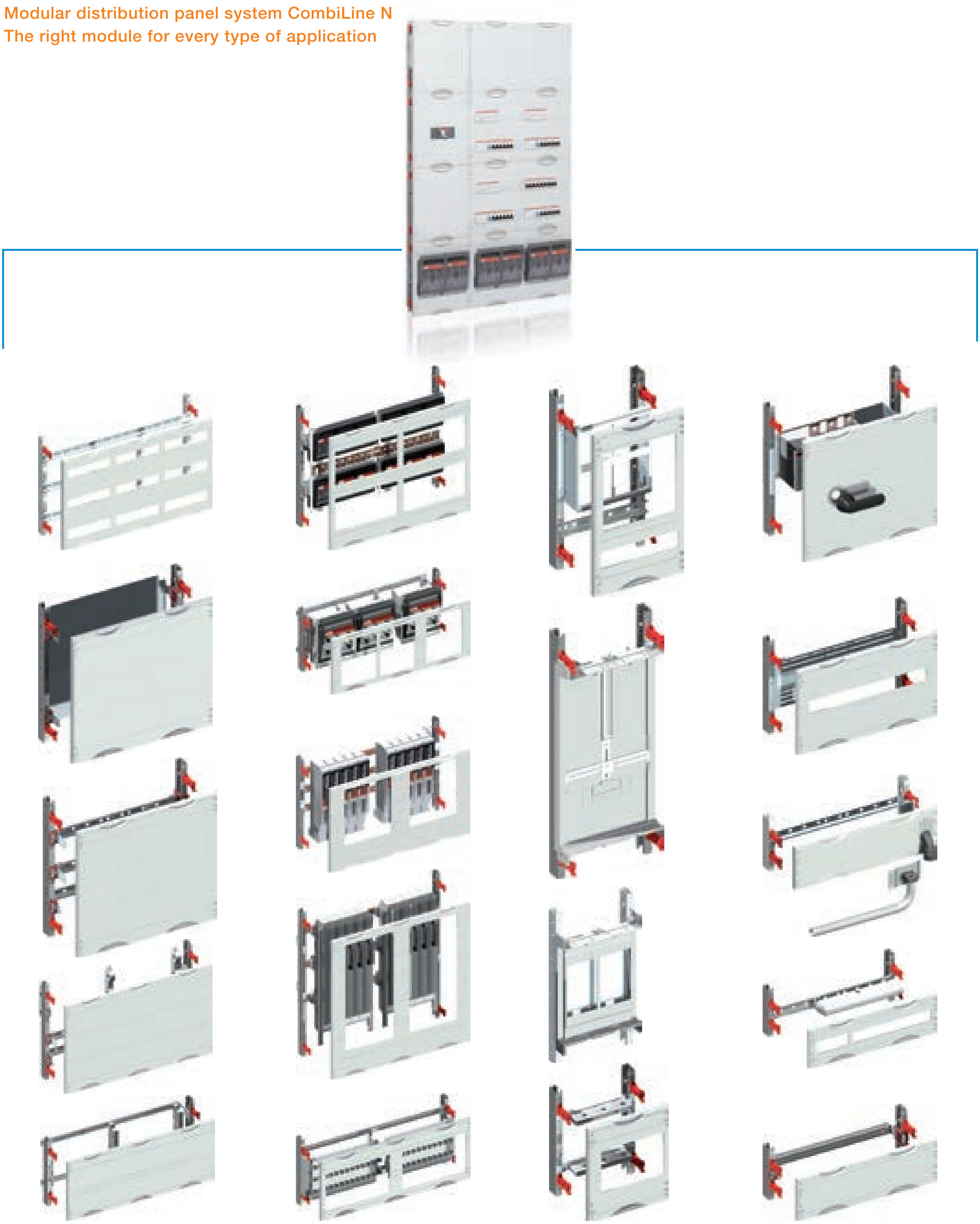


max. cabinet combinations
800 + 300 + 800 mm, wide cabinets

See page 14/252 in Solutions for electrical distribution in building

Enclosures technical details
CombiLine N 55 Series

Modular distribution panel system CombiLine N
The right module for every type of application



Enclosures technical details
CombiLine N Series

Modular distribution panel system CombiLine N
Extension with EDF or WR mounting frame

Empty cabinets for an extension with EDF mounting frame

Compact distribution boards
UL and AL ⧈

Wall-mounting cabinets U and A ⧈, B ⏚
TwinLine-G, TwinLine-L and TwinLine-W ⏚

Floor-standing cabinets HS ⧈, H ⏚
TwinLine-G, TwinLine-L and TwinLine-W ⏚

Switchgear cabinets TriLine® ⏚

Fire protection enclosures UF, AF and SF ⏚

Empty cabinets for an extension with WR mounting frame

Wall-mounting cabinets
TwinLine-G, TwinLine-L and TwinLine-W ⏚ ⧈

Floor-standing cabinets
TwinLine-G, TwinLine-L and TwinLine-W ⏚ ⧈

Switchgear cabinets TriLine® ⏚

EDF mounting frame
up to 400 A

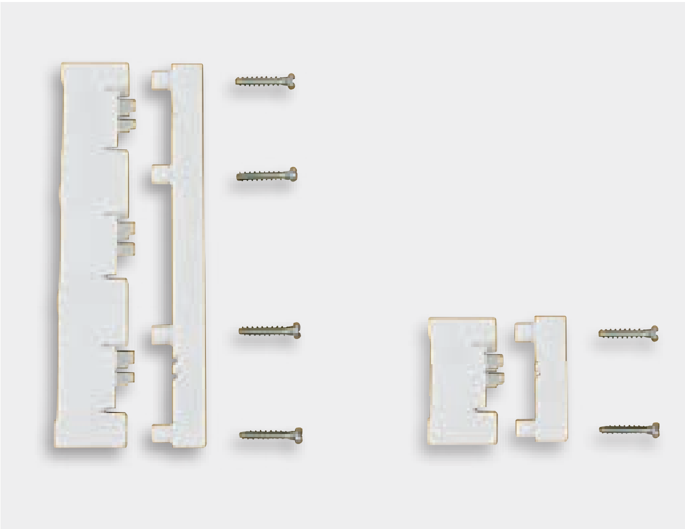
WR mounting frame
up to 850 A

See page 14/270 in Solutions for electrical distribution in building

Distribution panel system CombiLine N
Busbar holder with 60 mm bar spacing

Busbar modules and flatpacks

Compatible modules and flatpacks are now available for horizontal and vertical mounting of devices equipped with 60 mm busbar adapters from leading manufacturers. You can also combine
different devices by using the appropriate adapter frames. Special copper busbars and connection sets are available for side by side cabinet arrangements.

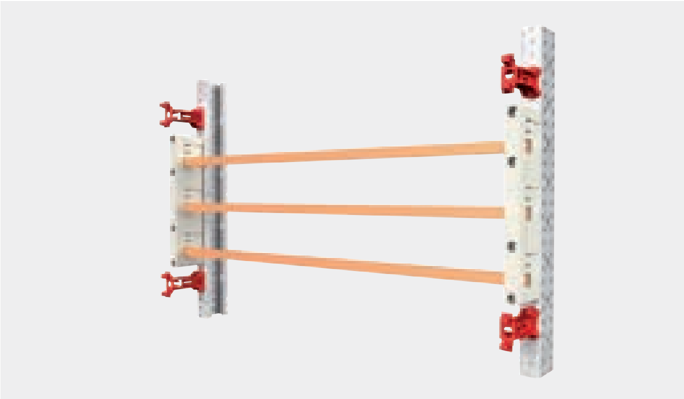


1 and 3-pole busbar holders for 12 x 5, 12 x 10, 20 x 5, 20 x 10, 30 x 5 and 30 x 10 mm copper busbars

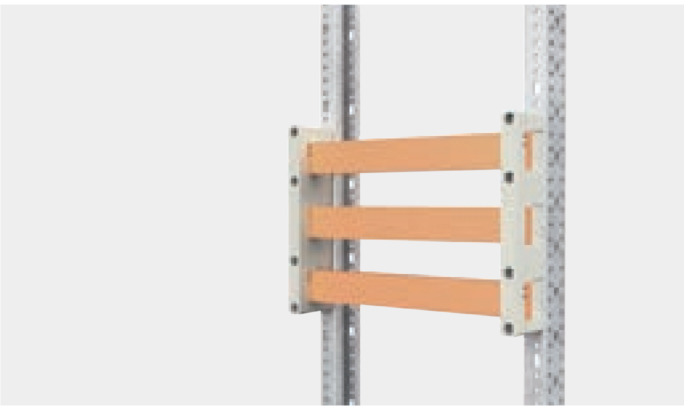
The holder is mounted directly onto the EDF or WR profile, without the need for additional parts. It can easily be expanded to a 4 or 5-pole busbar system by connecting single pole holders.

Enclosures technical details
CombiLine N Series

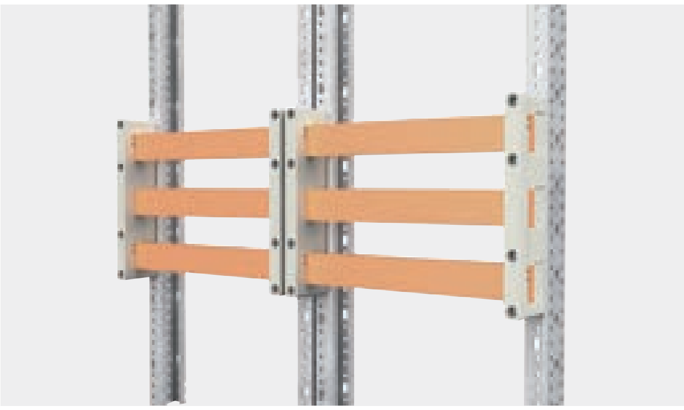
Distribution panel system CombiLine N
Busbar holder with 60 mm bar spacing



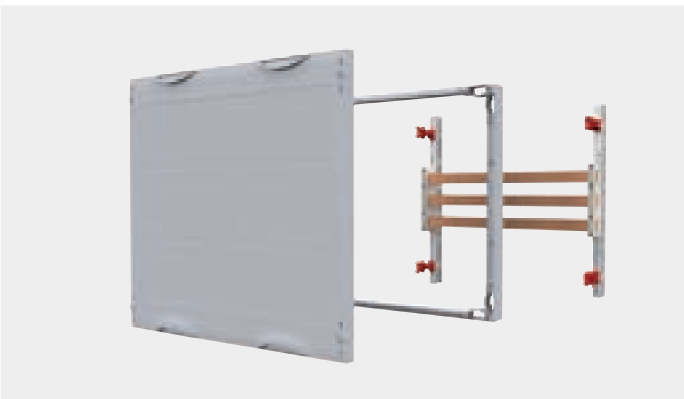
300 mm high modules for combining different devices such as mounting fuse elements or fuse switch disconnectors size 00.



450 mm high modules for the perfect combination of size 00, size 1 and size 2 fuse switch disconnectors



New, end-to-end copper bars eliminate the need for additional busbar connectors inside a cabinet. The busbars can be inserted across several modules from the front.



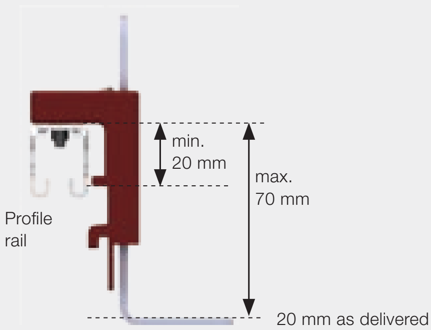
Reliable touch protection is also possible for different deeper device models thanks to covers used with raising frames.

Modular distribution panel system CombiLine N
Innovative deep-mounting bracket

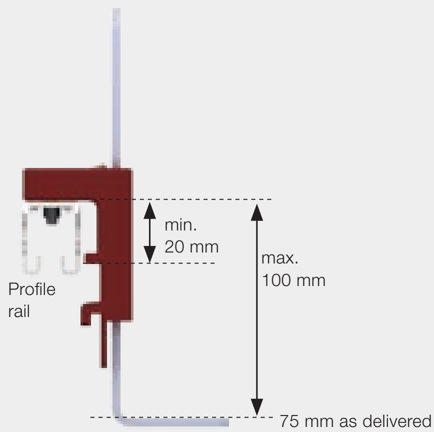
New deep-mounting bracket – innovation and high flexibility

For mounting on EDF or WR profiles, the new deep-mounting bracket can be used for both, double insulated or earthed installation.

ZW39P2 **Application**
- Modules for terminals



ZW59P2 **Application**
- Modules for terminals
- Mounting plate module
- Cable fastening modules



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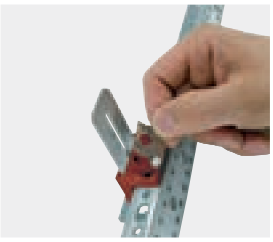
Enclosures technical details
CombiLine N Series

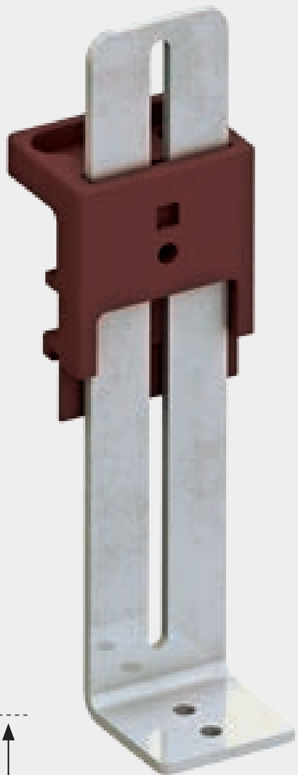
Modular distribution panel system CombiLine N
Innovative deep-mounting bracket

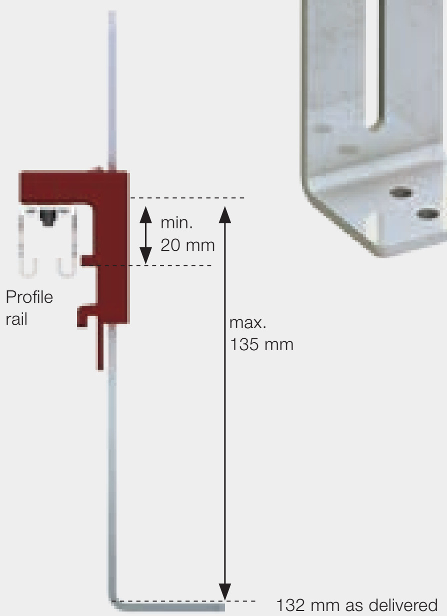


To enable double insulated mounting, simply remove the metal plate from the deep-mounting bracket. Once you have done this, no other insulation parts are required. Mounting and stepless depth adjustment can be carried out from the front, for optimum handling.

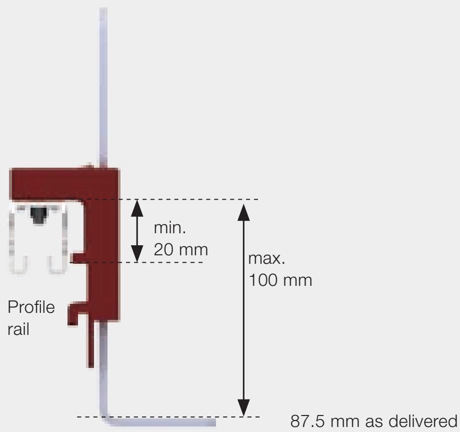
With the metal plate inserted, the continuity of the protective conductor is ensured with protection class I.

ZW79P2 **Application**
– Cable fastening module





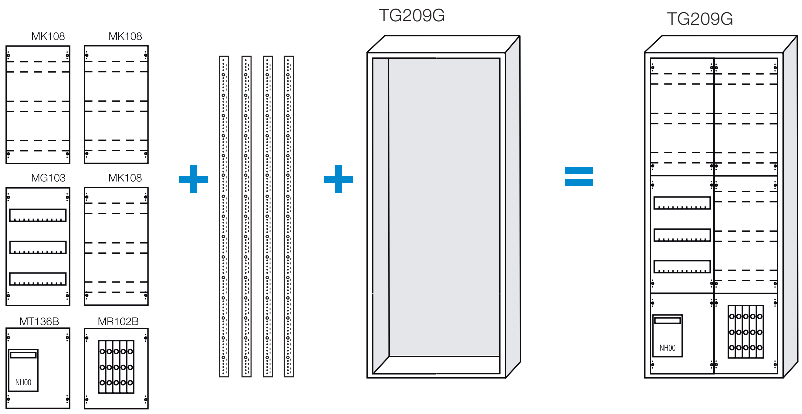
ZW259P2 **Application**
– Busbar modules for disconnectors for connecting through Cu busbars



Distribution panel system CombiLine N
Application options using the EDF mounting frame

UL and AL compact distribution boards / U, A wall-mounting cabinets and G, L and W TwinLine, UF, AF fire protection enclosures

Example: Extension with modules (mounted) to EDF mounting frame in TwinLine-G wall-mounting cabinet

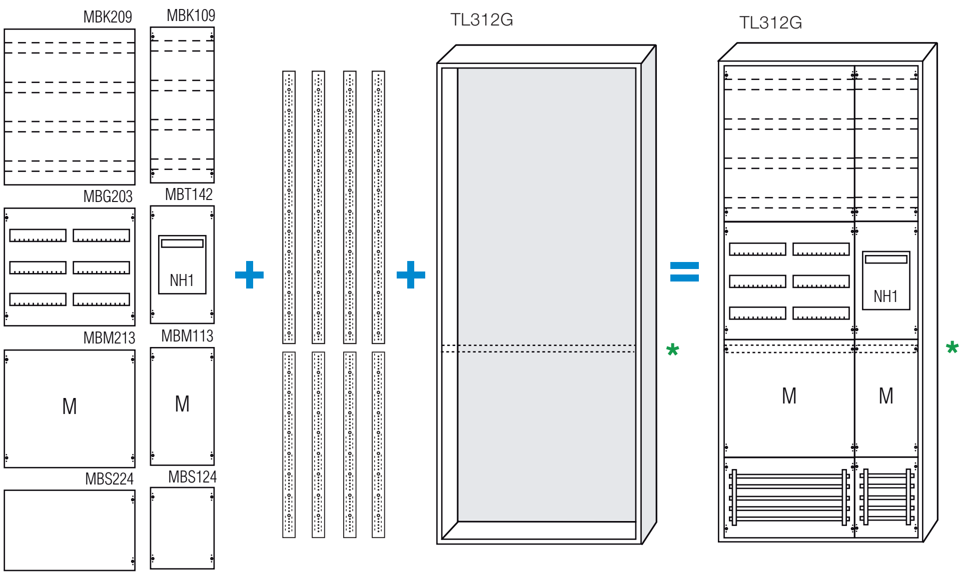


Modules (mounted) + EDF mounting frame + empty cabinet = wall-mounted distribution board

Supply format
Modules are mounted on the EDF mounting frame at the factory and integrated into the cabinet prior to delivery.

HS floor-standing cabinets and TwinLine G, L, W switchgear cabinets TriLine® / SF fire protection enclosures

Example: Configuration with modules (flatpacks, not mounted) and EDF mounting frame in a TwinLine-L floor-standing cabinet



+ 5 pcs. ZX1001 Cu busbar
+ 5 pcs. ZX1002 Cu busbar

Modules (Flatpacks) + EDF-Mounting frame + Empty cabinet = floor-standing distribution board

Supply format
Module flatpacks, EDF profiles, Cu busbars and empty cabinet are supplied as individually packaged units.

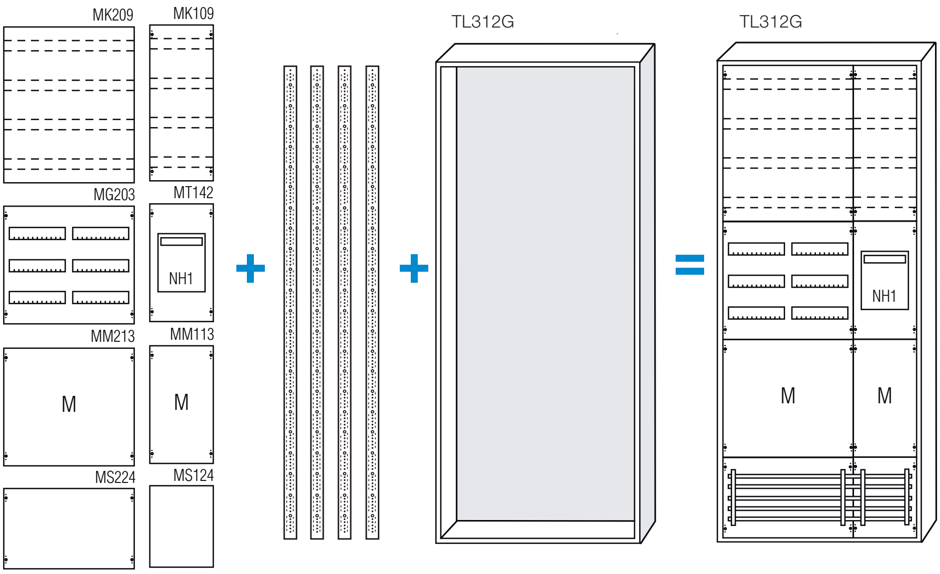
* The EDF mounting frame must not exceed a total height of 1,350 mm (OH 5). This is why, for design reasons, floor-standing cabinets (prepared for EDF mounting frame) come with a centre support rail installed. This centre rail can be repositioned up or down in grid steps of 150 mm.

Enclosures technical details
CombiLine N Series

Distribution panel system CombiLine N
Application options using the WR mounting frame

Floor-standing cabinets TwinLine G, L, W / TriLine® switchgear cabinets

Example: Extension with modules (mounted) to WR mounting frame in C-floor-standing cabinet



+ 5 pcs. ZXM1003 Cu busbar

Modules (mounted) + WR mounting frame + empty cabinet = floor-standing distribution board

Supply format
Modules are mounted
WR mounting frame at the
factory and integrated into the
cabinet
prior to delivery.

Modular distribution panel system CombiLine
The right choice for every user

The highly sophisticated quick mounting system from STRIEBEL & JOHN makes the completion of modular cabinets with distribution panels an effortless process. Simple, quick and safe – these are the three attributes of this system that speak for themselves.
You choose the best suited supply format: Select from the following options: complete delivery if you wish to receive the modules mounted to the empty cabinet, or flatpack with instructions to install the modules to the mounting frame yourself, or a delivery in individual parts.

Complete delivery
The modular system panel is supplied with all modules fully assembled on the mounting frame and installed in the distribution cabinet. The mounting frame must be ordered separately.

The benefits: You select components best suited to your application from the CombiLine modules, which makes it really easy to obtain the right low-voltage distribution board. The modular system panel planned by you is assembled at the factory and delivered to you preinstalled in the cabinet. This means that no time is wasted in searching for system accessories such as brackets, screws or fastening elements. All you need to do is select the correct mounting frame for the job. Or, if required, our Panel Design Configurator software can make this decision for you.

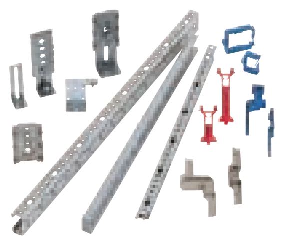
Delivery in individual parts
The parts are ordered individually, in order to create your own module, or to expand or modify an existing one.

The benefits: With our comprehensive selection of individual parts, you can remain quick and flexible when it comes to assembling, expanding or modifying a distribution panel.

Delivery as flatpack
All of the individual parts required for assembling a module are packed separately and supplied in the form of a flatpack, complete with mounting instructions. All you need to do is select the correct mounting frame for the job. The mounting frame parts must be ordered separately. If required, our Panel Design Configurator software can select the mounting frame for you.

The benefits: These flatpacks allow you to take a flexible approach towards stock keeping, and avoid a time-consuming search for system parts such as brackets, screws or fastening elements. The instructions supplied with the flatpack make assembly a child's play.
Quick and clear planning and calculation become perfect with the assistance of the Panel Design Configurator software.


Complete delivery


Delivery in individual parts


Delivery as flatpack

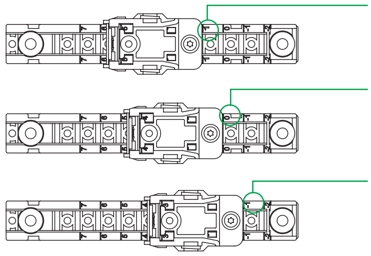
Enclosures technical details
CombiLine Series

Modular distribution panel system
Module combinations for busbars TwinLine cabinet to cabinet connections

Busbars for connecting TwinLine cabinets may be connected in different assembly positions of the CombiLine modules.

Depending on the position of the busbar holder, some modules may be connected in front of or behind the mounting frame;
e.g. if one N/PE busbar module is required on <u>top</u> of the cabinet and one busbar module at the <u>bottom</u> of the cabinet, the
combination options for the different modules must be taken into account. The different configuration options for the installation positions (1 / 0 / -1) are presented on the next page.

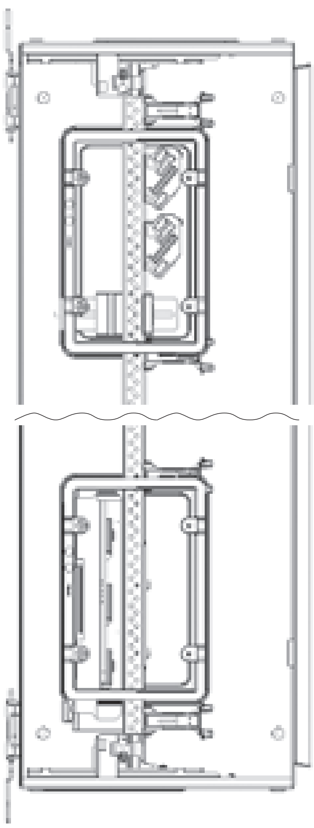
Mounting rail
Top view



Mounting rail
Position 1

Mounting rail
Position 0

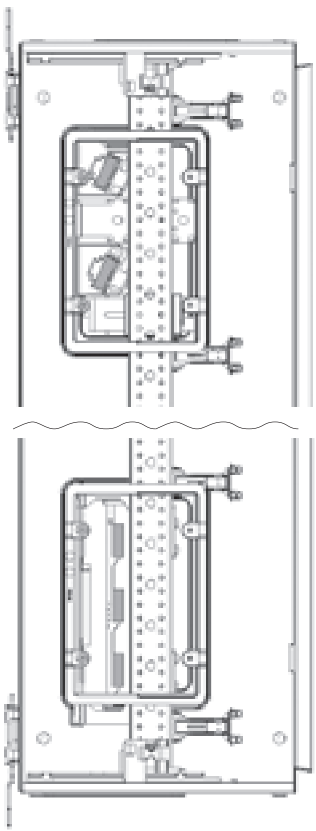
Mounting rail
Position -1



CombiLine module
M(B)N...74 on top

CombiLine module
M(B)S...27 bottom

Sample configuration on EDF mounting frame
On assembly position 1 top and bottom
in the TwinLine-L cabinet, depth 275 mm



CombiLine module
M(B)N...62 on top

CombiLine module
M(B)S...27 bottom

Sample configuration on WR mounting frame
On assembly position -1 top and bottom
in the TwinLine-L cabinet, depth 275 mm

Enclosures technical details
CombiLine S distribution system Unifix

Technical characteristics	Unifix H	Unifix L
Unifix systems		
Rated service voltage (U_e)	690 V AC	400 V AC
Rated insulation voltage (U_i)	1000 V AC	500 V AC
Rated impulse withstand voltage (U_{imp})	8 kV	6 kV
Rated frequency	50/60 Hz	50/60 Hz
Rated current (I_n)		
central power supply	400 A	100 A
lateral power supply	320 A	80 A
Rated short-time withstand current (I_{cw})	25 kA	-
Maximum peak current (I_{pk})	52,5 kA - 400 V	-
Maximum installable circuit-breaker size	250 A	100 A
Conditioned short-circuit current (I_{cc})		
Tmax XT1	50 kA - 400 V	-
Tmax XT3	50 kA - 400 V	-
With circuit-breaker		
S200	-	6 kA - 400 V
S200M	-	10 kA - 400 V
S200P	-	25 kA - 400 V
Degree of protection	IP20 with accessory	IP20
Characteristics of the insulating material	Self-extinguishing thermoplastic V1 (UL94)	Self-extinguishing thermoplastic V1 (UL94)
Characteristics of the conductor material	Electrolytic copper	Electrolytic copper
Width (No. modules/mm)	24/600 36/800	12/400 24/600 36/800
Installation of Unifix system		
Frame for Tmax XT series		
300 x 600 mm (H x L)	ED2183	-
300 x 800 mm (H x L)	ED2191	-
Fixing brackets Height 300 mm	AD1097	-
Crosspiece for direct connection to the rear busbars with shaped section with PB0803		
Width 600 mm	TL1000	-
Width 800 mm	TL1100	-
Busbar 4P		
12 mod.	-	ED2993
18 mod.	-	ED3009
24 mod.	-	ED3017
36 mod.	-	ED3025
Busbar 4P	-	
12 mod.	-	ED2944
18 mod.	-	ED2951
24 mod.	-	ED2969
36 mod.	-	ED2977
Fixing support	-	
24 mod.	-	GD1520
36 mod.	-	GD1530

(1) Select circuit-breakers in version with front terminals for copper cables.

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Enclosures technical details
CombiLine S distribution system Unifix

Series of circuit-breakers	Unifix H		Unifix L
Unifix systems			
Table for selecting connections according to the circuit-breaker			
SN201	(top power supply)		
DS941	ED2654 L1/N 40 A	-	ED3272 L1/N 40 A
	ED2662 L2/N 40 A	-	ED3280 L2/N 40 A
	ED2670 L3/N 40 A	-	ED3298 L3/N 40 A
S200 - DS200	(top power supply)	(bottom power supply)	
F200 up to 63A (Unifix L)	ED2531 L1 63A	ED2572 L1 63A	ED3033 L1 100A
	ED2549 L2 63A	ED2590 L2 63A	ED3041 L2 100A
	ED2556 L3 63A	ED2598 L3 63A	ED3058 L3 100A
	ED2564 N 63A	ED2606 N 63A	ED3066 N 100A
	ED2845 False pole module	-	-
S800	(top power supply)		
	ED2557 L1 ≤32A	-	-
	ED2558 L2 ≤32A	-	-
	ED2559 L3 ≤32A	-	-
	ED2560 N ≤32A	-	-
	ED2551 L1 125A	-	-
	ED2552 L2 125A	-	-
	ED2553 L3 125A	-	-
	ED2554 N 125A	-	-
	ED2550 False pole module	-	-
S280 (80-100A)	(top power supply)		
E200 up to 100A - RS370 - F200 80/100A (Unifix H)	ED2720 L1 100A	-	ED3132 pow. supply L1/L2/L3/N - 350mm
	ED2738 L2 100A	-	ED0026 pow. supply L1/L2/L3/N - 1500mm
	ED2746 L3 100A	-	ED0025 pow. supply L1/L2/L3/N - 2500mm
	ED2753 N 100A	-	-
MDRC - Various apparatus	(top power supply)	(bottom power supply)	
	ED2894 L1/N 16A	ED2910 L1/N 16A	ED3108 pow. supply 2 cables L1/N 16A
	ED2902 L1/L2 16A	ED2928 L1/L2 16A	ED3116 pow. supply 3 cables L1/L2/L3 16A
	-	-	ED3124 pow. supply 4 cables L1/L2/L3/N 16A
	-	-	ED3355 pow. supply 2 cables L1/N 40A
	-	-	ED3363 pow. supply 3 cables L1/L2/L3 40A
	-	-	ED3371 pow. supply 4 cables L1/L2/L3/N 71A
Circuit-breaker	(top/bottom power supply)	-	-
Tmax XT1	ED2217 L1 Top/L2 Bottom	-	-
	ED2225 L2 Top/L1 Bottom	-	-
	ED2233 L3 Top/N Bottom	-	-
Residual current	ED2241 N Top/L3 Bottom	-	-
Selenoid operator	ED2373 False pole module	-	-
	ED2381 False pole module	-	-
Circuit-breaker	(top power supply)	(bottom power supply)	-
Tmax XT3	ED2290 L1	ED2332 L1	-
	ED2308 L2	ED2340 L2	-
	ED2316 L3	ED2357 L3	-
Residual current	ED2324 N	ED2365 N	-
	ED2373 False pole module	-	-

(1) Select circuit-breakers in version with front terminals for copper cables.

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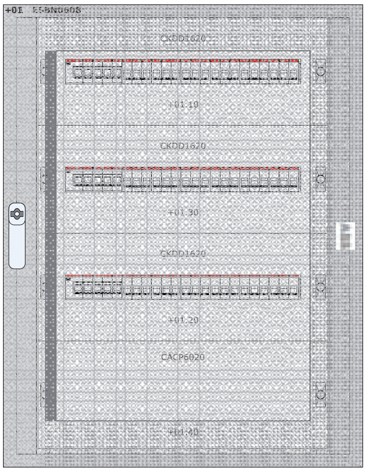
Enclosures technical details
TwinLine S 43 with CombiLine S - Examples of configurations



TwinLine S 43 (800 x 600 x 225 mm) IP43 and internal configuration CombiLine S

Type	Ord.no.	Description	Pcs.
ESBN0608	2CPX078111R9999	Rear wall, W 600 mm, H 800 mm	1
ESPG0600	2CPX078146R9999	Top/bottom plate (open/closed), D 225 mm, W 600 mm	1
ESSG0008	2CPX078129R9999	Side walls 2 pcs, D 225mm, H 800 mm	1
ESIN0008	2CPX078422R9999	Installation set for internal configuration, H 800 mm	1
TZ101	2CPX010450R9999	Flange for 52 entries	2
ESAT0608	2CPX078179R9999	Transparent door, W 600 mm, H 800 mm	1
CKDC1620	2CPX078321R9999	CombiLine S, DIN Components, Row distance 200 mm, 1 row, W 600 mm, H 200 mm	3
CACP6020	2CPX078353R9999	CombiLine S, Cover, plain, W 600 mm, H 200 mm	1

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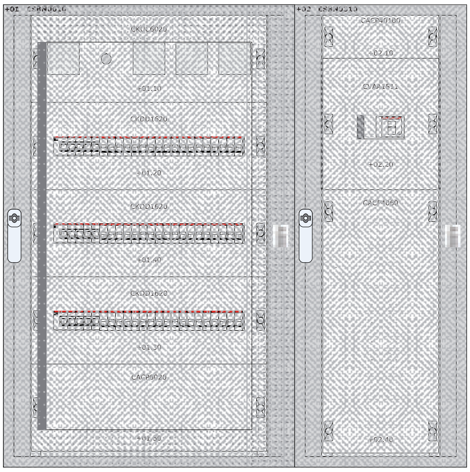
Enclosures technical details
TwinLine S 43 with CombiLine S - Examples of configurations



TwinLine S 43 (1000 x 600 x 225 mm + 1000 x 300 x 225 mm) IP43
Internal configuration CombiLine S, with busbars 250 A, 16 kA in external cable container

Type	Ord.no.	Description	Pcs.
ESBN0610	2CPX078112R9999	Rear wall, W 600 mm , H 1000 mm	1
ESPG0600	2CPX078146R9999	Top/bottom plate (open/closed), D 225 mm , W 600 mm	1
ESSG0010	2CPX078130R9999	Side walls 2 pcs, D 225 mm , H 1000 mm	1
ESAT0610	2CPX078180R9999	Transparent door, W 600 mm , H 1000 mm	1
ESBN0310	2CPX078103R9999	Rear wall, W 300 mm , H 1000 mm	1
ESPG0300	2CPX078145R9999	Top/bottom plate (open/closed), D 225 mm , W 300 mm	1
ESIN0010	2CPX078423R9999	Installation set for internal configuration, H 1000 mm	2
ESUG0010	2CPX078226R9999	Upright cabinet connection, D 225 mm , H 1000 mm	1
ESAS0310	2CPX078154R9999	Sheet steel door, W 300 mm , H 1000 mm	1
TZ101	2CPX010450R9999	Flange for 52 entries	3
CKDC1620	2CPX078321R9999	CombiLine S, DIN Components, Row distance 200 mm , 1 row, W 600 mm , H 200 mm	3
CACP6020	2CPX078353R9999	CombiLine S, Cover, plain, W 600 mm , H 200 mm	1
CKUC6020	2CPX078314R9999	CombiLine S, Measuring instruments, 4 pcs. 72x72 mm , W 600 mm , H 200 mm ,	1
CVAC1511	2CPX078269R9999	CombiLine S, Device vertical, W 300 mm , Tmax XT3, 1 device, 3/4 pole, fixed, lever operation	1
CACP3060	2CPX078348R9999	CombiLine S, Cover, plain, W 300 mm , H 600 mm	1
CACP3010	2CPX078341R9999	CombiLine S, Cover, plain, W 300 mm , H 100 mm	1
CASWP2	2CPX078454R9999	CombiLine S, Support, wiring duct, 2 pcs	3
CAHW6	2CPX078459R9999	CombiLine S, Mounting profile, for wiring system, W 600 mm	3
CKBS1231	2CPX078449R9999	CombiLine S, Busbar, support, flat busbars, holder scaled, W 300 mm , 1 support	3
BR0250		No. 2 flat busbars 250 A	1

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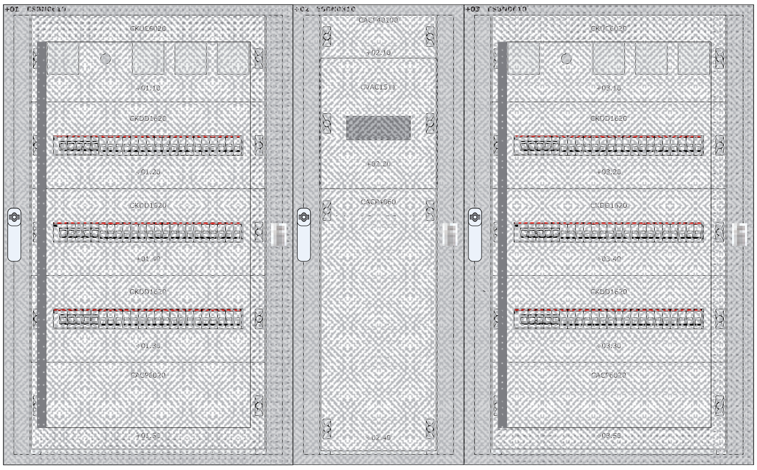
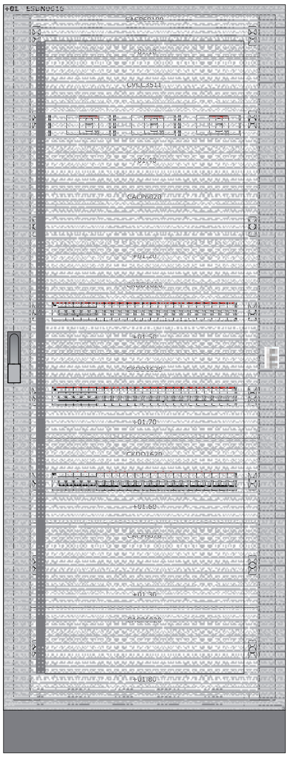


TwinLine S 43 (1000 x 600 x 225 mm + 1000 x 300 x 225 mm + 100 x 600 x 225 mm) IP43, Internal configuration CombiLine S, with busbars 250 A,16 kA in external cable container

Type	Ord.no.	Description	Pcs.
ESBN0610	2CPX078112R9999	Rear wall, W 600 mm, H 1000 mm	2
ESPG0600	2CPX078146R9999	Top/bottom plate (open/closed), D 225 mm, W 600 mm	2
ESSG0010	2CPX078130R9999	Side walls 2 pcs, D 225 mm, H 1000 mm	1
ESIN0010	2CPX078423R9999	Installation set for internal configuration, H 1000 mm	3
ESAT0610	2CPX078180R9999	Transparent door, W 600 mm, H 1000 mm	2
ESBN0310	2CPX078103R9999	Rear wall, W 300 mm, H 1000 mm	1
ESPG0300	2CPX078145R9999	Top/bottom plate (open/closed), D 225 mm, W 300 mm	1
ESUG0010	2CPX078226R9999	Upright cabinet connection, D 225 mm, H 1000 mm	2
ESAS0310	2CPX078154R9999	Sheet steel door, W 300 mm, H 1000 mm	1
TZ101	2CPX010450R9999	Flange for 52 entries	5
CKDC1620	2CPX078321R9999	CombiLine S, DIN Components, Row distance 200 mm, 1 row, W 600 mm, H 200 mm	6
CKUC6020	2CPX078314R9999	CombiLine S, Measuring instruments, 4 pcs. 72x72 mm, W 600 mm, H 200 mm	2
CACP6020	2CPX078353R9999	CombiLine S, Cover, plain, W 600 mm, H 200 mm	2
CACP3060	2CPX078348R9999	CombiLine S, Cover, plain, W 300 mm, H 600 mm	1
CACP3010	2CPX078341R9999	CombiLine S, Cover, plain, W 300 mm, H 100 mm	1
CVAC1511	2CPX078269R9999	CombiLine S, Device vertical, W 300 mm, Tmax XT3, 1 device, 3/4 pole, fixed, lever operation	1
CASWP2	2CPX078454R9999	CombiLine S, Support, wiring duct, 2 pcs	6
CAHW6	2CPX078459R9999	CombiLine S, Mounting profile, for wiring system, W 600 mm	6
CKBS1231	2CPX078449R9999	CombiLine S, Busbar, support, flat busbars, holder scaled, W 300 mm, 1 support	3
BR0250		No. 2 flat busbars 250A	1

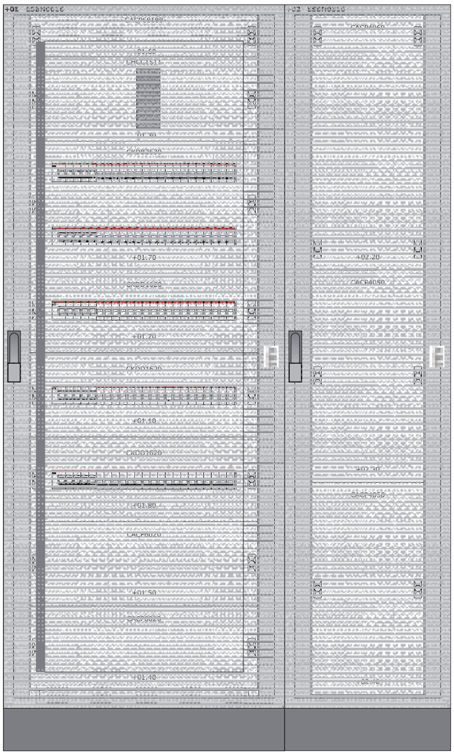
Enclosures technical details
TwinLine S 43 with CombiLine S - Examples of configurations



TwinLine S 43 (1600 x 600 x 275 mm) IP43
Internal configuration CombiLine S

Type	Ord.no.	Description	Pcs.
ESBN0616	2CPX078115R9999	Rear wall, W 600 mm, H 1600 mm	1
ESPL0600	2CPX078149R9999	Top/bottom plate (open/closed), D 275 mm, W 600 mm	1
ESSL0016	2CPX078142R9999	Side walls 2 pcs, D 275 mm, H 1600 mm	1
ESIN0016	2CPX078426R9999	Installation set for internal configuration, H 1600 mm	1
ESAL0610	2CPX078211R9999	Plinth, D 275 mm, W 600 mm, H 100 mm	1
ESAT0616	2CPX078183R9999	Transparent door, W 600 mm, H 1600 mm	1
TZ101	2CPX010450R9999	Flange for 52 entries	2

CKDC1620	2CPX078321R9999	CombiLine S, DIN Components, Row distance 200 mm, 1 row, W 600 mm, H 200 mm	3
CACP6010	2CPX078351R9999	CombiLine S, Cover, plain, W 600 mm, H 100 mm	1
CVCC3511	2CPX078400R9999	CombiLine S, Device vertical, W 600 mm, Tmax XT3, 3 device, 3/4 pole, fixed, lever operation	1
CACP6020	2CPX078353R9999	CombiLine S, Cover, plain, W 600 mm, H 200 mm	3
CASWP2	2CPX078454R9999	CombiLine S, Support, wiring duct, 2 pcs	3
CAHW6	2CPX078459R9999	CombiLine S, Mounting profile, for wiring system, W 600 mm	3



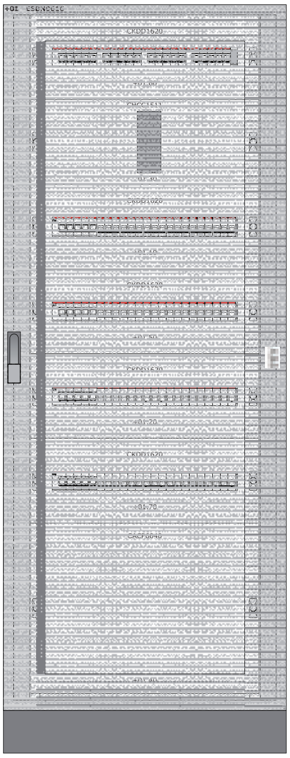
TwinLine S 43 (1600 x 600x 225 mm + 1600 x 300 x 225 mm) IP43
Internal configuration CombiLine S, with busbars 400 A, 25 kA in external cable container

Type	Ord.no.	Description	Pcs.
ESBN0616	2CPX078115R9999	Rear wall, W 600 mm, H 1600 mm	1
ESPG0600	2CPX078146R9999	Top/bottom plate (open/closed), D 225 mm, W 600 mm	1
ESSG0016	2CPX078133R9999	Side walls 2 pcs, D 225 mm, H 1600 mm	1
ESIN0016	2CPX078426R9999	Installation set for internal configuration, H 1600 mm	2
ESAG0610	2CPX078205R9999	Plinth, D 225 mm, W 600 mm, H 100 mm	1
ESAT0616	2CPX078183R9999	Transparent door, W 600 mm, H 1600 mm	1
ESBN0316	2CPX078106R9999	Rear wall, W 300 mm, H 1600 mm	1
ESPG0300	2CPX078145R9999	Top/bottom plate (open/closed), D 225 mm, W 300 mm	1
ESUG0016	2CPX078229R9999	Upright cabinet connection, D 225 mm, H 1600 mm	1
ESAG0310	2CPX078203R9999	Plinth, D 225 mm, W 300 mm, H 100 mm	1
ESAS0316	2CPX078157R9999	Sheet steel door, W 300 mm, H 1600 mm	1
TZ101	2CPX010450R9999	Flange for 52 entries	3

CKDC1620	2CPX078321R9999	CombiLine S, DIN Components, Row distance 200 mm, 1 row, W 600 mm, H 200 mm	3
CACP6010	2CPX078351R9999	CombiLine S, Cover, plain, W 600 mm, H 100 mm	1
CHCC1511	2CPX078243R9999	CombiLine S, Device horizontal, W 600 mm, Tmax XT3, 1 device, 3/4 pole, fixed, lever operation	1
CACP6020	2CPX078353R9999	CombiLine S, Cover, plain, W 600 mm, H 200 mm	2
CKDB2630	2CPX078406R9999	CombiLine S, DIN Components, Row distance 150 mm, 2 row, W 600 mm, H 300 mm	1
CACP3060	2CPX078348R9999	CombiLine S, Cover, plain, W 300 mm, H 600 mm	1
CACP3050	2CPX078347R9999	CombiLine S, Cover, plain, W 300 mm, H 500 mm	2
CASWP2	2CPX078454R9999	CombiLine S, Support, wiring duct, 2 pcs	5
CAHW6	2CPX078459R9999	CombiLine S, Mounting profile, for wiring system, W 600 mm	5
CASVP2	2CPX078452R9999	CombiLine S, Support, vertical universal, 2 pcs	2
CKBS2231	2CPX078372R9999	CombiLine S, Busbar, support, shaped busbars, holder scaled, W 300 mm, 1 support	3

BA0400		Busbar In = 400A	2

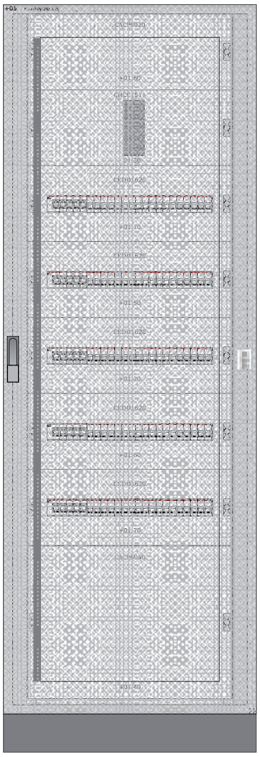
Enclosures technical details
TwinLine S 43 with CombiLine S - Examples of configurations



TwinLine S 43 (1800 x 600 x 225 mm) IP43
Internal configuration CombiLine S

Type	Ord.no.	Description	Pcs.
ESBN0618	2CPX078116R9999	Rear wall, W 600 mm, H 1800 mm	1
ESPG0600	2CPX078146R9999	Top/bottom plate (open/closed), D 225 mm, W 600 mm	1
ESSG0018	2CPX078134R9999	Side walls 2 pcs, D 225 mm, H 1800 mm	1
ESIN0018	2CPX078427R9999	Installation set for internal configuration, H 1800 mm	1
ESAG0610	2CPX078205R9999	Plinth, D 225 mm, W 600 mm, H 100 mm	1
ESAT0618	2CPX078184R9999	Transparent door, W 600 mm, H 1800 mm	1
TZ101	2CPX010450R9999	Flange for 52 entries	2

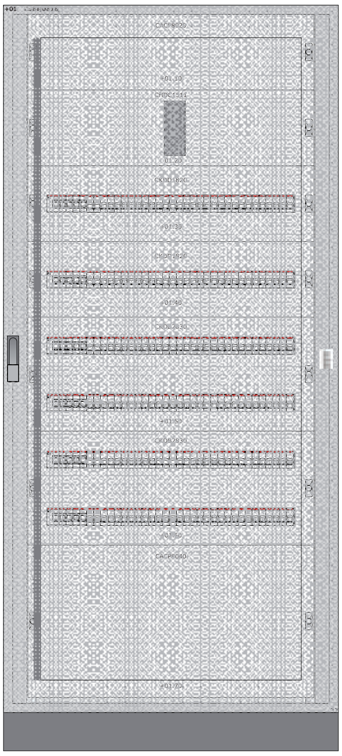
CKDC1620	2CPX078321R9999	CombiLine S, DIN Components, Row distance 200 mm, 1 row, W 600 mm, H 200 mm	6
CHCC1511	2CPX078243R9999	CombiLine S, Device horizontal, W 600 mm, Tmax XT3, 1 device, 3/4 pole, fixed, lever operation	1
CACP6040	2CPX078356R9999	CombiLine S, Cover, plain, W 600 mm, H 400 mm	1
CASWP2	2CPX078454R9999	CombiLine S, Support, wiring duct, 2 pcs	6
CAHW6	2CPX078459R9999	CombiLine S, Mounting profile, for wiring system, W 600 mm	6



TwinLine S 43 (1600 x 600x 225 mm + 1600 x 300 x 225 mm) IP43
Internal configuration CombiLine S, with busbars 400 A, 25 kA in external cable container

Type	Ord.no.	Description	Pcs.
ESBN0618	2CPX078116R9999	Rear wall, W 600 mm, H 1800 mm	1
ESPL0600	2CPX078149R9999	Top/bottom plate (open/closed), D 275 mm, W 600 mm	1
ESSL0018	2CPX078143R9999	Side walls 2 pcs, D 275 mm, H 1800 mm	1
ESIN0018	2CPX078427R9999	Installation set for internal configuration, H 1800 mm	1
ESAL0610	2CPX078211R9999	Plinth, D 275 mm, W 600 mm, H 100 mm	1
ESAT0618	2CPX078184R9999	Transparent door, W 600 mm, H 1800 mm	1
TZ101	2CPX010450R9999	Flange for 52 entries	2
CKDC1620	2CPX078321R9999	CombiLine S, DIN Components, Row distance 200 mm, 1 row, W 600 mm, H 200 mm	5
CHCC1511	2CPX078243R9999	CombiLine S, Device horizontal, W 600 mm, Tma x xT3, 1 device, 3/4 pole, fi xed, lever operation	1
CACP6040	2CPX078356R9999	CombiLine S, Cover, plain, W 600 mm, H 400 mm	1
CACP6020	2CPX078353R9999	CombiLine S, Cover, plain, W 600 mm, H 200 mm	1
CASWP2	2CPX078454R9999	CombiLine S, Support, wiring duct, 2 pcs	5
CAHW6	2CPX078459R9999	CombiLine S, Mounting profile, for wiring system, W 600 mm	5
CKBS1161	2CPX078447R9999	CombiLine S, Busbar, support, flat busbars, holder linear, W 600 mm, 1 support	4
BR0250		No. 2 flat busbars 250 A	4

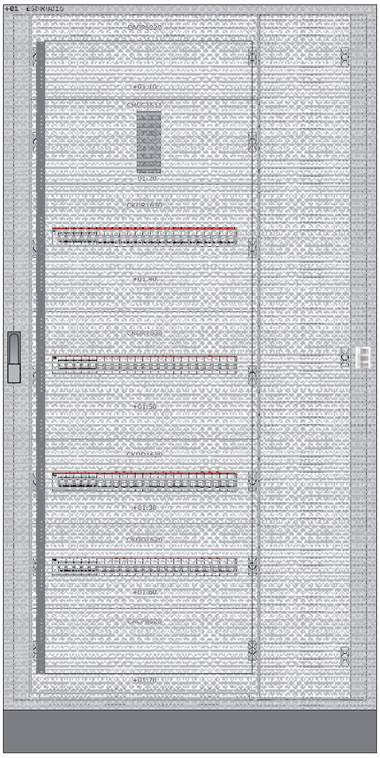
Enclosures technical details
TwinLine S 43 with CombiLine S - Examples of configurations



TwinLine S 43 (1800 x 800 x 275 mm) IP43
Internal configuration CombiLine S

Type	Ord.no.	Description	Pcs.
ESBN0818	2CPX078125R9999	Rear wall, W 800 mm, H 1800 mm	1
ESPL0800	2CPX078150R9999	Top/bottom plate (open/closed), D 275 mm, W 800 mm	1
ESSL0018	2CPX078143R9999	Side walls 2 pcs, D 275 mm, H 1800 mm	1
ESIN0018	2CPX078427R9999	Installation set for internal configuration, H 1800 mm	1
TZ101	2CPX010450R9999	Flange for 52 entries	3
ESAL0810	2CPX078213R9999	Plinth, D 275 mm, W 800 mm, H 100 mm	1
ESAT0818	2CPX078192R9999	Transparent door, W 800 mm, H 1800 mm	1

CKDC1820	2CPX078322R9999	CombiLine S, DIN Components, Row distance 200 mm, 1 row, W 800 mm, H 200 mm	2
CKDB2830	2CPX078407R9999	CombiLine S, DIN Components, Row distance 150 mm, 2 row, W 800 mm, H 300 mm	2
CHDC1511	2CPX078250R9999	CombiLine S, Device horizontal, W 800 mm, Tmax XT3, 1 device, 3/4 pole, fixed, lever operation	1
CACP8020	2CPX078363R9999	CombiLine S, Cover, plain, W 800 mm, H 200 mm	1
CACP8040	2CPX078366R9999	CombiLine S, Cover, plain, W 800 mm, H 400 mm	1
CASWP2	2CPX078454R9999	CombiLine S, Support, wiring duct, 2 pcs	6
CAHW8	2CPX078461R9999	CombiLine S, Mounting profile, for wiring system, W 800 mm	6

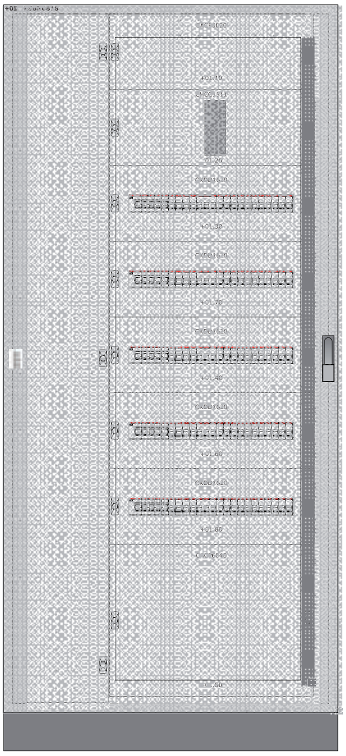


TwinLine S 43 (1600 x 800 x 225 mm) IP43 and internal cable container
Internal configuration CombiLine S

Type	Ord.no.	Description	Pcs.
ESBN0816	2CPX078124R9999	Rear wall, W 800 mm, H 1600 mm	1
ESPG0800	2CPX078147R9999	Top/bottom plate (open/closed), D 225 mm, W 800 mm	1
ESSG0016	2CPX078133R9999	Side walls 2 pcs, D 225 mm, H 1600 mm	1
ESIN0016	2CPX078426R9999	Installation set for internal configuration, H 1600 mm	1
ESAI0216	2CPX078220R9999	Internal cable container, H 1600 mm	1
ESAG0810	2CPX078207R9999	Plinth, D 225 mm, W 800 mm, H 100 mm	1
ESAT2616	2CPX078199R9999	Transparent door, for internal cable container, W 800 mm, H 1600 mm	1
TZ101	2CPX010450R9999	Flange for 52 entries	3

CKDC1620	2CPX078321R9999	CombiLine S, DIN Components, Row distance 200 mm, 1 row, W 600 mm, H 200 mm	2
CHCC1511	2CPX078243R9999	CombiLine S, Device horizontal, W 600 mm, Tmax XT3, 1 device, 3/4 pole, fixed, lever operation	1
CACP6020	2CPX078353R9999	CombiLine S, Cover, plain, W 600 mm, H 200 mm	2
CKDR1630	2CPX078383R9999	CombiLine S, DIN Components, Tmax breaker + RC mod, 1 row, W 600 mm, H 300 mm	2
CASWP2	2CPX078454R9999	CombiLine S, Support, wiring duct, 2 pcs	4
CAHW6	2CPX078459R9999	CombiLine S, Mounting profile, for wiring system, W 600 mm	4

Enclosures technical details
TwinLine S 43 with CombiLine S Examples of configurations



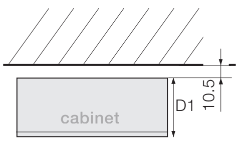
TwinLine S 43 (1800 x 800 x 275 m) IP43 and internal cable container
Internal configuration CombiLine S

Type	Ord.no.	Description	Pcs.
ESBN0818	2CPX078125R9999	Rear wall, W 800 mm, H 1800 mm	1
ESPL0800	2CPX078150R9999	Top/bottom plate (open/closed), D 275 mm, W 800 mm	1
ESSL0018	2CPX078143R9999	Side walls 2 pcs, D 275 mm, H 1800 mm	1
ESIN0018	2CPX078427R9999	Installation set for internal configuration, H 1800 mm	1
ESAI0218	2CPX078221R9999	Internal cable container, H 1800 mm	1
ESAL0810	2CPX078213R9999	Plinth, D 275 mm, W 800 mm, H 100 mm	1
ESAT2618	2CPX078200R9999	Transparent door, for internal cable container, W 800 mm, H 1800 mm	1
TZ101	2CPX010450R9999	Flange for 52 entries	3

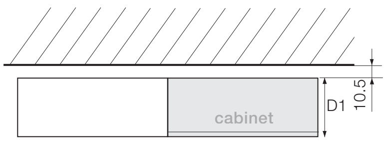
CKDC1620	2CPX078321R9999	CombiLine S, DIN Components, Row distance 200 mm, 1 row, W 600 mm, H 200 mm	5
CHCC1511	2CPX078243R9999	CombiLine S, Device horizontal, W 600 mm, Tmax XT3, 1 device, 3/4 pole, fixed, lever operation	1
CACP6020	2CPX078353R9999	CombiLine S, Cover, plain, W 600 mm, H 200 mm	1
CACP6040	2CPX078356R9999	CombiLine S, Cover, plain, W 600 mm, H 400 mm	1
CASWP2	2CPX078454R9999	CombiLine S, Support, wiring duct, 2 pcs	5
CAHW6	2CPX078459R9999	CombiLine S, Mounting profile, for wiring system, W 600 mm	5

Enclosures technical details
TwinLine S 43 - Power loss and weights of cabinets

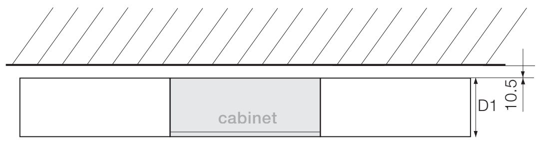
Type of installation
Separate cabinet wall mounted



Type of installation
First or last cabinet wall mounted



Type of installation
Central cabinet wall mounted

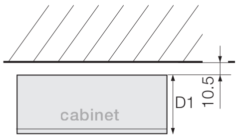


Cabinet types H x W x D	Power loss in Watt*												Cabinet weight in kg		max. installation weight in kg
	Separate cabinet wall mounted				First or last cabinet wall mounted				Central cabinet wall mounted						
	25 °C	30 °C	35 °C	40 °C	25 °C	30 °C	35 °C	40 °C	25 °C	30 °C	35 °C	40 °C	With door	Without door	
400 x 300 x 225	36	45	54	64	33	41	50	59	30	38	45	54	13.55	8.80	10
600 x 300 x 225	47	59	71	84	43	54	65	77	39	49	59	70	17.50	10.88	15
800 x 300 x 225	58	73	88	104	53	66	81	95	48	60	73	86	21.11	13.30	20.5
1000 x 300 x 225	70	87	106	125	63	80	96	114	57	72	87	102	24.75	15.03	31.5
1200 x 300 x 225	81	102	123	146	74	92	112	132	66	83	101	119	28.59	17.10	37.5
1400 x 300 x 225	92	116	141	166	84	105	127	150	75	94	114	135	32.67	19.17	43
1600 x 300 x 225	93	117	143	168	85	106	129	152	84	105	128	151	36.29	21.24	49
1800 x 300 x 225	95	119	144	170	86	108	130	154	85	107	129	153	39.90	23.32	60
2000 x 300 x 225	96	120	146	172	87	109	132	156	86	108	130	155	43.52	25.38	72
400 x 600 x 225	61	76	93	109	58	72.7	88.1	104	55	69	84	99	18.50	11.55	22
600 x 600 x 225	76	95	116	137	72	90	109	129	68	85	103	122	23.72	14.26	30
800 x 600 x 225	91	115	139	164	86	108	131	155	81	102	123	146	28.60	16.96	41
1000 x 600 x 225	94	118	143	169	89	112	136	160	85	107	129	152	33.51	19.68	63.5
1200 x 600 x 225	97	121	147	173	92	115	140	165	88	111	134	158	38.62	22.38	75
1400 x 600 x 225	110	137	167	197	102	128	155	183	97	122	147	174	43.97	25.09	86
1600 x 600 x 225	128	160	194	229	120	151	183	215	112	141	170	201	48.87	27.80	97
1800 x 600 x 225	149	187	226	267	137	172	208	246	129	162	196	231	53.75	30.50	120
2000 x 600 x 225	168	211	255	301	159	199	241	285	146	183	222	262	58.65	33.22	132
400 x 800 x 225	78	98	118	140	75	94	114	134	72	90	109	129	22.46	13.76	35
600 x 800 x 225	98	122	148	175	93	117	142	168	89	112	136	160	28.69	16.97	45
800 x 800 x 225	106	132	160	189	101	127	153	181	91	115	139	164	34.59	20.18	61.5
1000 x 800 x 225	113	142	171	202	108	136	164	194	106	133	161	190	40.50	23.40	95.5
1200 x 800 x 225	133	167	202	239	127	159	193	228	121	152	184	218	46.63	26.61	112.5
1400 x 800 x 225	154	193	234	276	145	182	220	260	139	175	212	250	53.00	29.83	129
1600 x 800 x 225	169	212	257	303	162	203	246	291	154	193	234	276	58.90	33.04	145
1800 x 800 x 225	194	244	295	349	184	230	279	329	177	221	268	317	64.79	36.25	180
2000 x 800 x 225	215	270	327	387	207	259	314	371	199	250	303	358	70.70	39.47	196

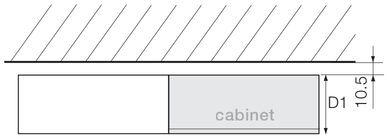
* Powerloss determinated by calculation with the method of IEC 60890 in accordance with IEC 61439-1 par. 10.10.4

Enclosures technical details
TwinLine S 43 - Power loss and weights of cabinets

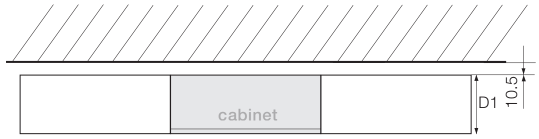
Type of installation
Separate cabinet wall mounted



Type of installation
First or last cabinet wall mounted



Type of installation
Central cabinet wall mounted

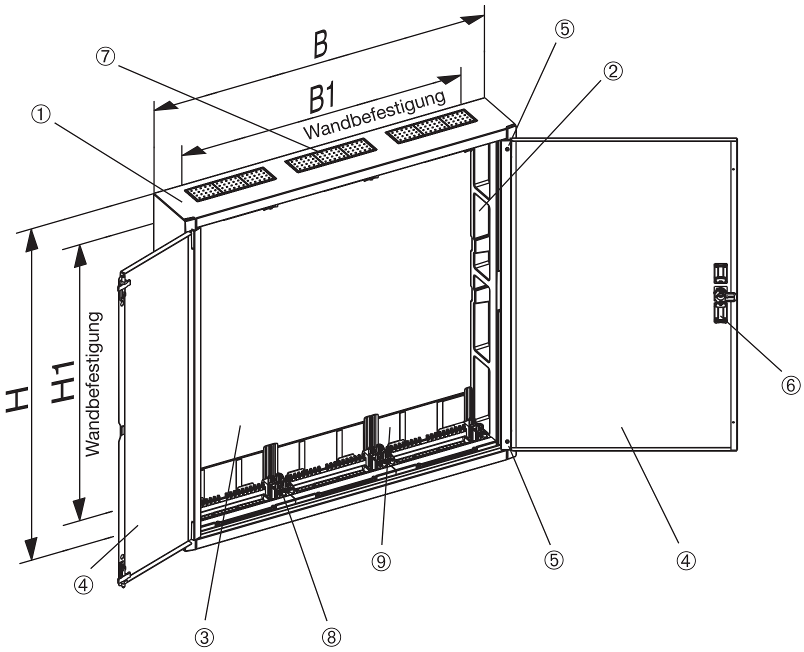


Cabinet types H x W x D	Power loss in Watt*												Cabinet weight in kg		max. installation weight in kg
	Separate cabinet wall mounted				First or last cabinet wall mounted				Central cabinet wall mounted						
	25 °C	30 °C	35 °C	40 °C	25 °C	30 °C	35 °C	40 °C	25 °C	30 °C	35 °C	40 °C	With door	Without door	
400 x 300 x 275	40	50	61	72	37	46	55	66	33	42	50	59	14.31	9.57	10
600 x 300 x 275	52	65	79	94	47	59	72	85	43	53	65	76	18.41	11.79	15
800 x 300 x 275	65	81	98	116	58	73	89	105	52	65	79	94	22.18	14.02	20.5
1000 x 300 x 275	77	97	118	139	70	88	106	125	62	78	94	111	25.97	16.25	31.5
1200 x 300 x 275	80	101	122	144	81	102	123	145	72	90	109	129	29.97	18.48	37.5
1400 x 300 x 275	83	104	127	150	92	115	140	165	81	102	124	146	34.21	20.71	43
1600 x 300 x 275	86	108	131	155	94	117	142	168	91	114	138	163	37.99	22.94	49
1800 x 300 x 275	97	122	148	174	95	119	145	170	93	116	140	165	41.75	25.17	60
2000 x 300 x 275	111	139	168	199	97	121	147	173	95	118	142	166	45.53	27.39	72
400 x 600 x 275	67	84	102	121	64	80	97	114	60	75	91	108	19.47	12.52	22
600 x 600 x 275	83	104	127	149	78	98	119	141	73	92	112	132	24.84	15.38	30
800 x 600 x 275	90	113	137	162	93	117	142	167	87	109	132	156	29.88	18.24	41
1000 x 600 x 275	97	121	147	174	98	123	149	176	93	116	141	166	34.94	21.11	63.5
1200 x 600 x 275	111	139	168	198	103	129	156	185	98	123	149	176	40.22	23.98	75
1400 x 600 x 275	122	153	185	219	113	142	172	203	104	131	159	187	45.72	26.84	86
1600 x 600 x 275	143	179	217	256	131	164	199	235	123	154	186	220	50.77	29.70	97
1800 x 600 x 275	165	207	250	296	152	191	231	273	139	174	211	250	55.82	32.57	120
2000 x 600 x 275	186	233	282	333	171	215	261	308	160	201	243	287	60.87	35.44	132
400 x 800 x 275	86	107	130	153	82	103	124	147	78	98	119	140	23.60	14.89	35
600 x 800 x 275	89	112	136	160	101	127	153	181	96	120	146	172	29.98	18.26	45
800 x 800 x 275	109	137	166	196	106	14	161	190	102	128	155	183	36.04	21.63	61.5
1000 x 800 x 275	130	163	197	233	122	153	186	219	118	148	179	211	42.11	25.01	95.5
1200 x 800 x 275	151	190	230	271	143	179	217	256	137	172	208	246	48.40	28.38	112.5
1400 x 800 x 275	176	221	268	317	165	207	251	296	155	195	236	278	54.92	31.75	129
1600 x 800 x 275	197	248	300	354	185	233	282	333	178	223	271	319	60.98	35.12	145
1800 x 800 x 275	209	262	318	375	200	250	303	358	188	236	286	338	67.02	38.48	180
2000 x 800 x 275	234	293	355	419	221	277	336	397	212	266	322	380	73.09	41.86	196

* Powerloss determinated by calculation with the method of IEC 60890 in accordance with IEC 61439-1 par. 10.10.4

Enclosures technical details
Compact distribution boards

1. The cabinet is made of sheet steel (1 mm) and is powder-coated (RAL 9016). Its extraordinary stability is achieved by the profiled cabinet frame. Problem-free surface mounting is therefore also possible.
2. The protective insulation is guaranteed by an inserted plastic profile.
3. An additional plastic rear wall is inserted in order to maintain the protective insulation.
4. The door provides great stability thanks to its special shape
   in the hinge area and on the closing side.
5. The door can be readjusted with the special hinge.
6. The standard lock offers not only a new design but also secure locking, both as "standard" and as "security design".
7. The flange openings on top are closed ex-factory with the membrane flange.
8. The cabinet provides an optimum connection space thanks to the individual panel holders.
9. Prepunched knockouts are provided for inserting cables from the rear.



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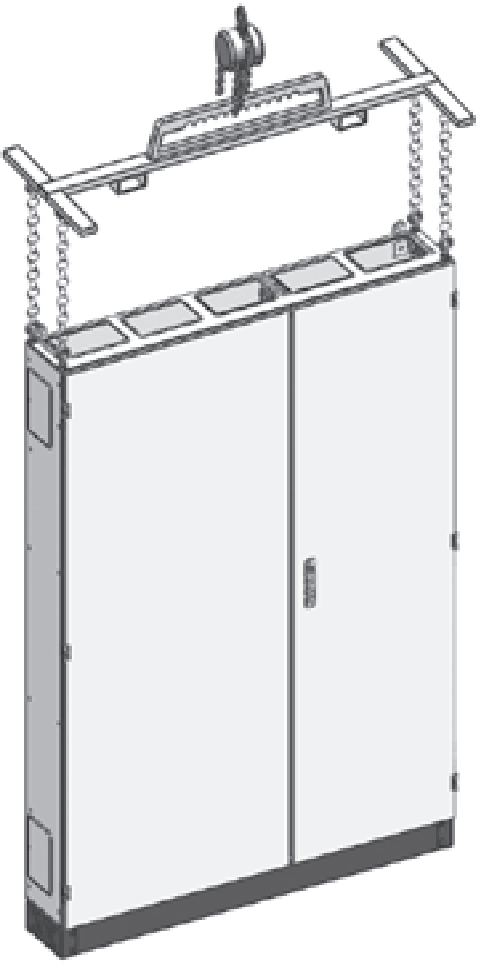
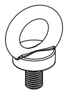
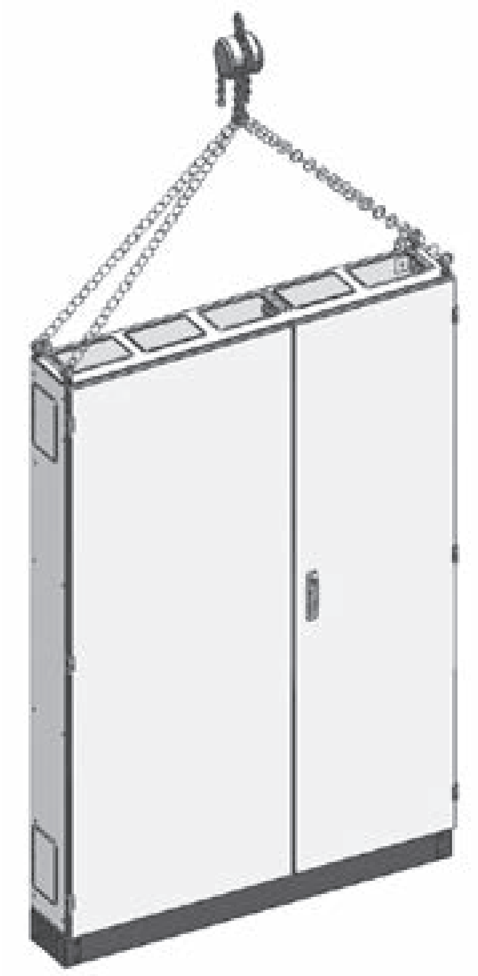
Enclosures technical details
TwinLineN 55 Transport by crane

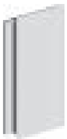
Lifting of the TwinLine enclosures is possible as indicated. Always use the STRIEBEL & JOHN transportation lugs type TZ615P4. Crane transport is only possible for individual cabinets! Also consider the weight limits of the cabinets.







Enclosures technical details
TwinLine Meter applications

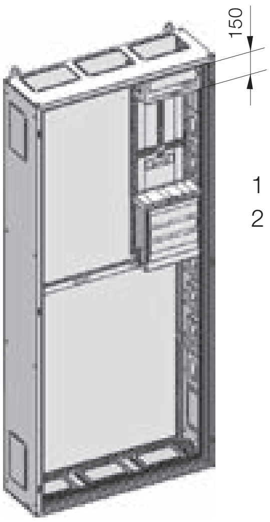


TZ610

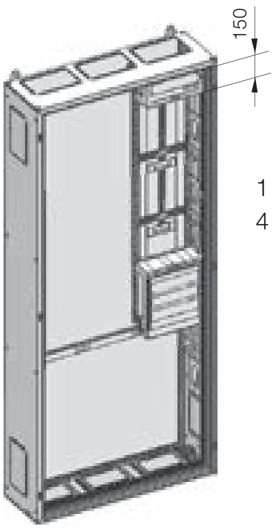
Internal cladding TZ610
For meter panels, depth = 225 - 350 mm
Additional profile for meter panels with 150 mm connection area in double insulated cabinets

TZ614

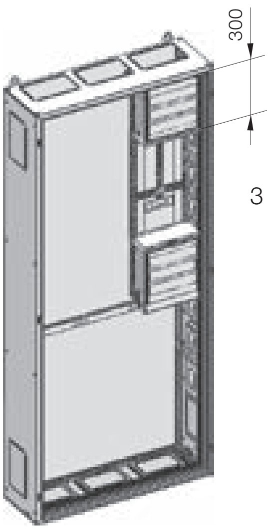
Cover rail TZ612-614
Required to integrate meter panels into double insulated floor-standing cabinets of the IPXXB degree of protection in the area of the available fastening holes for the centre support rail



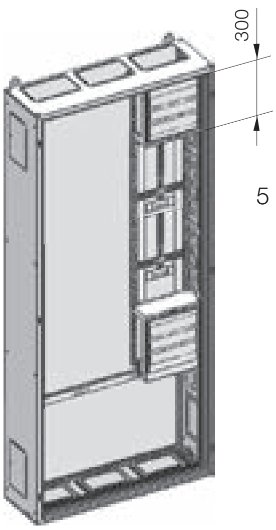
1 x TZ610
2 x TZ612-614



1 x TZ610
4 x TZ612-614



3 x TZ612-614



5 x TZ612-614

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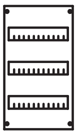
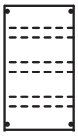
Enclosures technical details
TwinLine Meter applications

Distribution panel system with distribution board panels
Equipping of distribution panels



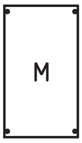
Panels for DIN rail mounting devices

Configuration: DIN rail 35 x 15 mm for device installation and with special square holes for the wiring system. DIN rail spacing 125 mm. Plastic covers. Slots for DIN rail mounting devices according to DIN 43880 for 12 devices (216 mm) per panel width.



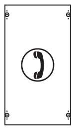
Panels for DIN rail mounting terminals

Configuration: DIN rail 35 x 15 mm for DIN rail mounting terminals, with special square holes for the wiring system. DIN rail spacing 125 mm. Plastic covers. Use ZK90P2 insulating pieces in order to fit DIN rails with double insulation. Use the deep-mounting brackets ED33P2 in order to fit the DIN rails in a recessed position.



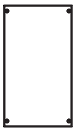
Panels with mounting plates

Configuration: ST1203 surface sendzimir-galvanised 2 mm sheet steel mounting plate. The mounting plate is mounted to deep-mounting brackets allowing
stepless depth adjustment. Maximum space between the mounting plate and cover is 143 mm (consider cabinet depth), plastic covers.



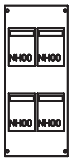
Panels with mounting cross members for drill-free mounting of devices

Configuration: Per 150 mm one mounting plate is mounted to deep-mounting brackets and its depth is steplessly adjustable. Maximum installation depth between mounting plate and cover is 143 mm (consider cabinet depth), plastic covers.



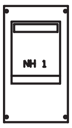
Panels as touch guard (or for custom assembly)

Configuration: Empty panel without installation parts, plastic covers (closed covers)



Panels for fuse switch disconnectors size 00 (160 A)*

Configuration: Cross member for disconnector mounting, Universal mounting with sliding nuts for adapting to different fastening positions (M6 threads), plastic covers. Covers with cut-outs for fuse switch disconnectors tailored to match trim dimensions (without disconnector)



Panels for fuse switch disconnectors size 1 (250 A)*

Configuration: Cross member for disconnector mounting, Universal mounting with sliding nuts for adapting to different fastening positions (M8 threads), plastic covers. Covers with cut-outs for fuse switch disconnectors tailored to match trim dimensions (without disconnector)

Panels with busbars

Configuration: 5 pole busbar system
Cu 12 x 5 mm, busbar spacing 40 mm, plastic cover (closed covers)

*Not suitable for fire protection enclosures

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