Overview

Tripping characteristics

Tripping characteristics at an ambient temperature of 30 °C

Tripping characteristic	Standards	Thermal tripps Test currents:				Electromagnetic trips Test currents:		
		Limiting no-damage current	Minimum no-damage current	Tripping time $I_n \leq 63$ A	$I_n > 63$ A	Hold	Latest tripping instant	Tripping time
		I_1	I_2	t		I_4	I_5	t
A	IEC/EN 60898	1.13 x I_n		> 1 h	> 2 h	2 x I_n		≥ 0.1 s
			1.45 x I_n	< 1 h	< 2 h		3 x I_n	< 0.1 s
B	IEC/EN 60898 DIN VDE 0641 Part 11	1.13 x I_n		> 1 h	> 2 h	3 x I_n		≥ 0.1 s
			1.45 x I_n	< 1 h	< 2 h		5 x I_n	< 0.1 s
C	IEC/EN 60898	1.13 x I_n		> 1 h	> 2 h	5 x I_n		≥ 0.1 s
			1.45 x I_n	< 1 h	< 2 h		10 x I_n	< 0.1 s
D	DIN VDE 0641 Part 12	1.13 x I_n		> 1 h	> 2 h	10 x I_n		≥ 0.1 s
			1.45 x I_n	< 1 h	< 2 h		20 x I_n	< 0.1 s

Breaking capacity

Particular demands are made on miniature circuit-breakers with regard to breaking capacity.

The values are standardized and are determined according to the test conditions of IEC/EN 60898.
The most common values are 6 000 and 10 000.

For other test conditions, different values can be specified that are higher those of IEC/EN 60898.

One such standard is IEC/EN 60947-2 for circuit-breakers.

Rated short-circuit capacity

		EN 60898 (IEC 60898)		EN 60947-2 (IEC 60947-2)	
		1-pole 230 V AC	2, 3 and 4-pole 400 V AC	1-pole 230 V AC	2, 3 and 4-pole 400 V AC
Rated current	I_n [A]	I_{cn} [kA]	I_{cn} [kA]	I_{cu} [kA]	I_{cu} [kA]
5SQ2	0.5 ... 63	3	3	4.5	4.5
5SX2	0.5 ... 63	6	6	10 [1]	10 [1]
5SX4	0.5 ... 50	10	10	15 [2]	15 [2]
		E DIN VDE 0641 Part 12		**E DIN VDE 0641 Part 12**	
		1-pole 230 V AC	2-pole 400 V AC	1-pole 220 V AC	2-pole 440 V AC
Rated current	I_n [A]	I_{cn} [kA]	I_{cn} [kA]	I_{cu} [kA]	I_{cu} [kA]
5SX5	0.5 ... 32	4.5	4.5	10 [1]	10 [1]

1) I_n = 63 A corresponds to I_{cu} = 6 kA

2) I_n = 40 A and 50 A corresponds to I_{cu} = 10 kA

Miniature Circuit-Breakers

Introduction

Overview

Selective miniature circuit-breakers/fuses

Distribution systems are usually set up as radial networks. An overcurrent protection device is required for each reduction of the cable cross-section. This produces a series connection staggered according to rated currents, which should, if possible, be “selective”.

Selectivity means that, in the event of a fault, only the protective device that is directly next to the fault in the current circuit is tripped. This means that current circuits in parallel can maintain a power flow.

In the case of miniature circuit-breakers with upstream fuses, the selectivity limit depends largely on the current limiting and tripping characteristics of the miniature circuit-breaker and the melting I^2t value of the fuse.

This produces different selectivity limits for miniature circuit-breakers with different characteristics and rated short-circuit capacity.

The following tables provide information on the short-circuit currents up to which selectivity exists between miniature circuit-breakers and upstream fuse according to IEC 60269-2-1, DIN VDE 0636-201. The values specified in kA are limit values that were determined under unfavorable test conditions. Under normal practical conditions, you can often expect considerably better values, depending on the upstream fuses.

Limit values of selective line miniature circuit-breakers/fuses in kA

Downstream miniature circuit-breakers		**Upstream** fuses							
	I_n [A]	16 A	20 A	25 A	35 A	50 A	63 A	80 A	100 A
5SX2									
Characteristic A	≤ 2	0.4	0.7	2.0	•	•	•	•	•
	3	0.3	0.6	1.6	2.0	•	•	•	•
	4	0.3	0.6	0.9	1.6	•	•	•	•
	6	0.2	0.4	0.8	1.2	3.0	3.2	•	•
	10	--	0.4	0.6	1.1	2.2	3.0	•	•
	16	--	--	0.5	1.0	2.0	2.6	4.5	•
	20	--	--	--	1.0	2.0	2.4	4.1	•
	25	--	--	--	--	1.5	2.0	3.7	•
	32	--	--	--	--	1.2	1.8	3.0	5.0
	40	--	--	--	--	--	1.7	2.5	4.0
Characteristic B	6	0.3	0.4	0.7	1.2	3.0	3.2	•	•
	10	--	0.4	0.6	1.0	2.2	3.0	5.0	•
	13	--	--	0.5	1.0	2.2	3.0	5.0	•
	16	--	--	--	1.0	2.0	2.4	4.0	•
	20	--	--	--	--	2.0	2.4	4.0	•
	25	--	--	--	--	--	2.0	3.5	•
	32	--	--	--	--	--	1.7	2.9	•
	40	--	--	--	--	--	--	--	4.0
	50	--	--	--	--	--	--	--	4.0
Characteristic C	≤ 2	0.3	0.5	1.2	1.7	•	•	•	•
	3	0.3	0.4	0.8	1.4	4.0	5.0	•	•
	4	0.3	0.4	0.6	1.1	3.0	4.0	•	•
	6	--	0.4	0.6	1.0	2.4	3.2	•	•
	8	--	--	0.5	0.9	1.4	2.6	3.1	•
	10	--	--	0.5	0.9	1.4	2.1	3.1	•
	13	--	--	--	0.8	1.3	2.0	3.0	•
	16	--	--	--	0.8	1.3	2.0	3.0	•
	20	--	--	--	--	1.3	2.0	2.7	•
	25	--	--	--	--	--	2.0	2.4	5.0
	32	--	--	--	--	--	--	2.2	4.0
	40	--	--	--	--	--	--	--	3.5
	50	--	--	--	--	--	--	--	3.0
	63	--	--	--	--	--	--	--	3.0
Characteristic D	≤ 2	0.3	0.5	0.7	1.3	3.0	•	•	•
	3	0.3	0.4	0.7	1.2	3.0	•	•	•
	4	--	0.4	0.6	1.0	2.5	4.0	•	•
	6	--	--	0.5	0.9	2.0	3.0	•	•
	8	--	--	--	0.7	1.4	2.0	3.1	•
	10	--	--	--	--	1.4	2.0	3.1	•
	13	--	--	--	--	--	1.7	3.0	•
	16	--	--	--	--	--	1.7	3.0	•
	20	--	--	--	--	--	--	2.4	5.0
	25	--	--	--	--	--	--	--	5.0
	32	--	--	--	--	--	--	--	4.0
	40	--	--	--	--	--	--	--	--
	50	--	--	--	--	--	--	--	--

• ≙ ≥ rated short-circuit capacity 5SX2 acc. to EN 60898 6 000.

Overview

Selective miniature circuit-breakers/fuses

In the event of a short circuit, when using the 5SX4 MCBs and fuses according to to IEC 60269-2-1, DIN VDE 0636-201, selectivity is provided up to the indicated values in kA.

Limit values of selective line miniature circuit-breakers/fuses in kA

Downstream miniature circuit-breakers		**Upstream** fuses								
	I_n [A]	16 A	20 A	25 A	35 A	50 A	63 A	80 A	100 A	125 A
5SX4										
Characteristic B	6	0.3	0.4	0.8	1.4	3.2	4.5	9.0	•	•
	10	--	0.4	0.7	1.2	2.5	3.5	5.0	•	•
	13	--	--	0.7	1.2	2.5	3.5	5.0	•	•
	16	--	--	--	1.0	2.0	2.8	4.2	9.0	•
	20	--	--	--	1.0	2.0	2.6	4.2	9.0	•
	25	--	--	--	--	1.7	2.2	3.7	7.0	•
	32	--	--	--	--	1.7	2.2	3.7	7.0	•
	40	--	--	--	--	--	1.6	2.2	4.0	6.0
	50	--	--	--	--	--	--	2.2	4.0	6.0
	63	--	--	--	--	--	--	--	3.0	5.0
Characteristic C	≤ 2	0.3	0.5	1.5	2.0	9.0	•	•	•	•
	3	0.3	0.4	1.1	1.6	5.0	6.0	•	•	•
	4	0.3	0.4	0.9	1.4	3.5	5.0	9.0	•	•
	6	--	0.4	0.8	1.4	2.7	4.5	6.0	•	•
	8	--	--	0.6	1.2	2.2	3.5	5.0	7.0	•
	10	--	--	0.5	1.2	2.0	3.0	4.2	7.0	•
	13	--	--	--	1.0	1.6	2.4	3.4	6.0	•
	16	--	--	--	1.0	1.5	2.2	3.0	6.0	•
	20	--	--	--	--	1.3	2.2	3.0	6.0	•
	25	--	--	--	--	--	2.2	2.9	5.0	9.0
	32	--	--	--	--	--	--	2.4	4.0	7.0
	40	--	--	--	--	--	--	2.0	3.5	4.0
	50	--	--	--	--	--	--	--	3.0	4.0
	63	--	--	--	--	--	--	--	--	--

• ≙ ≥ rated short-circuit capacity 5SX4 acc. to EN 60898 10 000.

Miniature Circuit-Breakers

Introduction

Overview

Selective miniature circuit-breakers/circuit-breakers

Distribution systems can also be set up without fuses. In such cases, a circuit-breaker acts as an upstream protective device.

In this case, the selectivity limit depends on the level of peak current $\hat{I}$ let through by the miniature circuit-breaker and the tripping current of the circuit-breaker.

The following tables show the short-circuit current in kA up to which selectivity is guaranteed between miniature circuit-breakers and upstream circuit-breaker according to IEC/EN 60947-2 at 230/400 V AC, 50 Hz.

Limit values of selective miniature circuit-breakers/circuit-breakers in kA

Downstream miniature circuit-breakers				**Upstream** circuit-breakers								
				3RV1.1		**3RV1.2**						
	I_n [A]			10	12	8	10	12.5	16	20	22	25
		$I >$[A]		120	144	96	120	150	192	240	264	300
			I_{cn} [kA]	50	50	100	100	100	50	50	50	50
				Selectivity limits [kA] [1]								
5SX2												
Characteristic A	2	6	6	0.2	0.2	--	--	0.2	0.2	0.6	1.2	1.5
	10	30	6	--	--	--	--	--	--	0.3	0.5	0.5
	16	48	6	--	--	--	--	--	--	0.3	0.4	0.5
	32	96	6	--	--	--	--	--	--	--	--	--
	40	120	6	--	--	--	--	--	--	--	--	--
5SX2/5SX4												
Characteristic B	6	30	6/10	0.2	0.2	--	--	0.2	0.2	0.3	0.5	0.5
	10	50	6/10	--	0.2	--	--	0.2	0.2	0.3	0.4	0.5
	13	65	6/10	--	--	--	--	--	0.2	0.2	0.4	0.4
	16	80	6/10	--	--	--	--	--	--	0.2	0.4	0.4
	20	100	6/10	--	--	--	--	--	--	--	--	0.4
	25	125	6/10	--	--	--	--	--	--	--	--	--
	32	160	6/10	--	--	--	--	--	--	--	--	--
	40	200	6/10	--	--	--	--	--	--	--	--	--
	50	250	6/10	--	--	--	--	--	--	--	--	--
5SX2/5SX4												
Characteristic C	0.5	5	6/10	0.2	0.2	0.1	0.1	0.2	0.2	0.5	0.6	0.6
	1	10	6/10	0.2	0.2	0.1	0.1	0.2	0.2	0.5	0.6	0.6
	1.6	16	6/10	0.2	0.2	0.1	0.1	0.2	0.2	0.5	0.6	0.6
	2	20	6/10	0.2	0.2	0.1	0.1	0.2	0.2	0.5	0.6	0.6
	3	30	6/10	--	0.2	--	--	0.2	0.2	0.3	0.4	0.5
	4	40	6/10	--	0.2	--	--	0.2	0.2	0.3	0.4	0.5
	6	60	6/10	--	0.2	--	--	0.2	0.2	0.3	0.4	0.5
	8	80	6/10	--	0.2	--	--	0.2	0.2	0.2	0.4	0.4
	10	100	6/10	--	0.2	--	--	0.2	0.2	0.2	0.4	0.4
	13	130	6/10	--	--	--	--	--	0.2	0.2	0.4	0.4
	16	160	6/10	--	--	--	--	--	--	0.2	0.4	0.4
	20	200	6/10	--	--	--	--	--	--	--	--	0.4
	25	250	6/10	--	--	--	--	--	--	--	--	--
	32	320	6/10	--	--	--	--	--	--	--	--	--
	40	400	6/10	--	--	--	--	--	--	--	--	--
	50	500	6/10	--	--	--	--	--	--	--	--	--
	63	630	6	--	--	--	--	--	--	--	--	--
5SX2												
Characteristic D	2	40	6	--	--	--	--	0.2	0.2	0.4	0.6	0.6
	6	120	6	--	--	--	--	--	--	0.3	0.4	0.4
	10	200	6	--	--	--	--	--	--	0.2	0.4	0.4
	16	320	6	--	--	--	--	--	--	--	--	--
	32	640	6	--	--	--	--	--	--	--	--	--
	40	800	6	--	--	--	--	--	--	--	--	--
	50	1,000	6	--	--	--	--	--	--	--	--	--

1) In 240/415 V, 50 Hz systems, the selectivity limits are reduced by 10 %.
$I >$ ≙ tripping current.

Overview

Selective miniature circuit-breakers/circuit-breakers

In the event of a short-circuit, there is selectivity between miniature circuit-breakers and circuit-breakers according to IEC/EN 60947-2 up to the specified values in kA.

Limit values of selective line miniature circuit-breakers/fuses in kA

Downstream miniature circuit-breakers				**Upstream** circuit-breakers						
				3RV1.3						
	I_n [A]			16	20	25	32	40	45	50
		$I >$[A]		192	240	300	384	480	540	600
			I_{cn} [kA]	50	50	50	50	50	50	50
				Selectivity limits [kA] [1]						
5SX2										
Characteristic A	2	6	6	0.2	0.8	1.2	2.5	3	6	6
	10	30	6	0.2	0.4	0.5	0.6	0.8	1	1.2
	16	48	6	--	0.3	0.4	0.6	0.8	0.8	1
	32	96	6	--	--	--	--	0.6	0.8	0.8
	40	120	6	--	--	--	--	--	--	0.8
5SX2/5SX4										
Characteristic B	6	30	6/10	0.2	0.3	0.5	0.6	0.8	1	1.2
	10	50	6/10	0.2	0.3	0.4	0.6	0.8	1	1.2
	13	65	6/10	0.2	0.3	0.4	0.6	0.8	1	1
	16	80	6/10	--	0.3	0.4	0.6	0.8	1	1
	20	100	6/10	--	--	0.4	0.6	0.8	1	1
	25	125	6/10	--	--	--	0.5	0.6	0.8	0.8
	32	160	6/10	--	--	--	--	0.6	0.8	0.8
	40	200	6/10	--	--	--	--	--	--	0.8
	50	250	6/10	--	--	--	--	--	--	--
5SX2/5SX4										
Characteristic C	0.5	5	6/10	0.3	0.5	0.6	1	1	1.5	3
	1	10	6/10	0.3	0.5	0.6	1	1	1.5	3
	1.6	16	6/10	0.3	0.5	0.6	1	1	1.5	3
	2	20	6/10	0.3	0.5	0.6	1	1	1.5	3
	3	30	6/10	0.2	0.3	0.4	0.6	0.8	1	1
	4	40	6/10	0.2	0.3	0.4	0.6	0.8	1	1
	6	60	6/10	0.2	0.3	0.4	0.6	0.8	1	1
	8	80	6/10	0.2	0.2	0.4	0.6	0.6	0.8	1
	10	100	6/10	0.2	0.2	0.4	0.6	0.6	0.8	1
	13	130	6/10	0.2	0.2	0.4	0.6	0.6	0.8	1
	16	160	6/10	--	0.2	0.4	0.6	0.6	0.8	1
	20	200	6/10	--	--	0.4	0.6	0.6	0.8	1
	25	250	6/10	--	--	--	0.5	0.6	0.8	0.8
	32	320	6/10	--	--	--	--	0.6	0.8	0.8
	40	400	6/10	--	--	--	--	--	--	0.8
	50	500	6/10	--	--	--	--	--	--	--
	63	630	6	--	--	--	--	--	--	--
5SX2										
Characteristic D	2	40	6	0.3	0.5	0.6	0.8	1.2	1.5	1.5
	6	120	6	0.2	0.3	0.4	0.6	0.8	1	1
	10	200	6	--	0.3	0.4	0.5	0.6	0.8	0.8
	16	320	6	--	--	--	0.5	0.6	0.6	0.8
	32	640	6	--	--	--	--	--	0.6	0.6
	40	800	6	--	--	--	--	--	--	--
	50	1000	6	--	--	--	--	--	--	--

1) In 240/415 V, 50 Hz systems, the selectivity limits are reduced by 10 %.
$I >$ ≙ tripping current.

Miniature Circuit-Breakers

Introduction

Overview

Selective miniature circuit-breakers/circuit-breakers

In the event of a short-circuit, there is selectivity between miniature circuit-breakers and circuit-breakers according to IEC/EN 60947-2 up to the specified values in kA.

Limit values of selective miniature circuit-breakers/circuit-breakers in kA

Downstream miniature circuit-breakers				**Upstream** circuit-breakers									
				3RV1.4									
	I_n [A]			16	20	25	32	40	50	63	75	90	100
		$I >$[A]		192	240	300	384	480	600	756	900	1 080	1 140
			I_{cn} [kA]	100	100	100	100	100	100	100	100	100	100
				Selectivity limits [kA] [1]									
5SX2													
Characteristic A	2	6	6	0.5	0.8	1.5	2.5	3	6	6	6	6	6
	10	30	6	0.3	0.4	0.5	0.6	0.8	1,2	1.5	2.5	3	4
	16	48	6	--	0.3	0.5	0.6	0.6	1	1.5	2	3	3
	32	96	6	--	--	--	--	0.6	0.8	1.5	2	2.5	3
	40	120	6	--	--	--	--	--	0.8	1.2	1.5	2	2
5SX2/5SX4													
Characteristic B	6	30	6/10	0.2	0.4	0.5	0.6	0.8	1.2	2	3	6/10	6/10
	10	50	6/10	0.2	0.3	0.5	0.6	0.8	1	1.5	2.5	4	4
	13	65	6/10	0.2	0.3	0.5	0.6	0.8	1	1.5	2	3	3
	16	80	6/10	--	0.3	0.5	0.6	0.8	1	1.5	2	3	3
	20	100	6/10	--	--	0.5	0.6	0.8	1	1.5	2	3	3
	25	125	6/10	--	--	--	0.5	0.8	0.8	1.5	2	3	3
	32	160	6/10	--	--	--	--	0.6	0.8	1.5	2	3	3
	40	200	6/10	--	--	--	--	0.6	0.8	1.2	1.5	2.5	2.5
	50	250	6/10	--	--	--	--	--	--	1.2	1.5	2.5	2.5
5SX2/SX4													
Characteristic C	0.5	5	6/10	0.4	0.6	0.8	0.8	1	3	6/10	6/10	6/10	6/10
	1	10	6/10	0.4	0.6	0.8	0.8	1	3	6/10	6/10	6/10	6/10
	1.6	16	6/10	0.4	0.6	0.8	0.8	1	3	6/10	6/10	6/10	6/10
	2	20	6/10	0.4	0.6	0.8	0.8	1	3	6/10	6/10	6/10	6/10
	3	30	6/10	0.2	0.3	0.5	0.6	0.8	1	2	2.5	5	5
	4	40	6/10	0.2	0.3	0.5	0.6	0.8	1	2	2.5	5	5
	6	60	6/10	0.2	0.3	0.5	0.6	0.8	1	2	2.5	5	5
	8	80	6/10	0.2	0.3	0.4	0.6	0.6	1	1.5	2	3	3
	10	100	6/10	0.2	0.3	0.4	0.6	0.6	1	1.5	2	3	3
	13	130	6/10	0.2	0.3	0.4	0.6	0.6	1	1.5	2	3	3
	16	160	6/10	--	0.3	0.4	0.6	0.6	1	1.5	2	3	3
	20	200	6/10	--	--	0.4	0.6	0.6	1	1.5	2	3	3
	25	250	6/10	--	--	--	0.5	0.6	0.8	1.2	1.5	2.5	2.5
	32	320	6/10	--	--	--	--	0.6	0.8	1.2	1.5	2.5	2.5
	40	400	6/10	--	--	--	--	--	0.6	1	1.5	2	2
	50	500	6/10	--	--	--	--	--	--	1	1.2	1.5	2
	63	630	6/10	--	--	--	--	--	--	--	--	1.5	1.5
5SX2													
Characteristic D	2	40	6	0.4	0.5	0.6	0.8	1	1.5	3	4	6	6
	6	120	6	0.2	0.3	0.4	0.6	0.6	1	1.5	2.5	3	3
	10	200	6	--	0.3	0.4	0.5	0.6	0.8	1.5	2	3	3
	16	320	6	--	--	--	0.5	0.6	0.8	1.2	1.5	2.5	2.5
	32	640	6	--	--	--	--	--	0.6	1	1.5	2	2
	40	800	6	--	--	--	--	--	--	1	1.2	1.5	1.5
	50	1000	6	--	--	--	--	--	--	1	1.2	1.5	1.5

1) In 240/415 V, 50 Hz systems, the selectivity limits are reduced by 10 %.
$I >$ ≙ tripping current.

Overview

Selective miniature circuit-breakers/circuit-breakers

In the event of a short-circuit, there is selectivity between miniature circuit-breakers and circuit-breakers according to IEC/EN 60947-2 up to the specified values in kA.

Limit values of selective miniature circuit-breakers/circuit-breakers in kA

Downstream miniature circuit-breakers				**Upstream** circuit-breakers											
				3VF3 adjustable						**3VF3 non-adjustable**					
	I_n [A]			50	63	80	100	125	160	50	63	80	100	125	160
		$I >$[A]		500	630	800	1 000	1 250	1 600	400	500	630	800	1 000	1 280
			I_{cn} [kA]	40/70/100	40/70/100	40/70/100	40/70/100	40/70/100	40/70/100	40/70/100	40/70/100	40/70/100	40/70/100	40/70/100	40/70/100
				Selectivity limits [kA] [1]											
5SX2															
Characteristic A	2	6	6	6	6	6	6	6	6	6	6	6	6	6	6
	10	30	6	1.6	4.7	6	6	6	6	2.5	4	4	4.5	4.9	6
	16	48	6	1.4	4.7	6	6	6	6	2.3	3.7	3.7	4.4	5	6
	32	96	6	1.2	3.6	4.6	6	6	6	1.8	3	3	3.5	3.7	6
	40	120	6	1	2.5	3.1	6	6	6	1.5	2	2	2.4	2.7	3.2
5SX2/3SX4															
Characteristic B	6	30	6/10	2.1	6/10	6/10	6/10	6/10	6/10	3.2	6/10	6/9.7	6/10	6/10	6/10
	10	50	6/10	1.8	6/8	6/10	6/10	6/10	6/10	2.5	6/6.2	4.8	6/6.2	6/6.5	6/10
	13	65	6/10	1.6	5.1	8.2	6/10	6/10	6/10	2.3	4.6	3.8	4.6	5.1	6/8.9
	16	80	6/10	1.6	5.1	8.2	6/10	6/10	6/10	2.3	4.6	3.8	4.6	5.1	6/8.9
	20	100	6/10	1.6	5.1	8.2	6/10	6/10	6/10	2.3	4.6	3.8	4.6	5.1	6/8.9
	25	125	6/10	1.4	3.5	4.6	5.5	6	6/10	2.1	3.4	3	3.4	3.7	5.2
	32	160	6/10	1.4	3.5	4.6	5.5	6	6/10	2.1	3.4	3	3.4	3.7	5.2
	40	200	6/10	1.3	2.4	2.8	3.3	4.5	6.7	1.8	2.3	2.2	2.4	2.7	3.6
	50	250	6/10	--	2.4	2.8	3.3	4.3	5.8	--	2.3	2.2	2.4	2.7	3.6
5SX2/3SX4															
Characteristic C	0.5	5	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10
	1	10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10
	1.5	15	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10
	2	20	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10
	3	30	6/10	1.9	6/9.5	6/10	6/10	6/10	6/10	2.5	6/8.2	6/6.3	6/8.2	6/8.6	6/10
	4	40	6/10	1.9	6/9.5	6/10	6/10	6/10	6/10	2.5	6/8.2	6/6.3	6/8.2	6/8.6	6/10
	6	60	6/10	1.9	6/9.5	6/10	6/10	6/10	6/10	2.5	6/8.2	6/6.3	6/8.2	6/8.6	6/10
	8	80	6/10	1.7	4.2	6/7.9	6/10	6/10	6/10	2.3	3.7	3.8	3.8	4.6	6/9.4
	10	100	6/10	1.7	4.2	6/7.9	6/10	6/10	6/10	2.3	3.7	3.8	3.8	4.6	6/9.4
	13	130	6/10	1.5	4.2	5.5	6/10	6/10	6/10	2.1	3.7	3.8	3.8	4.4	6/7.5
	16	160	6/10	1.5	4.2	5.5	6/10	6/10	6/10	2.1	3.7	3.8	3.8	4.4	6/7.5
	20	200	6/10	1.5	4.2	5.5	6/10	6/10	6/10	2.1	3.7	3.8	3.8	4.4	6/7.5
	25	250	6/10	1.1	3.4	4.5	5.4	5.7	6/8.8	1.9	3	3	3	3.6	4.9
	32	320	6/10	1.1	3.4	4.5	5.4	5.7	6/8.8	1.9	3	3	3	3.6	4.9
	40	400	6/10	0.9	2.2	2.6	2.8	3.1	4.8	1.4	2.1	2.2	2.2	2.3	2.9
	50	500	6/10	--	2.1	2.5	2.8	3.1	4.8	--	--	2.1	2.1	2.2	2.9
5SX2															
Characteristic D	2	40	6	2.4	6	6	6	6	6	4.2	6	6	6	6	6
	6	120	6	1.4	4.2	4.8	6	6	6	2.3	4.1	4.2	4.2	4.3	6
	10	200	6	1.3	3.9	5.5	6	6	6	1.9	3.7	3.7	3.7	4	6
	16	320	6	1.1	3.5	4.2	4.9	6	6	1.7	3.3	3.7	3.3	3.5	4.7
	32	640	6	--	--	3.3	3.9	4.2	6	--	--	--	2.4	2.7	3.7
	40	800	6	--	--	--	3.1	3.3	4.9	--	--	--	--	1.5	3
	50	1000	6	--	--	--	--	2.9	4.8	--	--	--	--	--	2.6

1) In 240/415 V, 50 Hz systems, the selectivity limits are reduced by 10 %.
The selectivity limits for adjustable trips apply to the maximum value,
I_n = rated current.
$I >$ ≙ tripping current.

Miniature Circuit-Breakers

Introduction

Overview

Selective miniature circuit-breakers/circuit-breakers

In the event of a short-circuit, there is selectivity between miniature circuit-breakers and circuit-breakers according to IEC/EN 60947-2 up to the specified values in kA.

Limit values of selective miniature circuit-breakers/circuit-breakers in kA

Downstream miniature circuit-breakers				**Upstream** circuit-breakers														
				3VF4				**3VF5**				**3VF6**		**3VF7**	**3VF8**	**3WN1**	**3WN6**	
I_n [A]				125	160	200	250	200	250	315	400	315	400-800	400-1250	800-2500	315-6300	315-3200	
$I >$[A]				1250	1600	2000	2500	2000	2500	3150	4000	3200	1575-6400	15000	20000	3780-75600	3780-48000	
			I_{cn} [kA]	40/70/100	40/70/100	40/70/100	40/70/100	45/70/100	45/70/100	45/70/100	45/70/100	45/70/100	45/70/100	50/70/100	70/100	65/80/100	65/75	
				Selectivity limits [kA] [1]														
5SX2/3SX4																		
Characteristic A	2	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	
	10	30	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	
	16	48	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	
	32	96	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	
	40	120	6	3.9	4.6	6	6	6	6	6	6	6	6	6	6	6	6	
Characteristic B	6	30	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10
	10	50	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10
	13	65	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10
	16	80	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10
	20	100	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10
	25	125	6/10	6/9.6	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10
	32	160	6/10	6/9.6	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10
	40	200	6/10	6	6	6	6	6	6	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10
	50	250	6/10	5.1	5.9	6	6	6	6	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10
Characteristic C	0.5	5	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10
	1	10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10
	1.5	15	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10
	2	20	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10
	3	30	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10
	4	40	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10
	6	60	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10
	8	80	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10
	10	100	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10
	13	130	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10
	16	160	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10
	20	200	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10
	25	250	6/10	6/8	6/9.1	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10
	32	320	6/10	6/8	6/9.1	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10
	40	400	6/10	3.6	4.8	6/6.5	6/6.5	6/6.5	6/6.5	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10
	50	500	6/10	3.6	4.8	6/6.2	6/6.2	6/6.2	6/6.3	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10	6/10
Characteristic D	2	40	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
	6	120	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
	10	200	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
	16	320	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
	32	640	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
	40	800	6	4	4.9	6	6	6	6	6	6	6	6	6	6	6	6	6
	50	1000	6	4	4.8	6	6	6	6	6	6	6	6	6	6	6	6	6

1) In 240/415 V, 50 Hz systems, the selectivity limits are reduced by 10 %.
The selectivity limits for adjustable trips apply to the maximum value,
I_n = rated current.
$I >$ ≙ tripping current.

Overview

Selective miniature circuit-breakers/miniature circuit-breakers

Within narrow limits, miniature circuit-breakers also offer selectivity between circuit-breakers in a fuseless distribution board.
This depends on the let-through peak current $\hat{I}$ of the downstream miniature circuit-breaker and on the tripping current of the upstream miniature circuit-breaker.

The following table shows the short-circuit current in kA up to which there is selectivity between series-connected circuit-breakers at 230 V AC.

Limit values of selective miniature circuit-breakers/miniature circuit-breakers in kA

Downstream miniature circuit-breakers				**Upstream** miniature circuit-breakers								
				5SX4 7 Characteristic C					**5SP4 7 Characteristic C**		**5SP4 8 Characteristic D**	
	I_n [A]			20	25	32	40	50	80	100	80	100
		$I >$[A]		200	250	320	400	500	800	1 000	1 200	1 500
			I_{cn} [kA]	10	10	10	10	10	10	10	10	10
				Selectivity limits [kA]								
5SX2/5SX4												
Characteristic B	6	30	6/10	0.2	0.2	0.3	0.5	0.5	0.8	1.5	3	5
	10	50	6/10	0.2	0.2	0.3	0.5	0.5	0.8	1.2	3	4
	13	65	6/10	0.2	0.2	0.3	0.4	0.5	0.8	1.2	2	3
	16	80	6/10	0.2	0.2	0.3	0.4	0.5	0.8	1.2	2	3
	20	100	6/10	--	0.2	0.3	0.4	0.5	0.8	1.2	2	3
	25	125	6/10	--	--	--	0.4	0.4	0.6	1.2	1.5	3
	32	160	6/10	--	--	--	0.4	0.4	0.6	1.2	1.5	3
	40	200	6/10	--	--	--	--	0.4	0.6	1.2	1.5	2.5
	50	250	6/10	--	--	--	--	--	0.6	1	1.5	2.5
Characteristic C	0.5	5	6/10	0.2	0.3	0.5	0.8	0.8	1.2	4	6/10	6/10
	1	10	6/10	0.2	0.3	0.5	0.8	0.8	1.2	4	6/10	6/10
	1.5	15	6/10	0.2	0.3	0.5	0.8	0.8	1.2	4	6/10	6/10
	2	20	6/10	0.2	0.3	0.5	0.8	0.8	1.2	4	6/10	6/10
	3	30	6/10	0.2	0.2	0.3	0.5	0.5	0.8	1.5	3	4
	4	40	6/10	0.2	0.2	0.3	0.5	0.5	0.8	1.5	3	4
	6	60	6/10	0.2	0.2	0.3	0.5	0.5	0.8	1.5	3	4
	8	80	6/10	0.2	0.2	0.3	0.4	0.4	0.6	1.2	2.5	3
	10	100	6/10	0.2	0.2	0.3	0.4	0.4	0.6	1.2	2.5	3
	13	130	6/10	0.2	0.2	0.3	0.4	0.4	0.6	1.2	2	3
	16	160	6/10	0.2	0.2	0.3	0.4	0.4	0.6	1.2	2	3
	20	200	6/10	--	0.2	0.3	0.4	0.4	0.6	1.2	2	3
	25	250	6/10	--	--	--	0.3	0.4	0.6	1	1.5	2.5
	32	320	6/10	--	--	--	0.3	0.4	0.6	1	1.5	2.5
	40	400	6/10	--	--	--	--	--	--	0.8	1.5	2
	50	500	6/10	--	--	--	--	--	--	0.8	1.5	2
	63	630	6	--	--	--	--	--	--	0.8	1.2	1.5

Miniature Circuit-Breakers

Introduction

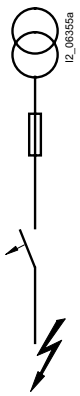
Overview

Back-up protection miniature circuit-breakers/fuses

If the maximum short-circuit current of the miniature circuit-breaker at the installation site is unknown, or if the specified rated short-circuit capacity is exceeded, an additional protective device must be connected upstream as back-up protection to prevent overloading of the miniature circuit-breaker. This is usually a fuse.

The following table shows the short-circuit currents in kA up to which back-up protection is guaranteed when using fuses according to IEC 60269-2-1, DIN VDE 0636-201.

Limit values of back-up protection miniature circuit-breakers/fuses in kA

Downstream miniature circuit-breakers		**Upstream** fuses					
	I_n [A]	50 A	63 A	80 A	100 A	125 A	160 A
5SX2/5SX4							
	0.3 ... 4	no back-up protection required up to 50 kA					
	6	50	50	50	50	50	35
	8	50	50	50	50	50	35
	10	50	50	50	50	50	35
	13	50	50	50	35	35	30
	16	50	50	50	35	30	30
	20	50	50	50	35	25	25
	25	50	50	50	35	30	25
	32	50	50	50	35	30	25
	40	50	50	50	50	25	15
	50	50	50	50	50	25	15
	63	50	50	35	25	25	15

Test circuit data:

U_p = 250 V
p.f. = 0.3 ... 0.5

Test cycle:

Acc. to EN 60947-2 (0 - C0)

Overview

Back-up protection miniature circuit-breakers/circuit-breakers

If MCBs are used in fuseless distribution boards, circuit-breakers are to be provided as back-up protection according to IEC/EN 60947-2.

The following table shows the short-circuit currents in kA up to which back-up protection is guaranteed if circuit-breakers are used.

Limit values of back-up protection miniature circuit-breakers/circuit-breakers in kA

Downstream MCBs			Upstream circuit-breakers											
			3VF3 adjustable						3VF3 non-adjustable					
I_n [A]			50	63	80	100	125	160	50	63	80	100	125	160
	I >[A]		500	630	800	1 000	1 250	1 600	400	500	630	800	1 000	1 280
	I_{cn} [kA]		40/70/100	40/70/100	40/70/100	40/70/100	40/70/100	40/70/100	40/70/100	40/70/100	40/70/100	40/70/100	40/70/100	40/70/100
			Back-up-protection up to kA											
5SX2/5SX4														
Characteristic A, Characteristic B, Characteristic C, Characteristic D	0.3 ... 4	6/10	No back-up protection required up to 50 kA											
	6	6/10	50	50	50	50	50	50	50	50	50	50	50	50
	8 ... 20	6/10	25	25	25	25	25	25	25	25	25	25	25	25
	25	6/10	20	20	20	20	20	20	20	20	20	20	20	20
	32	6/10	20	20	20	20	20	20	20	20	20	20	20	20
	40	6/10	20	20	20	20	20	20	20	20	20	20	20	20
	50	6/10	10	10	10	10	10	10	10	10	10	10	10	10
	63	6	10	10	10	10	10	10	10	10	10	10	10	10
5SQ2														
Characteristic B, Characteristic C	0.5 ... 2	3	6	6	6	6	6	6	6	6	6	6	6	6
	3, 4	3	4	4	4	4	4	4	4	4	4	4	4	4
	6 ... 63	3	4,5	4,5	4,5	4	4	4	4,5	4,5	4,5	4,5	4	4

Downstream MCBs			Upstream circuit-breakers											
			3VF4				3VF5				3VF6	3VF7	3VF8	3WN1/ 3WS1
I_n [A]			125	160	200	250	200	250	315	400	315 - 630	400 - 1 250	1 600 - 2 000	315 - 6 300
	I >[A]		1 250	1 600	2 000	2 500	2,000	2 500	3 150	4 000	3 200 - 6 300	15 000	20 000	3 780 - 75 600
	I_{cn} [kA]		40/70/100	40/70/100	40/70/100	40/70/100	45/70/100	45/70/100	45/70/100	45/70/100	45/70/100	50/70/100	70/100	65-100
			Back-up-protection up to kA											
5SX2/5SX4														
Characteristic A, Characteristic B, Characteristic C, Characteristic D	0.3 ... 4	6/10	No back-up protection required up to 50 kA											
	6	6/10	50	50	50	50	50	50	50	50	50	50	50	50
	8 ... 20	6/10	25	25	25	25	25	25	25	25	25	25	25	25
	25	6/10	20	20	20	20	20	20	20	20	20	20	20	20
	32	6/10	20	20	20	20	20	20	20	20	20	20	20	20
	40	6/10	20	20	20	20	20	20	20	20	20	20	20	20
	50	6/10	10	10	10	10	10	10	10	10	10	10	10	10
	63	6	10	10	10	10	10	10	10	10	10	10	10	10
5SQ2														
Characteristic B, Characteristic C	0.5 ... 2	3	3	6	6	6	6	6	6	6	6	6	6	6
	3, 4	3	3	4	4	4	4	4	4	4	4	4	4	4
	6 ... 63	3	3	3	3	3	3	3	3	3	3	3	3	3

Miniature Circuit-Breakers

Introduction

Overview

Internal resistance and power dissipation	Data per pole (loaded with I_n)							
I_n [A]	Type A		Type B		Type C		Type D	
	R_1 mΩ	P_v W	R_1 mΩ	P_v W	R_1 mΩ	P_v W	R_1 mΩ	P_v W
5SX2, 5SX4, 5SX5								
0.3	--	--	--	--	10 500	0.95	--	--
0.5	--	--	--	--	3 000	0.75	3 000	0.75
1	1 400	1.4	--	--	640	0.64	650	0.65
1.6	540	1.4	--	--	312	0.80	270	0.7
2	380	1.5	--	--	212	0.85	165	0.66
3	170	1.5	--	--	82	0.74	77	0.7
4	120	1.9	--	--	53	0.85	60	1
6	43	1.5	28	1.0	19	0.70	20	0.7
8	--	--	--	--	15	0.96	14	0.9
10	18	1.8	16.5	1.65	12.5	1.25	12	1.2
13	--	--	11.5	1.94	9	1.52	10	1.7
16	10	2.5	8.5	1.17	7.8	2	7	1.8
20	7.5	3	6.5	2.6	6	2.4	5.6	2.2
25	4.7	2.9	4.8	3	4.5	2.8	4.5	2.8
32	3.1	3.6	4	4.1	3.7	3.8	2.9	3
40	2.6	4.2	2.7	4.3	2.5	4	2.4	3.8
50	--	--	2	5	1.9	4.7	1.8	4.5
63	--	--	--	--	1.6	6.6	--	--
5SQ2								
0.5	--	--	--	--	8 000	2	--	--
1	--	--	--	--	1 850	1.85	--	--
1.6	--	--	--	--	631	1.62	--	--
2	--	--	--	--	690	2.76	--	--
3	--	--	--	--	260	2.34	--	--
4	--	--	--	--	170	2.72	--	--
6	--	--	77	2.8	68	2.45	--	--
8	--	--	--	--	42.5	2.72	--	--
10	--	--	16.2	1.6	13.5	1.95	--	--
13	--	--	10.3	1.7	8.1	1.37	--	--
16	--	--	8	2.1	6.8	1.74	--	--
20	--	--	5.9	2.3	5.5	2.2	--	--
25	--	--	5.2	3.2	4.6	2.87	--	--
32	--	--	3.9	4	2.6	2.66	--	--
40	--	--	3.1	4.96	2.3	3.68	--	--
50	--	--	--	--	1.8	4.5	--	--
63	--	--	--	--	1.5	5.95	--	--

Correction factor for power dissipation

- Direct current and alternating current up to 60 Hz: x 1.0
- Alternating current
  - 200 Hz: x 1.1
  - 400 Hz: x 1.15
  - 1 100 Hz: x 1.3

Overview

Personnel safety with miniature circuit-breakers

According to DIN VDE 0100-410 (IEC 60364-4-41), in order to protect against dangerous leakage currents in the TN system, the cross-sections of the conductor, or its distance from the protective device, must be dimensioned such that if a fault with negligible impedance occurs (i.e. a short-circuit) at any point between an phase conductor and a PE conductor, or a connected exposed conductive part, automatic tripping is achieved within the specified times of 0.4 s / 5 s.

This requirement is met through the following condition:

$Z_S \times I_a \leq U_O$

Z_S ≙ Impedance of the fault loop of all electrical circuits
I_a ≙ Current that trips within the specified times
U_O ≙ Voltage against ground

Maximum permissible impedance of fault loop at U_O = 230 V AC for compliance with trip conditions according to DIN VDE 0100-410.

I_n [A]	Characteristic A		Characteristic B		Characteristic C		Characteristic D	
	$t_a \leq 0.4$ s Ω	≤ 5 s Ω	$t_a \leq 0.4$ s Ω	≤ 5 s Ω	$t_a \leq 0.4$ s Ω	≤ 5 s Ω	$t_a \leq 0.4$ s Ω	≤ 5 s Ω
5SX, 5SQ								
0.3	--	--	--	--	76.6	153	--	--
0.5	--	--	--	--	46	92	--	92
1.0	76.6	76.6	--	--	23	46	15.3	46
1.6	47.9	47.9	--	--	14.4	28.8	9.6	28.8
2	38.3	38.3	--	--	11.5	23	7.6	23
3	25.5	25.5	--	--	7.7	15.4	5.1	15.4
4	19.1	19.1	--	--	5.8	11.6	3.8	11.6
6	12.7	12.7	7.6	7.6	3.8	7.6	2.5	7.6
8	--	--	--	--	2.8	5.7	1.9	5.7
10	7.6	7.6	4.6	4.6	2.3	4.6	1.1	4.6
13	--	--	--	3.57	1.7	3.4	0.9	3.4
16	4.7	4.7	2.9	2.9	1.4	2.8	0.7	2.8
20	3.8	3.8	2.3	2.3	1.1	2.2	0.5	2.2
25	3.0	3.0	1.8	1.8	0.9	1.8	0.4	1.8
32	2.4	2.4	1.4	1.4	0.7	1.4	0.3	1.4
40	1.9	1.9	1.1	1.1	0.6	1.2	0.28	1.2
50	--	--	0.9	0.9	0.5	1.0	0.23	1.0
63	--	--	0.7	0.7	0.4	0.8	0.2	0.8
80	--	--	--	--	0.3	0.6	0.14	0.6
100	--	--	--	--	0.2	0.4	0.1	0.4
125	--	--	--	--	0.16	0.3	0.1	0.3

At U_O = 240 V AC, Z_S x 1.04 applies.
At U_O = 127 V AC, Z_S x 0.55 applies.

Miniature Circuit-Breakers

Introduction

Overview

Fusing of luminaire circuits

Maximum permissible lamp load of a miniature circuit-breaker when operating fluorescent lamps L18 W, L 36 W, L 38 W, L 58 W.

Maximum number of fluorescent lamps

	I_n [A]	Lamp	Conventional ballast		Electronic ballast					
			Single-lamp		Full switching				Group switching	
			uncorrected	parallel corrected	single lamp		two lamps		single lamp	two lamps
5SX										
Characteristic			**all**	**all**	**B**	**C**	**B**	**C**	**all**	**all**
	10	L 18 W	21	26	20	40	27	56	80	92
		L 36 W	18	26	20	40	27	48	46	48
		L 38 W	18	26	20	40	27	46	44	46
		L 58 W	11	16	13	28	12	25	30	30
	13	L 18 W	28	34	26	52	35	72	104	121
		L 36 W	24	34	26	52	35	**62**	60	62
		L 38 W	24	34	26	52	35	**60**	57	60
		L 58 W	15	21	17	36	16	**33**	40	40
	16	L 18 W	34	42	32	65	44	89	128	150
		L 36 W	29	42	32	65	44	76	75	76
		L 38 W	29	42	32	65	44	75	70	75
		L 58 W	18	27	22	44	20	41	48	49
	20	L 18 W	43	52	40	81	56	112	160	187
		L 36 W	36	52	40	81	56	96	93	96
		L 38 W	36	52	40	81	56	92	88	92
		L 58 W	23	33	28	56	25	52	60	62
	25	L 18 W	53	66	51	102	68	139	200	235
		L 36 W	46	66	51	102	68	120	117	120
		L 38 W	46	66	51	102	68	116	110	116
		L 58 W	29	42	34	69	32	65	76	78
	32	L 18 W	68	84	65	131	89	179	250	300
		L 36 W	59	84	65	131	89	153	150	153
		L 38 W	59	84	65	131	89	150	141	150
		L 58 W	37	54	44	89	41	84	98	99

Comments:

Circuit impedance: The specified lamp load values apply, taking into account a line impedance of 800 mΩ. At 400 mΩ the permissible values are reduced by 10 %, at 200 mΩ by 20 %.

Reduction factors for miniature circuit-breakers for the simultaneously switching on of filament lamp load taking into account the rated current of the miniature circuit-breaker and the summated current of the lamps

	Reduction factors	
	Switching with miniature circuit-breaker	Switching with separate switch
5SX, 5SQ2		
Characteristic A	0.3	0.35
Characteristic B	0.5	0.6
Characteristic C	1	1
Characteristic D	1	1

Overview

Current carrying capacity of circuit- breakers with corrected and uncorrected HQ, HQI and NAV lamps (number)

		Lamp power [W]							
		35	70	150	250	400	1 000	2000	3 500
Lamp current	[A]	0.5	1	1.8	3	3.5	9.5	10.3	18
Corrected lamp current	[A]	0.3	0.5	1	1.5	2	6	5.5	9.8
Inrush peak	[A]	10	18	36	60	70	120	125	220

	I_n [A]	Lamp power [W]							
		35	70	150	250	400	1 000	2000	3 500
5SX2, 5SX4									
Characteristic B	6	3	1	0	0	0	0	0	0
	10	5	2	1	0	0	0	0	0
	13	6	3	1	1	1	0	0	0
	16	8	4	2	1	1	0	0	0
	20	10	5	2	1	1	0	0	0
	25	13	7	3	2	1	1	1	0
	32	16	8	4	2	2	1	1	0
	40	20	11	5	3	3	1	1	1
	50	21	12	6	3	3	1	1	1
Characteristic C	1	1	0	0	0	0	0	0	0
	1.6	2	1	0	0	0	0	0	0
	2	2	1	0	0	0	0	0	0
	3	3	1	0	0	0	0	0	0
	4	4	2	1	0	0	0	0	0
	6	6	3	1	1	0	0	0	0
	8	8	4	2	1	1	0	0	0
	10	10	5	2	1	1	0	0	0
	13	13	7	3	2	1	1	1	0
	16	16	9	4	2	2	1	1	0
	20	20	11	5	3	2	1	1	0
	25	25	14	7	4	3	2	1	1
	32	32	17	8	5	4	2	2	1
	40	40	22	11	6	5	3	3	1
	50	50	27	13	8	7	4	3	2
Characteristic D	1	1	0	0	0	0	0	0	0
	1.6	2	1	0	0	0	0	0	0
	2	2	1	0	0	0	0	0	0
	3	3	2	1	0	0	0	0	0
	4	5	2	1	1	0	0	0	0
	6	8	4	2	1	1	0	0	0
	8	11	5	3	2	1	0	0	0
	10	14	7	4	2	2	0	0	0
	13	18	9	5	3	2	1	1	0
	16	22	11	6	3	3	1	1	0
	20	28	14	7	4	4	1	1	0
	25	35	17	9	5	5	2	1	1
	32	44	22	12	7	6	2	2	1
	40	56	28	15	9	8	3	3	1
	50	70	35	19	11	10	4	3	2

Introduction

Overview

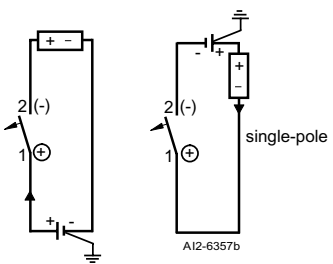
MCBs for DC and AC/DC

In DC networks up to 60 V or 120 V, all MCBs 5SX2 and 5SX4 are suitable for single-pole and double-pole application.

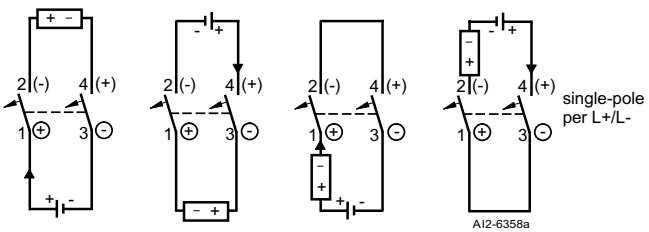
The 5SX5 design is required for higher voltages. Contrary to the standard product range, the 5SX5 MCBs are equipped with additional permanent magnets in the quenching chamber to support arc suppression.

For this reason, the polarity of the MCB is clearly marked and must be observed when connecting the cables and conductors.

Up to max. 220 V DC battery voltage



Up to max. 220 V DC battery voltage



Up to max. 440 V DC battery voltage