ABL

SWITCHING DEVICES

MARCH 2016

THE ORIGINAL. SINCE 1933.

SWITCHING DEVICES

Miniature Circuit Breakers	**4**
RCCB	**32**
RCBO	**56**
DIN-Rail Panel Products	**60**
Motor Protective Circuit breakers	**88**
Item Number Directory	**110**


ABL
C32 T3
OFF
OFF
OFF
ABL
B16 SL1
OFF
ABL
Made in Germany

MINIATURE CIRCUIT BREAKERS

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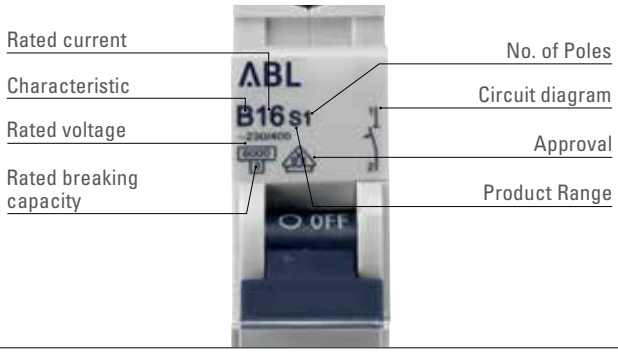
THE WINNING FEATURES OF
ABL SURSUM SWITCHING DEVICES

1 FUNCTIONAL FORM

- User-friendly ergonomics
- Intuitive product coding
- Clearly marked ON/OFF positions



2 COMPACT DESIGN OFFERING MAXIMUM WIRING SPACE

At 82,5 mm height one of the smallest IEC Miniature cirquit breakers available

3 EASIER BUSBAR REMOVAL

Innovative fixing slides for easy removal from the busbar, even when feeding from the top.

single fix

twin fix

4 SWITCHING DEVICES

in a consistent and contemporary design

5 EXTENSIVE APPLICATION POSSIBILITIES

Four seperate product ranges for different applications in Industry and house installations in AC and DC versions. With a wide range of trip characteristics and 22 nominal ratings between 0,3 A and 63A it offers the best possible protection.
Wide range of international Certificates of approvals (VDE, Germanischer Lloyd, CCC, EAC, CEBEC, SEV)

- S-Range
  6kA in compliance with IEC60898
  6A-32A, in B, C, Characteristic in 1-pole and 3-pole
- SL-Range
  6kA in compliance with IEC60898
  16A, in B Characteristic in 1-pole
- T-Range
  10kA in compliance with IEC60898 and IEC 60947
  0,3A-63A, in B, C, D, K, Z Characteristic in
  1-pole, 1+N, 2-pole, 3-pole, 3+N, 4-pole
- DC-Range
  6kA in compliance with IEC60898
  0,5A-63A, in B, C, Characteristic in 1-pole, 125V and 2-pole 250V DC when serial connected

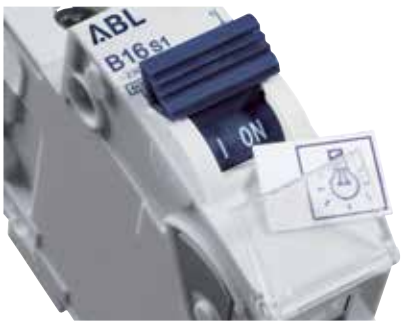
6 COMPLETE PRODUCT SYSTEM

- Full range of accessories for Circuit Breakers
- Auxilliary contacts can be mounted on the left and/or on the right side
- Common accessories for all product ranges

Auxiliary contact | Shunt trip | Undervoltage trip | Lock-off / Lock-on device

7 PROFESSIONAL LABELING SYSTEM

- with marking window
- Blank perforated labels available for one pole, two pole and three pole windows for convenient circuit indication



MINIATURE CIRCUIT BREAKERS S PRODUCT RANGE

6 kA B and C characteristic acc. to IEC 60898-1

RATED CURRENT I_n A	CHARACTERISTIC		WEIGHT g / EACH	PACKING UNIT
	B ITEM NO.	C ITEM NO.		
1-pole				
6	**B6S1**	**C6S1**	120	12
10	**B10S1**	**C10S1**	120	12
13	**B13S1**	**C13S1**	120	12
16	**B16S1**	**C16S1**	120	12
20	**B20S1**	**C20S1**	120	12
25	**B25S1**	**C25S1**	120	12
32	**B32S1**	**C32S1**	120	12

3-pole				
6	**B6S3**	**C6S3**	360	4
10	**B10S3**	**C10S3**	360	4
13	**B13S3**	**C13S3**	360	4
16	**B16S3**	**C16S3**	360	4
20	**B20S3**	**C20S3**	360	4
25	**B25S3**	**C25S3**	360	4
32	**B32S3**	**C32S3**	360	4

MINIATURE CIRCUIT BREAKERS SL PRODUCT RANGE

with screwless top terminal

B characteristic 6 kA acc. to IEC 60898-1

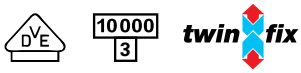
RATED CURRENT I_n A	CHARACTER-ISTIC B ITEM NO.	WEIGHT g/EACH	PACKING UNIT
einpolig			
16	**B16SL1**	120	12

plug power

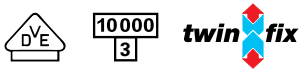
single fix

MINIATURE CIRCUIT BREAKERS T PRODUCT RANGE

10 kA B, C and D characteristic acc. to IEC 60898-1
10 kA K and Z characteristic acc. to IEC 60947-2



RATED CURRENT I_n A	CHARACTERISTIC					WEIGHT g / EACH	PACKING UNIT
	B ITEM NO.	C ITEM NO.	D ITEM NO.	K ITEM NO.	Z ITEM NO.		
1-pole							
0.3		C0.3T1	D0.3T1	K0.3T1	Z0.3T1	120	12
0.5		C0.5T1	D0.5T1	K0.5T1	Z0.5T1	120	12
0.8		C0.8T1	D0.8T1	K0.8T1	Z0.8T1	120	12
1	B1T1	C1T1	D1T1	K1T1	Z1T1	120	12
1.6		C1.6T1	D1.6T1	K1.6T1	Z1.6T1	120	12
2	B2T1	C2T1	D2T1	K2T1	Z2T1	120	12
2.5		C2.5T1	D2.5T1	K2.5T1	Z2.5T1	120	12
3	B3T1	C3T1	D3T1	K3T1	Z3T1	120	12
3.5		C3.5T1	D3.5T1	K3.5T1	Z3.5T1	120	12
4	B4T1	C4T1	D4T1	K4T1	Z4T1	120	12
5	B5T1	C5T1	D5T1	K5T1	Z5T1	120	12
6	B6T1	C6T1	D6T1	K6T1	Z6T1	120	12
8		C8T1	D8T1	K8T1	Z8T1	120	12
10	B10T1	C10T1	D10T1	K10T1	Z10T1	120	12
13	B13T1	C13T1	D13T1	K13T1	Z13T1	120	12
16	B16T1	C16T1	D16T1	K16T1	Z16T1	120	12
20	B20T1	C20T1	D20T1	K20T1	Z20T1	120	12
25	B25T1	C25T1	D25T1	K25T1	Z25T1	120	12
32	B32T1	C32T1	D32T1	K32T1	Z32T1	120	12
40	B40T1	C40T1	D40T1	K40T1		125	12
50	B50T1	C50T1	D50T1 *	K50T1		135	12
63	B63T1	C63T1	D63T1 *	K63T1		135	12

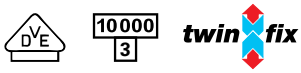


1-pole with switched neutral							
0.3		C0.3T8	D0.3T8	K0.3T8		240	6
0.5		C0.5T8	D0.5T8	K0.5T8		240	6
0.8		C0.8T8	D0.8T8	K0.8T8		240	6
1	B1T8	C1T8	D1T8	K1T8		240	6
1.6		C1.6T8	D1.6T8	K1.6T8		240	6
2	B2T8	C2T8	D2T8	K2T8		240	6
2.5		C2.5T8	D2.5T8	K2.5T8		240	6
3	B3T8	C3T8	D3T8	K3T8		240	6
3.5		C3.5T8	D3.5T8	K3.5T8		240	6
4	B4T8	C4T8	D4T8	K4T8		240	6
5	B5T8	C5T8	D5T8	K5T8		240	6
6	B6T8	C6T8	D6T8	K6T8		240	6
8		C8T8	D8T8	K8T8		240	6
10	B10T8	C10T8	D10T8	K10T8		240	6
13	B13T8	C13T8	D13T8	K13T8		240	6
16	B16T8	C16T8	D16T8	K16T8		240	6
20	B20T8	C20T8	D20T8	K20T8		240	6
25	B25T8	C25T8	D25T8	K25T8		240	6
32	B32T8	C32T8	D32T8	K32T8		240	6
40	B40T8	C40T8	D40T8	K40T8		250	6
50	B50T8	C50T8	D50T8 *	K50T8		270	6
63	B63T8	C63T8	D63T8 *	K63T8		270	6

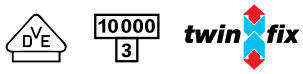
* only in 6 kA available

MINIATURE CIRCUIT BREAKERS T PRODUCT RANGE

10 kA B, C and D characteristic acc. to IEC 60898-1
10 kA K and Z characteristic acc. to IEC 60947-2



RATED CURRENT I_n A	CHARACTERISTIC					WEIGHT g / EACH	PACKING UNIT
	B ITEM NO.	C ITEM NO.	D ITEM NO.	K ITEM NO.	Z ITEM NO.		
2-pole							
0.3		C0.3T2	D0.3T2	K0.3T2	Z0.3T2	240	6
0.5		C0.5T2	D0.5T2	K0.5T2	Z0.5T2	240	6
0.8		C0.8T2	D0.8T2	K0.8T2	Z0.8T2	240	6
1	B1T2	C1T2	D1T2	K1T2	Z1T2	240	6
1.6		C1.6T2	D1.6T2	K1.6T2	Z1.6T2	240	6
2	B2T2	C2T2	D2T2	K2T2	Z2T2	240	6
2.5		C2.5T2	D2.5T2	K2.5T2	Z2.5T2	240	6
3	B3T2	C3T2	D3T2	K3T2	Z3T2	240	6
3.5		C3.5T2	D3.5T2	K3.5T2	Z3.5T2	240	6
4	B4T2	C4T2	D4T2	K4T2	Z4T2	240	6
5	B5T2	C5T2	D5T2	K5T2	Z5T2	240	6
6	B6T2	C6T2	D6T2	K6T2	Z6T2	240	6
8		C8T2	D8T2	K8T2	Z8T2	240	6
10	B10T2	C10T2	D10T2	K10T2	Z10T2	240	6
13	B13T2	C13T2	D13T2	K13T2	Z13T2	240	6
16	B16T2	C16T2	D16T2	K16T2	Z16T2	240	6
20	B20T2	C20T2	D20T2	K20T2	Z20T2	240	6
25	B25T2	C25T2	D25T2	K25T2	Z25T2	240	6
32	B32T2	C32T2	D32T2	K32T2	Z32T2	240	6
40	B40T2	C40T2	D40T2	K40T2		250	6
50	B50T2	C50T2	D50T2 *	K50T2		270	6
63	B63T2	C63T2	D63T2 *	K63T2		270	6



3-pole							
0.3		C0.3T3	D0.3T3	K0.3T3	Z0.3T3	360	4
0.5		C0.5T3	D0.5T3	K0.5T3	Z0.5T3	360	4
0.8		C0.8T3	D0.8T3	K0.8T3	Z0.8T3	360	4
1	B1T3	C1T3	D1T3	K1T3	Z1T3	360	4
1.6		C1.6T3	D1.6T3	K1.6T3	Z1.6T3	360	4
2	B2T3	C2T3	D2T3	K2T3	Z2T3	360	4
2.5		C2.5T3	D2.5T3	K2.5T3	Z2.5T3	360	4
3	B3T3	C3T3	D3T3	K3T3	Z3T3	360	4
3.5		C3.5T3	D3.5T3	K3.5T3	Z3.5T3	360	4
4	B4T3	C4T3	D4T3	K4T3	Z4T3	360	4
5	B5T3	C5T3	D5T3	K5T3	Z5T3	360	4
6	B6T3	C6T3	D6T3	K6T3	Z6T3	360	4
8		C8T3	D8T3	K8T3	Z8T3	360	4
10	B10T3	C10T3	D10T3	K10T3	Z10T3	360	4
13	B13T3	C13T3	D13T3	K13T3	Z13T3	360	4
16	B16T3	C16T3	D16T3	K16T3	Z16T3	360	4
20	B20T3	C20T3	D20T3	K20T3	Z20T3	360	4
25	B25T3	C25T3	D25T3	K25T3	Z25T3	360	4
32	B32T3	C32T3	D32T3	K32T3	Z32T3	360	4
40	B40T3	C40T3	D40T3	K40T3		375	4
50	B50T3	C50T3	D50T3 *	K50T3		405	4
63	B63T3	C63T3	D63T3 *	K63T3		405	4

* only in 6 kA available

MINIATURE CIRCUIT BREAKERS T PRODUCT RANGE

10 kA B, C and D characteristic acc. to IEC 60898-1
10 kA K and Z characteristic acc. to IEC 60947-2

10000 3 twin fix

RATED CURRENT I_n A	CHARACTERISTIC					WEIGHT g/EACH	PACKING UNIT
	B ITEM NO.	C ITEM NO.	D ITEM NO.	K ITEM NO.	Z ITEM NO.		
3-pole with switched neutral							
0.3		C0.3T9	D0.3T9	K0.3T9		480	3
0.5		C0.5T9	D0.5T9	K0.5T9		480	3
0.8		C0.8T9	D0.8T9	K0.8T9		480	3
1	B1T9	C1T9	D1T9	K1T9		480	3
1.6		C1.6T9	D1.6T9	K1.6T9		480	3
2	B2T9	C2T9	D2T9	K2T9		480	3
2.5		C2.5T9	D2.5T9	K2.5T9		480	3
3	B3T9	C3T9	D3T9	K3T9		480	3
3.5		C3.5T9	D3.5T9	K3.5T9		480	3
4	B4T9	C4T9	D4T9	K4T9		480	3
5	B5T9	C5T9	D5T9	K5T9		480	3
6	B6T9	C6T9	D6T9	K6T9		480	3
8		C8T9	D8T9	K8T9		480	3
10	B10T9	C10T9	D10T9	K10T9		480	3
13	B13T9	C13T9	D13T9	K13T9		480	3
16	B16T9	C16T9	D16T9	K16T9		480	3
20	B20T9	C20T9	D20T9	K20T9		480	3
25	B25T9	C25T9	D25T9	K25T9		480	3
32	B32T9	C32T9	D32T9	K32T9		480	3
40	B40T9	C40T9	D40T9	K40T9		500	3
50	B50T9	C50T9	D50T9 *	K50T9		540	3
63	B63T9	C63T9	D63T9 *	K63T9		540	3

10000 3 twin fix

4-pole							
0.3		C0.3T4	D0.3T4	K0.3T4		480	3
0.5		C0.5T4	D0.5T4	K0.5T4		480	3
0.8		C0.8T4	D0.8T4	K0.8T4		480	3
1	B1T4	C1T4	D1T4	K1T4		480	3
1.6		C1.6T4	D1.6T4	K1.6T4		480	3
2	B2T4	C2T4	D2T4	K2T4		480	3
2.5		C2.5T4	D2.5T4	K2.5T4		480	3
3	B3T4	C3T4	D3T4	K3T4		480	3
3.5		C3.5T4	D3.5T4	K3.5T4		480	3
4	B4T4	C4T4	D4T4	K4T4		480	3
5	B5T4	C5T4	D5T4	K5T4		480	3
6	B6T4	C6T4	D6T4	K6T4		480	3
8		C8T4	D8T4	K8T4		480	3
10	B10T4	C10T4	D10T4	K10T4		480	3
13	B13T4	C13T4	D13T4	K13T4		480	3
16	B16T4	C16T4	D16T4	K16T4		480	3
20	B20T4	C20T4	D20T4	K20T4		480	3
25	B25T4	C25T4	D25T4	K25T4		480	3
32	B32T4	C32T4	D32T4	K32T4		480	3
40	B40T4	C40T4	D40T4	K40T4		500	3
50	B50T4	C50T4	D50T4 *	K50T4		540	3
63	B63T4	C63T4	D63T4 *	K63T4		540	3

* only in 6 kA available

MINIATURE CIRCUIT BREAKERS S, SL AND T PRODUCT RANGES

Technical Data

Characteristic		**B**	**C**	**D**	**K**	**Z**
Application		Wiring protection	Wiring protection Device protection	Wiring protection Power circuits Transformers Motors	Wiring protection Power circuits Transformers Motors	Wiring protection Semiconductor protection High impedance
Number of poles						
Product range „S“		1-2		-	-	-
Product range „SL“		1	-	-	-	-
Product range „T“		1 - 4; 1 + N; 3 + N				1 - 3
Standards short circuit withstand rating		IEC 60898-1, DIN EN 60898-1, VDE 0641-11			IEC 60947-2, DIN EN 60947-2, VDE 0660-101	
Product range „S“		6 kA	6 kA	-	-	-
Product range „SL“		6 kA	-	-	-	-
Product range „T“		10 kA	10 kA	10 kA	10 kA	10 kA
Current limiting class		3	3			
Max. back-up fuse		Fuse according to DIN VDE 0636 125 A operating class gL/gG				
Rated AC voltage		230 / 400 V				
Rated DC voltage L/R = 4 ms		1-pole 60 V, 2-pole 125 V in serial connection of both poles				
Rated current range I_n						
Product range „S“		6 - 32 A	6 - 32 A	-	-	-
Product range „SL“		16 A	-	-	-	-
Product range „T“		1 - 32 A	6 - 32 A	0,3 - 63 A	0.3 - 63 A	0.3 - 32 A
Test currents	Thermal not tripping I_1 (A) > 1 h	1.13 x I_n	1.13 x I_n	1.13 x I_n	1.05 x I_n	1.05 x I_n
	Thermal tripping I_2 (A) < 1 h	1.45 x I_n	1.45 x I_n	1.45 x I_n	1.2 x I_n	1.35 x I_n
	Electromagnetic not tripping I_4 (A) > 0,1 s	3 x I_n	5 x I_n	10 x I_n	8 x I_n	2 x I_n
	Electromagnetic tripping I_5 (A) < 0,1 s	5 x I_n	10 x I_n	20 x I_n	12 x I_n	3 x I_n
Reference calibration temperature of the thermal tripping		30° C + 5° C			20° C + 5° C	
		Influence of the ambient temperature on the thermal tripping: Decrease of the current values with higher ambient temperature and increase with lower temperatures of approximately 5% per 10°C difference in temperature				
Frequency range of the electromagnetic trip		16 $^2/_3$ to 60 Hz With higher frequencies, the electromagnetic tripping values increase by approximately a factor of 1.1 at 100 Hz; 1.2 at 200 Hz; 1.3 at 300 Hz; 1.4 at 400 Hz; 1.5 for DC				
Ambient temperature		-25° C to +55° C				
Storage temperature		-40° C to +70° C				
Device depth acc. to DIN 43880		68 mm				
Mechanical endurance		20,000 switching cycles (20,000 ON / 20,000 OFF)				
Protection cover		Finger safe and safe to back of hand according to DIN EN 50274/ VDE0660-514, BGV A3				
Insulation group according to DIN VDE 0110		C at 250 V AC B at 400 V AC				
Degree of protection according to EN / IEC 60529		IP20				
Installation position		any				
Mounting		DIN-rail according to DIN EN 60715 35 mm				
Lockability		The handle can be secured against manual switching in the on and off position by a lead seal				
Climatic resistance		Humid heat constant according to DIN IEC 60068-2-78 Humid heat cycle according to DIN EN 60068-2-30				
Vibration resistance		> 15 g according to DIN EN 60068-2-59 during a load with I_1				
Resistance to mechanical shocks		25g 11ms				

MINIATURE CIRCUIT BREAKERS S, SL AND T PRODUCT RANGES

Technical Data

Additional performance features of the T product range – short circuit withstand rating according to IEC 60947-2, DIN EN 60947-2

Characteristic	**B, C, D, K, Z**		
1-pole	0.3 - 40 A	**254/440 V**	10 kA
2-pole / 3-pole	0.3 - 40 A	**440 V**	10 kA
Characteristic	**B, C**		
1-pole	0.3 - 20 A	230/400 V	**20 kA**

Conductor cross sections product ranges S and T

	Box terminal bottom		**Box terminal top**	
Type of conductor ***)**	max.	min.	max.	min.
Single wire	35 mm^2	0.5 mm^2	25 mm^2	0.5 mm^2
Multiple wire	35 mm^2	1.5 mm^2	25 mm^2	1.5 mm^2
Stranded wire	25 mm^2	1 mm^2	16 mm^2	1 mm^2
Stranded wire with ferrule	16 mm^2	0.5 mm^2	16 mm^2	0.5 mm^2
Busbar cable lug	Up to 3 mm thickness		Up to 3 mm thickness	
Combined, conductor and busbar or cable lug	Up to 35 mm^2 and up to 2 mm thickness		Up to 25 mm^2 and up to 2 mm thickness	
Torque	max. 2.5 Nm			

Conductor cross sections product SL Range

	Box terminal bottom		**Box terminal top**	
Type of conductor ***)**	max.	min.	max.	min.
Single wire	35 mm^2	0,5 mm^2	4 mm^2	1 mm^2
Multiple wire	35 mm^2	1,5 mm^2	4 mm^2	1,5 mm^2
Stranded wire	25 mm^2	1 mm^2	4 mm^2	1 mm^2
Stranded wire with ferrule	16 mm^2	0,5 mm^2	2,5 mm^2	1 mm^2
Busbar cable lug	Up to 3 mm thickness		-	
Combined, conductor and busbar or cable lug	Up to 35 mm^2 and Up tp 2 mm thickness		-	
Torque	max. 2,5 Nm		-	

* stripped length 12 - 14 mm

The following characteristics can be chosen:

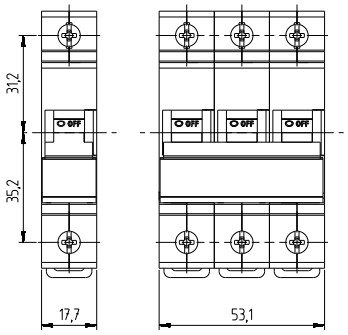
- B characteristic for wiring protection
- C characteristic for device protection with higher starting current inrush
- D characteristic for the protection of power circuits, motors and transformers
- K characteristic for the protection of power circuits, motors and transformers
- Z characteristic for semiconductor protection at high impedances

	S Range		**SL Range**	**T Range**					
No. of Poles	**1**	**3**	**1**	**1**	**2**	**3**	**4**	**1+N**	**3+N**
B-characteristic	•	•	•	•	•	•	•	•	•
C-characteristic	•	•		•	•	•	•	•	•
D-characteristic				•	•	•	•	•	•
K-characteristic				•	•	•	•	•	•
Z-characteristic				•	•	•			

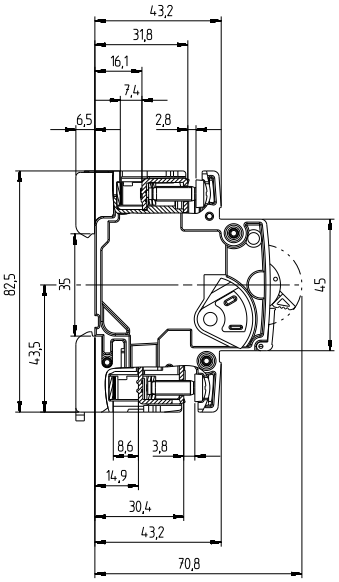
MINIATURE CIRCUIT BREAKERS S, SL AND T PRODUCT RANGES

Dimension Drawings

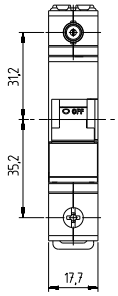
Miniature circuit breakers, **S product range**
- with screw terminals

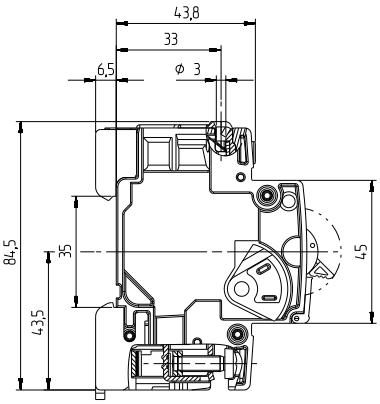


1-pole 3-pole

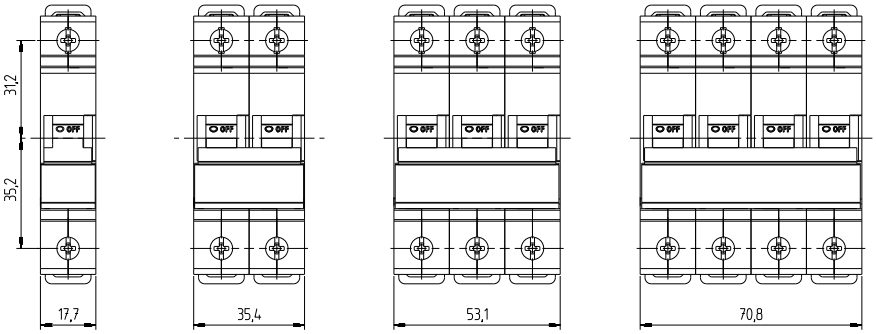


Miniature circuit breakers, **SL product range**
- with screw terminals

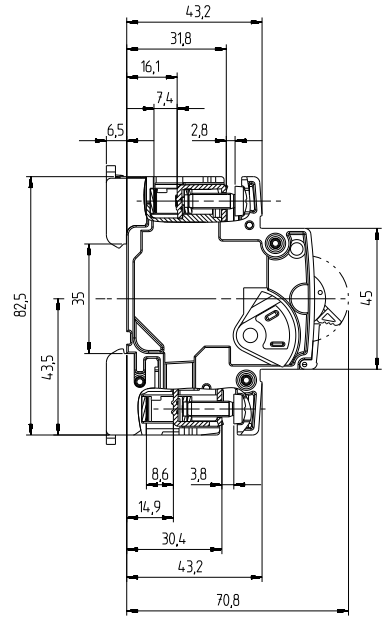




Miniature circuit breakers, **T product range**
- with screw terminals

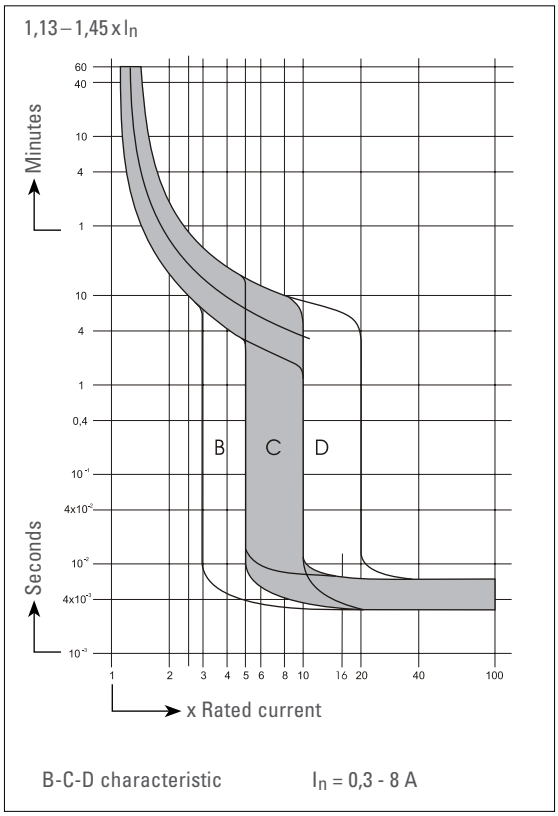


1-pole | 2-pole or 1-pole with switched neutral | 3-pole | 4-pole or 3-pole with switched neutral

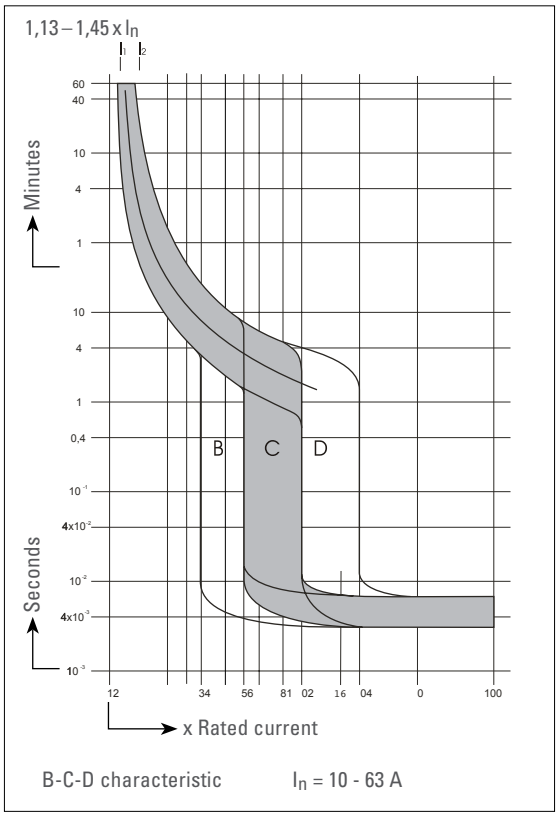


MINIATURE CIRCUIT BREAKERS S, SL AND T PRODUCT RANGES

Characteristic acc. to IEC 60898-1



B-C-D characteristic I_n = 0,3 - 8 A



B-C-D characteristic I_n = 10 - 63 A

Delayed thermal overload tripping

I_n = Rated current
Current which the miniature circuit breaker can sustain in uninterrupted operation

I_b = Rated operational current
Current determined by the load during undisturbed operation

I_1 = Thermal not tripping current
Current which, under defined conditions, does not lead to switching off within 60 min

I_2 = Thermal tripping current
Current which, under defined conditions, leads to switching off within 60 min

I_1 zu I_2 = Conditions
Current which, under defined conditions, is run up from I_1 to I_2 with a continuous increase, and leads to switch off within 60 min

I_3 = Tolerance limitation
at 2.55-times the rated current / nominal current
Current which, under defined conditions, does not lead to switch off within 1 sec
Current which, under defined conditions, leads to switch off at rated currents up to 32 A within 60 sec, at rated currents above 32 A within 120 sec

Undelayed electromagnetic short circuit tripping

I_4 = Magnetic not tripping current
Current which, under defined conditions, does not lead to switching off within 0.1 sec

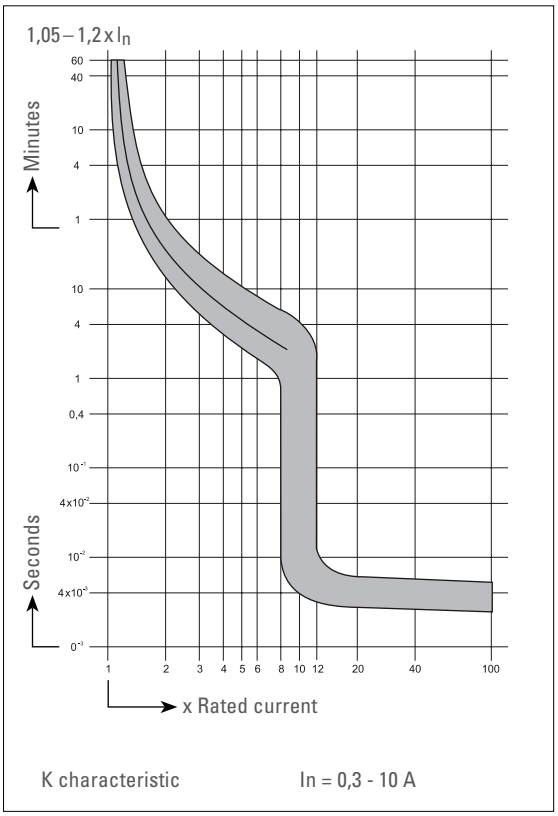
I_5 = Magnetic tripping current
Current which, under defined conditions, leads to switching off within 0.1 sec

Dependence of the short circuit trip at higher frequencies and for direct current.

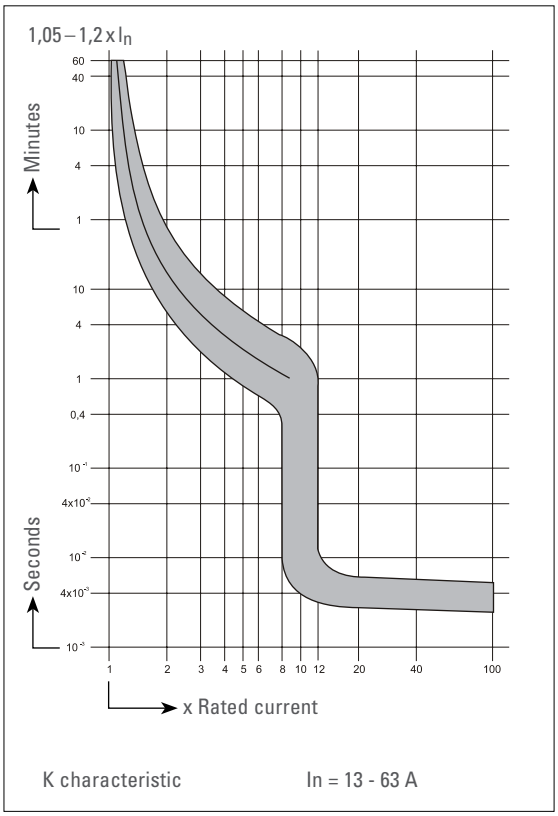
at 100 Hz about 1.1 times
at 200 Hz about 1.2 times
at 300 Hz about 1.3 times
at 400 Hz about 1.4 times
at 500 Hz about 1.5 times
for DC about 1.5 times

MINIATURE CIRCUIT BREAKERS S, SL AND T PRODUCT RANGE

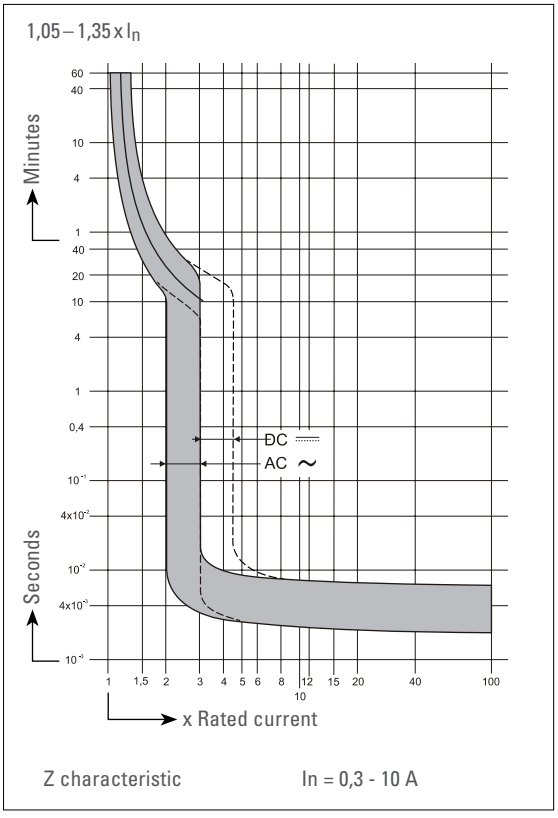
Characteristic acc. to IEC 60947-2



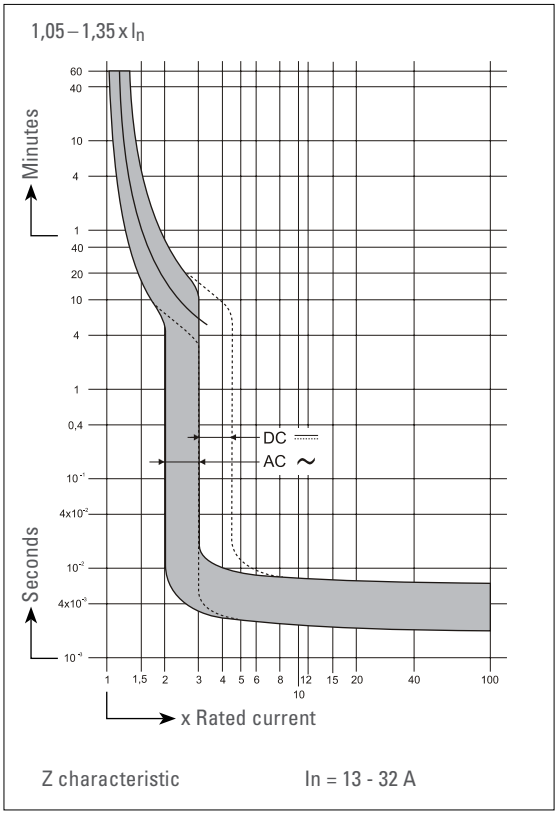
K characteristic In = 0,3 - 10 A



K characteristic In = 13 - 63 A



Z characteristic In = 0,3 - 10 A



Z characteristic In = 13 - 32 A

MINIATURE CIRCUIT BREAKERS S, SL AND T PRODUCT RANGES

Technical Data

Internal resistances in mOhm and power losses in Watt per pole (at I_n)

RATED CURRENT I_n (A)	B-CHARACTERISTIC		C-CHARACTERISTIC		D-CHARACTERISTIC		K-CHARACTERISTIC		Z-CHARACTERISTIC	
	INTERNAL RESISTANCE mOhm	POWER LOSS Watt	INTERNAL RESISTANCE mOhm.	POWER LOSS Watt	INTERNAL RESISTANCE mOhm.	POWER LOSS Watt	INTERNAL RESISTANCE mOhm.	POWER LOSS Watt	INTERNAL RESISTANCE mOhm.	POWER LOSS Watt
0,3	-	-	16600	1,5	16600,0	1,5	16860,0	1,5	31500,0	2,8
0,5	-	-	6850	1,7	6850,0	1,7	6850,0	1,7	10250,0	2,6
0,8	-	-	3050	2,0	3050,0	2,0	3050,0	2,0	5150,0	3,3
1	1950	2,0	1750	1,8	1750,0	1,8	1750,0	1,8	2690,0	2,7
1,6	-	-	590	1,5	590,0	1,5	590,0	1,5	940,0	2,4
2	510	2,0	420	1,7	420,0	1,7	420,0	1,7	690,0	2,8
2,5	-	-	295	1,8	295,0	1,8	295,0	1,8	430,0	2,7
3	211	1,9	200	1,8	173,0	1,6	200,0	1,8	345,0	3,1
3,5	-	-	125	1,5	125,0	1,5	125,0	1,5	225,0	2,8
4	131	2,1	109	1,7	105,0	1,7	109,0	1,7	225,0	3,6
5	85	2,1	61,6	1,5	61,6	1,5	65,4	1,6	105,0	2,6
6	52,9	1,9	49,1	1,8	45,9	1,7	49,1	1,8	82,3	3,0
8	-	-	24	1,5	20,7	1,3	44,0	2,8	37,1	2,4
10	13,4	1,3	13,4	1,3	13,4	1,3	31,5	3,1	27,8	2,8
13	11,3	1,9	8,04	1,4	8,1	1,4	8,8	1,5	15,1	2,6
16	8,04	2,1	8,04	2,1	8,1	2,1	7,5	1,9	11,3	2,9
20	7,1	2,8	7,45	3,0	6,4	2,5	6,3	2,5	7,4	3,0
25	5	3,1	5	3,1	4,1	2,5	4,7	2,9	5,8	3,7
32	3,6	3,7	3,6	3,7	2,7	2,8	2,8	2,9	3,6	3,7
40	2,2	3,5	2,2	3,5	2,2	3,5	2,2	3,5	-	-
50	1,95	4,9	1,9	4,8	1,8	4,6	2,0	4,9	-	-
63	1,77	7,0	1,77	7,0	1,7	6,8	1,8	7,0	-	-

Overload and short circuit currents

	OVERLOAD						SHORT CIRCUIT									
	B, C, D		K		Z		B		C		D		K		Z	
	I_1	I_2	I_1	I_2	I_1	I_2	I_4	I_5	I_4	I_5	I_4	I_5	I_4	I_5	I_4	I_5
I_n (A)	1,13	1,45	1,05	1,2	1,05	1,35	3	5	5	10	10	20	8	12	2	3
0,3	0,339	0,435	0,315	0,360	0,315	0,405	-	-	1,5	3	3	6	2,4	3,6	0,6	0,9
0,5	0,565	0,725	0,525	0,600	0,525	0,675	-	-	2,5	5	5	10	4	6	1	1,5
0,75	0,848	1,088	0,788	0,900	0,788	1,013	-	-	3,75	7,5	7,5	15	6	9	1,5	2,25
1	1,13	1,45	1,05	1,20	1,05	1,35	3	5	5	10	10	20	8	12	2	3
1,6	1,81	2,32	1,68	1,92	1,68	2,16	-	-	8	16	16	32	12,8	19,2	3,2	4,8
2	2,26	2,90	2,10	2,40	2,10	2,70	6	10	10	20	20	40	16	24	4	6
2,5	2,83	3,63	2,63	3,00	2,63	3,38	-	-	12,5	25	25	50	20	30	5	7,5
3	3,39	4,35	3,15	3,60	3,15	4,05	9	15	15	30	30	60	24	36	6	9
3,5	3,96	5,08	3,68	4,20	3,68	4,73	-	-	17,5	35	35	70	28	42	7	10,5
4	4,52	5,80	4,20	4,80	4,20	5,40	12	20	20	40	40	80	32	48	8	12
5	5,65	7,25	5,25	6,00	5,25	6,75	15	25	25	50	50	100	40	60	10	15
6	6,78	8,70	6,30	7,20	6,30	8,10	18	30	30	60	60	120	48	72	12	18
8	9,04	11,60	8,40	9,60	8,40	10,80	-	-	40	80	80	160	64	96	16	24
10	11,3	14,5	10,5	12,0	10,5	13,5	30	50	50	100	100	200	80	120	20	30
13	14,7	18,9	13,7	15,6	13,7	17,6	39	65	65	130	130	260	104	156	26	39
16	18,1	23,2	16,8	19,2	16,8	21,6	48	80	80	160	160	320	128	192	32	48
20	22,6	29,0	21,0	24,0	21,0	27,0	60	100	100	200	200	400	160	240	40	60
25	28,3	36,3	26,3	30,0	26,3	33,8	75	125	125	250	250	500	200	300	50	75
32	36,2	46,4	33,6	38,4	33,6	43,2	96	160	160	320	320	640	256	384	64	96
40	45,2	58,0	42,0	48,0	-	-	120	200	200	400	400	800	320	480	-	-
50	56,5	72,5	52,5	60,0	-	-	150	250	250	500	500	1000	400	600	-	-
63	71,2	91,4	66,2	75,6	-	-	189	315	315	630	630	1260	504	756	-	-

MINIATURE CIRCUIT BREAKERS S, SL AND T PRODUCT RANGES

Short circuit selectivity

10 kA miniature circuit breakers, T product range
Short circuit selectivity to fuses in kA

		Rated current I_n (A)									
Characteristic	B	6	10	13	16	20	25	32	40	50	63
	C	6/8	10	13	16	20	25	32	40	50	63
	D	6/8	10	13	16	20	25	32	40	50	63
I_n (A)	25	0,85 0,7 0,7	0,8 0,7 0,6	0,8 0,7 0,6	0,75 0,65 0,6	0,7 0,6 0,55	0,6 0,55 0,5				**1.)**
LV HRC fuse Characteristic gL/gG according to DIN VDE 0636	35	1,6 1,3 1,2	1,6 1,3 1,15	1,5 1,25 1,1	1,5 1,2 1,1	1,4 1,2 1,0	1,2 1,1 0,9	1,1 1,0 0,8	0,8 0,7 0,5		
	50	2,4 2,1 1,9	2,35 2,1 1,8	2,3 2,0 1,7	2,3 2,0 1,7	2,2 1,9 1,6	1,6 1,5 1,3	1,5 1,4 1,2	1,3 1,2 1,1	1,2 1,1 1,0	
	63	3,5 2,9 2,5	3,3 2,8 2,4	3,2 2,7 2,4	3,2 2,7 2,3	3,0 2,6 2,3	2,5 2,1 1,8	2,4 2,0 1,8	1,8 1,6 1,4	1,7 1,5 1,3	1,6 1,4 1,2
	80	5,0 4,1 3,5	4,8 4,0 3,4	4,7 3,9 3,3	4,6 3,9 3,2	4,3 3,6 3,1	3,4 2,8 2,5	3,3 2,8 2,4	2,5 2,1 1,9	2,4 2,0 1,8	2,3 1,9 1,7
	100	7,6 6,3 5,2	7,3 6,1 4,9	7,1 5,9 4,8	7,0 5,7 4,7	6,5 5,0 4,4	5,1 4,0 3,5	5,0 3,9 3,4	3,5 2,9 2,5	3,3 2,8 2,4	3,1 2,6 2,3
	125	10 10 8,8	10 10 8,0	10 10 7,7	10 10 7,6	10 8,7 7,1	8,8 6,9 5,7	8,5 6,8 5,6	5,4 4,5 3,8	5,1 4,3 3,6	4,9 4,1 3,5

1.) There is no more overload selectivity above the step line.

6 kA miniature circuit breakers, S and SL product ranges
Short circuit selectivity to fuses in kA

		Rated current I_n (A)						
Characteristic	B	6	10	13	16	20	25	32
	C	6	10	13	16	20	25	32
I_n (A)	25	0,85 0,7	0,8 0,7	0,8 0,7	0,75 0,65	0,7 0,6	0,6 0,55	**1.)**
LV HRC fuse Characteristic gL/gG according to DIN VDE 0636	35	1,6 1,3	1,6 1,3	1,5 1,25	1,5 1,2	1,4 1,2	1,2 1,1	1,1 1,0
	50	2,4 2,1	2,35 2,1	2,3 2,0	2,3 2,0	2,2 1,9	1,6 1,5	1,5 1,4
	63	3,5 2,9	3,3 2,8	3,2 2,7	3,2 2,7	3,0 2,6	2,5 2,1	2,4 2,0
	80	5,0 4,1	4,8 4,0	4,7 3,9	4,6 3,9	4,3 3,6	3,4 2,8	3,3 2,8
	100					6,0 5,0	5,1 4,0	5,0 3,9

1.) There is no more overload selectivity above the step line.

MINIATURE CIRCUIT BREAKERS DC PRODUCT RANGE

6 kA B and C characteristic acc. to IEC 60898-2

6000 T15 twinfix

RATED CURRENT I_n A	CHARACTERISTIC		WEIGHT g / EACH	PACKING UNIT
	B ITEM NO.	C ITEM NO.		
1-pole				
0.5		C0.5DC1	120	12
1	B1DC1	C1DC1	120	12
2	B2DC1	C2DC1	120	12
3	B3DC1	C3DC1	120	12
4	B4DC1	C4DC1	120	12
6	B6DC1	C6DC1	120	12
10	B10DC1	C10DC1	120	12
13	B13DC1	C13DC1	120	12
16	B16DC1	C16DC1	120	12
20	B20DC1	C20DC1	120	12
25	B25DC1	C25DC1	120	12
32	B32DC1	C32DC1	120	12
40	B40DC1	C40DC1	120	12
50	B50DC1	C50DC1	120	12
63	B63DC1	C63DC1	120	12

6000 T15 twinfix

2-pole				
0,5		C0.5DC2	240	6
1	B1DC2	C1DC2	240	6
2	B2DC2	C2DC2	240	6
3	B3DC2	C3DC2	240	6
4	B4DC2	C4DC2	240	6
6	B6DC2	C6DC2	240	6
10	B10DC2	C10DC2	240	6
13	B13DC2	C13DC2	240	6
16	B16DC2	C16DC2	240	6
20	B20DC2	C20DC2	240	6
25	B25DC2	C25DC2	240	6
32	B32DC2	C32DC2	240	6
40	B40DC2	C40DC2	240	6
50	B50DC2	C50DC2	240	6
63	B63DC2	C63DC2	240	6

MINIATURE CIRCUIT BREAKERS DC PRODUCT RANGE

Technical Data

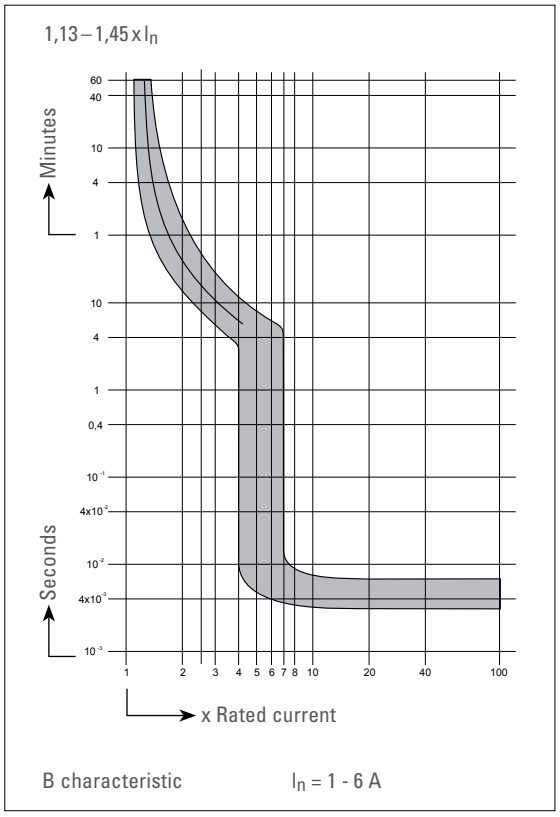
Characteristic		**B**	**C**
Application		Wiring protection	Wiring protection Device protection
Number of poles		1 and 2	
Standards		IEC 60898-2, DIN EN 60898-2, VDE 0641-12	
Rated switching capacity: DC L/R = 4 ms		6 kA	6 kA
Max. back-up fuse		Fuse according to DIN VDE 0636 100 A operating class gL/gG	
Rated DC voltage L/R = 15 ms		1-pole 125 V, 2-pole 250 V in serial connection of both poles	
Rated current range I_n			
Product range „DC“		1 - 63 A	0.5 - 63 A
Test currents	Thermal not tripping I_1 (A) > 1 h	1.13 x I_n	1.13 x I_n
	Thermal tripping I_2 (A) < 1 h	1.45 x I_n	1.45 x I_n
	Electromagnetic not tripping I_4 (A) > 0.1 s	4 x I_n	7 x I_n
	Electromagnetic tripping I_5 (A) < 0.1 s	7 x I_n	15 x I_n
Reference calibration temperature of the thermal tripping		30 °C + 5 °C	
		Influence of the ambient temperature on the thermal tripping: Decrease of the current values with higher ambient temperature and increase with lower temperatures of approximately 5% per 10 °C difference in temperature	
Ambient temperature		-25 °C to +55 °C	
Storage temperature		-40 °C to +70 °C	
Device depth acc. to DIN 43880		68 mm	
Mechanical endurance		20,000 switching cycles (20,000 ON/20,000 OFF)	
Protection cover		Finger safe and safe to back of hand according to DIN EN 50274/ VDE0660-514, BGV A3	
Degree of protection acc. to EN 60529 / IEC 60529		IP20	
Installation position		any	
Mounting		DIN-rail according to DIN EN 60715, 35 mm	
Lockability		The handle can be secured against manual switching in the on and off position by a lead seal	
Climatic resistance		Humid heat constant according to DIN IEC 60068-2-78 Humid heat cycle according to DIN EN 60068-2-30	
Vibration resistance		> 15 g according to DIN EN 60068-2-59 during a load with I_1	
Resistance to mechanical shocks		25g 11ms	

Conductor cross sections				
	Box terminal bottom		**Box terminal top**	
Type of conductor ***)**	max.	min.	max.	min.
Single wire	35 mm²	0,5 mm²	25 mm²	0,5 mm²
Multiple wire	35 mm²	1,5 mm²	25 mm²	1,5 mm²
Stranded wire	25 mm²	1 mm²	16 mm²	1 mm²
Stranded wire with ferrule	16 mm²	0,5 mm²	16 mm²	0,5 mm²
Busbar cable lug	Up to 3 mm thickness		Up to 3 mm thickness	
Combined, conductor and busbar or cable lug	Up to 35 mm² and up to 2 mm thickness		Up to 25 mm² and up to 2 mm thicknesss	
Torque	max. 2,5 Nm			

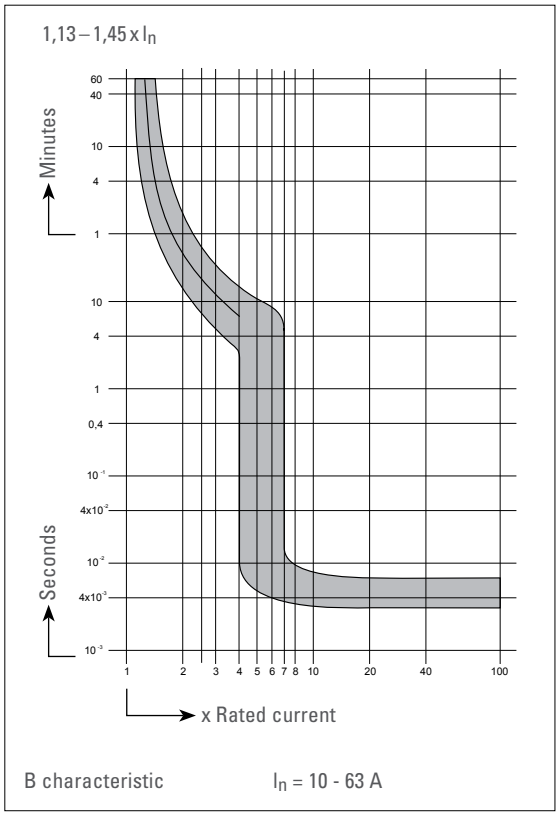
*) Stripped length 12 – 14 mm

MINIATURE CIRCUIT BREAKERS DC PRODUCT RANGE

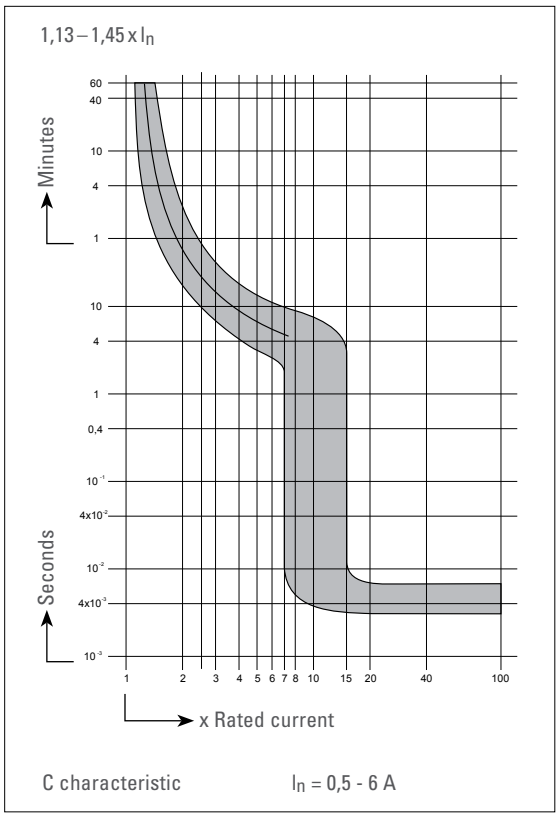
Characteristic



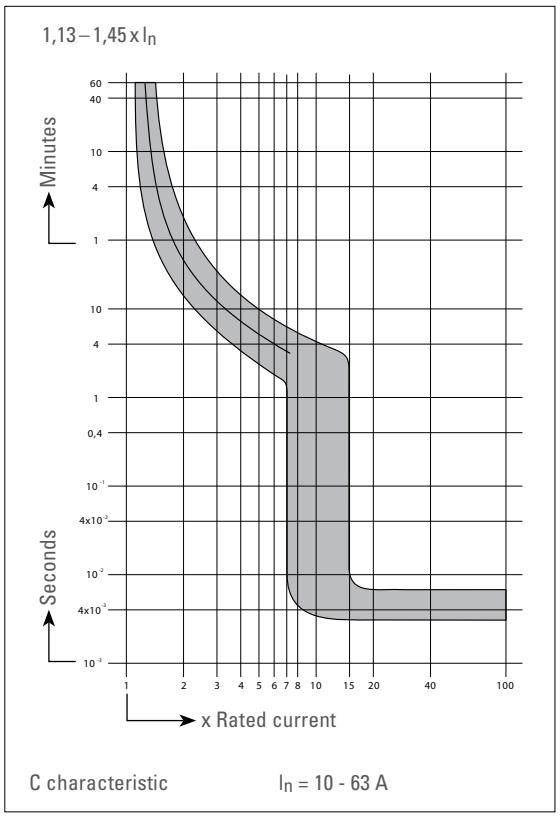
B characteristic I_n = 1 - 6 A



B characteristic I_n = 10 - 63 A



C characteristic I_n = 0,5 - 6 A



C characteristic I_n = 10 - 63 A

ACCESSORIES MINIATURE CIRCUIT BREAKERS

S, SL,T and DC product ranges

Shunt trip

MODULE	RATED OPERATING VOLTAGE	MAX. OPERATING CURRENT AT U_n (T < 10 ms)	ITEM NO.	WEIGHT g / EACH	PACKING UNIT
1	12 V UC	1,3 A	**FL12**	105	5
1	24 V UC	0,6 A	**FL24**	105	5
1	48 - 72 V UC	0,2 A	**FL48**	105	5
1	110-230 V UC, 400 V AC	0,25 A bei 110 V	**FL110**	105	5
		0,5 A bei 230 V			
		0,8 A bei 400 V			

Pull-in voltage 0.7 x U_e Switch in duration at U_e 100%

Single Pole Miniature Circuit Breaker, 10 A,
B Characteristic for the special designation of circuits e.g. fire warning and telephone systems etc.

RATED CURRENT I_n [A]	ITEM NO.	WEIGHT g / EACH	PACKING UNIT
10	**B10T1R**	150	12

Distance device 9 mm

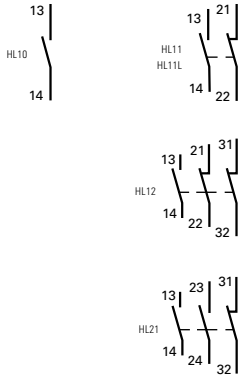
MODULE	ITEM NO.	WEIGHT g / EACH	PACKING UNIT
1/2	**ISD**	13	10

Lock-off/Lock-on device

ITEM NO.	WEIGHT g / EACH	PACKING UNIT
EASS	2	10

ACCESSORIES MINIATURE CIRCUIT BREAKERS

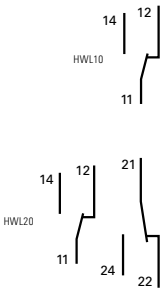
S, SL, T and DC product ranges



Auxiliary contact

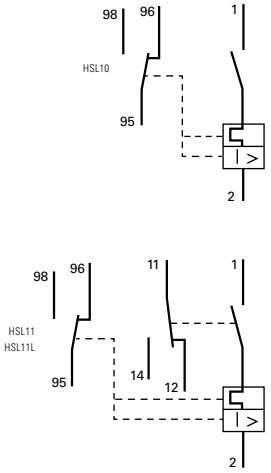
MODULE	TYPE OF CONTACT	CONTACTS	ITEM NO.	WEIGHT g / EACH	PACKING UNIT
1/2	1 auxiliary contact	1NO	**HL10**	35	20
1/2	2 auxiliary contacts	1NO + 1NC	**HL11**	40	20
1/2	2 auxiliary contacts	1NO + 1NC	**HL11L***	40	20
1/2	3 auxiliary contacts	1NO + 2NC	**HL12**	45	20
1/2	3 auxiliary contacts	2NO + 1NC	**HL21**	45	20

* Mounting on the left



Auxiliary contact

MODULE	TYPE OF CONTACT	CONTACTS	ITEM NO.	WEIGHT g / EACH	PACKING UNIT
1/2	1 auxiliary contact	1 CO contact	**HWL10**	40	20
1/2	2 auxiliary contacts	2 CO contact	**HWL20**	50	20



Auxiliary contact with signal contact

MODULE	TYPE OF CONTACT	CONTACTS	ITEM NO.	WEIGHT g / EACH	PACKING UNIT
1/2	1 signal contact / 1 auxiliary contact	2 CO contact	**HSL11**	50	20
1/2	1 signal contact / 1 auxiliary contact	2 CO contact	**HSL11L***	50	20
1/2	1 signal contact	1 CO contact	**HSL10**	40	20

* Mounting on the left

The signal contact and the auxiliary contact are each fitted with a floating CO contact. Both contacts have trip-free mechanisms, i.e. manipulating the contact positions from outside is not possible. The signal contact indicates overload or short circuit of the main device while the auxiliary contact shows the switch condition (on/off).

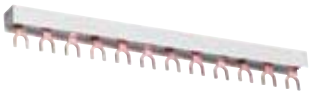
Technical Data		HL10, HL11/L, HL12, HL21	HWL10, HWL20, HSL10, HSL11/L
Standards		IEC 60947-5-1, DIN EN 60947-5-1, VDE 0660-200	
Rated voltage		230 V~	
Conventional thermal current in enclosure		I_{the} 16 A	
Rated operating currents I_e	Usage category AC-15 Usage category AC-15 Usage category DC-13 Usage category DC-13	10 A / 230 V 16 A / 110 V 1 A / 250 V 3 A / 125 V	4.8 A / 230 V 9.6 A / 120 V 1.8 A / 250 V 3.5 A / 125 V
Minimum switching capacity		0.05 VA at 6 V UC	

Conductor cross sections for all auxiliary contacts		
Type of conductor *)	max.	min.
Single wire	0,5 mm^2	2,5 mm^2
Stranded wire	0,5 mm^2	1,5 mm^2
Stranded wire with ferrule	0,5 mm^2	1,5 mm^2

*) Stripped length 8 – 9 mm

BUSBARS

for S, SL, T and DC miniature circuit breakers



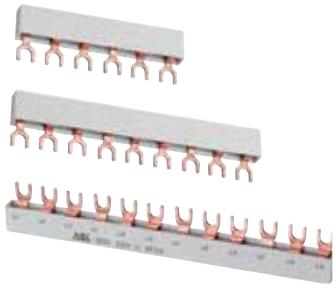
Busbars fork type

CROSS SECTION (mm^2)	BUSBAR CURRENT START OF BUSBAR/ MIDDLE INFEED	MODULES/ PHASES	ITEM NO.	WEIGHT g / EACH	PACKING UNIT	SUITABLE END CAP ITEM NO.
1-phase						
12	65/110	56	**SB16010**	250	50	
1-phase 1-pole circuit breaker + auxiliary contact						
24	90/150	37/1	**SDO.124**	200	50	
2-phase and 1-phase + N						
10	63/100	28/2	**SB26010**	390	20	SB.A5
3-phase + N, L1/N, L2/N, L3/N, for MCB 1+N, 2 modules						
16	80/130	27/2 3+N	**SB41627**	725	15	SB.A3
2-phase 2-pole circuit breaker + auxiliary contact						
16	80/130	22/2	**SB26216**	310	20	SB.A2
3-phase						
10	63/100	4/3	**SB31210**	84	25	SB.A1
10	63/100	19/3	**SB36010**	420	20	SB.A1
16	80/130	19/3	**SB36016**	675	20	SB.A2
3-phase 3-pole circuit breaker + auxiliary contact						
16	80/130	16/3	**SB36316**	630	20	SB.A2
3-phase 1-pole circuit breaker + auxiliary contact						
16	80/130	36/1	**SDO.316**	500	20	SB.A2
4-phase and 3-phase + N						
16	80/130	14/4	**SB46016**	835	15	SB.A3

End caps for busbars

FOR BUSBARS ITEM NO.	ITEM NO.	WEIGHT g / EACH	PACKING UNIT
SB31210, SB36010	**SB.A1**	0,8	10
SB36016, SB36316, SDO.316, SB41627, SB26216	**SB.A2**	1	10
SB46016	**SB.A3**	1,1	10
SB26010	**SB.A5**	0,8	10

BUSBARS
for S, SL and T miniature circuit breakers



Busbars fork type

CROSS SECTION (mm^2)	BUSBAR CURRENT START OF BUSBAR/ MIDDLE INFEED	NUMBER OF POLES	ITEM NO.	WEIGHT g/EACH	PACKING UNIT
3-phase					
10	63	6	**G31006**	37	25
10	63/100	9	**G31009**	60	25
10	63/100	12	**G31012**	84	25
16	80	6	**G31606**	52	20
16	80/130	9	**G31609**	87	20
16	80/130	12	**G31612**	119	20

Busbars cannot be cut to length!

Busbars fork type

3-phase for left-hand RCCB installation in the distribution board (N omitted)					
10	63	11	**G31011S**	82	25
16	80	11	**G31611S**	117	20
3-phase for right-hand RCCB installation in the distribution unit					
16	80	11	**G31611**	108	20

Busbars cannot be cut to length!

MINIATURE CIRCUIT BREAKERS T 80/100/125 A

B, C and D characteristic 10 kA acc. to IEC 60898-1

10000

RATED CURRENT I_n A	CHARACTERISTIC			WEIGHT g / EACH	PACKING UNIT
	B ITEM NO.	C ITEM NO.	D ITEM NO.		
1-pole					
80	**B80T1**	**C80T1**	**D80T1**	222	6
100	**B100T1**	**C100T1**	**D100T1**	222	6
125	**B125T1**	**C125T1**	**D125T1**	222	6

10000

2-pole					
80	**B80T2**	**C80T2**	**D80T2**	448	3
100	**B100T2**	**C100T2**	**D100T2**	448	3
125	**B125T2**	**C125T2**	**D125T2**	448	3

10000

3-pole					
80	**B80T3**	**C80T3**	**D80T3**	674	2
100	**B100T3**	**C100T3**	**D100T3**	674	2
125	**B125T3**	**C125T3**	**D125T3**	674	2

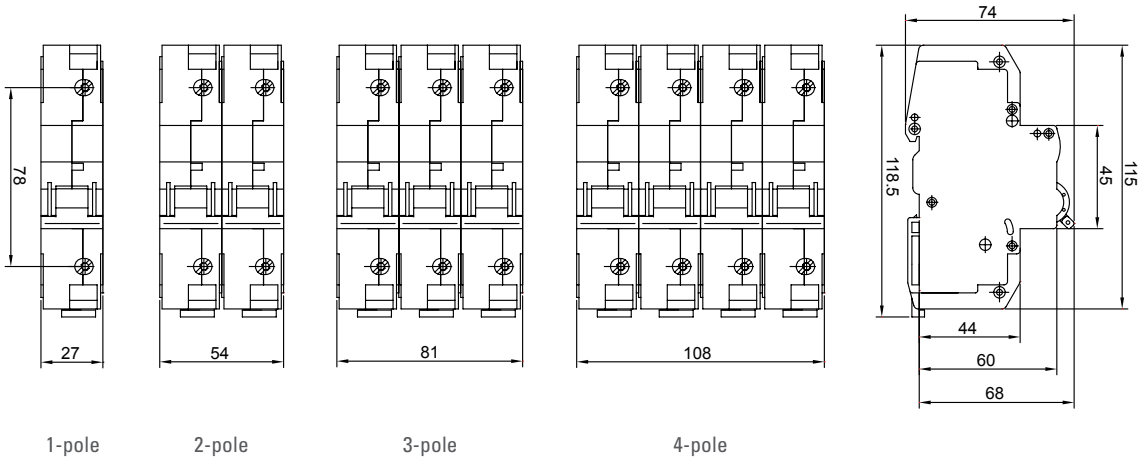
10000

4-pole					
80	**B80T4**	**C80T4**	**D80T4**	900	1
100	**B100T4**	**C100T4**	**D100T4**	900	1
125	**B125T4**	**C125T4**	**D125T4**	900	1

MINIATURE CIRCUIT BREAKERS T 80/100/125 A

Technical Data

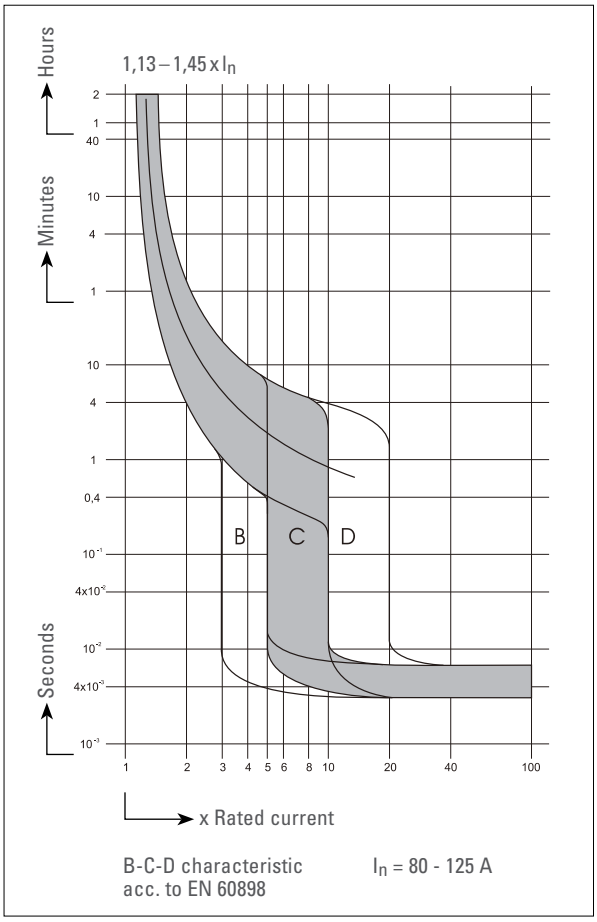
Technical data	
Standards	EN 60898-1, GOST-R
Number of poles	1, 2, 3, 4
Tripping characteristics	B, C, D according to EN 60898-1
Rated voltage U_n [V]	230/400
Rated current I_n [A]	80, 100, 125
Breaking capacity [kA]	10
Rated frequency [Hz]	50 - 60
Electrical endurance	4,000 switching cycles
Cross-section of conductors [mm^2]	2.5 - 50
Mounting	on DIN rail 35 x 7.5 mm according EN 60715
Protection degree	IP 20
Ambient temperature	-5 °C till +40 °C
Operating position	optional
Rated DC voltage U_n [V]	max. 110 DC (for one pole, t=4 ms)
Sealable	in the ON or OFF position



1-pole 2-pole 3-pole 4-pole

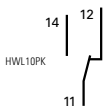
MINIATURE CIRCUIT BREAKERS 80/100/125 A

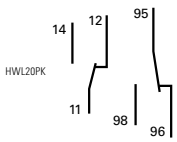
Technical Data



ACCESSORIES FOR MINIATURE CIRCUIT BREAKERS T 80/100/125 A

1-/2-/3-/4-pole





Auxiliary contact

MODULE	TYPE OF CONTACT	CONTACTS	ITEM NO.	WEIGHT g/EACH	PACKING UNIT
½	1 auxiliary contact	1 CO	**HWL10PK**	43	10
½	2 auxiliary contacts	2 CO	**HWL20PK**	48	10

Technical Data		**HWL10PK**	**HWL20PK**
Standards		IEC 60947-5-1, DIN EN 60947-5-1, VDE 0660-200	
Rated Voltage		230 V	
Rated isolation current		400 V	
Conventional thermal current in enclosure		I_{the} 16 A	
Rated operating currents I_e	Usage category AC-15 Usage category AC-14 Usage category DC-13 Usage category DC-13	4 A / 230 V 3,5 A / 400 V; 6,5 A / 230 V 0,25 A / 220 V; 0,5 A / 110 V 16 A / 24 V	

Conductor cross sections

Type of conductor *)	max.	min.
single wire	0,5 mm²	2,5 mm²
stranded wire	0,5 mm²	1,5 mm²
stranded wire with ferrule	0,5 mm²	1,5 mm²

***) Stripped length 8 - 9 mm**

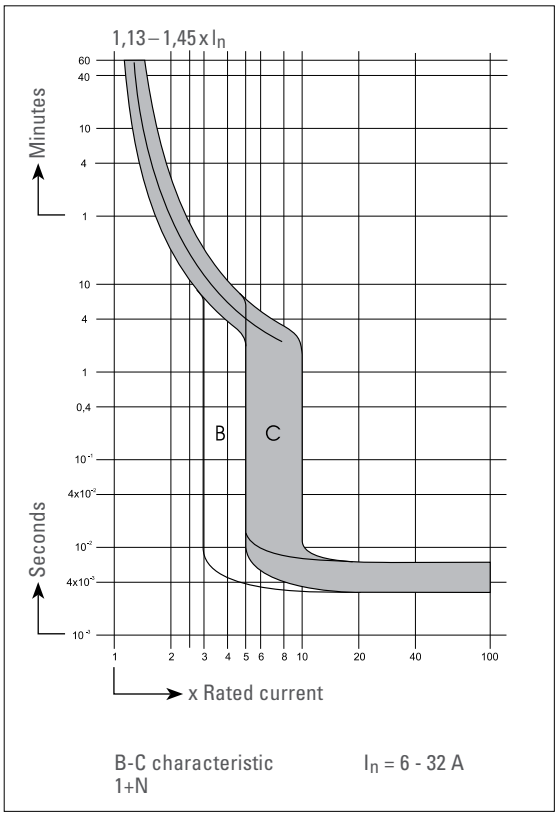
MINIATURE CIRCUIT BREAKERS 1+N PRODUCT RANGE

6 kA B and C characteristic acc. to IEC 60898-1

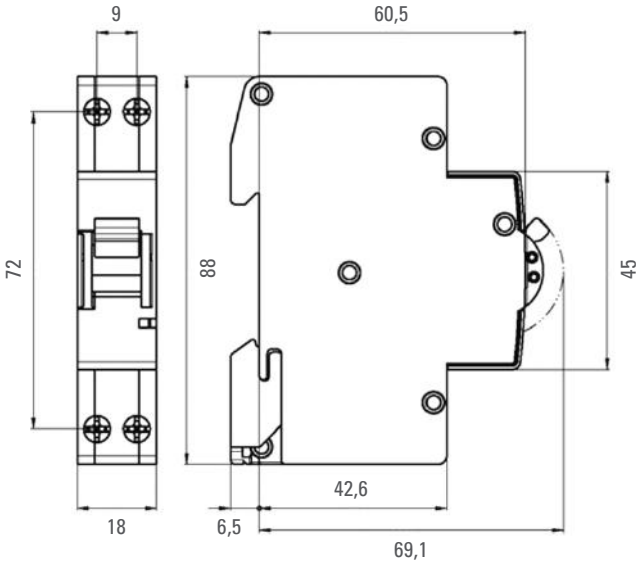
RATED CURRENT I_n A	CHARACTERISTIC		WEIGHT g / EACH	PACKING UNIT
	B ITEM NO.	C ITEM NO.		
1-pole with switched neutral, 1 module				
10	**B10N8R**	**C10N8R**	101	12
13	**B13N8R**	**C13N8R**	101	12
16	**B16N8R**	**C16N8R**	101	12
20	**B20N8R**	**C20N8R**	101	12
25	**B25N8R**	**C25N8R**	101	12
32	**B32N8R**	**C32N8R**	101	12

KEMA KEUR 6000 3

Technical Data



B-C characteristic 1+N I_n = 6 - 32 A



BUSBARS FOR MINIATURE CIRCUIT BREAKERS

1+N Product Range

Pin-type busbars for 1 + N miniature circuit breakers in 1M							
CROSS SECTION (mm^2)	**BUSBAR CURRENT**	**MODULES**	**PHASES**	**ITEM NO.**	**WEIGHT g / EACH**	**PACKING UNIT**	**SUITABLE END CAP ITEM NO.**
1-phase + N							
10	63	12/2	1+N	**SN11012**	75	25	SB.A2
10	63	54/2	1+N	**SN11054**	350	20	SB.A2
3-phase + N, L1/N, L2/N, L3/N							
16	80	12/2	3+N	**SN31612**	160	25	SB.A3
16	80	54/2	3+N	**SN31654**	720	15	SB.A3

Power feed terminals L grey							
16	80			**SBL1N**	14	1	
Power feed terminals N blue							
16	80			**SBN1N**	14	1	


ABL
RCCB RP4303
40A In 30mA
ABL
RCCB RP2203
25A In 30mA

RCCB AND RCBOs

RCCB

RW Product Range
Sensitive to alternating currents, Type AC
Undelayed tripping 34
Short-time delayed tripping 36
Selective tripping 36

RP Product Range
Sensitive to pulsating currents, Type A
Undelayed tripping 38
Short-time delayed tripping 39
Selective tripping 39

RA Product Range
Sensitive to universal current, Type B
Short-time delayed tripping 41
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Auxiliary contact 44
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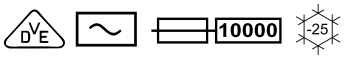
RCBO

RC and RB product range 56
Auxiliary contact 57
Busbars 57
Technical Data 58

RCCB – SENSITIVE TO ALTERNATING CURRENT TYPE AC

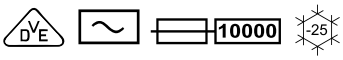
Undelayed tripping acc. to IEC 61008



RATED RESID. CURRENT $I_{\Delta n}$ mA	RATED CURRENT I_n A	SURGE CURRENT STRENGTH > A	MAX. BACK-UP FUSE A	MODULES	ITEM NO.	WEIGHT g / EACH	PACKING UNIT
2-pole, undelayed tripping							
30	16	250	63	2	**RW2103**	250	1
100	16	250	63	2	**RW2110**	250	1
300	16	250	63	2	**RW2130**	250	1
30	25	250	63	2	**RW2203**	250	1
100	25	250	63	2	**RW2210**	250	1
300	25	250	63	2	**RW2230**	250	1
30	40	250	63	2	**RW2303**	260	1
100	40	250	63	2	**RW2310**	260	1
300	40	250	63	2	**RW2330**	260	1
30	63	250	100	2	**RW2403**	270	1
100	63	250	100	2	**RW2410**	270	1
300	63	250	100	2	**RW2430**	270	1

RCCB – SENSITIVE TO ALTERNATING CURRENT TYPE AC

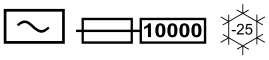
Undelayed tripping acc. to IEC 61008



RATED RESID. CURRENT $I_{\Delta n}$ mA	RATED CURRENT I_n A	SURGE CURRENT STRENGTH > A	MAX. BACK-UP FUSE A	MODULES	ITEM NO.	WEIGHT g/EACH	PACK-ING UNIT
4-pole, undelayed tripping							
30	16	250	63	4	**RW4103**	450	1
100	16	250	63	4	**RW4110**	450	1
300	16	250	63	4	**RW4130**	450	1
30	25	250	63	4	**RW4203**	450	1
100	25	250	63	4	**RW4210**	450	1
300	25	250	63	4	**RW4230**	450	1
30	40	250	63	4	**RW4303**	450	1
100	40	250	63	4	**RW4310**	450	1
300	40	250	63	4	**RW4330**	450	1
30	63	250	100	4	**RW4403**	450	1
100	63	250	100	4	**RW4410**	450	1
300	63	250	100	4	**RW4430**	450	1
30	80	250	125	4	**RW4503**	470	1
300	80	250	125	4	**RW4530**	470	1
500	80	250	125	4	**RW4550**	470	1
30	100	250	125	4	**RW4603**	470	1
100	100	250	125	4	**RW4610**	470	1
300	100	250	125	4	**RW4630**	470	1
30	125	250	125	4	**RW4703**	470	1
100	125	250	125	4	**RW4710**	470	1
300	125	250	125	4	**RW4730**	470	1
500	125	250	125	4	**RW4750**	470	1

RCCB – SENSITIVE TO ALTERNATING CURRENT TYPE AC

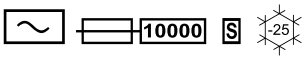
Short-time delayed tripping acc. to IEC 61008



RATED RESID. CURRENT $I_{\Delta n}$ mA	RATED CURRENT I_n A	SURGE CURRENT STRENGTH > A	MAX. BACK-UP FUSE A	MODULES	ITEM NO.	WEIGHT g/EACH	PACKING UNIT
4-pole, short-time delayed tripping							
30	40	3,000	63	4	**RW4303K**	450	1
30	63	3,000	100	4	**RW4403K**	450	1

RCCB – SENSITIVE TO ALTERNATING CURRENT TYPE AC

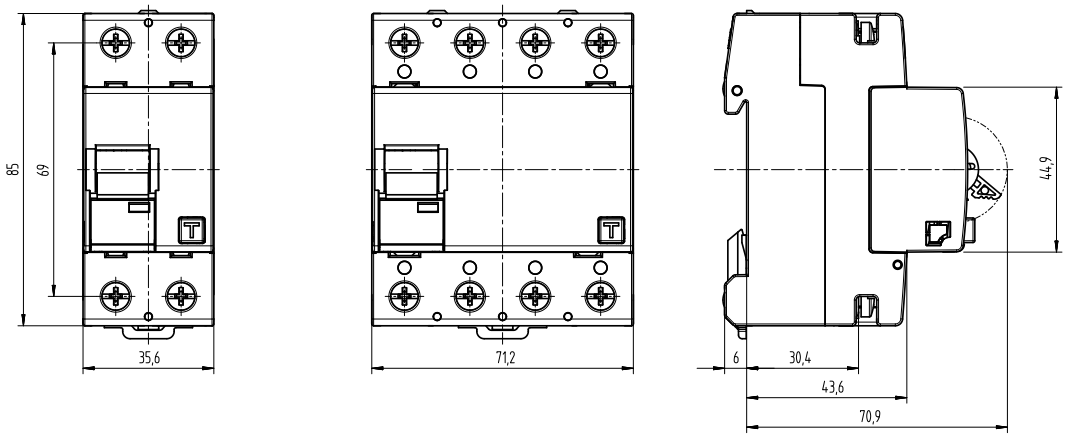
Selective tripping acc. to IEC 61008



RATED RESID. CURRENT $I_{\Delta n}$ mA	RATED CURRENT I_n A	SURGE CURRENT STRENGTH > A	MAX. BACK-UP FUSE A	MODULES	ITEM NO.	WEIGHT g/EACH	PACKING UNIT
4-pole, short-time delayed tripping							
300	40	5,000	63	4	**RW4330S**	450	1
300	63	5,000	100	4	**RW4430S**	450	1
300	100	5,000	125	4	**RW4630S**	450	1
300	125	5,000	125	4	**RW4730S**	450	1

RCCB – SENSITIVE TO ALTERNATING CURRENT TYPE AC

RW product range, undelayed tripping acc. to IEC 61008



RW product range, 2-pole

RW product range, 4-pole

Function

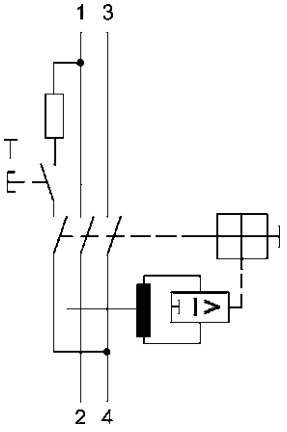
RCCB independent of the mains voltage for realising the protective measure "protection through automatic power supply cut-off", in compliance with the requirements of international construction regulations.

Characteristics

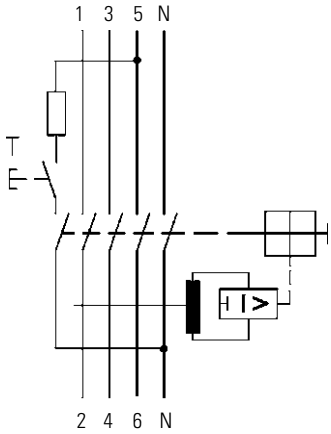
- 2-pole or 4-pole
- Large range of products with
  - Rated currents from 16 A to 125 A
  - Rated residual currents 0.03 A to 0.5 A
- Tripping independent of supply and auxiliary voltage
- Sensitive to AC residual currents (type AC)
- High short-circuit strength
- Double-sided two-tier terminals for large conductor cross-section and busbar
- Switch-position display
- Window for labels
- Multi-functional switching knob with three functions:
  - **On** (top position)
  - **Off** (bottom position)
  - Display **"tripped"** (centre position)
  If the RCCB trips due to a fault, the switching knob stays in the centre position

Type of mounting

- Quick mounting on DIN-rail in accordance with EN 60715 in any standard distribution
- Any mounting position



RW product range, 2-pole



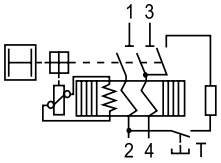
RW product range, 4-pole 25-80 A

Areas of application

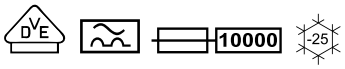
Power supplies of residential and single-purpose buildings as well as industrial facilities
with TN-S and TN-C-S networks. In IT networks, RCCBs of the RW series for switch-off in case
of a second failure can be provided for.
Excluded is the use in TN-C networks and for protecting systems in which electronic equipment might cause DC residual currents or residual currents with frequencies of ≠ 50 Hz.

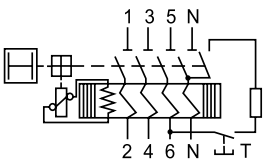
RCCB – SENSITIVE TO PULSATING CURRENTS, TYPE A

Undelayed tripping acc. to IEC 61008

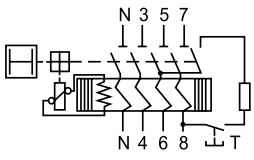


RATED RESID. CURRENT $I_{\Delta n}$ mA	RATED CURRENT I_n A	SURGE CURRENT STRENGTH > A	MAX. BACK-UP FUSE A	MODULES	ITEM NO. N-POL RIGHT	ITEM NO. N-POL LEFT	WEIGHT g/EACH	PACK-ING UNIT
2-pole, undelayed tripping								
10	**16**	250	50	2	**RP2101**		270	1
30	**25**	250	100	2	**RP2203**		270	1
300	**25**	250	100	2	**RP2230**		270	1
30	**40**	250	100	2	**RP2303**		270	1
300	**40**	250	100	2	**RP2330**		270	1
30	**63**	250	100	2	**RP2403**		270	1
300	**63**	250	100	2	**RP2430**		270	1
500	**63**	250	100	2	**RP2450**		270	1





25-125 A, N-pole right

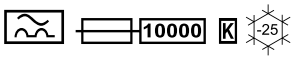


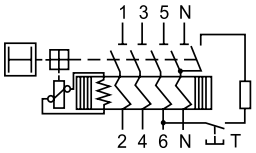
25-63 A, N-pole left

4-pole, undelayed tripping								
30	**25**	250	100	4	**RP4203**	**RP4203L**	450	1
300	**25**	250	100	4	**RP4230**	**RP4230L**	420	1
500	**25**	250	100	4	**RP4250**	**RP4250L**	420	1
30	**40**	250	100	4	**RP4303**	**RP4303L**	450	1
300	**40**	250	100	4	**RP4330**	**RP4330L**	420	1
500	**40**	250	100	4	**RP4350**	**RP4350L**	420	1
30	**63**	250	100	4	**RP4403**	**RP4403L**	450	1
300	**63**	250	100	4	**RP4430**	**RP4430L**	420	1
500	**63**	250	100	4	**RP4450**	**RP4450L**	420	1
30	**80**	250	125	4	**RP4503**		460	1
300	**80**	250	125	4	**RP4530**		430	1
500	**80**	250	125	4	**RP4550**		430	1
30	**100**	250	125	4	**RP4603**		460	1
300	**100**	250	125	4	**RP4630**		430	1
500	**100**	250	125	4	**RP4650**		430	1
30	**125**	250	125	4	**RP4703**		460	1
300	**125**	250	125	4	**RP4730**		430	1
500	**125**	250	125	4	**RP4750**		430	1

RCCB – SENSITIVE TO PULSATING CURRENTS, TYPE A

Short-time delayed tripping acc. to IEC 61008





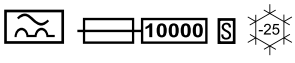
RATED RESID. CURRENT $I_{\Delta n}$ mA	RATED CURRENT I_n A	SURGE CURRENT STRENGTH > A	MAX. BACK-UP FUSE A	MODULES	ITEM NO.	WEIGHT g / EACH	PACKING. UNIT
4-pole, short-time delayed tripping							
30	**40**	3.000	100	4	**RP4303K**	430	1
30	**63**	3.000	100	4	**RP4403K**	430	1

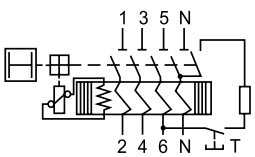
Areas of application

- Power supplies of residential and single-purpose buildings as well as industrial facilities with TN-S and TN-C-S networks, where normal RCCBs unwantedly trip as a result of transient drainage currents, such as
- Systems with long cable lengths behind the RCCB
- Lighting systems with many fluorescent lamps (> 20 pieces)
- Computer systems
- Solaria
- X-ray systems
- The use in TN-C networks and in systems in which electronic equipment might cause smooth DC residual currents or residual currents with frequencies of ≠ 50 Hz is excluded.

RCCB – SENSITIVE TO PULSATING CURRENTS, TYPE A

Selective tripping acc. to IEC 61008





RATED RESID. CURRENT $I_{\Delta n}$ mA	RATED CURRENT I_n A	SURGE CURRENT STRENGTH > A	MAX. BACK-UP FUSE A	MODULES	ITEM NO.	WEIGHT g / EACH	PACKING. UNIT
4-pole, selective tripping							
300	**40**	5.000	100	4	**RP4330S**	430	1
300	**63**	5.000	100	4	**RP4430S**	450	1
300	**100**	5.000	125	4	**RP4630S**	460	1
300	**125**	5.000	125	4	**RP4730S**	460	1

Areas of application

Main distributors in extended electricity supply systems with TN-S and TN-C-S systems, e.g. for

- Camping sites
- Marinas
- Allotment colonies
- Fairgrounds
- etc.

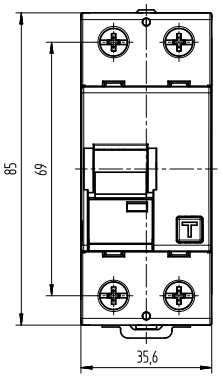
Here, selective RCCBs mostly protect the cables from the main distribution to the sub-distributions. The use in TN-C networks and in systems in which electronic equipment might cause smooth DC residual currents or residual currents with frequencies of ≠ 50 Hz is excluded.

Notes

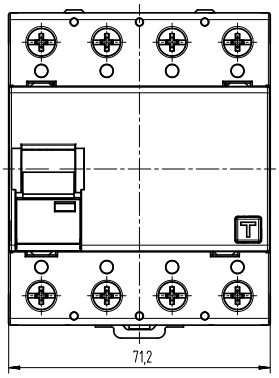
To ensure the selectivity of the RCCB, the rated residual current of the RP4xxxS must be selected at least one level higher than that of the undelayed switch connected downstream.

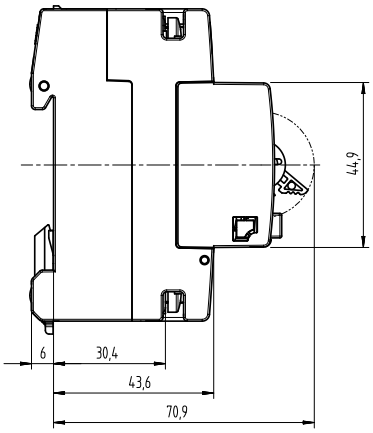
RCCB – SENSITIVE TO PULSATING CURRENTS, TYPE A

RP product range, undelayed tripping acc. to IEC 61008



RP product range, 2-pole





RP product range 4-pole

Function

RCCB independent of the mains voltage for realising the
protective measure "protection through automatic power-
supply cut-off", in compliance with the requirements of VDE 0100 part 410 and corresponding international construction regulations.

Characteristics

- 2-pole or 4-pole
- Large range of products with
  - Rated currents from 16 A to 125 A
  - Rated residual currents 0.03 A to 0.5 A
- Tripping independent of supply and auxiliary voltage
- Sensitive to AC and pulsating DC residual currents (type A)
- High short-circuit strength
- Double-sided two-tier terminals for large conductor cross-section and busbar
- Switch-position display
- Window for labels
- Multi-functional switching knob with three functions:
  - **On** (top position)
  - **Off** (bottom position)
  - Display **"tripped"** (centre position)

  If the RCCB trips due to a fault, the switching knob stays in the centre position.

Type of mounting

- Quick mounting on DIN-rail according to EN 60715 in any standard distribution
- Any mounting position

Areas of application

Power supplies of residential and single-purpose buildings as well as industrial facilities with TN-S and TN-C-S networks. In IT networks, RCCBs of the RP range for switch-off in case of a second fault can be provided for. The use in TN-C networks and for protecting systems in which electronic equipment might cause DC residual currents or residual currents with frequencies of ≠ 50 Hz is excluded.

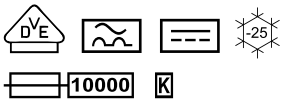
Characteristics

- 4-pole
- Selectively to all undelayed RCCBs (type AC, A, or B) for residual currents of all frequencies in the detection range and for residual currents of type B
- Large range of products with
  - Rated currents from 40 A to 125 A
  - Rated residual currents 0.3 A
- Small size for all rated currents
- For systems with high drainage currents in the frequency range > 1 kHz
- Very unsusceptible to transient drainage and residual currents due to high surge current strength
- Electromagnetic compatibility in compliance with VDE 0664 part 30 and VDE 0839 part 6-2 (interference resistance for industrial use)
- High availability, also of the voltage-dependent detection of smooth DC and AC residual currents with frequencies ≠ 50 / 60 Hz, due to full operability with mains voltages above 30 V, applied to any 2 current paths only
- Tripping at residual currents of type A, independent of mains voltage
- High short-circuit strength
- Double-sided two-tier terminals for large conductor cross-section and busbar connection
- Switch-position display
- Window for labels
- Multi-functional switching knob with three functions:
  - **On** (top position)
  - **Off** (bottom position)
  - Display **"tripped"** (centre position)

  If the RCCB trips due to a fault, the switching knob stays in the centre position

RCCB – SENSITIVE TO UNIVERSAL CURRENT, TYPE B

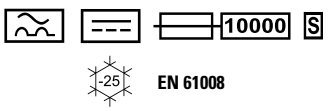
Short-time delayed tripping acc. to IEC 61008



RATED RESID. CURRENT $I_{\Delta n}$ mA	RATED CURRENT I_n A	SURGE CURRENT STRENGTH > A	MAX. BACK-UP FUSE A	MODULES	ITEM NO.	WEIGHT g / EACH	PACKING. UNIT
4-pole, short-time delayed tripping							
30	**25**	5.000	100	4	**RA4203**	450	1
300	**25**	5.000	100	4	**RA4230**	450	1
500	**25**	5.000	100	4	**RA4250**	450	1
30	**40**	5.000	100	4	**RA4303**	500	1
300	**40**	5.000	100	4	**RA4330**	500	1
500	**40**	5.000	100	4	**RA4350**	500	1
30	**63**	5.000	100	4	**RA4403**	500	1
300	**63**	5.000	100	4	**RA4430**	500	1
500	**63**	5.000	100	4	**RA4450**	500	1
30	**80**	5.000	125	4	**RA4503**	500	1
300	**80**	5.000	125	4	**RA4530**	500	1
500	**80**	5.000	125	4	**RA4550**	500	1
30	**100**	5.000	125	4	**RA4603**	500	1
300	**100**	5.000	125	4	**RA4630**	500	1
500	**100**	5.000	125	4	**RA4650**	500	1
30	**125**	5.000	125	4	**RA4703**	500	1
300	**125**	5.000	125	4	**RA4730**	500	1
500	**125**	5.000	125	4	**RA4750**	500	1

RCCB – SENSITIVE TO UNIVERSAL CURRENT, TYPE B

Selective tripping acc. to IEC 61008

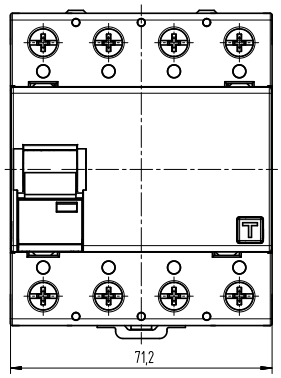


40-80 A N-pole right
100-125 A N-pole left

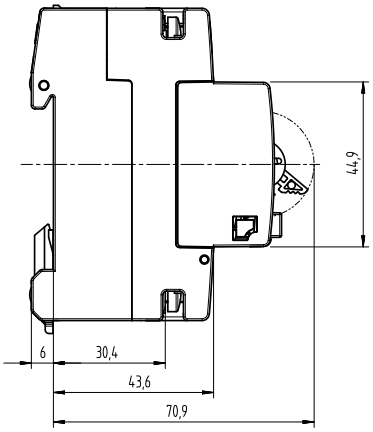
RATED RESID. CURRENT $I_{\Delta n}$ mA	RATED CURRENT I_n A	SURGE CURRENT STRENGTH > A	MAX. BACK-UP FUSE A	MODULES	ITEM NO.	WEIGHT g / EACH	PACKING. UNIT
300	**40**	5.000	100	4	**RA4330S**	450	1
300	**63**	5.000	100	4	**RA4430S**	500	1
300	**80**	5.000	125	4	**RA4530S**	500	1
300	**100**	5.000	125	4	**RA4630S**	500	1
300	**125**	5.000	125	4	**RA4730S**	500	1

RCCB – SENSITIVE TO UNIVERSAL CURRENT, TYPE B

RA product range – short-time delayed tripping acc. to IEC 61008



RAxxx product range, 4-pole
25 to 80 A



RAxxx product range, 4-pole
100 to 125 A

Function

RCCB sensitive to universal current for realising the protective measure "protection through automatic power-supply cut-off" in systems with electronic equipment, in compliance with the requirements of VDE 0100-410, VDE 0160, and corresponding international construction regulations.

In addition to the mains-voltage-independent detection of AC and pulsating DC residual currents, all units of the RA4xxx product range are also able to detect smooth DC residual currents.

For this purpose, a voltage > 30 V between only two user-defined current paths is sufficient. The circuit breaker thus complies with type B according to IEC TR 60755.

Beyond this requirement, the RA4 consistently detects residual currents of all frequencies up to 1 MHz. With its low requirements concerning the auxiliary voltage and its large frequency range of residual current detection, this residual current circuit breaker clearly exceeds the requirements of the construction standard for B-type RCCBs, E DIN VDE 0664-100.

The frequency response of the RA4xxx tripping current (see figure

on page 53) is designed such that residual currents with high frequencies, e.g. in the range of the pulse frequencies of frequency converters, are detected with clearly reduced sensitivity. This largely prevents false tripping through drainage currents.

However, even with residual currents of these frequencies, protection in case of indirect contact (fault protection) in compliance with VDE 0100-410 is realisable. The defined tripping threshold for all frequencies of up to 1 MHz always enables the definition of a maximum earth resistance, so that – in the event of fault – any inadmissibly high touch voltage will be switched off fast.

The devices of this range have different frequency responses for residual current tripping. In cases where capacitive drainage currents with the pulse frequencies of electronic equipment cause false tripping of the NK-type circuit breakers, an RA4xxx switch allows for mostly fault-free operation.

Even for rated residual currents ≤ 0.3 A, however, fire protection is only given for frequencies of up to approx. 1 kHz.

With this switch, protection in case of indirect contact, i.e. fault protection according to VDE 0100-410, can be realised at corresponding earth resistances throughout the entire frequency range of residual current tripping. The maximum permissible earth

resistances result, as quotients, from the permissible touch voltage and the highest residual response current in the entire frequency range comprised.

RCCB – SENSITIVE TO UNIVERSAL CURRENT, TYPE B

RA product range – short-time delayed tripping acc. to IEC 61008

Characteristics

- 4-pole
- Sensitive to universal current for residual currents with frequencies and mixed frequencies from 0 to 1 MHz
- Large range of products with
  - Rated currents from 25 A to 125 A
  - Rated residual currents 0.03 A to 0.5 A
- Small size for all rated currents
- VDE test mark approved in compliance with
- DIN VDE 0664-10/E DIN VDE 0664-100
- Very unsusceptible to transient drainage and residual currents, due to delayed tripping response
- Electromagnetic compatibility in compliance with VDE 0664-30 and VDE 0839 6-2 (interference resistance for industrial use)
- High availability, also of the voltage-dependent detection of smooth DC and AC residual currents with frequencies ≠ 50/60 Hz, due to full operability with mains voltages above 30 V, applied to any 2 current paths only
- Tripping at residual currents of type A, independent of mains voltage
- High short-circuit strength
- Double-sided two-tier terminals for large conductor cross-section and busbar connection
- Switch-position display
- Multi-functional switching knob with three functions:
  - **On** (top position)
  - **Off** (bottom position)
  - Display **"tripped"** (centre position)

  If the RCCB trips due to a fault, the switching knob stays in the centre position
- Window for labels

Type of mounting

- Quick mounting on DIN-rail in accordance with EN 60715 in any standard distribution
- Any mounting position
- Infeed direction from above (N, 1, 3, 5)

Areas of application

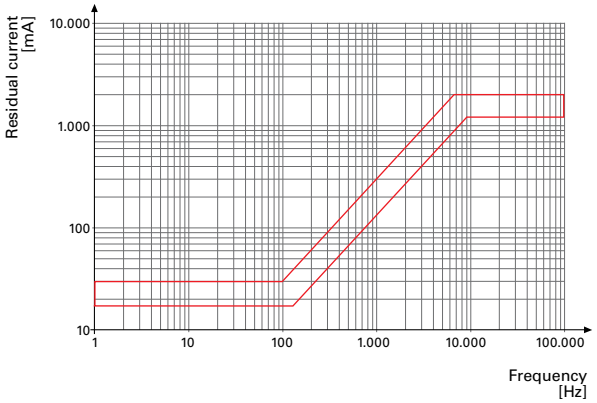
Commercial and industrial installations with TN-S and TN-C-S systems where power electronics equipment without galvanic mains separation is used, such as:

- Frequency converters
- UPS systems
- Switched-mode power supplies
- High-frequency converters
- On-site power supply distribution boards
- Photovoltaic systems

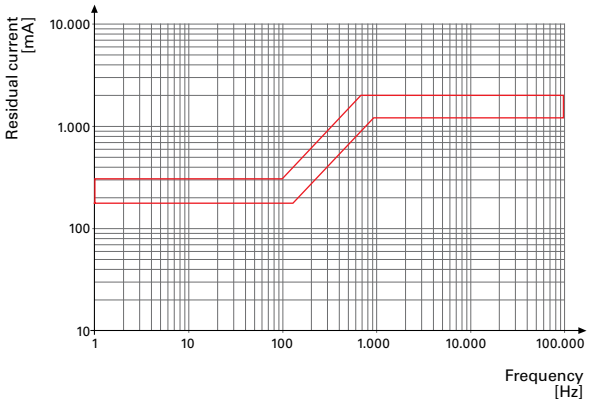
Note

Not intended for use in DC power supplies!

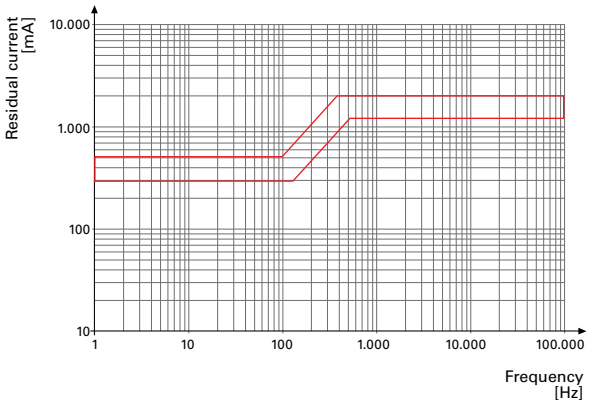
RA4xxx 30 mA



RA4xxx 300 mA

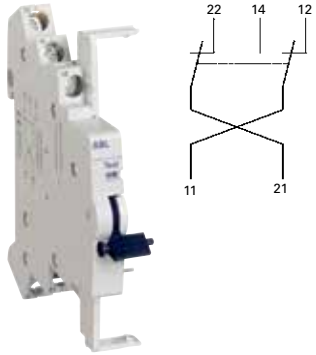


RA4xxx 500 mA



AUXILIARY CONTACT
for all RCCBs

AUXILIARY CONTACT FOR ALL RCCBS



Auxiliary contact

MO	TYPE OF CONTACT	CONTACTS	ITEM NO.	WEIGHT g / EACH	PAKING UNIT
½	2 Auxiliary contacts (1 signal contact)	1 CO + 1 NC	**RH11**	45	1

1 switch – 2 functions
With the help of a CO contact, it is possible to switch between the signal contact and auxiliary contact functions.

Function
The RH11 can be retrofitted as an auxiliary contact or as a fault signal switch on an RCCB for all circuit breaker ranges, allowing for the display of an RCCB's operating state with the help of further output devices (buzzer, signal lamps etc.).
The function setting is carried out with an actuator on the RH11.

Auxiliary contact
Switches when the RCCB is switched on and off
Correct function can be tested with a test button
Fault signal switch
Switches only when the RCCB trips (middle position)

Characteristics
- Can switch between auxiliary contact or fault signal switch function
- Can be retrofitted
- Small size (1/2 M)
- Settable
- 1 CO contact and 1 NC contact

Type of mounting
- Left of the RCCB with bracketing
- Any installation position

Areas of application
Operating state queries for electricity supplies for residential and single-purpose buildings as well as industrial plants.

Note
The auxiliary contact does not influence the RCCB.

Technical Data	Auxiliary contact and fault signal switch RH11
Rated voltage U_n	230 V AC / 110 V DC
Rated current I_n	6 A AC / 1 A DC
Switch contacts	1 x CO contact/ 1 x NC contact
Cross sections of connection lines	1 – 1.5 mm^2
Terminal screw torque	0.8 Nm

RESIDUAL CURRENT CIRCUIT BREAKERS · RP AND RW PRODUCT RANGE

RP (Type A) / RW (Type AC), Technical data

Technical data							
Characteristic	**Type A (sensitive to pulsating current) / Type AC (sensitive to alternating currrent)**						
Rated current I_n	**16 A**	**25 A**	**40 A**	**63 A**	**80 A**	**100 A**	**125 A**
Rated residual current $I_{\Delta n}$	0.01 A /0.03 A / 0.1 A / 0.3 A / 0.5 A						
Surge current strength	0.5 µs / 100 kHz / 200 A, ring-wave test						
Rated voltage U_n	230 V AC / 400 V AC						
Max. permissible operational voltage	U_n + 10%						
Rated frequency	50 Hz						
Voltage operating area of the test equipment	2-pole: 100 V AC – 250 V AC / 4-pole: 185 V AC – 440 V AC						
Maximum tripping times	1 x $I_{\Delta n}$: ≤ 300 ms / 5 x $I_{\Delta n}$: ≤ 40 ms						
Rated switching capacity I_m	500 A	500 A	500 A	800 A	800 A	1000 A	1250 A
Rated residual switching capacity $I_{\Delta m}$	500 A	500 A	500 A	800 A	800 A	1000 A	1250 A
Conditional rated short-circuit current I_{nc} 2-pole	10 kA						
Conditional rated residual short-circuit current $I_{\Delta c}$ 2-pole	10 kA						
Conditional rated short-circuit current I_{nc} 4-pole	10 kA						
Conditional rated residual short-circuit current $I_{\Delta c}$ 4-pole	10 kA						
Short-circuit back-up fuse	see table on page 60						
Power loss 2-pole 0,01 A (A, AC) / 0,03 A (AC)	1.5 W	3.5 W	8.0 W				
Power loss 2-pole 0,03 – 0,5 A	0.5 W	1.0 W	2.0 W	4.5 W	7.5 W	12 W	18 W
Power loss 4-pole 0,03 – 0,5 A	0.7 W	1.5 W	4.0 W	8.5 W	14 W	22 W	30 W
Installation position	any						
Degree of protection	IP20						
Resistance to mechanical shocks	20 g / 20 ms duration						
Vibration resistance	> 5g (f ≤ 80 Hz, duration > 30 min)						
Ambient temperature range	- 25 °C to + 40 °C						
Climatic resistance	Acc. to DIN IEC 60068-2-30: Humid heat / cyclical (25 °C / 55 °C ; 93 % / 95 % rF)						
Cross sections of connection lines Circular conductor, solid Multiple wire Stranded wire	1 x 1.5 – 50 mm² (1-conductor connection) / 2 x 1.5 – 16 mm² (2-conductor connection) 1 x 1.5 – 50 mm² (1-conductor connection) / 2 x 1.5 – 16 mm² (2-conductor connection) 1 x 1.5 – 35 mm² (1-conductor connection) / 2 x 1.5 – 16 mm² (2-conductor connection)						
Terminal screw torque	3 Nm						
Minimum conductor cross section						50 mm²	
Mechanical endurance	> 5,000 switching cycles						
Electrical endurance	> 2,000 switching cycles						
Building standards	DIN VDE 0664 T 10, EN 61008-1, IEC 61008-1						

Technical data	**Differences in technical data to the RP/RW table above**
Short-time delayed	
Surge current strength	3,000 A / lightning stroke current 8/20 µs

Selective							
Rated current I_n			40 A	63 A	80 A	100 A	125 A
Rated residual current $I_{\Delta n}$	0.3 A						
Surge current strength	5,000 A / lightning stroke current 8/20 µs						
Response delay	1 x $I_{\Delta n}$: 130 ms <T ≤ 500 ms / 5 x $I_{\Delta n}$: 50 ms <T ≤ 150 ms						

RESIDUAL CURRENT CIRCUIT BREAKERS · RA PRODUCT RANGE

RA (Type B), 4 pole, short-time delayed, selective, Technical data

Technical data						
Characteristic	**Type B (sensitive to universal current)**					
No. of poles	**4**					
Rated current I_n	**25 A**	**40 A**	**63 A**	**80 A**	**100 A**	**125 A**
Rated residual current $I_{\Delta n}$	0.03 A / 0.3 A / 0.5 A					
Tripping frequency range	Short-time delayed: 0 – 1 MHz / selective: 0 – 100 kHz					
Surge current strength	Short-time delayed: 3 kA / selective: 5 kA lightning impulse current 8/20 µs					
Rated voltage U_n	230 V AC / 400 V AC					
Minimum operating voltage necessary for detecting residual currents of type A for detecting residual currents of type B	0 V (independent of mains voltage) [2] 30 VAC					
Max. permissible operational voltage	U_n + 10%					
Rated frequency	50 Hz					
Voltage operating area of the test equipment	185 V AC – 440 V AC					
Maximum tripping times	1 x $I_{\Delta n}$: ≤ 300 ms / 5 x $I_{\Delta n}$: ≤ 40 ms					
Response delay	1 x $I_{\Delta n}$: 130 ms <T ≤ 500 ms / 5 x $I_{\Delta n}$: 50 ms <T ≤ 150 ms					
Rated switching capacity I_m	500 A	500 A	800 A	800 A	1000 A	1250 A
Rated residual switching capacity $I_{\Delta m}$	500 A	500 A	800 A	800 A	1000 A	1250 A
Conditional rated short-circuit current I_{nc}	10 kA					
Conditional rated residual short-circuit current $I_{\Delta c}$	10 kA					
Short-circuit back-up fuse DIN VDE 0636 / IEC 60269-1	see table on page 60					
Power loss	1.5 W	4.0 W	8.5 W	14 W	22 W	30 W
Intrinsic consumption	max. 3.5 W					
Infeed side (res. current to 80 A) Infeed side (res. current 100/125 A)	Terminals 1, 3, 5, N [1] Terminals N, 3, 5, 7 [1]					
Installation position	any					
Degree of protection	IP20					
Resistance to mechanical shocks	20 g / 20 ms duration					
Vibration resistance	> 5g (f ≤ 80 Hz, duration > 30 min)					
Ambient temperature range	- 25 °C to + 40 °C					
Climatic resistance	Acc. to DIN IEC 60068-2-30: Humid heat / cyclical (25 °C / 55 °C ; 93 % / 95 % rH)					
Cross sections of connection lines Circular conductor, solid Multiple wire Stranded wire	1 x 1.5 – 50 mm² (1-conductor connection) / 2 x 1.5 – 16 mm² (2-conductor connection) 1 x 1.5 – 50 mm² (1-conductor connection) / 2 x 1.5 – 16 mm² (2-conductor connection) 1 x 1.5 – 35 mm² (1-conductor connection) / 2 x 1.5 – 16 mm² (2-conductor connection)					
Terminal screw torque	3 Nm					
Minimum conductor cross section						50 mm²
Mechanical endurance	> 5,000 switching cycles					
Electrical endurance	> 2,000 switching cycles					
Building standards	DIN VDE 0664 -10, E DIN VDE 0664-100					
Electromagnetic compatibility	VDE 0664-30, VDE 0839-6-2 (Interference resistance – industrial applications)					

1) Recommended for simple insulation tests on the system side, because in this way the internal overvoltage-protection elements can be disconnected from the load side of the system by switching off the B-type RCCB.

2) For supply voltages below 30 V AC, tripping caused by A and AC-type residual currents is guaranteed due to a function independent of mains voltage.

RESIDUAL CURRENT CIRCUIT BREAKERS · RA AND RP PRODUCT RANGE

Short-circuit back-up fuses

PRODUCT RANGE		RATED CURRENT I_n [A]	RATED RESIDUAL CURRENT $I_{\Delta n}$ [A]	SHORT CIRCUIT BACK-UP FUSES SCPD [A]
2-pole	A	16	0.01	50
		25		
		40		
		16	0.03 - 0.5	100
		25		
		40		
		63		
4-pole	A, B	25	0.03 - 0.5	100
		40		
		63		
		80		125
		100		
		125		

Rated short-circuit current I_{nc} = for all RCCBs = 10 kA

Tripping behaviour of the RCDs at different time sequences of the differential current

Only in systems whose equipment exclusively consists of linear or approximately linear electrical components – i.e. the flow of current is proportional to the voltage – can it be assumed that, in case of fault, only pure AC residual currents with the frequency of the mains voltage flow to the ground. These are components with ohmic, inductive or capacitive behaviour.
Even for sinusoidal supply voltages, equipment consisting of non-linear passive or active components such as rectifier diodes or quick switches like thyristors or transistors can cause currents that contain strong harmonics and/or whose mean values are not zero for the duration of one supply-frequency period,
i.e. that have a DC component.

The residual current can also have a frequency differing from the supply frequency or consist of several partial currents with frequencies differing from the supply frequency. Therefore, RCDs with different technologies are also necessary to detect it.
The IEC 60755 technical report defines different types of RCDs as regards the time sequence of the residual currents which activate them.

This is illustrated in the following table.

RCD type	Sensitivity for differential/residual currents	Symbol
A	Residual currents of type AC and pulsating DC residual currents, whose inst. value is approx. zero (< 6 mA) for the duration of at least a half period of the mains frequency	
B	Residual currents of type A (i.e. also AC) as well as smooth DC residual currents and AC residual currents with frequencies up to 1000 Hz	

The table on the following page (Figure 3) shows an arrangement of usual basic circuits of equipment with non-linear components (in short: electronic equipment, EE) and the time sequences of the resulting residual currents.
Just like the form of the current curve, the fundamental frequency of the residual current also has an influence on the response behaviour of the RCDs. Therefore, the response current and the response times are only within the range of the standardised values if the residual current frequency corresponds to the rated frequency of the RCDs.
For our standard devices, it is 50 Hz.

Area of application for A-type RCDs

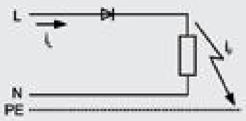
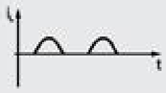
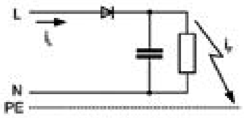
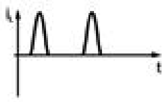
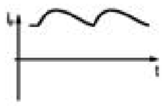
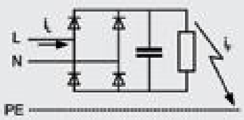
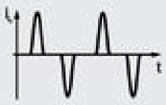
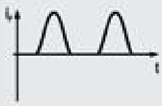
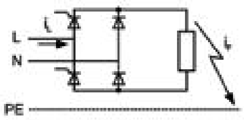
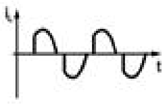
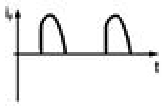
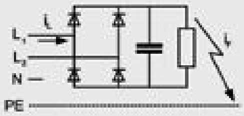
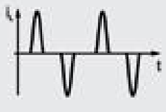
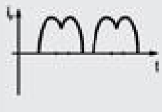
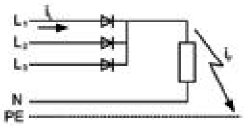
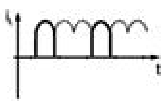
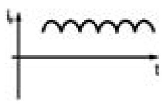
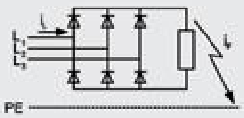
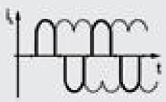
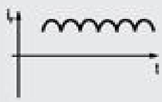
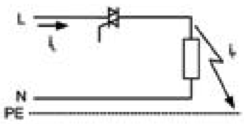
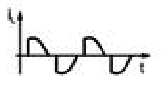
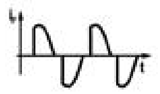
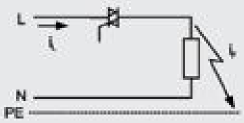
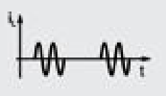
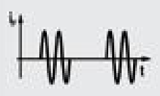
After the previous explanations, it can be seen that, in case of an earth fault, AC-type RCDs are only activated within the stipulated limits if an approximately sinusoidal residual current is flowing i.e. current whose time mean value is zero and that does not show any excessive distortions (harmonic component <10%).

However, electronic components in similar circuits as illustrated in the table (Figure 3) on the next page are often used for modern equipment, e.g. to increase performance.
Thus, the time sequences of the possible residual currents are no longer sinusoidal, which means that, next to the supply frequency, there are also DC components and harmonics.
Even a slight DC component of the residual current makes AC-type RCDs more insensitive or completely inefficient as regards measuring the AC component. AC-type RCDs can thus only offer sufficient protection in systems whose equipment contains exclusively passive linear components and in which any later connection of non-permitted equipment – e.g. via plug connections – can be excluded.

Due to this restricted protection scope, AC-type RCDs are no longer allowed to be used in Germany and several other western European countries.

Instead, A-type RCDs are usually installed nowadays because they are also properly activated by pulsating DC residual currents. Their function is exclusively based on the principle of induction, as is the case with AC-type RCDs. Thus, they only
react to residual currents that cause a sufficient change of the magnetic flow in the converter core. To achieve this, a residual current must pulsate in such a way that its instantaneous value is equal to or almost zero (≤ 6 mA) for at least half a supply-frequency period.
Therefore, A-type RCDs offer sufficient protection for electronic equipment with single-phase connection, except for EE with one-way rectifier and smoothing (Figure 3, circuit 2).
A-type RCDs do not react to residual currents with a high DC component or even smooth DC residual currents, as can be the case with EE with multi-phase connection (see circuits 3, 6 and 7 in Figure 3). Their intended function – reacting to A-type residual currents – even gets disturbed when there is smooth DC residual current at the same time. Thus, according to EN 50178 / VDE 0160, EE that can create smooth DC residual currents must on no account be connected in system parts downstream of an A-type RCD.

If EE can cause residual currents with a high DC component (≥ 6 mA), i.e. protection by an A-type RCD is not guaranteed, the manufacturer of the equipment must point out this fact in the operating instructions.

Row	Basic circuit with fault location	Type of load current	Type of residual current	RCD tripping		
						
1	Single-phase 				•	•
2	Single-phase with smoothing 					•
3	Full-bridge circuit 				•	•
4	Full-bridge circuit, half-controlled 				•	•
5	Full-bridge circuit between external conductors 				•	•
6	Three-phase star circuit 					•
7	Three-phase full-bridge circuit 					•
8	Generalised phase control 			•	•	•
9	Burst control 			•	•	•

Basic circuits of electronic equipment, time sequences of the load and residual currents as well as RCDs suitable for standard tripping

Figure 3

Source:
E DIN VDE 0100-530; Appendix B

Area of application of B-type RCDs
If equipment according to the circuits 2, 6 and 7 in Figure 3 (see previous page) can cause smooth DC residual current which is not detected by an A-type RCD, the manufacturer of the equipment must – under the terms of EN 50178 / VDE 0160 – point out that it is necessary to use a B-type RCD. This applies to almost all equipment of power electronics (EE) if it is operated in earthed networks without galvanic isolation in a three-phase manner, such as frequency converters, bigger UPS systems, welding inverters etc.

Such equipment usually delivers output voltage in the form of bipolar pulse-width modulated square-wave pulses with pulse frequencies in the range of 1 kHz up to several tens of kHz. For frequency converters, the resulting load current then has a sinusoidal shape – as a result of the inductance of the motors connected – with the desired adjusted motor frequency. Earth faults, however, normally display an ohmic resistance behaviour. That is why the output voltage of a frequency converter creates pulse-width modulated rectangular residual currents with the pulse frequency.

This means that for such applications, a RCD must also react to residual currents with the pulse frequency and their harmonics (3rd and 5th harmonic) to offer comprehensive protection.
The response threshold must not exceed the maximum values permitted for a certain protection level (fault protection, fire protection or operator protection) for the whole frequency range.

Unfortunately, the current device standards do not pay the necessary attention to this point yet. The German VDE 0664-100 standard only offers details about the detection of residual current of up to 2 kHz and the international set of standard specifications IEC 60755 and the future IEC 62423 only require a residual current sensitivity of up to 1 kHz.
For these upper frequencies, residual current response thresholds of up to approx. 20 or 10 times the rated residual current are still allowed.
However, for fire protection, for example, it would be necessary to have a response frequency range of up to at least 100 kHz with an upper response threshold of a maximum of 0.3 A.

Operational drainage currents with very different frequencies constantly flowing to the ground from equipment via suppressor capacitors, for example, are a serious problem that often makes the use of RCDs difficult. If they are high enough, they can undesirably activate a B-type RCD if it detects the residual current via a broad frequency range with high sensitivity. False tripping can often be avoided by selecting the RCDs with respect to their response-current frequency response and the rated residual current.

By choosing the equipment, it is, however, recommended to guarantee even while planning the system that the sum of the drainage currents does not exceed the lower response threshold of the RCDs and thus false tripping can be excluded.
For this purpose, we specify the frequency response of the response current for all device types in the catalogue texts of our various RCDs with tripping characteristic B.

Designs with increased surge current strength (K type)
Pulse-shaped overvoltages caused by switching operations or thunderstorms can trigger discharge currents via the capacitance of the equipment to the ground or the interconnect capacitance resulting in undelayed RCDs being activated occasionally. Equipment with a high capacitance to the ground due to either the extensive dimensions of live parts or suppressor capacitors connected to the ground is critical in this regard.

Among the loads mentioned first are, for example, electrical panel heating and fluorescent lamps in big quantities (> 20 units per current path) with conventional ballasts.

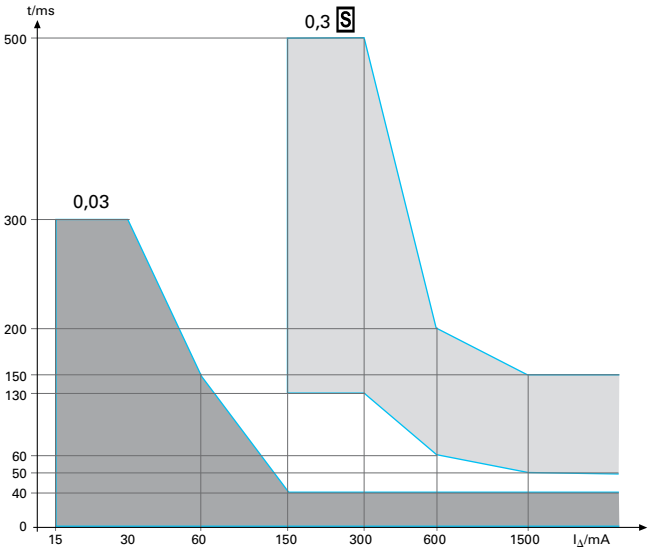
The equipment mentioned second includes, amongst others, fluorescent lamps with electronic ballasts, X-ray equipment and computer systems. The use of our RCDs with increased surge current strength (for K-type RCCBs) is recommended to guarantee reliable operation without false switch-off even in these especially critical cases.

These devices are largely resistant to surge residual currents because of a special design of the residual current detection and assessment unit.
Testing the surge current strength is normally carried out by means of the standardised lightning stroke current 8/20 according to IEC 60060-1.

There, the peak value of the highest current surge that can flow through the RCD transformer in both directions and via all current paths without causing tripping is used as a measurement.

The surge current strength of our standard RCCBs and RCBOs is > 200 A.

The following figure on the next page shows the tripping times of an RCCB responding in an undelayed and in a delayed (selective) manner.

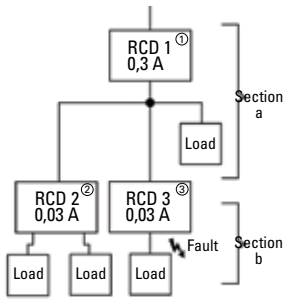


Tripping times of an RCCB responding in an undelayed and in a delayed (selective) manner

Selectivity

Selective RCDs only react to the occurrence of residual current after a current flow duration of several supply-frequency periods. This makes selective tripping possible if, for example, two RCD residual current circuit breakers are connected in series, i.e. even for high residual currents, only that RCD in whose downstream system part the earth fault occurs reacts in the event of fault.

The figure below makes this correlation clear.



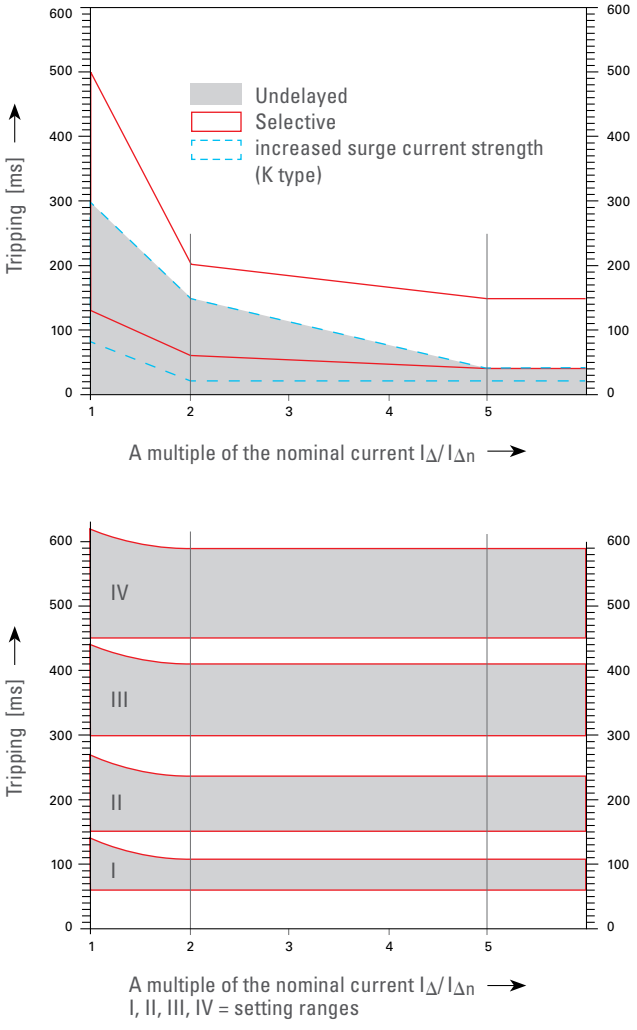
Selective tripping if two RCDs for sequenced residual current protection are connected in series

If an undelayed RCD was used instead of an RCD 1, every residual current $I_\Delta > 0.3$ A in system part b would trip both RCD 1 and RCD 3.
Only the response delay of the selective RCD 1 ensures that only RCD 3 responds.
The response time of both selective and normal RCDs can depend on the amount and type of the residual current.
The above figure (tripping times) gives an example of a normal residual current circuit breaker with $I_{\Delta n}$ = 30 mA and a selective circuit breaker with $I_{\Delta n}$ = 300 mA to illustrate this.

The rated residual current of the delayed RCD must, compared to the undelayed RCD, be chosen at least one level higher to ensure selectivity in any case (i.e. also for small residual currents). In a system with selective sequences, the earth resistance R_A must not be any greater than half the value to be found in table 1 (see page 59).

In the event of fault, this enables a residual current with twice the value of the rated residual current to flow without the permitted touch voltage U_{Lzul} being exceeded so that also the delayed RCCB is activated within a period of < 300 ms.

Selective RCCBs have a surge current strength of > 5 kA.



Total tripping times for undelayed and delayed RCCBs

Tripping times
The figure "tripping times" on the previous page shows the tripping times of our RCCBs and CBRs depending on a multiple of the rated residual current. From this, the tripping times for circuit breakers of all rated residual currents can be determined for every desired residual current value.

Voltage dependence
A RCD independent of the mains voltage e.g. in the form of a conventional residual current circuit breaker (RCCB) takes the energy necessary for tripping only from the earth residual current.
Even if the mains voltage drops or the neutral is disconnected, a RCCB is still functional. Even longer periods of overvoltage as a result of system disturbances have no impact on the tripping function of a residual current circuit breaker. Because of this high degree of operational reliability, a residual current circuit breaker is always to be preferred to a residual current operated protective device depending on the mains voltage.

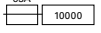
In German systems that are not operated by personnel with technical expertise and not subject to regular maintenance carried out by experts, the basic protection measure "protection by automatic power-supply cut-off" in compliance with VDE 0100-410 must therefore only be realised with RCDs that are independent of auxiliary voltage.
Our residual current circuit breakers meet the requirement of mains voltage independence.

Our RA4xxx RCCBs, sensitive to universal current, can also be considered independent of mains voltage in terms of the DIN EN 61008-1 VDE 0664-10 standard, because they react to A-type residual currents even in the case of loss of the mains voltage, i.e. if two phases and the neutral are interrupted. These devices only require a very little amount of auxiliary voltage, namely 30 V AC, for tripping with smooth DC residual currents and residual currents whose frequency differs from the supply frequency. This value is below the touch voltage of 50 V permitted in normal installations. Thus, the requirement of the VDE 0664-100 and even more that of the future international IEC 62423 standard is more than fulfilled.

Ambient temperature
In almost all international standards, the normal ambient temperature range for RCDs is - 5 °C to + 35 °C with short-term temperatures of up to 40 °C for a maximum of 1h in 24h. Generally, our RCDs are upgraded for low temperatures of down to - 25 °C. This quality is indicated by the 

symbol on the nameplate of the devices.
If these RCDs are to work at temperatures below - 5 °C, all international standards grant a tripping current which is 25 % higher. The earth resistance must thus be reduced to 80 % – compared to applications at temperatures down to - 5 °C – to still achieve tripping at a touch voltage of ≤ 50 V / ≤ 25 V.

Short-circuit strength
RCDs must be protected against short circuits and, if it appears to be necessary, against overloading by means of suitable protection devices. The maximum prospective short-circuit current in connection with the maximum permissible back-up fuse (according to VDE 0636 utilisation category gL) is specified for our RCCBs in the data tables.

On the nameplate of the RCCB, the 

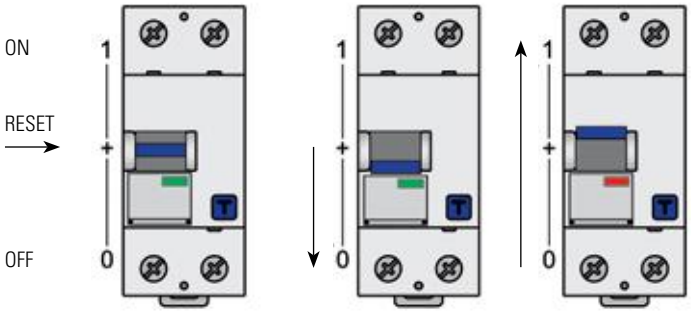
symbol, for example, indicates that, in connection with a back-up fuse of 63 A, the circuit-breaker sustains a prospective short-circuit current of 10 kA.
Our RCCBs for nominal currents of up to 63 A are sufficiently protected against short circuits by a back-up fuse of 63 A. In most cases, this guarantees a short-circuit current even through the service fuse (max. 63 A).

Please note that a short-circuit fuse does not automatically guarantee overload protection.
Overload must be excluded by system planning taking simultaneity factors into account.

Installation notes

Mounting
Our RCDs can be used in any position. With the exception of B-type RCCBs, the infeed and load side are not defined either. 4-pole devices can also be used for 2 and 3-pole operation. Here, the voltage supply of the test equipment must be taken into account.
Mounting is carried out on DIN-rails according to DIN EN 60715.
The IP40 degree of protection that can be achieved with accurate terminal covers only guarantees touch protection and limited protection against solid foreign bodies. Without additional housing, the RCDs can thus only be used in dry and dust-free rooms.

We recommend additional housing of the IP54 degree of protection for the use in rooms that are occasionally wet or in spots with increased dirt accumulation.



Reset function
The switching knob is equipped with a so-called reset function.

Residual current circuit breaker in centre position
It tripped due to a fault in the circuit. It is of utmost importance that any possible causes be checked before switching on again.

Residual current circuit breaker in 0 position
It was switched off manually.

Informed at a glance
On the basis of the switching knob position, it can be seen if the residual current circuit breaker was switched off by a fault **(knob is in the centre position)** or manually **(knob is in the 0 position).**

Important note:
For your own safety, the knob must be moved from the centre position to the 0 position to eliminate the fault. Only then can the residual current circuit breaker be switched on again!

Connecting and testing
Feed all conductors necessary for the operation of the system (also the neutral) through the RCCB.
Make sure all conductors are well insulated against the ground (test with insulation resistance meter). Earth the equipment to be protected. Try not to use the neutral connected upstream of the RCCB as a protective conductor (danger when neutral is interrupted before the branch point, e.g. in overhead systems). Before start-up, not only check the RCCB for correct functioning, but also the whole protective circuit (measure earth resistance and detect maximum possible touch voltage for residual currents at the tripping limit of the RCCB).

The residual current circuit breakers must be checked every six months to guarantee their smooth mechanical functioning.

Quality characteristics
- The metal parts of the switching mechanism are made of rust-proof material
- All devices meet the requirements of the RoHS guideline, which means that all plastics used are bromine-free and halogen-free, the metal parts do not contain lead or cadmium
- All materials used are recyclable
- All electrical data is tested several times during extensive
  final tests and permanently allocated to every device and archived.

General explanations regarding Residual Current Operated Protective Devices (RCDs)

Principle

A Residual Current operated protective Device – RCD for short –
continuously calculates the sum of the instantaneous values of all currents that, via the active conductors, flow into an electrical system operated in an earthed AC network.

According to Kirchhoff's Current Law, this sum must always be zero. In the case of an insulation fault, the sum of these currents is not zero, because – depending on the fault impedance RF
and the earth resistance RA – a residual current, also called differential current or residual current, does not flow back to the current source via the active conductors, but via the earth.
If the effective value of the residual current exceeds the rated residual current $I_{\Delta n}$ of the RCD, the system is disconnected from the current source.

An auxiliary voltage source may be necessary to detect and assess the differential current, or it can be done independently of auxiliary voltage.
In Germany, the term "residual current" is used when designating RCDs that detect and assess the residual current independently of auxiliary voltage, whereas the term "differential
current" refers to detection and assessment depending on auxiliary voltage.

Protection in case of indirect contact by automatically disconnecting the power supply according to VDE 0100 - 410 (fault protection)

If – in the case of an insulation fault – earthed, conductive system parts which are not part of the operating circuit (e.g. enclosures of equipment of protection class I) have a voltage higher than the maximum permissible touch voltage U_{Lzul}, the system to be protected must be disconnected from the power supply quickly.
Earthing these parts with a sufficiently low earth resistance RA allows for the touch voltage U_{Lzul} to cause a residual current to flow which activates an RCD and causes the system to be
disconnected from the power supply immediately. To achieve this, the residual current must be higher than the rated residual current $I_{\Delta n}$ of the RCD.

The interrelationships are illustrated in Figure 1.

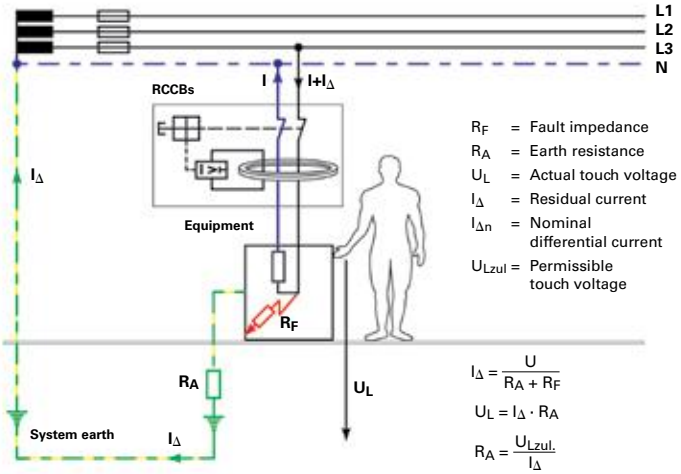


Figure 1

The maximum values for RA for the maximum permissible touch voltages 25 V and 50 V can be found in the subsequent table. The resistance values for applications of up to - 25 °C are reduced by a factor of 0.8, compared to the values for - 5 °C, because the response current I_{Δ} of the RCD at - 25 °C may exceed the rated residual current $I_{\Delta n}$ by 25%.

RATED RESIDUAL CURRENT $I_{\Delta n}$ [A]	Imin. U_{Lzul}	- 5 °C 25 V [Ω]	- 5 °C 50 V [Ω]	- 25 °C 25 V [Ω]	- 25 °C 50 V [Ω]
0,01		2500	5000	2000	4000
0,03		830	1660	660	1330
0,30		83	166	60	130
0,50		50	100	40	80

Table 1

Highest permissible earth resistance RA depending on the rated residual current $I_{\Delta n}$ and the touch voltage U_{Lzul} at a minimum ambient temperature $T_{min.}$ of - 5 °C / - 25 °C.
All earth resistances must have half the value for systems with selective RCD sequences!

Additional protection in case of direct contact according to VDE 0100-410 (operator protection)

By using high-sensitivity RCDs with a rated residual current of $I_{\Delta n} \leq 30$ mA, additional protection in case of direct contact with an (unearthed) part conducting voltage is achieved (see Figure 2).

This additional protection is necessary if

- The insulation of totally-insulated devices or a feed cable is damaged,
- The protective conductor is interrupted,
- The protective and active conductor got mixed up and conductive parts which are normally earthed are thus energised, or
- There is contact with a part which is energised under normal operating conditions during repair work.

Based on this extended protection scope, the VDE set of standard specifications stipulates the use of a residual current circuit breaker according to VDE 0664-10 or an RCBO according to VDE 0664-20 with $I_{\Delta n} \leq 30$ mA for the construction of systems in areas that are particularly accident-prone.

This applies to, for example,

- Outlet circuits in rooms with a bath tub or a shower (VDE 0100-701)
- Caravans, boats and yachts as well as their power supplies at camping sites or moorings (VDE 0100-721)
- Rooms used for medical purposes (VDE 0107).

By no means must this additional protection be considered a basic protection measure since the residual current flows through the human body into the earth in case of direct contact. It is rather an "emergency brake" for the fault events mentioned above. According to VDE 0100-530, only RCDs as described in the section "RCDs for fault protection, operator protection and fire protection" on the right side may be used for additional protection.

Fire protection

Effective protection against fires caused by earth faults can even be achieved with relatively insensitive RCDs ($I_{\Delta n} \leq 300$ mA). For earth residual currents ≤ 300 mA, the electric power transferred at the fault location is normally not sufficient to ignite standard flammable materials.
Although ignition is possible for higher residual currents because of the power, the RCD switches off the power supply in less than 0.3 seconds and thus limits the electric ignition power to harmless values.

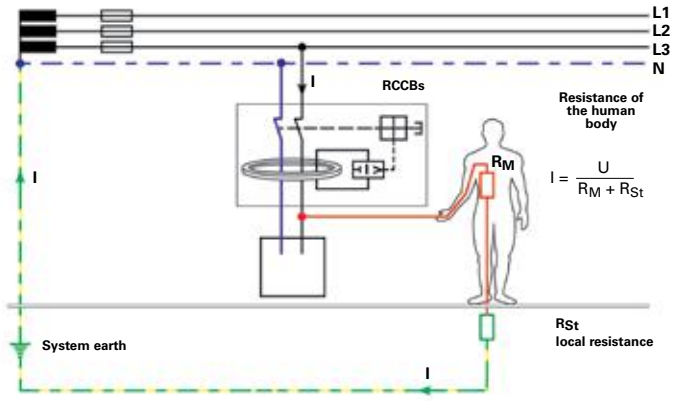


Figure 2

RCDs for fault protection, operator protection and fire protection

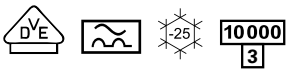
According to VDE 0100-530 (construction of non-voltage systems - part 530: selecting and setting up electrical equipment, switchgears and control gears), the following RCDs can be used for the protection targets mentioned above:

- Residual current circuit breakers according to DIN EN 61008-1
  VDE 0664-10 Abbreviation: **RCCB** (**R**esidual **C**urrent **C**ircuit **B**reaker without integral overcurrent protection)
- RCBOs according to DIN EN 61009-1 VDE 0664-20 Abbreviation: **RCBO** (**R**esidual **C**urrent Circuit **B**reaker with integral **O**vercurrent Protection)
- Circuit breakers with residual current trip according to DIN EN 60947-2 VDE 660-101 Appendix B Abbreviation: **CBR** (**C**ircuit **B**reaker providing **R**esidual current protection)
- **M**odular **R**esidual **C**urrent Protective **D**evices (abbreviation: **MRCD**) according to DIN EN 60947-2 VDE 0660-101 Appendix M whose units for measuring differential current (transformers), assessing differential current (differential current relays) and the load switch unit are accommodated in separated enclosures can be used in systems that are operated and, on a regular basis, maintained by people with electrotechnical expertise.
  In systems where it is not possible to install the devices mentioned above – e.g. because an instant switch-off means endangering people or creating a lot of material damage – **RCM** differential current monitoring devices (abbreviation for **R**esidual **C**urrent **M**onitor) according to DIN EN 62020 VDE 0662 can be used.

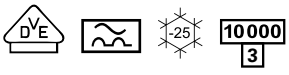
RESIDUAL CURRENT OPERATED CIRCUIT BREAKER WITH OVERCURRENT PROTECTION

sensitive to pulsating currents, Type A acc. to IEC 61009

RCBOs offer a compact possibility of implementing wiring protection and protection against personal injury in one device. The RCBO protects itself through its CB part against overload. An undesired overload due to too-high load currents is not possible.
One RCBO is assigned to every circuit. So the full residual current is available to every circuit as drainage current. For one residual current in a circuit, only the affected circuit is switched off.



RATED CURRENT I_n A	RATED RESID. CURRENT $I_{\Delta n}$ mA	CHARACTERISTIC		MODULES	WEIGHT g / EACH	PACKING UNIT
		B ITEM NO.	C ITEM NO.			
Short circuit withstand rating 10 kA MCB 1-pole + N						
6	10	**RB0601**	**RC0601**	2	225	1
6	30	**RB0603**	**RC0603**	2	225	1
6	100	**RB0610**	**RC0610**	2	225	1
6	300	**RB0630**	**RC0630**	2	225	1
6	500	**RB0650**	**RC0650**	2	225	1
10	10	**RB1001**	**RC1001**	2	225	1
10	30	**RB1003**	**RC1003**	2	225	1
10	100	**RB1010**	**RC1010**	2	225	1
10	300	**RB1030**	**RC1030**	2	225	1
10	500	**RB1050**	**RC1050**	2	225	1
13	30	**RB1303**		2	225	1
16	10	**RB1601**	**RC1601**	2	225	1
16	30	**RB1603**	**RC1603**	2	225	1
16	100	**RB1610**	**RC1610**	2	225	1
16	300	**RB1630**	**RC1630**	2	225	1
16	500	**RB1650**	**RC1650**	2	225	1
20	10	**RB2001**	**RC2001**	2	225	1
20	30	**RB2003**	**RC2003**	2	225	1
20	100	**RB2010**	**RC2010**	2	225	1
20	300	**RB2030**	**RC2030**	2	225	1
20	500	**RB2050**	**RC2050**	2	225	1
25	10	**RB2501**	**RC2501**	2	225	1
25	30	**RB2503**	**RC2503**	2	225	1
25	100	**RB2510**	**RC2510**	2	225	1
25	300	**RB2530**	**RC2530**	2	225	1
25	500	**RB2550**	**RC2550**	2	225	1
32	30	**RB3203**	**RC3203**	2	225	1
32	100	**RB3210**	**RC3210**	2	225	1
32	300	**RB3230**	**RC3230**	2	225	1
32	500	**RB3250**	**RC3250**	2	225	1
40	30	**RB4003**	**RC4003**	2	225	1
40	100	**RB4010**	**RC4010**	2	225	1
40	300	**RB4030**	**RC4030**	2	225	1
40	500	**RB4050**	**RC4050**	2	225	1



Short circuit withstand rating 10 kA MCB 2-pole						
10	30	**RB1003N**		3	335	1
13	30	**RB1303N**		3	335	1
16	30	**RB1603N**	**RC1603N**	3	335	1

RESIDUAL CURRENT OPERATED CIRCUIT BREAKER WITH OVERCURRENT PROTECTION

Accessories and Busbars

Auxiliary contact
Rated voltage U_e 230V AC
Rated operating current I_e
at AC-14 for U_e 400V AC 3.5 A
at AC-14 for U_e 230V AC 6.5 A
at DC-13 for U_e 110/220V UC 0.5/0.25 A
at DC-13 for U_e 24V UC 16 A
Rated current I_{th} 16 A

	ITEM NO.	WEIGHT g / EACH	PACKING UNIT
1 CO	**RLH1W**	50	1

CROSS SECTION (mm^2)	BUSBAR CURRENT START OF BUSBAR/ MIDDLE INFEED	MODULES +H (AUXILIARY CONTACT)	PHASES	ITEM NO.	WEIGHT g / EACH	PACKING UNIT	SUITABLE END CAP ITEM NO.
Busbars fork type for RCBOs 2 M							
2-phase and 1-phase + N							
10	63/110	28/2	2/1+N	**SB26010**	390	20	SB.A5
16	80/130	28/2	2/1+N	**SB26016**	430	20	SB.A2
2-phase / 1-phase + N and auxiliary contact							
16	80/130	22/2+H	2/1+N	**SB26216**	470	20	SB.A2
3-phase + N, L1/N, L2/N, L3/N							
16	80/130	27/2	3+N	**SB41627**	725	15	SB.A3
Busbars fork type for RCBOs 3 M							
3-phase + N, L1/N, L2/N, L3/N							
16	80/130	18/3	3+N	**SB41618**	650	5	SB.A3
Busbars fork type for RCBOs 2 M							
3-phase + N, L1/N, L2/N, L3/N							
16	80/130	6/2	3+N	**G41606**	135	20	–

Busbars cannot be cut to length!

RESIDUAL CURRENT OPERATED CIRCUIT BREAKER WITH OVERCURRENT PROTECTION

Technical data

RCBO	
Rated voltage U_n	230 V
Rated residual current $I_{\Delta n}$ [mA]	10, 30,100, 300 und 500
RCCB type	sensitive to alternating current Type AC
Rated current I_n [A]	6, 10, 13, 16, 20, 25, 32 und 40
Function limit for functions of the test equipment	AC 100 V
Short circuit withstand rating I_{cn} (according to DIN EN 61009)	10 kA
Energy limiting class	3
Frequence	50 Hz
Number of poles	LS 1-pole+N (2 M), LS 2-pole (3 M)
Installation position	any
Degree of protection	IP 20
Connecting terminals	Both-sided multi-function terminal For simultaneous connection of conductors and pin rails
Terminal screws	± and Pozidriv 2
Torque	2 Nm
Conductor cross sections	1.5 to 25 mm^2
Mechanical endurance	10,000 switching cycles (10,000 ON/10,000 OFF)
Electrical endurance	4,000 switching cycles (4,000 ON/4,000 OFF)
Standard	DIN VDE 0664-T100, EN 61009, IEC 61009

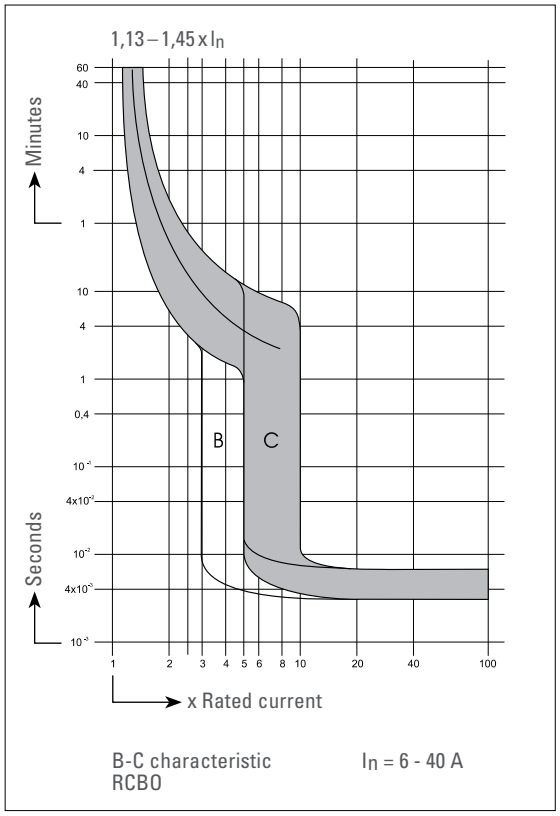
Thermal trip and short circuit trip circuit breaker			
Characteristic		**B**	**C**
Test currents	Thermal not tripping I_1 (A) > 1 h	1.13 x I_n	1.13 x I_n
	Thermal tripping I_2 (A) < 1 h	1.45 x I_n	1.45 x I_n
	Electromagnetic not tripping I_4 (A) > 0.1 s	3 x I_n	5 x I_n
	Electromagnetic tripping I_5 (A) < 0.1 s	5 x I_n	10 x I_n

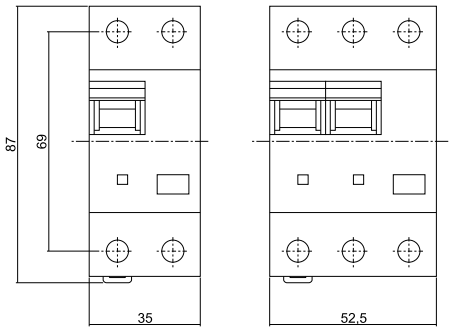
RESIDUAL CURRENT OPERATED CIRCUIT BREAKER WITH OVERCURRENT PROTECTION

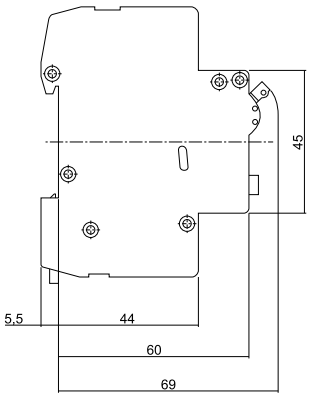
Technical data

Short circuit selectivity to fuses in kA									
RCBO 10 kA									
		Rated current I_n (A)							
Characteristic	**B**	6	10	13	16	20	25	32	40
	C	6	10	13	16	20	25	32	40
I_n (A)	16								**1.)**
Fuse according to DIN VDE 0636 operating class	20	0,5 / 0,5	0,5 / 0,5	0,5 / 0,5					
	25	0,8 / 0,8	0,7 / 0,7	0,6 / 0,6	0,6 / 0,6	0,5 / 0,5			
	35	1,1 / 1	0,9 / 0,8	0,8 / 0,8	0,8 / 0,8	0,7 / 0,7	0,7 / 0,7		
	50	2,5 / 2,3	2,1 / 1,9	2,0 / 1,8	1,9 / 1,7	1,8 / 1,6	1,8 / 1,5	1,7 / 1,4	
	63	5 / 3	2,7 / 2,6	2,6 / 2,5	2,5 / 2,4	2,4 / 2,3	2,3 / 2,2	2,2 / 2,1	2,1 / 2
	80	8 / 8	5 / 5	4,2 / 4,2	3,8 / 3,8	3,6 / 2,6	3,4 / 3,4	3,3 / 3,3	3,2 / 3,1
	100	10 / 10	8,5 / 7	7 / 6,5	6,5 / 6,1	6,1 / 5,8	5,8 / 5,3	5,3 / 5,1	5,1 / 4,8

1.) There is no more overload selectivity above the step line.







DIN-RAIL PANEL PRODUCTS

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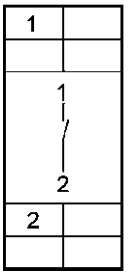
DIN-RAIL PANEL PRODUCTS
Switches

ON/OFF SWITCH 1-POLE
16 A 250 V~

1 M

	ITEM NO.	WEIGHT g/EACH	PACKING UNIT
1NO	**AS161**	55	12

AS161

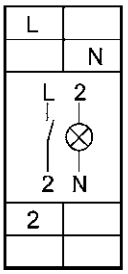


ON/OFF SWITCH 1-POLE
WITH LIGHT SIGNAL
16 A 250 V~

1 M

	ITEM NO.	WEIGHT g/EACH	PACKING UNIT
1NO	**ASL161**	55	12

ASL161

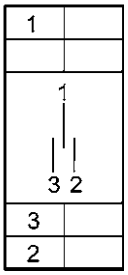


GROUP SWITCH 1-POLE
16 A 250 V~
Autom.-Off-Manual

1 M

	ITEM NO.	WEIGHT g/EACH	PACKING UNIT
1CO	**GS161**	55	12

GS161

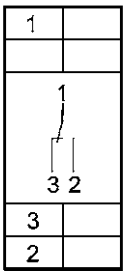


CO SWITCH 1-POLE
16 A 250 V~

1 M

	ITEM NO.	WEIGHT g/EACH	PACKING UNIT
1CO	**WS161**	55	12

WS161



DIN-RAIL PANEL PRODUCTS

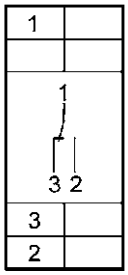
Button, light signals and SCHUKO socket outlet

MOMENTARY-CONTACT SWITCH
16 A 250 V~

1 M

	ITEM NO.	WEIGHT g / EACH	PACKING UNIT
1CO	**WT161**	55	12

WT161



LIGHT SIGNAL 230 V UC

1 M

	ITEM NO.	WEIGHT g / EACH	PACKING UNIT
Clear	**RST230**	73	12
Red	**RSR230**	73	12
Blue	**RSB230**	73	12
Green	**RSG230**	73	12
Yellow	**RSY230**	73	12

ON/OFF SWITCH 3-POLE 415 V~

Incoming circuit breaker for circuit distribution board, lockable in the "ON" or "OFF" position, maximum connection cross section 25 mm^2

3 M

RATED CURRENT	ITEM NO.	WEIGHT g / EACH	PACKING UNIT
63 A	**AS63**	200	4
100 A	**AS100**	200	4

SCHUKO SOCKET OUTLET SCHUKO®
10/16 A 250 V~

2.5 M

	ITEM NO.	WEIGHT g / EACH	PACKING UNIT
	SD230	110	4

DIN-RAIL PANEL PRODUCTS

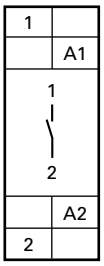
Installation relays / storage relays mechanical

INSTALLATION RELAY
16 A 250 V~
1-pole 1NO

1 M

	ITEM NO.	WEIGHT g / EACH	PACKING UNIT
12 V~	**IR01210**	99	12
230 V~	**IR23010**	99	12

IR...10

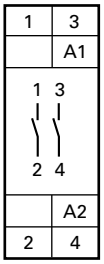


INSTALLATION RELAY
16 A 250 V~
2-pole 2NO

1 M

	ITEM NO.	WEIGHT g / EACH	PACKING UNIT
230 V~	**IR23020**	104	12

IR...20

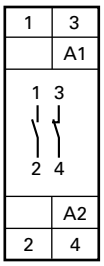


INSTALLATION RELAY
16 A 250 V~
2-pole 1NO + 1NC

1 M

	ITEM NO.	WEIGHT g / EACH	PACKING UNIT
230 V~	**IR23011**	106	12

IR...11

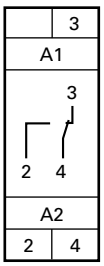


STORAGE RELAY
sealable
16 A 250 V~
1 CO contact

1 M

	ITEM NO.	WEIGHT g / EACH	PACKING UNIT
230 V~	**SP2301W**	85	12

SP2301W



DIN-RAIL PANEL PRODUCTS

Installation relays / storage relays mechanical

Installation relay / Storage relay mechanical		
Technical data / type	**IR**	**SP2301W**
Contact material	$AgSnO_2$	
Contact interval	3 mm / 2 mm	
Interval control connections / contact	> 6 mm	
Test voltage contact / contact contact / magnet system	2000 V 4000 V	
Nominal switching capacity AC 250 V, 400 V	16 A, 10 A / 10 A, 6 A	16 A / 250 V 3520 VA
Incandescent lamps and halogen lamp load 230 V	10 A (2300 W)	
Fluorescent lamp load in DUO switching	16 A (3500 W) / 10 A (2000 W)	
Fluorescent lamp load inductive or capacitive	10 A (1300 W)	
Electronic ballasts	I_{on} 140 A 10 ms / 70 A 10 ms [1]	
Fluorescent lamp load compensated in parallel	4 A (500 W)	
Inductive load cos φ = 0.6 / 230 V AC	10 A (1300 W)	
High-pressure mercury lamp and metal halide lamp, uncompensated	500 W	
Contact load DC max.	100 W	
Mechanical endurance, change of position 10^3 / h	$>10^6$	$>10 \times 10^8$
Endurance with rated load, cos φ = 1 and 10^3 / h	$>10^5$	
Endurance with incandescent lamps 1000 W and 10^3 / h	$>10^5$	
Endurance with rated load, cos φ = 0.6 und 10^3 / h	$>4 \times 10^4$	
Switching frequency max.	10^3 / h	10^4 / h
Closing delay	10 - 20 ms	10 ms
Opening delay	5 - 15 ms	5 ms
Switch position display	per contact	Light emitting diode
Manual operation	yes	no
Switch-on duration	100% [2]	100%
Temperature at the installation location max. / min.	+50° / -5 °C	+40 °C
Control voltage range	0.9 to 1.1 x U_n	0.95 to 1.06 x U_n
Coil power loss AC + DC ± 20 %	1- and 2-pole 2 W	1.9 W
Total power loss when continually excited Rated voltage and rated contact load	1-pole 4 W 2-pole 6 W	1.9 W
Max. parallel capacitance (length) of the control line	0.06 µF (200 m)	
Max. induction voltage at the control inputs	0.2 x U_n	

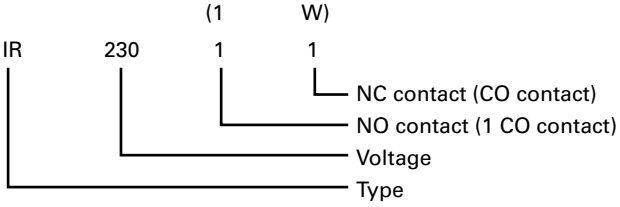
1) For electronic ballasts, a switch-on current 40 times more powerful is to be expected.
2) Should several remote switches and installation relays be under continuous excitation, please make sure that there is sufficient ventilation in accordance with the power loss calculation and additionally that a ventilation interval of approx. ½ modules is observed.

Function description:

IR = Installation relay
SP = Storage relay

Type key

e.g. installation relay
Item No. IR23011



DIN-RAIL PANEL PRODUCTS

Electronic control relays

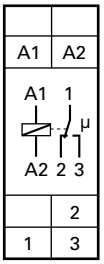
CONTROL RELAYS

10 A / 250 V
1 CO contact
Universal control voltage
8 – 230 V

1 M

	ITEM NO.	WEIGHT g/EACH	PACKING UNIT
8 to 230 V UC	**STU1W**	58	1

STU1W



Bistable relay contact
After installation, the mains voltage must first be applied to the relay so that the switching contacts can go into a defined state.
After about 2 seconds, the switched load can be connected to the mains.

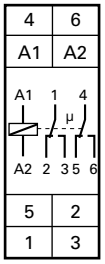
CONTROL RELAYS

10 A / 250 V
2 CO contacts
Universal control voltage
8 – 230 V

1 M

	ITEM NO.	WEIGHT g/EACH	PACKING UNIT
8 to 230 V UC	**STU2W**	74	1

STU2W



Bistable relay contact
After installation, the mains voltage must first be applied to the relay so that the switching contacts can go into a defined state.
After about 2 seconds, the switched load can be connected to the mains.

Electronic control relays	
Technical data / type	**STU1W / STU2W**
Contacts	
Contact material / Contact interval	$AgSnO_2$ / 0.5 mm
Interval control connections / contact	< 6mm
Interval control connections C1-C2 / contact	
Test voltage contact / contact	1000 V
Test voltage control connections / contact	4000V
Nominal switching capacity AC	10A / 250V
Incandescent lamps and halogen lamp load 230 V for lamps with max. 200 W	1000 W
Fluorescent lamp load in DUO switching	1000 W
Fluorescent lamp load inductive or capacitive	1000 W
Fluorescent lamp load compensated in parallel	4 A; 500 W
High-pressure mercury lamp and metal halide lamp, uncompensated	–
Electronic ballasts	I_{VV} max. 70A /10ms [1]
Inductive load cos φ = 0.6 / 230 V AC	5 A, 650 W
Max. switching current DC1: 12 V / 24 V DC	8 A
Endurance with rated load, cos φ = 1 or incandescent lamps 1,000 W at 100 / h	> 10^5
Endurance for rated load, cos φ = 0.6 und 100 / h	> 4 x 10^4
Switching frequency max.	10^4 / h
Closing delay	5 - 10 ms
Opening delay	5 - 10 ms
Switch position display	Light emitting diode
Box terminal cross section	12 mm^2
Maximum cross section of a conductor	6 mm^2
Screw heads slotted/cross slot	pozidriv
Protection cover (device side)	DIN EN 50274, VDE 0660-514 BGV A3
Electronics	
Switch-on duration	100%
Temperature at the installation location max. / min.	+50 °C / -20 °C
Minimum command duration / control voltage area	50 ms / 0.9 to 1.1 x U_n
Coil power loss AC+DC ± 20%	1U 0.5 W, 2U 0.8 W
Control current	
	12 V UC: 90 mA [2]
	230 V UC 20 mA [2]
Max. parallel capacity (length) of the control line	0.06 µF (approx. 200 m)

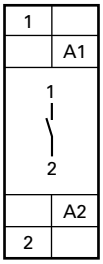
Fulfilled EN 61000-6-3, EN 61000-6-1 and EN 60669 standards
1) For electronic ballasts, a switch-on current 40 times more powerful is to be expected
2) Control relays STU1W and STU2W are clocked. From this, currents of up to 1 A result in the µs range.

REMOTE SWITCH
16 A 250 V~
1-pole 1NO

1 M

	ITEM NO.	WEIGHT g / EACH	PACKING UNIT
12 V~	**FS01210**	96	12
230 V~	**FS23010**	96	12

FS...10

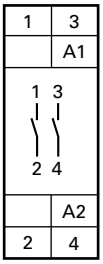


REMOTE SWITCH
16 A 250 V~
2-pole 2NO

1 M

	ITEM NO.	WEIGHT g / EACH	PACKING UNIT
230 V~	**FS23020**	107	12

FS...20

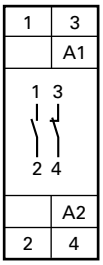


REMOTE SWITCH
16 A 250 V~
2-pole 1NO + 1NC

1 M

	ITEM NO.	WEIGHT g / EACH	PACKING UNIT
230 V~	**FS23011**	107	12

FS...11

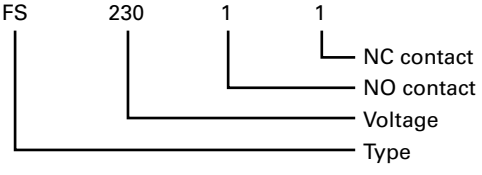


Mechanical remote switches	
Technical data / type	**FS**
Contact material	Ag Sn O_2
Contact interval	3 mm / 2 mm
Interval control connections / contact	> 6 mm
Test voltage contact / contact contact / magnet system	2000 V 4000 V
Nominal switching capacity AC 250 V, 400 V	16 A, 10 A / 10 A, 6 A
Incandescent lamps and halogen lamp load 230 V	10 A (2300 W)
Fluorescent lamp load in DUO switching	16 A (3500 W) / 10 A (2000 W)
Fluorescent lamp load inductive or capacitive	10 A (1300 W)
Electronic ballasts	I_{on} 140 A 10 ms / 70 A 10 ms [1]
Fluorescent lamp load compensated in parallel	4 A (500 W)
Inductive load cos φ = 0.6 / 230 V AC	10 A (1300 W)
High-pressure mercury lamp and metal halide lamp, uncompensated	500 W
Contact load DC max.	100 W
Mechanical endurance, change of position 10^3 / h	$>10^6$
Endurance with rated load, cos φ = 1 und 10^3 / h	$>10^5$
Endurance with incandescent lamps 1000 W and 10^3 / h	$>10^5$
Endurance with rated load, cos φ = 0.6 and 10^3 / h	$>4 \times 10^4$
Switching frequency max.	10^3 / h
Switch position display	per contact
Manual operation	yes
Switch-on duration	100% [2]
Temperature at the installation location max. / min.	+50° / -5 °C
Control voltage range	0.9 to 1.1 x U_n
Coil power loss AC + DC ± 20%	1- and 2-pole 5 - 6 W
Total power loss when continually excited Rated voltage and rated contact load	1-pole 7 - 8 W 2-pole 9 - 10 W
Max. parallel capacity (length) of the control line	0.06 µF (200 m)
Max. induction voltage at the control inputs	0.2 x U_n
Glow lamps parallel to the 230 V control buttons	5 mA
With capacitor 1 µF / 250 V AC parallel to the coil	10 mA
With capacitor 2.2 µF / 250 V AC parallel to the coil	15 mA

1) For electronic ballasts, a switch-on current 40 times more powerful is to be expected.
2) If several remote switches and installation relays are under continuous excitation, please make sure that there is sufficient ventilation in accordance with the power

Function description:
FS = Remote switch

Type key
e.g. remote switch
Item No. FS23011



REMOTE SWITCH CENTRAL CONTROL
16 A / 250 V
2 NO floating
Incandescent lamp load 2,000 W

1 M

	ITEM NO.	WEIGHT g/EACH	PACKING UNIT
8 to 230 V UC	**FZU20**	70	12

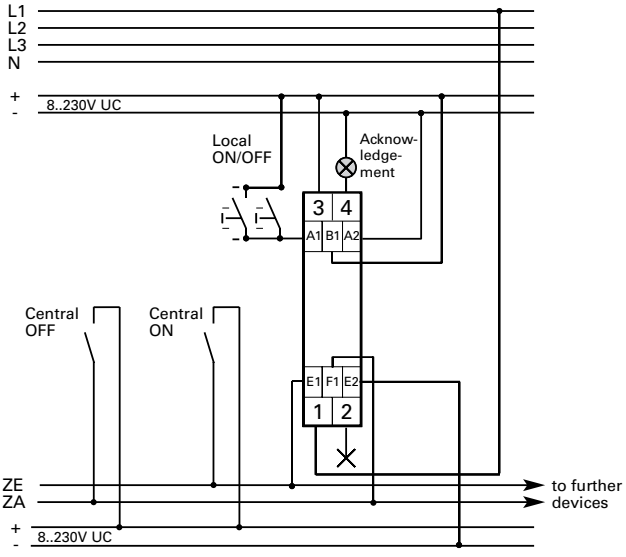
FZU20 – Local Universal Control Voltage 8...230V UC

With additional control inputs, central on and central off for 8..230V UC, with galvanic separation from the local control input.
Very low switching noise. Glow lamp current from 110 V control voltage up to 50 mA in switch positions 1 to 3 and 5 to 7.

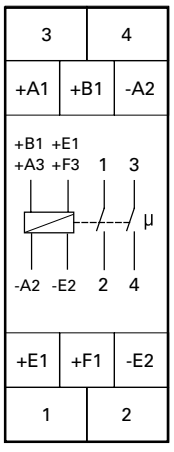
A rotary switch allows for setting various priorities.
These determine which other control inputs are blocked **as long as a control input is continually excited.**
This will then determine how the remote switch reacts **during failure and subsequent return of mains voltage:**
In switch positions 1 to 4 the switching position remains unaltered.
Switch off is done in switch positions 5 to 8.
Central commands pending will then be executed.

OFF = Permanently OFF
Positions 1 + 5 = No priority. Local button pressing is even possible with permanently excited central control inputs. The final central command is carried out.
Positions 2 + 6 = Priority for central ON and OFF. Local button pressing is without any effect for the duration central OFF, however, has priority over central ON
Positions 3 + 7 = Priority for central ON and OFF. Local button pressing is without any effect for the duration central ON, however, has priority over central OFF.
Positions 4 + 8 = Priority for the permanently excited local button. Central commands are not carried out for the duration. Glow lamp current is not permitted in these positions.
ON = Continuously ON

Switching example of electronic impulse switch for central control

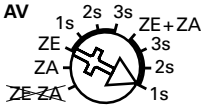


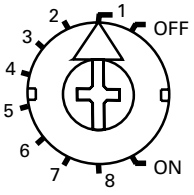
FZU20



Function rotary switch

~~**ZE ZA**~~ = no central control
ZA = only central control OFF
ZE = only central control ON + response delay 0, 1, 2 or 3 seconds
ZE ZA = central control ON and OFF + response delay 0, 1, 2 or 3 seconds





Electronic remote switch	
Technical data / type	**FZU20**
Contacts	
Contact material / Contact interval	$AgSnO_2$ / 0.5 mm
Interval control connections / contact	6 mm
Test voltage C1-C2 or A1-A2 / contact	4000 V
Test voltage contact / contact	4000 V
Test voltage control connections / contact	4000 V
Nominal switching capacity AC	16 A / 250 V
Incandescent lamps and halogen lamp load 230 V [1)]	2000 W
Fluorescent lamp load in (conventional ballast) DUO switching	1000 VA
Fluorescent lamp load in (conventional ballast) uncompensated or serially compensated	500 VA
Compact fluorescent lamps with electronic ballast and energy-saving lamps (ESL)	I_{ON} max. 70 A / 10 ms [2)]
Max. switching current DC1: 12 V / 24 V DC	8 A
Endurance with rated load, cos φ = 1 and incandescent lamps 1,000 W for 100 / h	$>10^5$
Endurance with rated load, cos φ = 0.6 at 100 / h	$>4 \times 10^4$
Switching frequency max.	10^3 / h
Maximum cross section of a conductor (3-fold terminal)	6 mm^2 (4 mm^2)
2 conductors with same cross-section (3-fold terminal)	2.5 mm^2 (1.5 mm^2)
Screw head	Slotted / cross slot pozidriv
Protection cover (device side)	DIN EN 50274, VDE 00660-514 BGV A3

Electronics	
Switch-on duration (also for central ON/OFF)	100%
Temperature at the installation location max. / min.	+50 °C / -20 °C
Stand-by loss (active power) 230 V	0,4 W
Stand-by loss (active power) 12 V / 24 V	0.03 W / 0,06 W
Control current Universal control voltage all control voltages (< 5 s) ± 20%	
Control current Universal control voltage 8/12/24/230 V (<10 s) ± 20%	0.1 / 0.1 / 0.2 /1 / (30) mA
Control current Central 8/12/24/230 V (<10 s) ± 20%	2 / 4 / 9 / 5 / (100) mA
Max. parallel capacitance (length) of the central control line for 230 V AC	0.3 µF (1000 m)
Max. parallel capacitance (length) of the central control line for 230 V AC	0.9 µF (3000 m)

Fulfilled EN 50081-1, EN 50082-2 and EN 60669 standards
Bistable relay as NOC. Wait for short automatic synchronisation after installation before applying the switched load to the mains.
1) For lamps with max. 150 W
2) For electronic ballasts, a switch-on current 40 times more powerful is to be expected

TOUCH DIMMER

Universal control voltage
8 to 230 V UC,
R, L and C loads 400 W
Dimmable ESL 100 W
Dimmable LED, 230 V 100 W

1 M

	ITEM NO.	WEIGHT g/EACH	PACKING UNIT
	TDU500	96	1

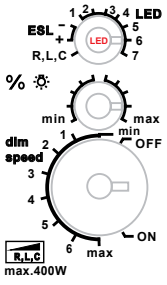
Electronic universal touch dimmer for R, L and C loads
Universal control voltage 8..230 V UC, galvanically separated from supply and switching voltage 230 V.
Short control commands switch on/off, permanent activation adjusts brightness up to the maximum value.
A brief interruption of the activation alters the dimming direction.
The set level of brightness remains saved when switched off.

With switches for children's rooms:
When switching on and pressing the button for at least 1 second, the light will switch on at the lowest brightness level and slowly increase brightness, without altering the last brightness level saved.

With sleep function:
The lighting is dimmed from its current brightness and switches off when it receives a double impulse. The maximum dimming time of 60 minutes is dependent on the current brightness and can be shortened accordingly.
Switching-off during the dimming procedure is always possible by pressing the button briefly. Pressing the button for a longer time during the dimming procedure turns up the light and ends the sleep function.

Defined switch-off during electricity failure.
From 110 V control voltage, glow lamp current 30 mA
With the **% ☼ -rotary switch** the minimum brightness can be set (completely dimmed) e.g. for dimmable energy-saving lamps.

Function
Rotary switch



The **dim speed rotary switch** can be used to set the dimming speed. At the same time the duration of the soft ON and soft OFF is altered. The **+ESL** settings take into consideration the special conditions for dimmable energy-saving lamps: The switching-on procedure is optimised and the dimming rate is altered logorithmically. The children's room switch is not possible in these settings and wound (inductive) transformers are not allowed to be dimmed.

Memory is switched off in the **–ESL** setting. This can be advantageous with ESL, since cold ESL require a higher minimum brightness than might be stored in the memory with warm ESL.

The **LED** settings take into account the special conditions for dimmable 230V LED lamps. Different dimming curves can be selected. In these settings, no wound (inductive) transformers may be dimmed.

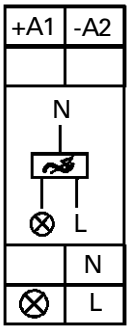
Automatic electronic overload protection and thermal overload switch-off.

L loads (inductive loads, e.g. wound transformers) and C loads (capacitor loads, e.g. electronic transformers) must not be mixed.
L and C loads can be mixed as desired with R loads (ohmic loads, e.g. 230 V incandescent and halogen lamps).

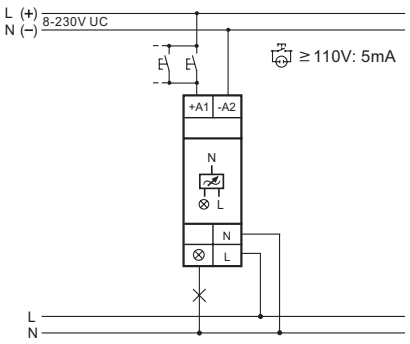
Technical data for dimmer TDU500 [1]	
Incandescent lamps 230 V (R)	400 W
Halogen lamps 230 V (R)	400 W
Inductive transformers (L)	400 W [2] [3]
Electronic transformers (C)	400 W [2] [3]
Dimmable energy-saving lamps ESL	100 W [4]
Dimmable LED 230 V	100 W
Temperature at the installation location max. / min.	+50 °C / -20 °C [5]
Control voltage area	0.9 bis 1.1 x U_n
Constant current supply	12 mA

The parallel operation of inductive (wound) and capacitive (electronic) transformers is not allowed!

[1] For loads greater than 300 W, a ventilation interval of 1/2 module is to be maintained to devices mounted next to each other.
[2] A maximum of two inductive (wound) transformers are allowed per universal dimmer switch and only the same types may be used; in addition, secondary-side idling is not allowed. Otherwise the universal dimmer switch may be destroyed! Therefore no secondary-side load switch-off allowed.
[3] When calculating loads, 20% loss for inductive (wound) transformers and 5% loss for capacitive (electronic) transformers must be taken into account in addition to the lamp load.
[4] In the ESL settings, no inductive (wound) transformers may be dimmed.
[5] Influences the maximum switching capacity.



Connection example

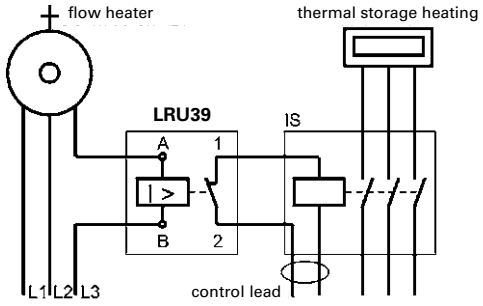


DIN-RAIL PANEL PRODUCTS
Load shedding relays

LOAD SHEDDING RELAYS
sealable
for electronically and pneumatically regulated flow heaters

1 M

	ITEM NO.	WEIGHT g/EACH	PACKING UNIT
6,7-39 A	**LRU39**	90	12



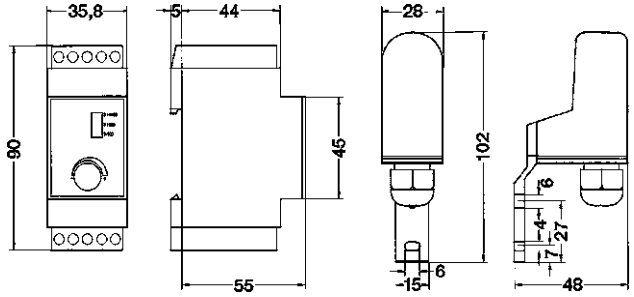
Load shedding relays			
Technical data / type	**LRU39 for electronic and pneumatic flow heaters**		
Field coil			
Rated current area AC	6.7 ... 39 A	Response current AC	< 5.3 A
Rated power for 230 V AC	1.5 ... 9 KW / 230 V~	Max. continuous current AC	43 A
Rated power for 230 / 400 V AC	4.6 ... 27 KW / 400 V~	Constant thermal load capacity 40 °C	2.5 W
Operating / rated power	0.5 ... 4 VA	Connection terminal single wire	2.5 mm^2 – 16 mm^2
		Connection terminal multiple wire	2.5 mm^2 – 16 mm^2
Relay contact			
Contact	1 NC	Max. electrical switching frequency / h	approx. 1,800 switching cycles / h
Rated contact current for 250 V AC	1 A	Max. ambient temperature	40 °C
Contact material	Hard silver gold-flashed	Response time / release time	10... 20 ms / 20 ... 30 ms
Max. switching voltage AC	400 V	Volume resistance	approx. 3 mΩ
Max. switching capacity	250 VA	Test voltage contact / coil AC	2.5 KV
Max. switch-on peak current	5 A	Isolation group acc. to VDE 0110	C / 250 V
Electric endurance with rated load	>100,000 switching cycles	Protection type housing	IP40
Mechanical endurance	approx. 1 million switching cycles	Connection terminal single wire	0.75 mm^2 – 4 mm^2
Switch-on duration	100%	Connection terminal multiple wire	0.75 mm^2 – 4 mm^2

DIN-RAIL PANEL PRODUCTS
Twilight switch

TWILIGHT SWITCH
WITH SEPARATE LIGHT COLLECTOR
230 V~, 50 … 60 Hz
16 A, 1 CO contact

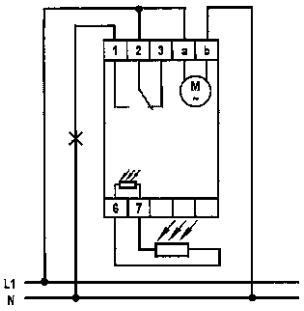
2 M

	ITEM NO.	WEIGHT g / EACH	PACKING UNIT
	DS2301W	230	1



Twilight switch DS2301W	
Technical data	
Light intensity Area 1 Area 2 Area 3	2 -100 Lux 2 -1000 Lux 2 -10 000 Lux
Delay when switching on	8 sec.
Delay when switching off	38 sec.
Contact material	AgCdO
Contact interval	< 3 mm
Interval control connections / contact	5 mm
Rated insulation voltage contact / contact contact / magnet system	1 KV 4 KV
Switching capacity AC	16 A / 250 V cos φ =1
Incandescent lamp load	2300 W
Inductive load cos φ = 0.8	3 A / 250 V
Mechanical endurance, change of position	5 x 10^7
Endurance with rated load, cos φ = 1 and 10^3 / h	10^5
Endurance with incandescent lamps 1000 W and 10^3 / h	25 x 10^3
Endurance with rated load, cos φ = 0.6 und 10^3 / h	75 x 10^3
Switch position display relay	LED red
Switch position display switch point	LED green
Switch-on duration	100%
Temperature at the installation location min. / max.	0 °C to 55 °C
Total power loss during continuous excitation	2.2 W
Degree of protection	IP20
Protection type light collector	IP65
Max. cable length to light collector	100 m

Wiring diagram:
Twilight switch
with separate light collector



DIN-RAIL PANEL PRODUCTS

Time relays and multi-function time relays

MULTI-FUNCTION TIME RELAYS

16 functions
1 CO contact 10 A / 250 V~
Time range 0.1 sec. - 40 hrs

1 M

	ITEM NO.	WEIGHT g / EACH	PACKING UNIT
8 V to 230V UC	**MRU1W**	75	10

TIME RELAYS

1 CO contact 10 A / 250 V~
Time range 0.1 sec. - 40 hrs

1 M

	ITEM NO.	WEIGHT g / EACH	PACKING UNIT
8 V to 230V UC	**AVU1W**	75	1
	RVU1W	75	1

Function description MRU1W
Stand-by loss only 0.1 Watt
Depending on the connection for the electricity supply to terminal B1 or B2, **two different function levels can be selected:**

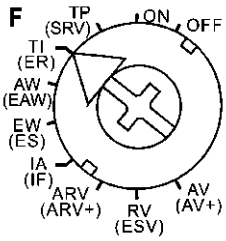
Function level 1 for connection of electricity supply to B1-A2

RV = Release delay
AV = Response delay
TI = Clock generator starting with impulse
TP = Clock generator starting with pause
IA = Impulse-controlled response delay
EW = Passing make contact

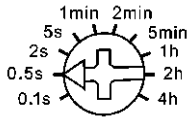
AW = Passing break contact
ARV = Response and release delay
ON = Continuously ON
OFF = Permanently OFF

Function level 2 for connection to electricity supply to B2-A2

ER = Relay function
EAW = Passing make and break contact
Er S = Impulse switch function
IF = Impulse former
ARV+ = Additive response and release delay
ESV = Impulse switch with release delay and Pre-warning of switch-off
AV+ = Additive response delay
SRV = Impulse switch with release delay
ON = Continuously ON
OFF = Permanently OFF

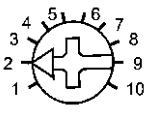


T



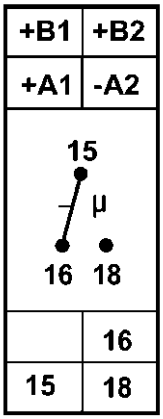
The time base T
is set for latching rotary switches [T]. There is a choice between the base values 0.1 seconds, 0.5 seconds, 2 seconds, 5 seconds, 1 minute, 2 minutes, 5 minutes, 1 hour, 2 hours and 4 hours.
The total time is calculated from the time base multiplied by the multiplier.

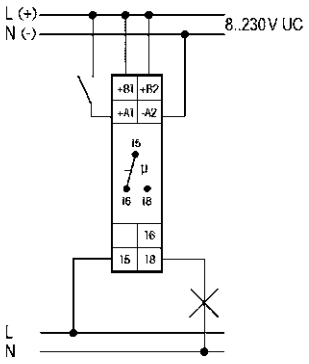
xT



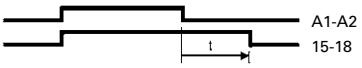
The multiplier x T
is set with the latching rotary switch [xT] and is between 1 and 10. This makes it possible to set times between 0.1 seconds (time base 0.1 seconds and multiplier 1) and 40 hours (time base 4 hours and multiplier 10).

Light emitting diode
under the large rotary switch provides information about the contact position during the time period.
It blinks as long as NOC 15 -18 is open (15 -16 closed) and glows continuously as long as NOC 15 -18 is closed (15-16 open).



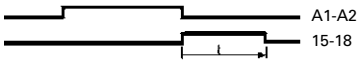


RV = Release delay
(Delay in switching off)



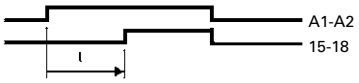
When applying control voltage, the NOC changes to 15–18. With the interruption of the control voltage, the time period begins and at its end the NOC returns to its rest position. Can be reset during the time period.

AW = Passing break contact relay



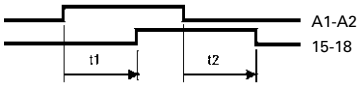
When the control voltage is interrupted, the NOC changes to 15–18 and returns after the impulse time has elapsed. If the control voltage is applied during the impulse time, the NOC immediately reverts to its rest position and the residual time is deleted.

AV = Response delay
(Delay when switching on)



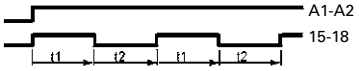
With the application of the control voltage, the time period begins and at its end the NOC changes to 15–18. After an interruption, the time period starts again.

ARV = Response and release delay



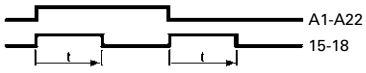
When the control voltage is applied, the timing period is started; at its end the NOC changes to 15–18. If the control voltage is interrupted after this, another timing period is started; at its end the NOC returns to the rest position. This release delay is identical to the response delay. After an interruption of the response delay, the time period begins again.

TI = Clock generator starting with impulse



As long as the control voltage is applied, the NOC closes and opens. For MRU1W the switching time in both directions is identical and corresponds to the time set. For TIUMW both times can be set separately. When the control voltage is applied, the NOC immediately changes to 15–18.

EAW = Passing make contact relay and passing break contact relay

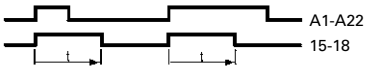


When the control voltage is applied and interrupted, the NOC changes to 15–18 and returns after the set impulse time has elapsed.

TP = Clock generator starting with pause
(Flashing relay)

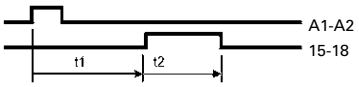
Function descriptions same as TI, except that when the control voltage is applied, the contact does not change to 15–18 but rather first remains at 15-16 or open.

IF = Impulse former



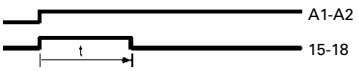
When the control voltage is applied, the NOC changes to 15–18 for the time set. Further activations are only evaluated after the set time has elapsed.

IA = Impulse-controlled response delay



With the start of a control pulse from 20 ms, the timing period t1 starts; at its end, the NOC changes to 15–18 for the time t2 (=1 second) (e.g. for automatic door openers). If t1 is set to the shortest time of 0.1 seconds, IA operates as an impulse former, for which t2 elapses, independent of the control signal's duration (min. 150ms).

EW = Passing make contact relay



With the application of the control voltage, the NOC changes to 15–18 and returns after the impulse time. If the control voltage is removed during the impulse time, the NOC immediately returns to the rest position and the remaining time is deleted.

ARV+ = Additive response and release delay
Same function as the ARV, but after an interruption of the response delay, the elapsed time remains stored.

ESV = Impulse switch with release delay and pre-warning of switch-off
Function as SRV. Also with pre-warning of switch-off: approx. 30 sec. before time elapses, the light flickers 3 times in shorter and shorter periods.

AV+ = Additive response delay
Same function as the AV, but after an interruption, the time already elapsed remains stored.

SRV = Impulse switch with release delay
The NOC switches back and forth with control impulses from 50 ms. In contact position 15-18, the device automatically switches to the rest position after the delay time has elapsed.

Time relays and multi-function relays	
Technical data / type	**MRU1W / AVU1W / RVU1W**
Switch-on duration	100%
Temperature at the installation location max. / min.	+50 °C / -20 °C
Contact material / contact interval	$AgSnO_2$ / 0.5 mm
Interval control connections / contact	3 mm
Test voltage contact / contact	1000 V
Test voltage control connections / contact	2000 V
Nominal switching capacity AC	10 A / 250 V
Incandescent lamps and fluorescent lamps, inductive or capacitive	1000 W
Fluorescent lamps in DUO switching	1000 W
Fluorescent lamps compensated in parallel	500 W
Electronic ballasts	I_{on} max 70 A / 10ms 2)
Inductive load cos φ = 0.6 / 230 V AC	650 W
Max. switching current DC 1 (not for NP type): 12 V / 24 V DC	8 A
Endurance with rated load, cos φ = 1 and incandescent lamps 1000 W for 100 / h	$>10^5$
Endurance with rated load, cos φ = 0.6 bei 100 / h	$>4 \times 10^4$
Temperature dependency	<0,2% each °C
Repetition accuracy at 25 °C	± 0,1%
Setting accuracy from 1 minute	± 0,2%
Control voltage dependency between 0.8 and 1.1 x U_n	none
Bridging time during mains failures (then total reset)	min. 0.2 seconds
Control current 12 V / 230 V ± 20%	0.05 / 0.9 mA
Control current 12 V DC / 230 V DC ± 20%	0.09 / 1.7 mA
Power consumption continuous electricity supply 12 V / 230 V UC relay OFF	0.02 / 0.4 W
Power consumption continuous electricity supply 12 V / 230 V UC relay ON	0.3 / 1.0 W 3)
Max. parallel capacity (length) of the control lines for 230 V	0.2 µF (approx. 600 m)
Protection cover (device side)	DIN EN 50274, VDE 0660-514 BGV A3
Box terminal cross section	12 mm^2
Maximum cross section of a conductor	6 mm^2
Screw head	Slotted / cross slot pozidriv

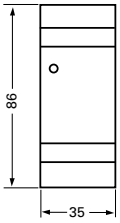
Meets VDE0435, EN 61000-6-3, EN 61000-6-1 and EN 60669 standards
1) Only with constant mains voltage >110 V and only when “relay on” for more than 60 minutes, is it necessary to maintain a ventilation interval of 1/2 module on both sides. If required, use the distance device. For 230 V AC, a capacitor 0.33 µF / 250 V in series with B1 is also sufficient.
2) For electronic ballasts, a switch-on current 40 times more powerful is to be expected.

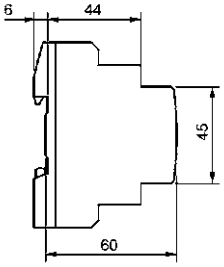
DIN-RAIL PANEL PRODUCTS
Mains monitoring

MAINS MONITORING
NW1
NWA1 asymmetrical monitoring
UAB 154 V, UAN 198 V

2 M

	ITEM NO.	WEIGHT g / EACH	PACKING UNIT
1NO + 1NC	**NW1**	98	1
	NWA1	98	1

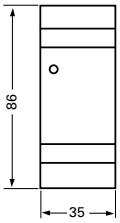


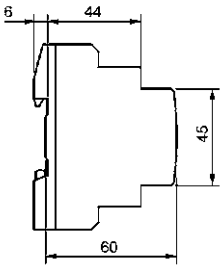


MAINS MONITORING
NW2
NWA2 asymmetrical monitoring
UAB 187 V, UAN 210 V

2 M

	ITEM NO.	WEIGHT g / EACH	PACKING UNIT
1S + 1Ö	**NW2**	98	1
	NWA2	98	1





Mains monitoring			
Technical data / type		**NW1 / NW2**	**NWA1 / NWA2**
Mains connection		1 - 3-phase 230 / 400 V	3-phase 230 / 400 V
Operational voltage		via L1-N 230 V AC	
Frequency		45…65 Hz	
Power consumption		5.5 VA	
Response / drop delay		0.15…0.5 sec.	
Input pulse amplitude max.	6 ms 20 ms	2.5 KV 1.0 KV	
Asymmetrical monitoring		none	10%
Back-up fuse		no / device inherently stable	
Relays			
Contact material		Ag Ni 0.15 + HV	
Contact interval		> 0.35	
Interval control connections / contact		15 mm	
Rated insulation voltage	contact / contact contact / magnet system	1 000 V_{eff} 4 000 V_{eff}	
Rated switching capacity		2 000 VA	
Contact load DC max. (A)	24 V	8 A	
	60 V	1.8 A	
	110 V	0.4 A	
	220 V	0.3 A	
Minimum contact load		10 mA / 12 V	
Mechanical endurance		3 x 10^7	
Endurance with rated load, cos φ =1		100 000	
Endurance with rated load cos φ = 0.4		80 000	
Switching frequency max.		3 000 / h	
Switch position display		LED	
Switch-on duration / switching safety		100%	
Temperature at the installation location max. / min.		-40 °C / + 70 °C	
Total power loss during constant excitation		0.55 VA	

DIN-RAIL PANEL PRODUCTS

Installation contactors

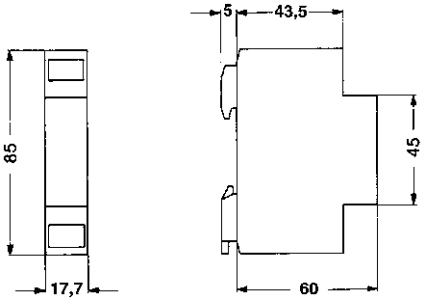
INSTALLATION CONTACTOR

20 A / 230 V AC

2-pole · Control voltage 230 V AC

1 M

	ITEM NO.	WEIGHT g/EACH	PACKING UNIT
2NO	**IS2020**	200	12
1NO 1NC	**IS2011**	200	12



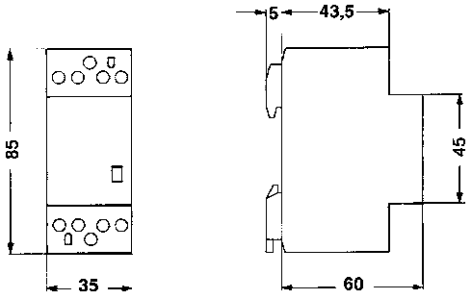
INSTALLATION CONTACTOR

25 A 230 / 400 V AC

4-pole · Control voltage 230 V AC

2 M

	ITEM NO.	WEIGHT g/EACH	PACKING UNIT
4NO	**IS2540**	280	6
2NO 2NC	**IS2522**	280	6
3NO 1NC	**IS2531**	280	6



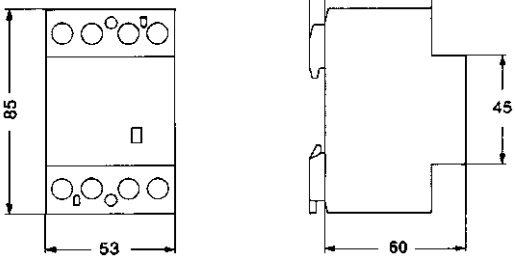
INSTALLATION CONTACTOR

40 A and 63 A 230 / 400 V AC

4-pole · Control voltage 230 V AC

3 M

	ITEM NO.	WEIGHT g/EACH	PACKING UNIT
4NO	**IS4040**	450	4
4NO	**IS6340**	450	4



AUXILIARY CONTACT

Continuous thermal current I_{th} = 6 A

Rated operating current I_e

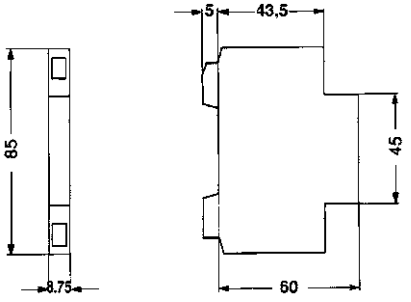
with AC-15 for U_e 240 V AC 3 A

415 V AC 2 A

440 V AC 1,6 A

½ M

	ITEM NO.	WEIGHT g/EACH	PACKING UNIT
1NO 1NC	**ISH11**	23	3



SEALING CAP

	ITEM NO.	WEIGHT g/EACH	PACKING UNIT
2 M	**ISP2**	2	10
3 M	**ISP3**	3	10

DISTANCE DEVICE 9MM

	ITEM NO.	WEIGHT g/EACH	PACKING UNIT
½ M	**ISD**	13	10

We recommend the use of distance devices at ambient temperatures higher than 40° C

Technical data acc. to IEC 60947-3, IEC 60947-5-1, VDE 0660, EN 60947-3, EN 60947-5-1

Main contact element types		**IS20..**	**IS25..**	**IS40..**	**IS63..**
Rated insulation voltage U_i	**V AC**	**440**	**440**	**440**	**440**
Rated operating voltage U_e	V AC	440	440	440	440
Allowed switching frequency z	AC1, AC3 1 / h	300	300	600	600
Mechanical endurance	S x 10^6	1	1	1	1

Usage category AC1

Rated operating current I_e (=I_{th}) open	at 60 °C A	20	25	40	63
Switching element endurance	S x 10^6	0.1	0.1	0.1	0.1
Power loss per pole for I_e / AC1	W	2	2	3	7

Usage category AC3 – Switching of three-phase motors

Rated operating current I_e	A	-	9	27	30
Rated power for 220 V	kW	-	2.2	7.5	8
Three-phase motors 230 - 240 V 50 - 60Hz 380 - 415 V	kW kW	-	2.5 4	8 12.5	8.5 15
Switching element endurance	S x 10^6	-	0.15	0.15	0.15

Magnetic coil

Magnetic coil output	Switching VA	7 - 9	14 - 18	33 - 45	33 - 45
Alternating current activation	Stop VA	2.2 - 4.2	4.4 - 8.4	7	7
	W	0.8 - 1.6	1.6 - 3.2	2.6	2.6

Magnetic coil operating areas					
Control voltage dependency U_S		0.85 - 1.1	0.85 - 1.1	0.85 - 1.1	0.85 - 1.1

Short circuit protection

Max. back-up fuse main circuits	gL (gG) / A	35	35	63	80
Switching times for control voltage U_S ±10%	Closing delay ms	7 - 16	9 - 15	11 - 15	11 - 15
	Opening delay ms	6 - 12	4 - 8	6 - 13	6 - 13
	Arc duration ms	10 - 15	10 - 15	10 - 15	10 - 15

Connection cross sections

Single or multiple wire main conductor	mm^2	1.5 - 10	1.5 - 10	2.5 - 25	2.5 - 25
Stranded wire	mm^2	1.5 - 6	1.5 - 6	2.5 - 16	2.5 - 16
Stranded wire with ferrule	mm^2	1.5 - 6	1.5 - 6	2.5 - 16	2.5 - 16
Number of clampable conductors per terminal		1	1	1	1
Coil single wire or multiple wire	mm^2	0.75 - 2.5	0.75 - 2.5	0.75 - 2.5	0.75 - 2.5
Stranded wire	mm^2	0.5 - 2.5	0.5 - 2.5	0.5 - 2.5	0.5 - 2.5
Stranded wire with ferrule	mm^2	0.5 - 1.5	0.5 - 1.5	0.5 - 1.5	0.5 - 1.5
Number of clampable conductors per terminal		1	1	1	1

Auxiliary contact ISH11

Rated insulation voltage U_i		V AC	440			
Thermal rated current = I_{th}	40 °C 60 °C	A A	10 6			
Usage category AC15						
Rated operating current I_e	220 - 240 V 380 - 415 V 440 V	A A A	3 2 1.6			
Usage category DC13						
Rated operating current I_e each pole	24 - 60 V 110 V 220 V	A A A	2 0.4 0.1			
Short-circuit protection						
Largest rated current of the fuses short-circuit current 1kA, without welding the contacts		gL (gG) / A	10			

DIN-RAIL PANEL PRODUCTS

Installation contactor IS – Switching of lamp loads

LAMP TYPE	OUTPUT Watt	CURRENT I_n / A	CAPACITOR µ F	MAX. NUMBER OF LAMPS PER CONDUCTING PATH FOR 230 V 50 HZ AND MAX. 60 °C			
				IS20..	IS25..	IS40..	IS63..
Incandescent lamps	60	0,27	-	22	28	92	129
	100	0,45	-	13	17	55	77
	200	0,91	-	7	8	27	38
	300	1,36	-	4	5	19	26
	500	2,27	-	3	3	11	16
	1000	4,5	-	1	1	6	8
Fluorescent lamps Uncompensated or Serially compensated	11	0.16	1,3	60	75	210	310
	18	0.37	2,7	25	30	90	140
	24	0.35	2,5	25	30	90	140
	36	0.43	3,4	20	25	70	140
	58	0.67	5,3	14	17	45	70
	65	0.67	5,3	13	16	40	65
	85	0.8	5,3	11	14	35	60
Fluorescent lamps Duo switching	11	0.07	-	2 x 100	2 x 110	2 x 220	2 x 250
	18	0.11	-	2 x 50	2 x 55	2 x 130	2 x 200
	24	0.14	-	2 x 40	2 x 44	2 x 110	2 x 160
	36	0.22	-	2 x 30	2 x 33	2 x 70	2 x 100
	58	0.35	-	2 x 20	2 x 22	2 x 45	2 x 70
	65	0.35	-	2 x 15	2 x 16	2 x 40	2 x 60
	85	0.47	-	2 x 10	2 x 11	2 x 30	2 x 40
Fluorescent lamps Parallel compensation	11	0.09	2	30	43	67	107
	18	0.13	2	20	32	50	80
	24	0.16	3	15	32	50	80
	36	0.27	4	10	32	50	80
	58	0.45	7	6	18	36	46
	65	0.5	7	5	18	36	46
	85	0.6	8	4	18	33	44
Fluorescent lamps with electronic ballast	18	0.09	-	40	40	100	150
	36	0.16	-	20	20	50	75
	58	0.25	-	15	15	30	55
	2 x 18	0.17	-	2 x 20	2 x 20	2 x 50	2 x 60
	2 x 36	0.32	-	2 x 10	2 x 10	2 x 25	2 x 30
	2 x 58	0.49	-	2 x 7	2 x 7	2 x 15	2 x 20
Transformers for low-voltage halogen lamps	20	0.09	-	40	52	110	174
	50	0.22	-	20	24	50	80
	75	0.33	-	13	16	35	54
	100	0.43	-	10	12	27	43
	150	0.65	-	7	9	19	29
	200	0.87	-	5	5	14	23
	300	1.3	-	3	4	9	14
Mercury high-pressure lamps uncompensated e.g. high-pressure mercury lamp and metal halide lamp	50	0.61	-	16	21	38	55
	80	0.8	-	12	16	29	40
	125	1.15	-	8	11	20	28
	250	2.15	-	4	6	11	15
	400	3.25	-	3	4	7	10
	700	5.4	-	1	2	4	6
	1000	7.5	-	1	1	3	4
Mercury high-pressure lamps compensated e.g. high-pressure mercury lamp and metal halide lamp	50	0.28	7	7	18	36	50
	80	0.41	8	5	16	31	44
	125	0.65	10	3	13	25	35
	250	1.22	18	2	7	14	19
	400	1.95	25	1	5	10	14
	700	3.45	45	1	3	6	8
	1000	4.8	60	-	2	4	6

LAMP TYPE	OUTPUT Watt	CURRENT I_n / A	CAPACITOR µ F	MAX. NUMBER OF LAMPS PER CONDUCTING PATH FOR 230 V 50 HZ AND MAX. 60 °C			
				IS20..	IS25..	IS40..	IS63..
Metal halogen lamps uncompensated e.g. high-pressure mercury lamp and metal halide lamp, CDM	35	0.53	-	22	24	57	65
	70	1	-	12	14	30	35
	150	1.8	-	6	8	17	18
	250	3	-	4	5	10	12
	400	3.5	-	3	4	8	10
	1000	9.5	-	1	1	3	4
	2 000	16.5	-	-	-	2	2
	2 000 / 400 V	10.5	-	-	-	2	2
	3 500 / 400 V	18	-	-	-	1	1
Metal halogen lamps compensated e.g. high-pressure mercury lamp and metal halide lamp, CDM	35	0.25	6	8	21	42	58
	70	0.45	12	4	11	21	29
	150	0.75	20	2	7	13	18
	250	1.5	33	1	4	9	11
	400	2.1	35	1	4	9	10
	1000	5.8	95	-	1	3	4
	2 000	11.5	148	-	-	2	2
	2 000 / 400 V	6.6	58	-	-	3	4
	3 500 / 400 V	11.6	100	-	-	2	3
Metal halogen lamps with electronic ballast (e.g. PCI) 50 -125 x I_n lamps for 0.6 ms	20	0.1	Integrated	9	9	18	20
	35	0.2	Integrated	6	6	11	13
	70	0.36	Integrated	5	5	10	12
	150	0.7	Integrated	4	4	8	10
Low pressure sodium vapour lamps uncompensated	35	1.5	-	7	9	22	30
	55	1.5	-	7	9	22	30
	90	2.4	-	4	6	13	19
	135	3.3	-	3	4	10	14
	150	3.3	-	3	4	10	14
	180	3.3	-	3	4	10	14
	200	3.3	-	3	4	10	14
Low pressure sodium vapour lamps compensated	35	0.31	20	3	6	15	18
	55	0.42	20	2	6	15	18
	90	0.63	30	1	4	10	12
	135	0.94	45	1	3	7	8
	150	1	40	1	3	8	9
	180	1.16	40	1	3	8	9
	200	1.32	25	-	-	10	12
High pressure sodium vapour lamps uncompensated	150	1.8	-	5	8	17	22
	250	3	-	4	5	10	13
	330	3.7	-	3	4	8	10
	400	4.7	-	2	3	6	8
	1000	10.3	-	1	1	3	4
High pressure sodium vapour lamps compensated	150	0.83	20	2	7	20	25
	250	1.5	33	1	4	12	15
	330	2	40	1	3	10	13
	400	2.4	48	1	2	8	12
	1000	6.3	106	-	1	4	6
High pressure sodium vapour lamps Sodium vapour lamps with electronic ballast (e.g. PCI) 50 - 125 x I_n lamp for 0.6 ms	20	0.1	Integrated	9	9	18	20
	35	0.2	Integrated	6	6	11	13
	70	0.36	Integrated	5	5	10	12
	150	0.7	Integrated	4	4	8	10

STAIRWAY LIGHT TIME SWITCHES
WITH PRE-WARNING
OF SWITCH-OFF

230 V AC 50 / 60 Hz
16 A 1 NO (not floating)
Time range 1 to 30 minutes
Incandescent lamp load 2300 W
Glow lamp current 50 mA

1 M

	ITEM NO.	WEIGHT g / EACH	PACKING UNIT
	TZA2301	76	12

TZA2301 Stairway light time switches
Stand-by loss only 0.5 Watt.
Contact circuit in zero crossing to protect the contacts and lamps. This is especially good for increasing the endurance for energy-saving lamps. Very low switching noise.
Exact time settings from 1 to 30 minutes with minute scale.
Control, supply and switching voltage 230 V. Also with galvanically separated universal control voltage 8...230 V UC.
Glow lamp current up to 50 mA, independent of the glow lamp ignition voltage.
Own continuous light switch with large rotary switch.

When the pre-warning switch-off is activated, the light flickers approx. 30 seconds before time elapses and 3 times in total in shorter and shorter periods.

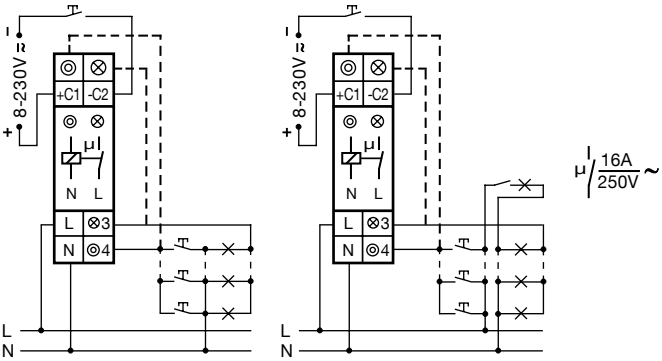
When the continuous light button is activated, pressing the button for longer than one second can activate the continuous light, which is automatically switched off after 60 minutes or can be switched off by pressing for longer than 2 seconds.
If the continuous light button and the pre-warning of switch-off are activated, then the pre-warning of switch-off only activates after switching off the continuous light.
If energy-saving lamps are switched (ESL) completely or partly, then set the pre-warning of switch-off and the continuous light button on the right ESL side of the rotary switch.
Within 1 second after switch-on or subsequent switch-on, the **time** can be **extended** (pumped) with the TLZ functions by briefly pressing the button three times. Every touch adds one time to the set time.

Multifunctional: Can switch between the **FS** (impulse relay), **ST** (relay) and **ESV** (impulse relay with release delay) functions.
The ESV function, the times (t) settable with the rotary switch above correspond to the following values: 1 = 2 min, 2 = 5 min, 3 = 10 min, 4 = 15 min, 6 = 25 min, 8 = 35 min, 10 = 45 min, 12 = 60 min, 20 = 90 min, 30 = 120 min.
After the set delay time has elapsed, automatic switch-off is carried out if the manual OFF command was not given. Pre-warning of switch-off and the continuous light button can be connected for ESV. Forgotten continuous light is switched off after 2 hours.

Connection examples

3-conductor circuit
with subsequent switching

4-condictor circuit,
with attic lighting,
with subsequent switching

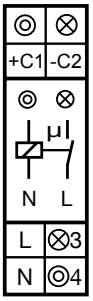


Automatic mode:

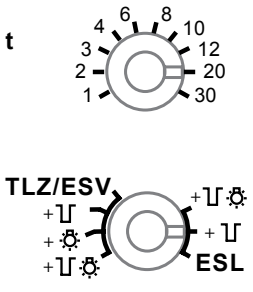
pre-warning switch

continuous light button

TLZ: t_{max} = 30 min
ESV: t_{max} = 120 min



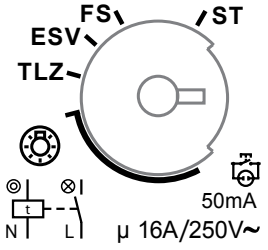
With double connections for button and lamp so that they can be connected above and below or only below.



Time setting
TLZ / ESL t = time 1 to 30 minutes
ESV t = time 2 to 120 minutes

Function selection switch TLZ / ESV and ESL

= Pre-warning of switch-off
= Continuous light button
= Continuous light button + pre-warning of switch-off
= Continuous light switch



Technical data stairway light time switch	**TZA2301 ***
Contacts	
Contact material / contact interval	$AgSnO_2$ / 0.5mm
Interval control connections / contact	3 mm
Interval A1-A2 / contact	6 mm
Test voltage control connections / contact	2 000 V
Test voltage A1-A2 / contact	4 000 V
Nominal switching capacity AC	16 A / 250 V
Incandescent lamps and halogen lamp load 230 V [1)]	2 300 W
Fluorescent lamp load (conventional ballast) In DUO switching or uncompensated	1 000 VA
Fluorescent lamp load (conventional ballast) with parallel compensation or with electronic ballast	500 VA
Compact fluorescent lamps with electronic ballast And energy-saving lamps ESL	15 x 7 W 10 x 20 W
Endurance with rated load, cos φ = 1 or for incandescent lamps 1 000 W for 100 / h	$>10^5$
Endurance with rated load, cos φ = 0.6 to 100 / h	$>4 \times 10^4$
Switching frequency max.	10^3 / h
Box terminal cross sections	12 mm^2
Maximum cross section of a conductor	6 mm^2
Screw head	Slotted / cross slot, pozidriv slot
Protection cover (device side)	VDE 0106 part 100

Electronics	
Switch-on duration	100%
Temperature at the installation location max. / min.	+50 °C / -20 °C
Stand-by loss (active power)	0.5 W
Control current locally at 230 V (<10 s) ± 20%	5 (100) mA
Max. parallel capacity (approx. length) of the individual control lines for 230 V AC	0.06 µF (approx. 200 m)

Fulfilled EN 61000-6-3, EN 61000-6-1 and EN 60 669 standards
With pre-warning of switch-off acc. to DIN 18015-2

* Bistable relay as NOC. Wait for automatic synchronisation after installation before applying the switched load to the mains.

1) For lamps with max. 150 W.

DIN-RAIL PANEL PRODUCTS

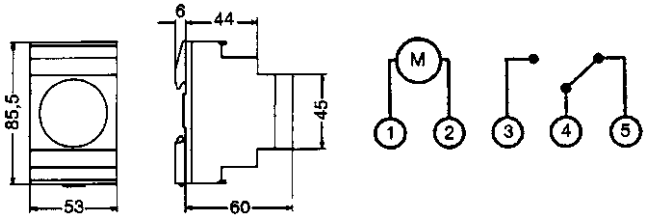
Synchronised / Quartz time switch

SYNCHRONISED TIME SWITCH

230 V~ 50 Hz
16 A, 1 CO contact
without power reserve

3 M

	ITEM NO.	WEIGHT g/EACH	PACKING UNIT
24 h	**AZ1TS**	200	1
7 Tage	**AZ7TS**	200	1

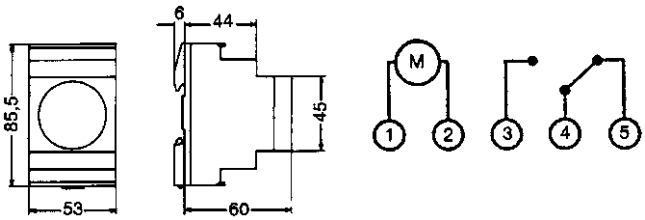


QUARTZ TIME SWITCH

230 V~ 50 / 60 Hz
16 A, 1 CO contact
Power reserve 150 h

3 M

	ITEM NO.	WEIGHT g/EACH	PACKING UNIT
24 h	**AZ1TQ**	200	1
7 Tage	**AZ7TQ**	200	1



Technical data / type	AZ1TS / AZ7TS	AZ1TQ / AZ7TQ
Operating voltage	220 - 240 V AC	230 V AC / 130 V DC
Frequency	50 Hz	45 - 60 Hz
Power consumption	approx. 1 VA	
Power reserve	–	150 h battery
Charge time	–	70 h
Accuracy	Network synchronisation	± 2.5 sec. / day at 20 °C
Minimum switch-on duration · Daily program · Weekly program	30 min 3 h	
Programming · Daily program · Weekly program	30 min 3 h	
Manual switch	Continuous OFF / clock operations / continuously ON	
Contacts	1 CO contact	
Contact power · with ohmic load cos. φ = 1 · with inductive load cos. φ = 0.6	16 A / 250 V AC µ 4 A / 250 V AC	
For incandescent lamps	1350 W	
Temperature range	-25 °C to +55 °C	
Protection class	II acc. to EN 60335-1	
Degree of protection	IP20 acc. to EN 60529	

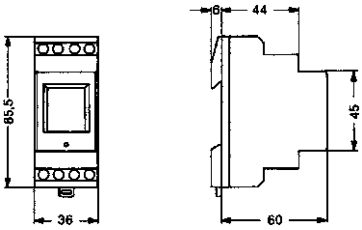
DIN-RAIL PANEL PRODUCTS
Digital timer

DIGITAL TIMER
230 V~, 50/60 Hz, 16 A
1 channel, 50 storage places
2 channels, 50 storage places
Program 24 h, 7 days

2 M

	ITEM NO.	WEIGHT g / EACH	PACKING UNIT
1 channel	**DZ201**	170	1
2 channels	**DZ302**	170	1

Technical data / Typ	**DZ201**	**DZ302**
Operating voltage	220-240 V / 50-60 Hz	
Power input up to 230 V~ (AC)	5 VA	
Switching capacity AC Ohmic load (VDE, IEC) Inductive load cos. φ 0,6 Incandescent lamp load	 16 A / 250 V AC 8 A / 250 V AC 1000 W	
Switching capacity DC 24 V– 50 V– 220 V–	 800 mA 300 mA 150 mA	
Switching output	Floating	
Switching contacts	1 CO contact	2 CO contact
Ambient temperature	–25 °C *) ... + 55 °C	
Protection class	II acc. to EN 60335-1	
Accuracy	type ± 1 s / day when +20 °C	
Power reserve	3 years ex works for +20 °C	
Shortest switching time	1 min	
Programmable	1 min	
Storage places	50	
Manual switch	Automatic / pre-selection Fix ON/ Fix OFF	
Block formation of week days	Free assignment	
Display switch state	Yes	
Daylight saving time option	automatic / free selection / off	
Max. conductor cross section	4 mm²	
Type of connection	Captive ± screw terminals	
Sealable	Yes	
Programming	Menu in 15 languages	



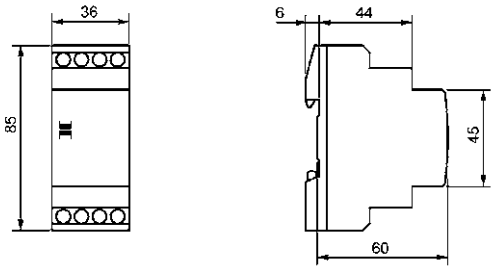
*) for limited display functions

SAFETY BELL
TRANSFORMER

230 V~ 50 Hz
U/I secondary
8 - 12 V / 1 – 0.67 A
Short-circuit proof with PTC

2 M

	ITEM NO.	WEIGHT g/EACH	PACKING UNIT
8 VA	**KT08**	211	1

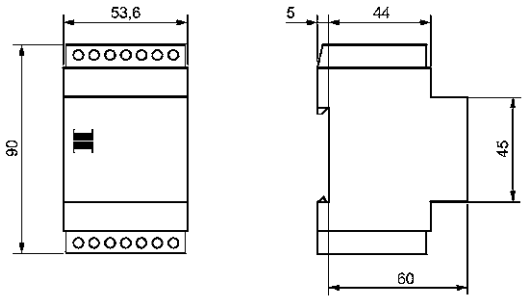


SAFETY BELL
TRANSFORMER

230 V~ 50 Hz
U/I secondary
16 VA 8-12-24 V / 1.3-1.3-0.67 A
24 VA 8-12-24 V / 2-2-1 A
Short-circuit proof with PTC

3 M

	ITEM NO.	WEIGHT g/EACH	PACKING UNIT
16 VA	**KT16**	537	1
24 VA	**KT24**	758	1

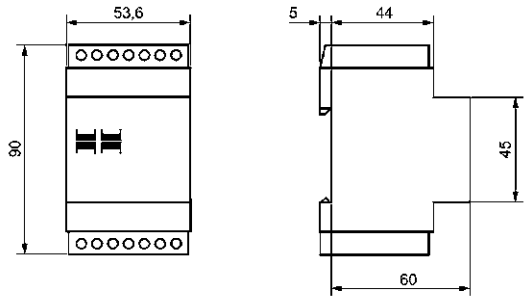


SAFETY TRANSFORMER

230 V~ 50 Hz
U/I secondary 12-12 V / 1.67-1.67 A
Parallel circuit 12 V / 3.3 A
Series circuit 24 V / 1.67 A
Short-circuit proof with PTC

3 M

	ITEM NO.	WEIGHT g/EACH	PACKING UNIT
40 VA	**ST40**	790	1

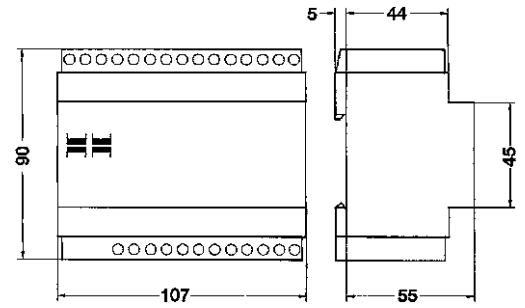


SAFETY TRANSFORMER

230 V~ 50 Hz
U/I secondary 12-12 V / 2.63-2.63 A
Parallel circuit 12 V / 5.25 A
Series circuit 24 V / 2.63 A
Short-circuit proof with PTC

6 TE

	ITEM NO.	WEIGHT g/EACH	PACKING UNIT
63 VA	**ST63**	1731	2




L1
1
L2
3
L3
5
OFF
OFF
OFF
ABL
MA16M
EAC
6
L1
3
L2
4
L3
6

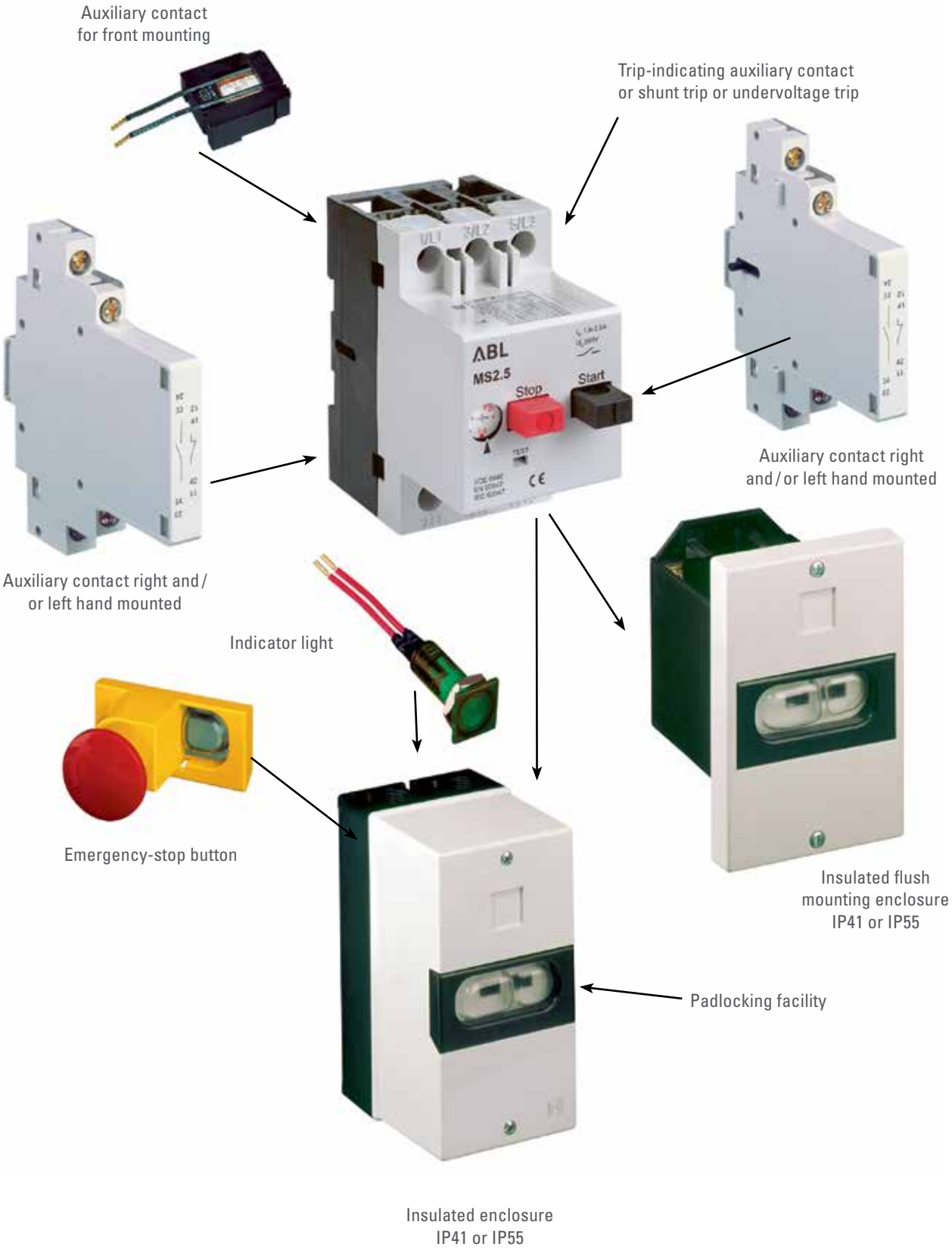
MOTOR PROTECTIVE CIRCUIT BREAKERS MS

MOTOR PROTECTIVE CIRCUIT BREAKERS MS **90**
Motor Protective Circuit Breakers MS/BS 91
Transformer Protective Circuit Breakers MST 92
Motor Protective Devices for variable-speed fan motors 92
Accessories 93
Technical Data 99

MOTOR PROTECTIVE CIRCUIT BREAKERS MA 102
Accessories 104
Busbars 105
Technical Data 106

MOTOR PROTECTIVE CIRCUIT BREAKERS MS

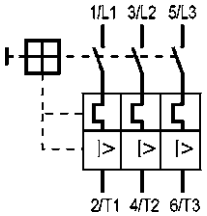
Overview



MOTOR PROTECTIVE CIRCUIT BREAKERS MS/BS

acc. to IEC 60947-4-1, UL 508

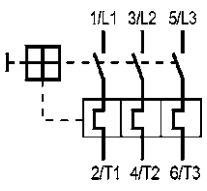
The MS motor protective circuit breakers offer optimal protection for motors and other loads up to 32 A, due to its high breaking capacity with strongly limited current.
They are equipped with phase failure sensitivity, isolating and main switch functions; 14 ranges are covering nominal rated currents from 0.1 up to 32 A.
The MPCBs are self protected up to 6.3 A at 400 V. Ranges > 6.3 A provide a short circuit withstand rating of 6 kA. The MPCBs are temperature compensated; the actuating current of the short circuit trip is 12 x I_u.



FILE E 137938

RATED CURRENT A	MAX. RATED OPERATING POWER (kW/AC 3)			OPERATING CURRENT SHORT CIRCUIT TRIP (A)	ITEM NO.	WEIGHT g / EACH	PACKING UNIT
	400/415 V	500 V	690 V				
MS with overload and short circuit tripping Phase failure sensitivity							
0.1 – 0.16	–	–	0.06	1.92	**MS016**	250	1
0.16 – 0.25	**0.06**	0.06	0.12	3	**MS025**	250	1
0.25 – 0.4	**0.09**	0.12	0.18	4.8	**MS04**	250	1
0.4 – 0.63	**0.12**	0.18	0.25	7.6	**MS063**	250	1
0.63 – 1	**0.25**	0.37	0.55	12	**MS1**	250	1
1 – 1.6	**0.55**	0.75	1.1	19.2	**MS1.6**	250	1
1.6 – 2.5	**0.75**	1.1	1.5	30	**MS2.5**	250	1
2.5 – 4	**1.5**	2.2	3	48	**MS4**	250	1
4 – 6.3	**2.2**	3	4	75.6	**MS6.3**	250	1
6.3 – 10	**4**	5.5	7.5	120	**MS10**	250	1
10 – 16	**7.5**	9	12.5	192	**MS16**	250	1
16 – 20	**9**	12.5	15	240	**MS20**	250	1
20 – 25	**12.5**	15	22	300	**MS25**	250	1
25 – 32	**15**	18.5	–	384	**MS32**	250	1

*32 A without VDE, without UL-approval

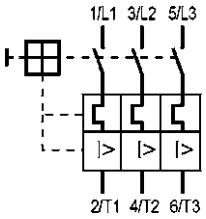


RATED CURRENT A	MAX. RATED OPERATING POWER (kW/AC 3)			OPERATING CURRENT SHORT CIRCUIT TRIP (A)	ITEM NO.	WEIGHT g / EACH	PACKING UNIT
	400/415 V	500 V	690 V				
0.4 – 0.63	**0.12**	0.18	0.25		**BS063**	230	1
0.63 – 1	**0.25**	0.37	0.55		**BS1**	230	1
1 – 1.6	**0.55**	0.75	1.1		**BS1.6**	230	1
1.6 – 2.5	**0.75**	1.1	1.5		**BS2.5**	230	1
2.5 – 4	**1.5**	2.2	3		**BS4**	230	1
4 – 6.3	**2.2**	3	4		**BS6.3**	230	1
6.3 – 10	**4**	5.5	7.5		**BS10**	230	1
10 – 16	**7.5**	9	12.5		**BS16**	230	1
16 – 20	**9**	12.5	15		**BS20**	230	1
20 – 25	**12.5**	15	22		**BS25**	230	1
25 – 32	**15**	18,5	-		**BS32**	230	1

*32 A without VDE-approval

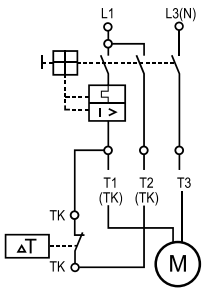
TRANSFORMER PROTECTIVE CIRCUIT BREAKERS MST

acc. to IEC 60947-4-1



RATED CURRENT A	MAX. RATED OPERATING POWER (kW/AC 3)			OPERATING CURRENT SHORT CIRCUIT TRIP (A)	ITEM NO.	WEIGHT g / EACH	PACKING UNIT
	400/415 V	500 V	690 V				
MST with overload and short circuit tripping for transformers with high inrush currents							
0.1 – 0.16	–	–	–	3.2	**MST016**	250	1
0.16 – 0.25	–	0.16	–	5	**MST025**	250	1
0.25 – 0.4	**0.16**	0.25	0.25	8	**MST04**	250	1
0.4 – 0.63	**0.25**	0.4	0.4	12.6	**MST063**	250	1
0.63 – 1	**0.4**	0.63	1	20	**MST1**	250	1
1 – 1.6	**0.63**	1	–	32	**MST1.6**	250	1
1.6 – 2.5	**1**	1.6	2	50	**MST2.5**	250	1
2.5 – 4	**1.6/1**	2.5	2.5	80	**MST4**	250	1
4 – 6.3	**2.5**	4	6.3	126	**MST6.3**	250	1
6.3 – 10	**4.0/5.0**	6.3	–	200	**MST10**	250	1
10 – 16	**6.3/8**	10	10	320	**MST16**	250	1
16 – 20	**12.5**	16	–	400	**MST20**	250	1
20 – 25	**12.5**	16	–	500	**MST25**	250	1

MOTOR PROTECTIVE DEVICES FOR VARIABLE-SPEED FAN MOTORS



RATED CURRENT A	ITEM NO.	WEIGHT g / EACH	PACKING UNIT
Motor protective devices for variable-speed fan motors			
0,4-10	MWC10	190	1

The MWC 10 is a multi-polar circuit breaker which allows a thermal contact, which is built into the motor (directly into the coil), to be analysed.

For example, if the motor is hindered due to dirt, the coil will heat up more than normal and the thermal contact (NC contact) in the coil will break the circuit.

The bimetal built into the circuit breaker recognizes the opening of the thermal contact in the motor coil and, with the smallest motor rated current, switches off all poles completely within max. 40 s.

However, this type of full motor protection neglects wiring protection. The connection from the full motor protection to the fan is not protected.
In order to protect this connection, a back-up fuse is needed which fits the conductor cross section. This back-up fuse is usually installed in front of the full motor protection.

ACCESSORIES FOR MOTOR PROTECTIVE CIRCUIT BREAKERS MS

FILE E 137938

MODULES	WIRING DIAGRAM	CONTACTS	ITEM NO.	WEIGHT g / EACH	PACKING UNIT
Auxiliary contact for side mounting					
½ M		2 NO	**HMS20**	40	5
½ M		1 NO + 1 NC	**HMS11**	40	5
½ M		1 NO	**HMS10**	40	5
½ M		2 NC	**HMS02**	40	5
½ M		1 NC	**HMS01**	40	5

Early make auxiliary contact for side mounting					
½ M		1 NO + 1 NC	**VHMS11**	40	5
½TE		2 NO	**VHMS20**	40	5

ACCESSORIES FOR MOTOR PROTECTIVE CIRCUIT BREAKERS MS

	WIRING DIAGRAM	CONTACTS	ITEM NO.	WEIGHT g / EACH	PACKING UNIT
Trip-indicating auxiliary contact for inside mounting					
		1 NO	**SHMS10**	25	10
		1 NC	**SHMS01**	25	10

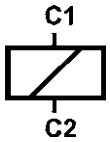
Auxiliary contact for front mounting					
		1 NO + 1 NC	**FHMS11**	13	10
		1 NO	**FHMS10**	11	10
		1 NC	**FHMS01**	11	10

Can not be used together with EHMS, SHMS, AMS and UMS.

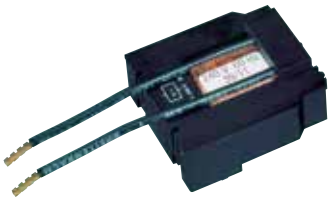
Technical Data	HMS, VHMS	FHMS	SHMS
Rated impulse withstand voltage U_{imp}	4 000 V		
Rated operating voltage U_e	500 V	250 V	500 V
Overvoltage category/Pollution level	III/3	III/3	III/3
Max. current (with free air circulation) I_{th}	6A	5A	6A
Rated operating current I_e	3.5/2 A	1 A/–	2/1 A
Can also be used for low voltage and PLC-inputs	24 V DC, 10 mA		
Cross section: 1 conductor mm^2 2 conductor mm^2 only HMS, VHMS	0.75 – 2.5 r; 0.75 – 1.5 f (with ferrule) 0.75 – 2.5 r; 0.75 – 1.5 f (with ferrule)		

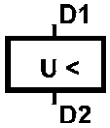
It is possible to equip the breakers with different auxiliary contacts. Auxiliary contacts HMS, FHMS and EHMS operate in accordance with the main contacts. They are designed for remote signaling, electrical interlocking and control applications. Early make contacts VHMS operate earlier than the main contacts. Trip-indicating auxiliary contacts SHMS operate in case of a fault.

FILE E 137938



	RATED OPERATING VOLTAGE	ITEM NO.	WEIGHT g / EACH	PACKING UNIT
Shunt trip for inside mounting with connecting cable (140 mm long)				
	110 V 50 Hz, 120 V 60 Hz	**AMS110**	75	10
	220-230V 50 Hz, 240 V 60 Hz	**AMS220**	75	10
	380-415 V 50 Hz, 440 V 60 Hz	**AMS380**	75	10
	24 V 50/60 Hz	**AMS24**	75	10
	500 V 50 Hz	**AMS500**	75	10
	24 V DC	**AMSD24**	75	10
	Pull-in voltage 0,7 x U_e		Switch in duration for U_e 100 % AC	





Undervoltage trip for inside mounting with connecting cable (140 mm long)				
	110 V 50 Hz, 120 V 60 Hz	**UMS110**	75	10
	220-230 V 50 Hz, 240 V 60 Hz	**UMS220**	75	10
	380-415 V 50 Hz, 440 V 60 Hz	**UMS380**	75	10
	24 V 50/60 Hz	**UMS24**	75	10
	500 V 50 Hz	**UMS500**	75	10
	Pull-in voltage ≥ 0.85 x U_e	Drop out voltage 0,35 - 0,7 x U_e	100%	Switch in duration for U_e

ACCESSORIES FOR MOTOR PROTECTIVE CIRCUIT BREAKERS MS

INSULATED ENCLOSURE IP41

with integrated PE(N)
terminal top and bottom each
2 metric knock-outs

	ITEM NO.	WEIGHT g/EACH	PACKING UNIT
	MS.G41	220	1

INSULATED FLUSH MOUNTING ENCLOSURE IP41

with integrated PE(N) terminal

	ITEM NO.	WEIGHT g/EACH	PACKING UNIT
	MS.F41	150	1

INSULATED ENCLOSURE IP55

with integrated PE(N)
terminal top and bottom each
2 metric knock-outs

	ITEM NO.	WEIGHT g/EACH	PACKING UNIT
	MS.G55	240	1

INSULATED FLUSH MOUNTING ENCLOSURE IP55

with integrated PE(N) terminal

	ITEM NO.	WEIGHT g/EACH	PACKING UNIT
	MS.F55	170	1

INSULATED ENCLOSURE WITH CEE-PLUG IP54

16 A 400 V
1 opening at the bottom

NO. OF POLES	ITEM NO.	WEIGHT g/EACH	PACKING UNIT
5-pole	**MS.C51**	420	1
4-pole	**MS.C41**	415	1
3-pole	**MS.C31**	410	1

INSULATED ENCLOSURE WITH CEE-PLUG IP54 AND PHASE-INVERTER

16 A 400 V
1 opening at the bottom

NO. OF POLES	ITEM NO.	WEIGHT g/EACH	PACKING UNIT
5-pol.	**MS.P51**	420	1

INSULATED ENCLOSURE WITH IP54 SCHUKO EARTHED PLUG

with 2 earthing systems
acc. to CEE7/VII
16 A 250 V, 2-pole + ⏚
1 opening at the bottom

NO. OF POLES	ITEM NO.	WEIGHT g/EACH	PACKING UNIT
2-pole + ⏚	**MS.C21**	410	1

Max. assembly of insulated enclosures

ITEM NO.	MS/BS	HMS VHMS	AMS/UMS SHMS/FHMS	MS.PT/MS.PV MS.PS2/MS.VS	MS.BS	MS.N	MS.SL
MS.G41	1	2	1	1	1	2	1
MS.G55	1	2	1	1	-	2	1
MS.F41	1	2	1	1	1	2	1
MS.F55	1	2	1	1	-	2	1
MS.C21	1	-	1	-	-	-	-
MS.C31	1	-	1	-	-	-	-
MS.C41	1	-	1	-	-	-	-
MS.C51	1	-	1	-	-	-	-
MS.P51	1	-	1	-	-	-	-

ACCESSORIES FOR MOTOR PROTECTIVE CIRCUIT BREAKERS MS

STOP BUTTON

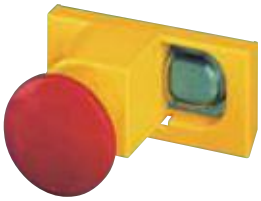
not latching
red, on grey surface

	ITEM NO.	WEIGHT g / EACH	PACKING UNIT
	MS.PT	55	5

PADLOCKING FACILITY

for up to three padlocks

	ITEM NO.	WEIGHT g / EACH	PACKING UNIT
	MS.VS	100	10



EMERGENCY-STOP BUTTON

latching, turn to release
red, on yellow surface

	ITEM NO.	WEIGHT g / EACH	PACKING UNIT
	MS.PV	60	5

KIT IP55

to increase degree of protection
from IP41 to IP55

	ITEM NO.	WEIGHT g / EACH	PACKING UNIT
	MS.BS	25	10

EMERGENCY-STOP BUTTON

latching, key release (2 keys)
red, on yellow surface

	ITEM NO.	WEIGHT g / EACH	PACKING UNIT
	MS.PS2	65	5

N-TERMINAL

connecting of fifth conductor

	ITEM NO.	WEIGHT g / EACH	PACKING UNIT
	MS.N	10	10

INDICATOR LIGHT

with glow bulb,
nominal rated voltage: 220-240 V

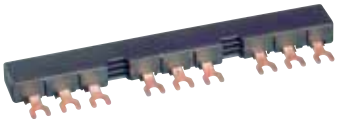
COLOUR	ITEM NO.	WEIGHT g / EACH	PACKING UNIT
green	**MS.SLG2**	10	5

INDICATOR LIGHT

with glow bulb,
nominal rated voltage: 380-440 V

COLOUR	ITEM NO.	WEIGHT g / EACH	PACKING UNIT
green	**MS.SLG3**	10	5

ACCESSORIES FOR MOTOR PROTECTIVE CIRCUIT BREAKERS MS



DESCRIPTION	MAX. BUSBAR CURRENT (A)	LENGTH	ITEM NO.	WEIGHT g / EACH	PACKING UNIT
Busbars					
for 2 MPCBs without auxiliary contacts	63	90 mm	**SB.D02**	37	10
for 3 MPCBs without auxiliary contacts	63	136 mm	**SB.D03**	55	10
for 4 MPCBs without auxiliary contacts	63	180 mm	**SB.D04**	75	10
for 2 MPCBs each with 1 auxiliary contact fitted on the right side	63	99 mm	**SB.D12**	40	10
for 3 MPCBs each with 1 auxiliary contact fitted on the right side	63	153 mm	**SB.D13**	65	10
for 4 MPCBs each with 1 auxiliary contact fitted on the right side	63	207 mm	**SB.D14**	90	10
for 5 MPCBs each with 1 auxiliary contact fitted on the right side	63	261 mm	**SB.D15**	115	10
for 2 MPCBs each with 2 auxiliary contacts	63	108 mm	**SB.D22**	45	10
for 4 MPCBs each with 2 auxiliary contacts	63	234 mm	**SB.D24**	105	10

Incoming terminal block					
	63		**SB.DE1**	30	10

Shroud					
			SB.DA1	5	10

MOTOR PROTECTIVE CIRCUIT BREAKERS MS
Technical Data

Standards	IEC 60947-4-1, DIN EN 60947-4-1, VDE 0660-102
Mechanical endurance	5000 switching cycles
Electrical endurance	1000 switching cycles
Max. operating frequency	30 switching cycles / h
Ambient temperature not enclosed, max./min. enclosed, max./min.	 -20°C to +55°C -20°C to 40°C
Resistance to mechanical shocks	15 g / 10 ms
Installation position	any, in IP41 enclosure vertical
Cross section (1 or 2 conductors)	1.0 – 6 r; 0.75 – 4 f (with ferrule) 2 conductors differing by not more than 2 sizes
Torque for terminal screws · Main conductor · Auxiliary conductor · Auxiliary contact for front mounting	 1.2 Nm 1.0 Nm 0.5 Nm
Rated impulse withstand voltage U_{imp}	6 000 V
Overvoltage category / Pollution level	III / 3
Rated operating voltage U_e	690 V AC
Rated operating current I_e	0.16 – 32 A according to setting range
Frequency	40…60 Hz
	At higher frequencies, the electromagnetic tripping values rise by a factor of about 1.1 at 100 Hz; 1.2 at 200 Hz; 1.4 at 400 Hz; 1.5 at 500 Hz
Utilization category (IEC 60947-4-1, DIN EN 60947-4-1, VDE 0660-102)	AC-3 max. 690 V
Temperature compensation (reference values to VDE / IEC)	-5 °C / +40 °C
Temperature compensation Operating range	-20 °C…+55 °C
Power loss in watt per path of current	by min. setting range 0.6 – 1.05 W / by max. setting range 1.5 – 2.6 W

Rated short circuit withstand rating I_{cu} MS
IEC 60947-2, DIN EN 60947-2, VDE 0660-101

UPPER SETTING THERMAL TRIPPING	I_{cu} (kA)				CURRENT LIMITER SBMS32 · I_{cu} (kA)	
	230 V	400 V	500 V	690 V	230 V	400 V
0,16 – 1,6 A	No additional protective devices needed inherently stable for any selected short circuit currents				No additional protective devices needed inherently stable for any selected short circuit currents	
2,5 – 6,3 A			3	2,5		
10 A		6	3	2,5		50
16 – 32 A	10	6	2,5	2	100	50

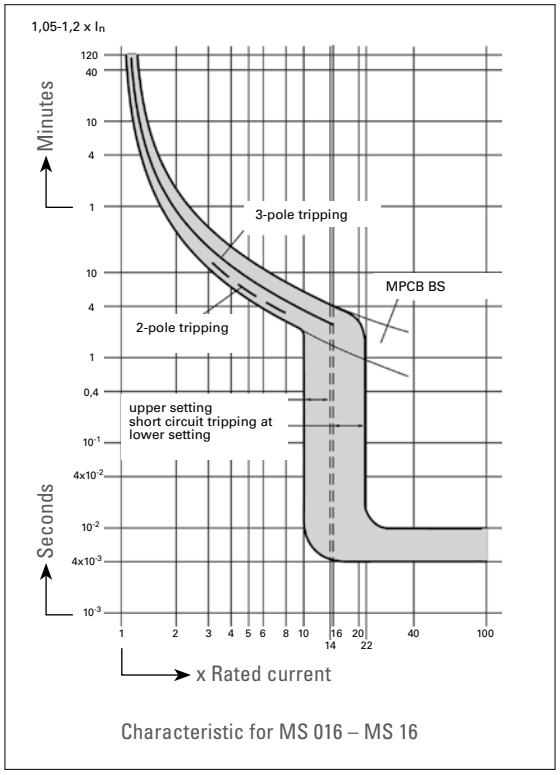
Switching times at short circuit
minimum command time 2 ms
opening delay 2 ms
opening time 7 ms

Back-up-protection MS (if the short circuit current is higher than the short circuit withstand rating of MS)

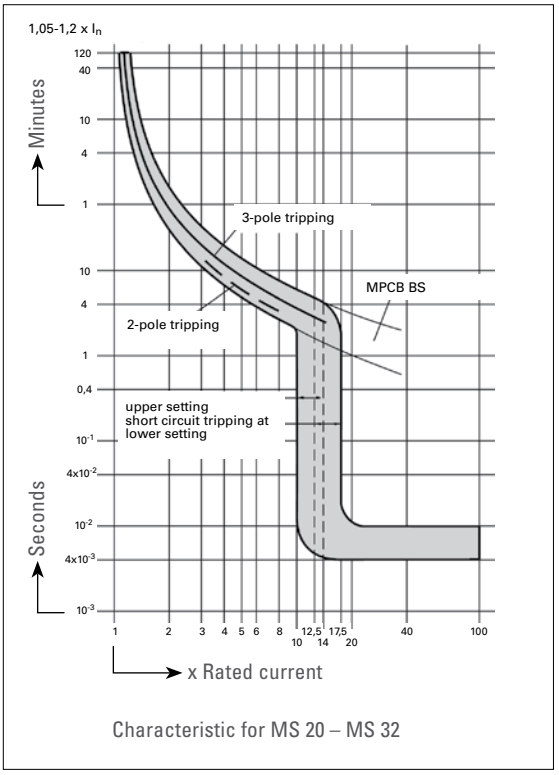
RATED CURRENT	BACK-UP FUSE (gL, aM) (A)			
	230 V	400 V	500 V	690 V
0,1 - 0,16 A	No back-up fuse necessary inherently stable for any selected short circuit currents			
0,16 - 0,25 A				
0,25 - 0,4 A				
0,4 - 0,63 A				
0,63 - 1 A				
1 - 1,6 A				
1,6 - 2,5 A			25	20
2,5 - 4 A			35	25
4 - 6,3 A			50	35
6,3 - 10 A		80	50	35
10 - 16 A	80	80	63	35
16 - 20 A	80	80	63	50
20 - 25 A	80	80	63	50
25 - 32 A	80	80	63	50

Back-up-protection BS

RATED CURRENT (A)	FUSE (A)	RATED CURRENT (A)	FUSE (A)	RATED CURRENT (A)	FUSE (A)
0,4 – 0,63	2	2,5 – 4	10	16 – 20	50
0,63 – 1	4	4 – 6,3	16	20 – 25	50
1 – 1,6	6	6,3 – 10	25	25 – 32	50
1,6 – 2,5	6	10 – 16	35		



Characteristic for MS 016 – MS 16

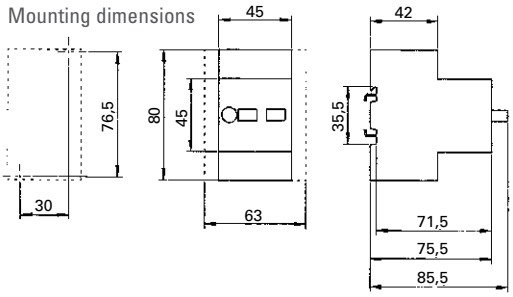


Characteristic for MS 20 – MS 32

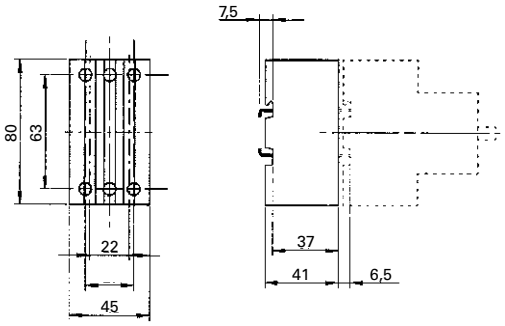
MOTOR PROTECTIVE CIRCUIT BREAKERS MS

Dimension Drawings

Motor protective circuit breaker MS

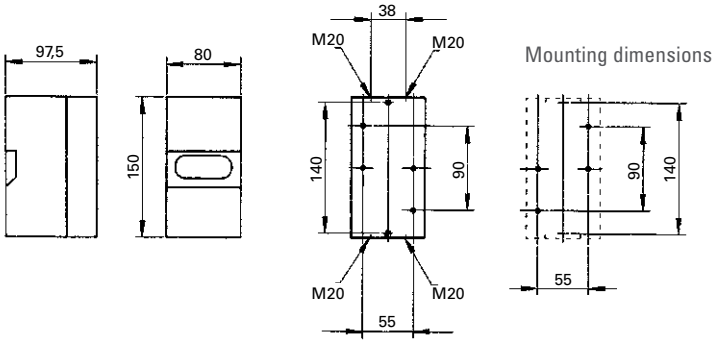


Current limiter SBMS32

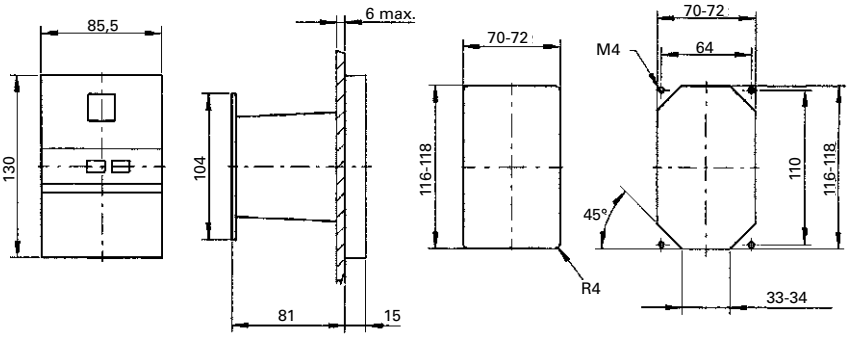


Insulated enclosure IP41 / IP55 MS.G41 / MS.G55

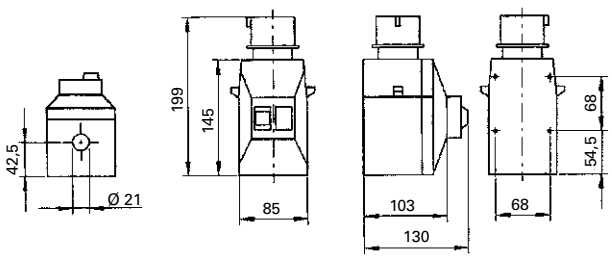
possible to integrate 1 MPCB
and 2 side mounted auxiliary contacts



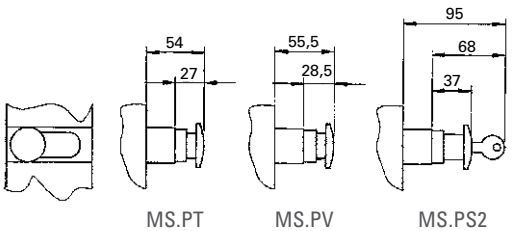
Insulated flush mounting enclosur MS.F41 / MS.F55



Insulated enclosure with CEE plug

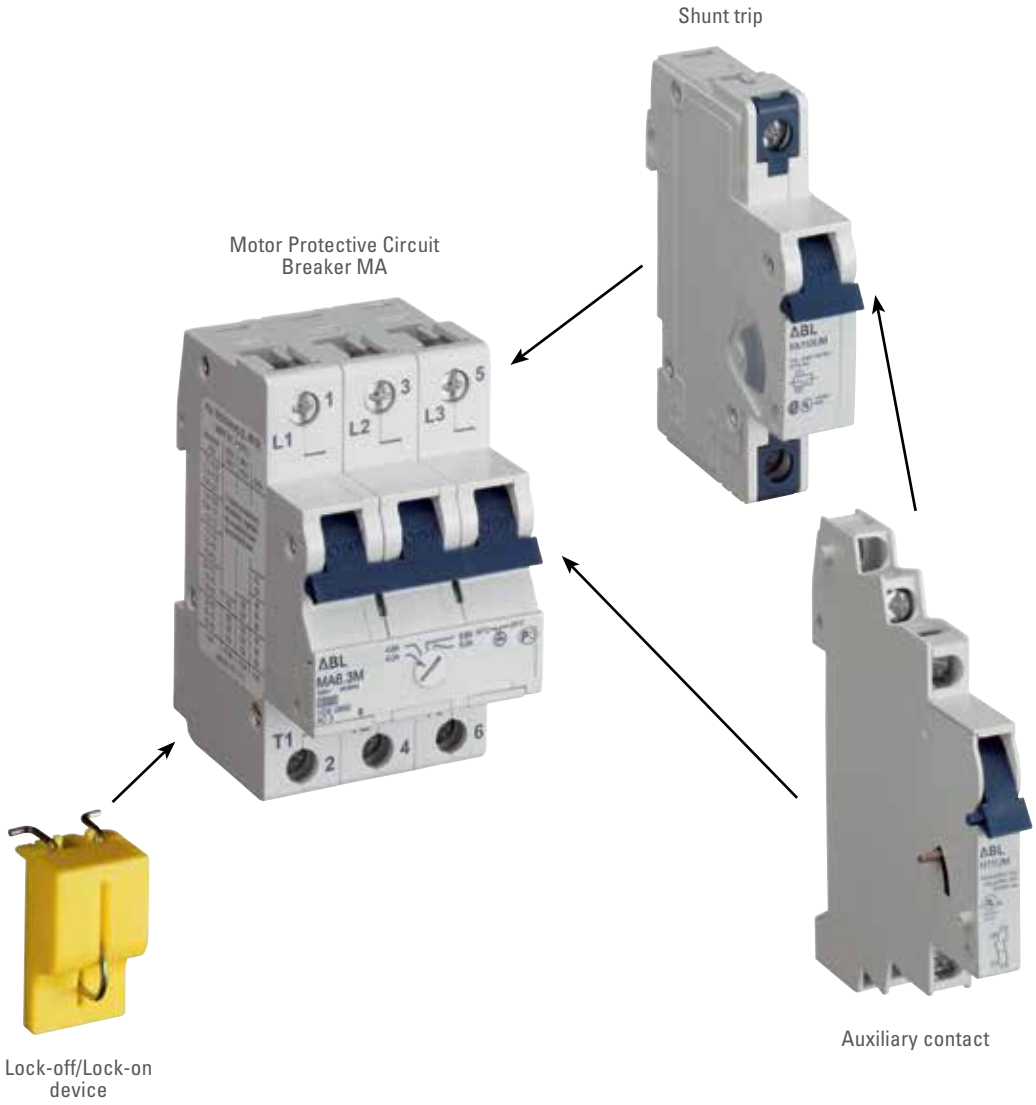


Emergency-stop button MS.PT – PS.PS2

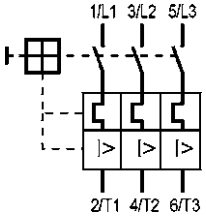


MOTOR PROTECTIVE CIRCUIT BREAKERS MA

Overview



MOTOR PROTECTIVE CIRCUIT BREAKERS MA
IEC 60947



RATED CURRENT [A]	MAX. RATED OPERATING POWER (KW/AC 3)			OPERATING CURRENT SHORT CIRCUIT TRIP [A]	ITEM NO.	WEIGHT G / EACH	PACKING UNIT
	400/415 V	500 V	690 V				
MA with overload and short circuit tripping Temperature compensation from +20 °C bis +40 °C adjustable							
0,1 – 0,16	–	–		1,92	**MA016M**	450	1
0,16 – 0,25	0,06	0,06		3	**MA025M**	450	1
0,25 – 0,4	0,09	0,12		4,8	**MA040M**	450	1
0,4 – 0,63	0,12	0,25		7,6	**MA063M**	450	1
0,63 – 1	0,25	0,37		12	**MA1.0M**	450	1
1 – 1,6	0,55	0,75		19,2	**MA1.6M**	450	1
1,6 – 2,5	0,75	1,1		30	**MA2.5M**	450	1
2,5 – 4	1,5	2,2		48	**MA4.0M**	450	1
4 – 6,3	2,2	3		75,6	**MA6.3M**	450	1
6,3 – 10	4	4		120	**MA10M**	450	1
10 – 16	7,5	9		192	**MA16M**	450	1
16 – 20	9	12,5		240	**MA20M**	450	1
20 – 25	12,5	15		300	**MA25M**	450	1
25 – 32	15	18,5		348	**MA32M**	450	1
32 – 40	18,5	22		480	**MA40M**	450	1

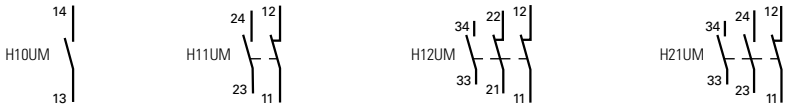
ACCESSORIES
for motor protective circuit breakers MA

Shunt trip

MODULE	RATED OPERATING VOLTAGE	MAX. OPERATING CURRENT AT U_n (t < 10 ms)	ITEM NO.	WEIGHT g / EACH	PACKING UNIT
1	12 V ≃	1,3 A	**FA12UM**	105	5
1	24 V ≃	0,6 A	**FA24UM**	105	5
1	48 - 72 V ≃	0,2 A	**FA48UM**	105	5
1	110 - 240 V ≃, 415 V~	0,25 A at 110 V	**FA110UM**	105	5
		0,5 A at 240 V			
		0,8 A at 415 V			
	Pull-in voltage 0.7 x U_e		Switch in duration for U_e 100%		

Auxiliary contact

MODULE	TYPE OF CONTACT	CONTACTS	ITEM NO.	WEIGHT g / EACH	PACKING UNIT
1/2	1 auxiliary contact	1NO	**H10UM**	35	10
1/2	2 auxiliary contacts	1NO + 1NC	**H11UM**	40	10
1/2	3 auxiliary contacts	1NO + 2NC	**H12UM**	45	10
1/2	3 auxiliary contacts	2NO + 1NC	**H21UM**	45	10

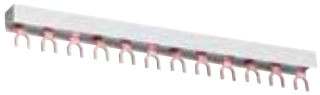


Standards	according to IEC 60947-5-1, DIN EN 60947-5-1, VDE 0660-200, UL 508	
Rated operating currents	10 A / 240 V AC 3 A / 110 V DC 1 A / 220 V DC	
Minimum contact load	1 mA at 24 V DC	
Conductor cross sections		
Type of conductor ***)**	min.	max.
Single wire	0.5 mm^2	2.5 mm^2
Stranded wire	0.5 mm^2	1.5 mm^2
Stranded wire with ferrule	0.5 mm^2	1.5 mm^2
Torque	max. 0.8 Nm	

***) Stripped length 8 - 9 mm**

ACCESSORIES

for motor protective circuit breakers MA



Busbars

CROSS SECTION (mm^2)	BUSBAR CURRENT START OF BUSBAR/ MIDDLE INFEED	MODULES/ PHASES	ITEM NO.	WEIGHT g / EACH	PACKING UNIT	PASSENDE ENDKAPPE ART.-NR.
3 phase						
10	63/100	4/3	**SB31210**	84	25	SB.A1
10	63/100	19/3	**SB36010**	420	20	SB.A1
16	80/130	19/3	**SB36016**	675	20	SB.A2
3 phase 3-pole circuit breaker + auxiliary contact						
16	80/130	16/3	**SB36316**	630	20	SB.A2

DISTANCE DEVICE 9 MM

MODULE	ITEM NO.	WEIGHT g / EACH	PACKING UNIT
½	HDS	7	10

LOCK-OFF/LOCK-ON DEVICE

For miniature circuit breakers and motor protective circuit breakers

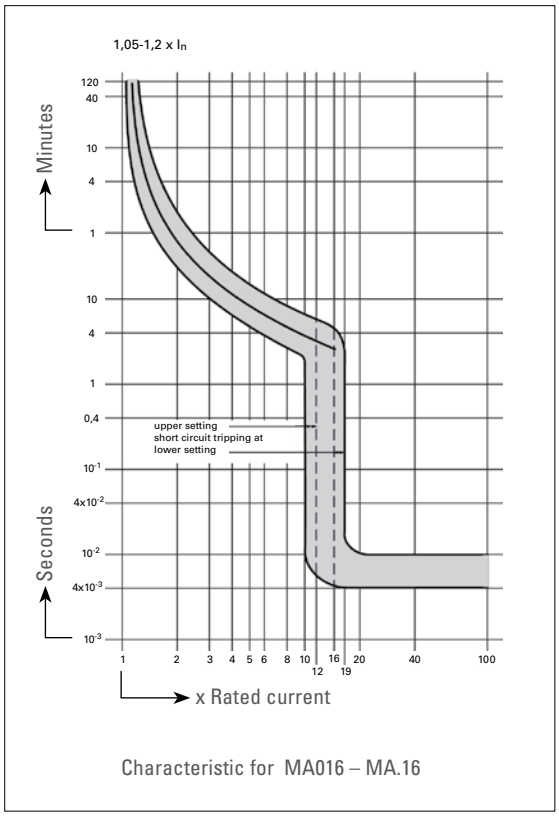
	ITEM NO.	WEIGHT g / EACH	PACKING UNIT
	EASS	4	10

Technical Data		
Standards		IEC 60947-2, DIN EN 60947-2, VDE 0660-101 IEC 60947-4-1, DIN EN 60947-4-1, VDE 0660-102 DIN VDE 0100, DIN VDE 0110, DIN VDE 0113
Short circuit withstand rating		10 kA at 240/415 V~
Utilization category		AC 3 at U_e 415 V~ (up to I_n 25 A)
Max. back-up fuse		Fuse according to DIN-VDE 0636 100 A operating class gL for 240/415 V~ (only for I_n > 10 A)
Rated voltage		500 V~ / 50-60 Hz
Rated current range		15 setting ranges from 0.1 up to 40 A
Rated uninterrupted current I_{th}		40 A
Tripping time at 6 x I_e		> 5s/TII
Test currents	Thermal not tripping I_1 (A) > 2 h	1.05 x I_e
	Thermal tripping I_2 (A) < 2 h	1.2 x I_e
	Electromagnetic not tripping I_4 (A) > 0.1 s	for the lower setting 16 x I_e (12.5 x I_e > 16 A) for the upper setting 10 x I_e
	Electromagnetic tripping I_5 (A) < 0.1 s	for the lower setting 19 x I_e (15 x I_e > 16 A) for the upper setting 12 x I_e
Temperature compensation		up to +40 °C
Permitted ambient temperature		open -20 °C to +50 °C, enclosure -20 °C to +40 °C storage/transport -40 °C to +70 °C
Device depth according to DIN 43880		68 mm
Mechanical endurance		30 000 switching cycles (30 000 ON / 30 000 OFF)
Permitted operating frequency		30 switching cycles / h
Protection cover		Safe for fingers and back of hand acc. to DIN EN 50274, VDE 0660-514 BGV A2
Degree of protection according to EN/IEC 60529		IP20
Installation position		any
Mounting		On DIN-rail acc. to DIN EN 60715 35 mm
Lockability		The handle can be secured against manual switching in the on and off position by a lead seal
Climatic resistance		Humid heat constant according to DIN IEC 60068-2 – 78 Humid heat cyclic according to DIN EN 60068-2 – 30
Vibration resistance		> 15 g according to DIN EN 60068-2 – 59 for a load with I_1
Resistance to mechanical shocks		25 g 11 ms

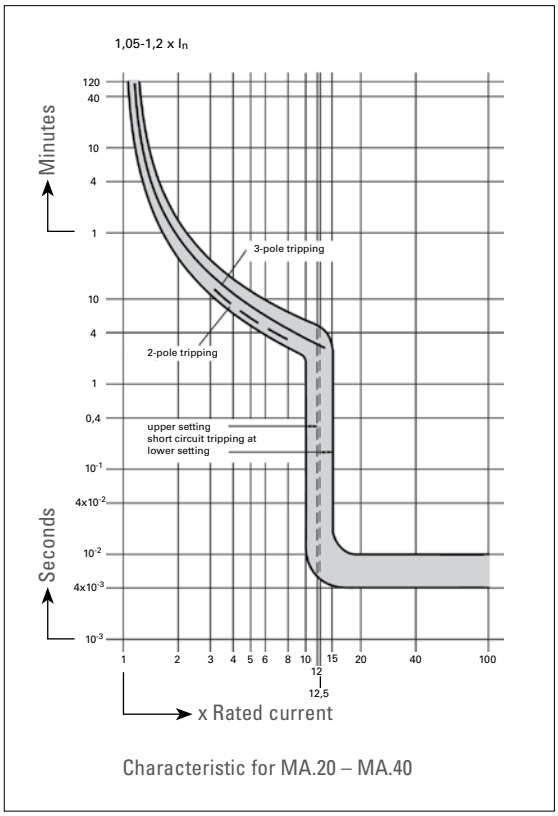
Conductor cross sections

	BOX TERMINAL BOTTOM		BOX TERMINAL TOP	
Type of conductor ***)**	max.	min.	max.	min.
Single wire	25 mm^2	0.5 mm^2	25 mm^2	0.5 mm^2
Multiple wire	25 mm^2	(16 mm^2)	25 mm^2	(16 mm^2)
Stranded wire	16 mm^2	0.5 mm^2	16 mm^2	0.5 mm^2
Stranded wire with ferrule	16 mm^2	0.5 mm^2	16 mm^2	0.5 mm^2
Busbar Cable lug	up to 3 mm thickness		up to 1.5 mm thickness	
Combined, conductor and busbar or cable lug	up to 25 mm^2 and up to 2 mm thickness		not possible	
Torque	max. 2.5 Nm			

***) Stripped length: bottom 12 - 14 mm, top 10 - 12 mm**



Characteristic for MA016 – MA.16



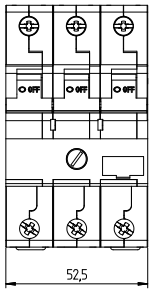
Characteristic for MA.20 – MA.40

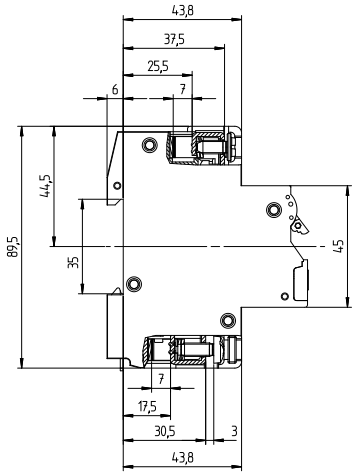
MOTOR PROTECTIVE CIRCUIT BREAKERS MA

Internal resistance per pole in mΩ and power loss in Watt of the complete device

TYPE	LOWER SETTING A	UPPER SETTING A	INTERNAL RESISTANCE PER POLE mΩ	POWER LOSS FOR THE COMPLETE DEVICE FOR	
				LOWER SETTING Watt	UPPER SETTING Watt
MA016M	0,10	0,16	85500	2,6	6,6
MA025M	0,16	0,25	35000	2,7	6,6
MA040M	0,25	0,40	15000	2,8	7,2
MA063M	0,40	0,63	5200	2,5	6,2
MA1.0M	0,63	1,0	2300	2,7	6,9
MA1.6M	1,0	1,6	950	2,9	7,3
MA2.5M	1,6	2,5	355	2,7	6,7
MA4.0M	2,5	4,0	142	2,7	6,8
MA6.3M	4,0	6,3	54	2,6	6,4
MA.10M	6,3	10	28	3,3	8,4
MA.16M	10	16	13,9	4,2	10,7
MA.20M	16	20	9,9	7,6	11,9
MA.25M	20	25	6,3	7,6	11,8
MA.32M	25	32	3,85	7,2	11,8
MA.40M	32	40	3,1	9,5	14,9

RATED CURRENTS (A)	RATED SHORT CIRCUIT WITHSTAND RATING I_{cu} ACCORDING TO IEC 60947-2. DIN EN 60947-2 I_{cu} (kA)			BACK-UP PROTECTION. IF THE SHORT CIRCUIT CURRENT EXCEEDS THE SHORT CIRCUIT WITHSTAND RATING BACK-UP FUSE (gL, aM) A WENN $I_{cc} > I_{cn}$		
	230 V	400 V	500 V	230 V	400 V	500 V
0,1 – 0,16	No additional protective devices needed inherently stable for any selected short circuit currents			No back-up fuse necessary inherently stable for any selected short circuit currents		
0,16 – 0,25						
0,25 – 0,4						
0,4 – 0,63						
0,63 – 1						
1 – 1,6						
1,6 – 2,5						
2,5 – 4			6			63
4 – 6,3			6			63
6,3 – 10			6			80
10 – 16		10	6		100	80
16 – 20	15	10	6	100	100	80
20 – 25	15	10	6	100	100	80
25 – 32	15	10	6	100	100	80
32 – 40	15	10	6	100	100	80





MOTOR PROTECTIVE CIRCUIT BREAKERS MS AND MA

Nominal rated motor currents

Nominal rated motor currents for three-phase motors (reference values for cage rotors)
Lowest possible short circuit fuse for three-phase motors. The maximum value is calculated according to setting range.

MOTOR POWER			230 V NOMINAL RATED MOTOR CURRENT	FUSE START-UP DIRECT	Y/Δ	400 V NOMINAL RATED MOTOR CURRENT	FUSE START-UP DIRECT	Y/Δ	500 V NOMINAL RATED MOTOR CURRENT	FUSE START-UP DIRECT	Y/Δ	690 V NOMINAL RATED MOTOR CURRENT	FUSE START-UP DIRECT	Y/Δ
kW	cos. φ	%	**A**	A	A	**A**	A	A	**A**	A	A	**A**	A	A
0,06	0,7	58	**0,37**	2	-	**0,21**	2	-	**0,17**	2	-	**0,12**	2	-
0,09	0,7	60	**0,54**	2	-	**0,31**	2	-	**0,25**	2	-	**0,18**	2	-
0,12	0,7	60	**0,72**	4	2	**0,41**	2	-	**0,33**	2	-	**0,24**	2	-
0,18	0,7	62	**1,04**	4	2	**0,6**	2	-	**0,48**	2	-	**0,35**	2	-
0,25	0,7	62	**1,4**	4	2	**0,8**	4	2	**0,7**	2	-	**0,43**	2	-
0,37	0,72	62	**2**	6	4	**1,2**	4	2	**0,9**	2	2	**0,7**	2	-
0,55	0,75	69	**2,7**	10	4	**1,5**	4	2	**1,2**	4	2	**0,9**	4	2
0,75	0,78	74	**3,2**	10	4	**1,9**	6	4	**1,5**	4	2	**1,1**	4	2
1,1	0,81	74	**4,6**	10	6	**2,6**	6	4	**2,1**	6	4	**1,5**	4	2
1,5	0,81	74	**6,3**	16	10	**3,6**	6	4	**2,9**	6	4	**2,1**	6	4
2,2	0,81	78	**8,7**	20	10	**5**	10	6	**4**	10	4	**2,9**	10	4
3	0,82	80	**11,5**	25	16	**6,6**	16	10	**5,3**	16	6	**3,8**	10	4
4	0,82	83	**14,8**	32	16	**8,5**	20	10	**6,8**	16	10	**4,9**	16	6
5,5	0,82	86	**19,6**	32	25	**11,3**	25	16	**9**	20	16	**6,5**	16	10
7,5	0,82	87	**26,4**	50	32	**15,2**	32	16	**12,1**	25	16	**8,8**	20	10
11	0,84	87	**38**	80	40	**21,7**	40	25	**17,4**	32	20	**12,6**	25	16
15	0,84	88	**51**	100	63	**29,3**	63	32	**23,4**	50	25	**17**	32	20
18,5	0,84	88	**63**	125	80	**36**	63	40	**28,9**	50	32	**20,9**	32	25
22	0,84	92	**71**	125	80	**41**	80	50	**33**	63	32	**23,8**	50	25
30	0,85	92	**96**	200	100	**55**	100	63	**44**	80	50	**32**	63	32
37	0,86	92	**117**	200	125	**68**	125	80	**54**	100	63	**39**	80	50
45	0,86	93	**141**	250	160	**81**	160	100	**65**	125	80	**47**	80	63
55	0,86	93	**173**	250	200	**99**	200	125	**79**	160	80	**58**	100	63
75	0,86	94	**233**	315	250	**134**	200	160	**107**	200	125	**78**	160	100
90	0,86	94	**279**	400	315	**161**	250	200	**129**	200	160	**93**	160	100
110	0,86	94	**342**	500	400	**196**	315	200	**157**	250	160	**114**	200	125
132	0,87	95	**401**	630	500	**231**	400	250	**184**	250	200	**134**	250	160
160	0,87	95	**486**	630	630	**279**	400	315	**224**	315	250	**162**	250	200
200	0,87	95	**607**	800	630	**349**	500	400	**279**	400	315	**202**	315	250
250	0,87	95	-	-	-	**437**	630	500	**349**	500	400	**253**	400	315
315	0,87	96	-	-	-	**544**	800	630	**436**	630	500	**316**	500	400
400	0,88	96	-	-	-	**683**	1000	800	**547**	800	630	**396**	630	400
450	0,88	96	-	-	-	**769**	1000	800	**615**	800	630	**446**	630	630
500	0,88	97	-	-	-	-	-	-	-	-	-	**491**	630	630
560	0,88	97	-	-	-	-	-	-	-	-	-	**550**	800	630
630	0,88	97	-	-	-	-	-	-	-	-	-	**618**	800	630

The nominal rated motor currents are valid for normal three-phase motors with surface and internal surface cooling with 1500 min-1.

Start-up direct: Start-up current max. 6 x nominal rated motor current
Start-up time max. 5 s.

Y/Δ Start-up: Start-up current max. 2 x nsominal rated motor current
Start-up time max. 15 s.
Set motor circuit breaker relays in a line to 0.58 x protective nominal rated motor current.

Nominal rated fuse currents for Y/Δ starts are also valid for three-phase motors with slip ring rotors.
Use larger fuses for a higher rated current, start-up current and / or a longer start-up time.
The table is valid for "delayed-action" or "gI" fuses (DIN VDE 0636)

For NH-fuses with aM characteristic, fuse = nominal rated current is selected.

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ITEM NO.	PAGE
AMS110	95
AMS220	95
AMS24	95
AMS380	95
AMS500	95
AMSD24	95
AS100	63
AS161	62
AS63	63
ASL161	62
AVU1W	75
AZ1TQ	85
AZ1TS	85
AZ7TQ	85
AZ7TS	85
B100T1	27
B100T2	27
B100T3	27
B100T4	27
B10DC1	20
B10DC2	20
B10N8R	30
B10S1	8
B10S3	8
B10T1	10
B10T1R	23
B10T2	11
B10T3	11
B10T4	12
B10T8	10
B10T9	12
B125T1	27
B125T2	27
B125T3	27
B125T4	27
B13DC1	20
B13DC2	20
B13N8R	30
B13S1	8
B13S3	8
B13T1	10
B13T2	11
B13T3	11
B13T4	12
B13T8	10
B13T9	12
B16DC1	20
B16DC2	20
B16N8R	30
B16S1	8
B16S3	8
B16SL1	9
B16T1	10
B16T2	11
B16T3	11
B16T4	12
B16T8	10
B16T9	12
B1DC1	20
B1DC2	20
B1T1	10
B1T2	11
B1T3	11
B1T4	12
B1T8	10
B1T9	12
B20DC1	20
B20DC2	20
B20N8R	30
B20S1	8
B20S3	8
B20T1	10
B20T2	11
B20T3	11
B20T4	12
B20T8	10
B20T9	12
B25DC1	20
B25DC2	20
B25N8R	30
B25S1	8
B25S3	8
B25T1	10
B25T2	11
B25T3	11
B25T4	12
B25T8	10
B25T9	12
B2DC1	20
B2DC2	20
B2T1	10
B2T2	11
B2T3	11
B2T4	12
B2T8	10
B2T9	12
B32DC1	20
B32DC2	20
B32N8R	30
B32S1	8
B32S3	8
B32T1	10
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B32T3	11
B32T4	12
B32T8	10
B32T9	12
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B3T2	11
B3T3	11
B3T4	12
B3T8	10
B3T9	12
B40DC1	20
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B40T3	11
B40T4	12
B40T8	10
B40T9	12
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B4DC2	20
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B4T2	11
B4T3	11
B4T4	12
B4T8	10
B4T9	12
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B63T3	11
B63T4	12
B63T8	10
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B6DC2	20
B6S1	8
B6S3	8
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B6T3	11
B6T4	12
B6T8	10
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B80T1	27
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B80T3	27
B80T4	27
BS063	91
BS1.6	91
BS10	91
BS16	91
BS1	91
BS2.5	91
BS20	91
BS25	91
BS32	91
BS4	91
BS6.3	91
C0.3T1	10
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C0.3T3	11
C0.3T4	12
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C100T3	27
C100T4	27
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C10S3	8
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C10T2	11
C10T3	11
C10T4	12
C10T8	10
C10T9	12
C125T1	27

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C125T2	27
C125T3	27
C125T4	27
C13DC1	20
C13DC2	20
C13N8R	30
C13S1	8
C13S3	8
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C13T3	11
C13T4	12
C13T8	10
C13T9	12
C16DC1	20
C16DC2	20
C16N8R	30
C16S1	8
C16S3	8
C16T1	10
C16T2	11
C16T3	11
C16T4	12
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C16T9	12
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C1T3	11
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C20S3	8
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C20T8	10
C20T9	12
C25DC1	20
C25DC2	20
C25N8R	30
C25S1	8
C25S3	8

ITEM NO.	PAGE
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D8T8	10
D8T9	12
DS2301W	74
DZ201	86
DZ302	86
EASS	105
EASS	23
FA110UM	104
FA12UM	104
FA24UM	104
FA48UM	104
FHMS01	94
FHMS10	94
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FL110	23
FL12	23
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G31006	26
G31009	26
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HL10	24
HL11	24
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HMS11	93
HMS20	93
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HWL20	24
HWL20PK	29
IR01210	64
IR23010	64
IR23011	64
IR23020	64
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IS2020	79
IS2522	79
IS2531	79
IS2540	79
IS4040	79
IS6340	79
ISD	23
ISD	79
ISH11	79
ISP2	79
ISP3	79
K0.3T1	10
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K0.3T3	11
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K0.3T9	12
K0.5T1	10
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K0.5T3	11
K0.5T4	12
K0.5T8	10
K0.5T9	12
K0.8T1	10
K0.8T2	11
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