



9 Series
Final level of protection in electrical distribution

M9/Multi 9

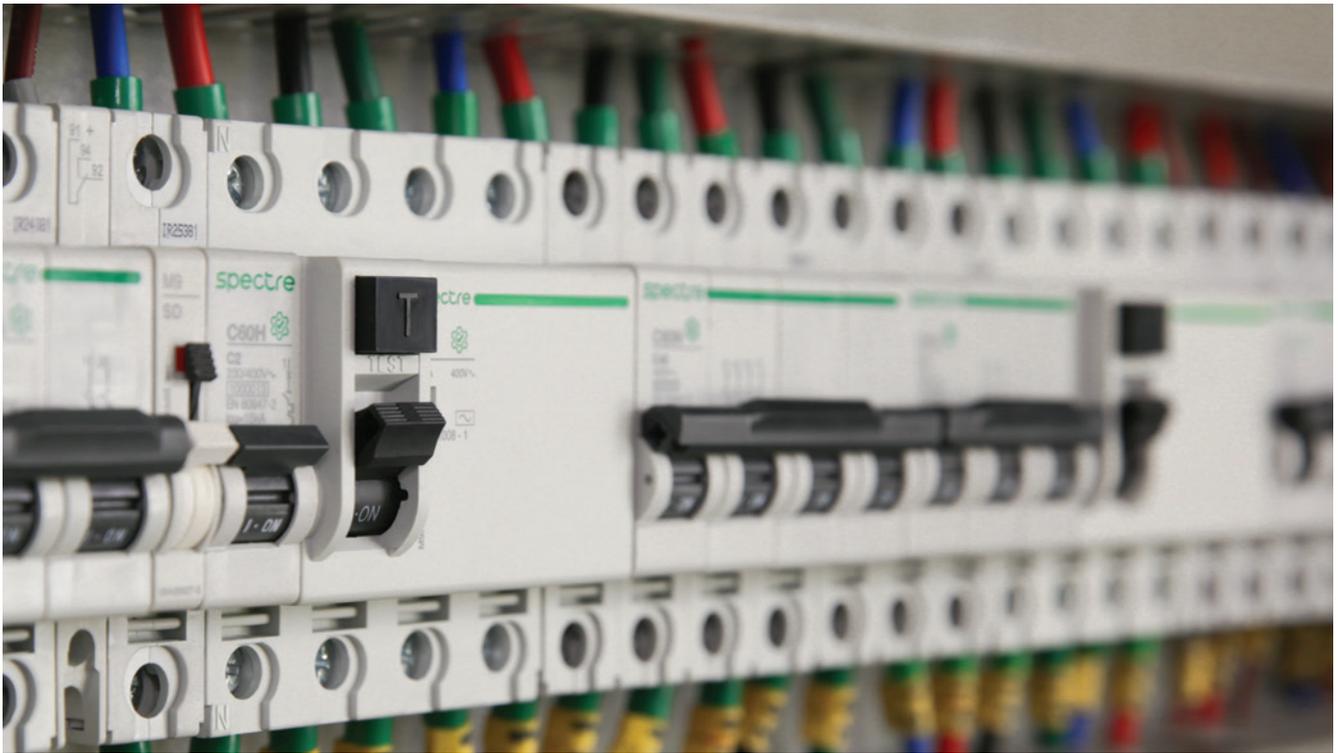
Multistandard protection for OEMs,
residential and industry



altech-electric.com

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M9/Multi9

Modular protection for OEMs, residential and industry

M9 (the same legendary Multi9™ by Schneider Electric) is a range of DIN rail modular devices, a solution offering great performance, M9 (Multi9) is a Spectre Electric offer dedicated to OEMs and all residential and industrial sectors, meeting the major standards for industry applications. Designed to meet your needs for most types of panels and machines, offering a wide range of modular devices, it provides protection, signaling functions and accessories.



Miniature circuit breakers

IEC/EN 60947-2: 10 kA, IEC 60898: **6000 A**
 C60N - B and C curves



C60N 1P



C60N 2P



C60N 3P



C60N 4P

Function

- The circuit-breakers combine the following functions:
 - protection of circuits against short-circuit currents
 - protection of circuit against overload currents
 - control
 - isolation
- C60N circuit breaker are used in the tertiary and industrial sectors.

Tripping curves

B curve

- When the short-circuit currents are weak (generators, long cables).
- Power circuit:
 - ratings: 2 to 63 A set at 30 °C
 - tripping curve: the magnetic trip units operate between 3 and 5 I_n.

C curve

- Cables feeding conventional loads.
- Power circuit:
 - ratings: 2 to 63 A set at 30 °C
 - tripping curve: the magnetic trip units operate between 5 and 10 I_n.

Technical data according to IEC 60898

- Power circuit:
 - voltage rating (U_e): 230...400 V AC
 - breaking capacity:
 - according to IEC 60898, I_{cn} rated short-circuit capacity (O-CO cycle):

Rating (A)	Type	Voltage	Breaking capacity I _{cn} (A)	Service breaking capacity (I _{cs})
2...63	1P	230/400	6000	100% of I _{cn}
	2P, 3P, 4P	400	6000	100% of I _{cn}

- limitation class: 3.

Technical data according to IEC 60947-2

- Power circuit:
 - voltage rating (U_e): 240...440 V AC / 12...240 V DC
 - impulse voltage (U_{imp}): 6 kV
 - insulation voltage (U_i): 500 V AC
 - breaking capacity:
 - according to IEC 60947-2, I_{cu} ultimate breaking capacity (O-CO cycle):

Alternating current (AC) 50/60 Hz					Service breaking capacity (I _{cs})
Ultimate breaking capacity (I _{cu}) according to IEC/EN 60947-2					
	Voltage (U _e)				I _{cs}
Ph/Ph (2P, 3P, 4P)	240 V	415 V	-	440 V	
Ph/N (1P)	-	240 V	415 V	-	
Rating (I _n) 1 to 63 A	20 kA	10 kA	3 kA ^(*)	6 kA	
i _{tr}	1.2 x 12 I _n				

(*) Breaking capacity under 1 pole with IT isolated neutral system (case of double fault).

Direct current (DC)					
Ultimate breaking capacity (I _{cu}) according to IEC/EN 60947-2					
	Voltage (U _e)				Service breaking capacity (I _{cs})
Between +/-	≤60 V	≤125 V	≤125 V	≤250 V	
Number of poles	1P	2P	3P	4P	
Rating (I _n) 1 to 63 A	15 kA	20 kA	30 kA	40 kA	

General technical data

- Fast closing: allows the high inrush currents of some loads to be better held.
- Isolation with positive break indication: opening is indicated by a green strip on the device operating handle. This indicator shows opening contacts of all the poles.

Miniature circuit breakers

IEC/EN 60947-2: 10 kA, IEC 60898: **6000 A**
 C60N - B and C curves (cont.)

Catalog numbers

spectre

C60N circuit breaker Spectre Electric



Rating (In)	Curve		Curve		Curve		Curve	
	B	C	B	C	B	C	B	C
2 A	24046-SE M9F10102	24396-SE M9F11102	24072-SE M9F10202	24332-SE M9F11202	24085-SE M9F10302	24345-SE M9F11302	24098-SE M9F10402	24358-SE M9F11402
4 A	24048-SE M9F10104	24398-SE M9F11104	24074-SE M9F10204	24334-SE M9F11204	24087-SE M9F10304	24347-SE M9F11304	24100-SE M9F10404	24360-SE M9F11404
6 A	24049-SE M9F10106	24399-SE M9F11106	24075-SE M9F10206	24335-SE M9F11206	24088-SE M9F10306	24348-SE M9F11306	24101-SE M9F10406	24361-SE M9F11406
10 A	24050-SE M9F10110	24401-SE M9F11110	24076-SE M9F10210	24336-SE M9F11210	24089-SE M9F10310	24349-SE M9F11310	24102-SE M9F10410	24362-SE M9F11410
16 A	24051-SE M9F10116	24403-SE M9F11116	24077-SE M9F10216	24337-SE M9F11216	24090-SE M9F10316	24350-SE M9F11316	24103-SE M9F10416	24363-SE M9F11416
20 A	24052-SE M9F10120	24404-SE M9F11120	24078-SE M9F10220	24338-SE M9F11220	24091-SE M9F10320	24351-SE M9F11320	24104-SE M9F10420	24364-SE M9F11420
25 A	24053-SE M9F10125	24405-SE M9F11125	24079-SE M9F10225	24339-SE M9F11225	24092-SE M9F10325	24352-SE M9F11325	24105-SE M9F10425	24365-SE M9F11425
32 A	24054-SE M9F10132	24406-SE M9F11132	24080-SE M9F10232	24340-SE M9F11232	24093-SE M9F10332	24353-SE M9F11332	24106-SE M9F10432	24366-SE M9F11432
40 A	24055-SE M9F10140	24407-SE M9F11140	24081-SE M9F10240	24341-SE M9F11240	24094-SE M9F10340	24354-SE M9F11340	24107-SE M9F10440	24367-SE M9F11440
50 A	24056-SE M9F10150	24408-SE M9F11150	24082-SE M9F10250	24342-SE M9F11250	24095-SE M9F10350	24355-SE M9F11350	24108-SE M9F10450	24368-SE M9F11450
63 A	24057-SE M9F10163	24409-SE M9F11163	24083-SE M9F10263	24343-SE M9F11263	24096-SE M9F10363	24356-SE M9F11363	24109-SE M9F10463	24369-SE M9F11463

Schneider Electric

Schneider Electric

Rating (In)	Curve		Curve		Curve		Curve	
	B	C	B	C	B	C	B	C
2 A	24046	24396	24072	24332	24085	24345	24098	24358
4 A	24048	24398	24074	24334	24087	24347	24100	24360
6 A	24049	24399	24075	24335	24088	24348	24101	24361
10 A	24050	24401	24076	24336	24089	24349	24102	24362
16 A	24051	24403	24077	24337	24090	24350	24103	24363
20 A	24052	24404	24078	24338	24091	24351	24104	24364
25 A	24053	24405	24079	24339	24092	24352	24105	24365
32 A	24054	24406	24080	24340	24093	24353	24106	24366
40 A	24055	24407	24081	24341	24094	24354	24107	24367
50 A	24056	24408	24082	24342	24095	24355	24108	24368
63 A	24057	24409	24083	24343	24096	24356	24109	24369
width in 9-mm modules	2		4		6		8	

Miniature circuit breakers

IEC/EN 60947-2: 15 kA, IEC 60898: 10000 A
 C60H - B and C curves



C60H 1P



C60H 2P



C60H 3P



C60H 4P

Function

- The circuit-breakers combine the following functions:
 - protection of circuits against short-circuit currents
 - protection of circuit against overload currents
 - control
 - isolation
- C60H circuit breaker are used in the tertiary and industrial sectors.

Tripping curves

B curve

- When the short-circuit currents are weak (generators, long cables).
- Power circuit:
 - ratings: 2 to 63 A set at 30 °C
 - tripping curve: the magnetic trip units operate between 3 and 5 In.

C curve

- Cables feeding conventional loads.
- Power circuit:
 - ratings: 2 to 63 A set at 30 °C
 - tripping curve: the magnetic trip units operate between 5 and 10 In.

Technical data according to IEC 60898

- Power circuit:
 - voltage rating (Ue): 230...400 V AC
 - breaking capacity:
 - according to IEC 60898, Icn rated short-circuit capacity (O-CO cycle):

Rating (A)	Type	Voltage	Breaking capacity Icn (A)	Service breaking capacity (Ics)
2...63	1P	230/400	10000	75% of Icn
	2P, 3P, 4P	400	10000	75% of Icn

- limitation class: 3.

Technical data according to IEC 60947-2

- Power circuit:
 - voltage rating (Ue): 240...440 V AC / 12...240 V DC
 - impulse voltage (Uimp): 6 kV
 - insulation voltage (Ui): 500 V AC
 - breaking capacity:
 - according to IEC 60947-2, Icu ultimate breaking capacity (O-CO cycle):

Alternating current (AC) 50/60 Hz					
Ultimate breaking capacity (Icu) according to IEC/EN 60947-2					Service breaking capacity (Ics)
	Voltage (Ue)				
Ph/Ph (2P, 3P, 4P)	240 V	415 V	-	440 V	50% of Icu
Ph/N (1P)	-	240 V	415 V	-	
Rating (In) 1 to 63 A	30 kA	15 kA	3 kA ^(*)	10 kA	
i _{IT}	1.2 x 12 In				

(*) Breaking capacity under 1 pole with IT isolated neutral system (case of double fault).

Direct current (DC)					
Ultimate breaking capacity (Icu) according to IEC/EN 60947-2					Service breaking capacity (Ics)
	Voltage (Ue)				
Between +/-	≤60 V	≤125 V	≤125 V	≤250 V	100% of Icu
Number of poles	1P	2P	3P	4P	
Rating (In) 1 to 63 A	20 kA	25 kA	40 kA	50 kA	

General technical data

- Fast closing: allows the high inrush currents of some loads to be better held.
- Isolation with positive break indication: opening is indicated by a green strip on the device operating handle. This indicator shows opening contacts of all the poles.

Miniature circuit breakers

IEC/EN 60947-2: 15 kA, IEC 60898: 10000 A
C60H - B and C curves (cont.)

Catalog numbers

spectre

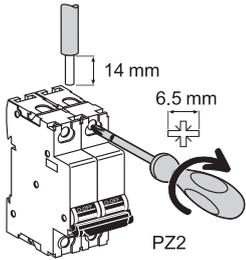
C60H circuit breaker									Spectre Electric
Type	1P		2P		3P		4P		
Rating (In)	Curve		Curve		Curve		Curve		
	B	C	B	C	B	C	B	C	
2 A	24640-SE M9F13102	24969-SE M9F14102	24722-SE M9F13202	24982-SE M9F14202	24735-SE M9F13302	24995-SE M9F14302	24748-SE M9F13402	25008-SE M9F14402	
4 A	24642-SE M9F13104	24971-SE M9F14104	24724-SE M9F13204	24984-SE M9F14204	24737-SE M9F13304	24997-SE M9F14304	24750-SE M9F13404	25010-SE M9F14404	
6 A	24643-SE M9F13106	24972-SE M9F14106	24725-SE M9F13206	24985-SE M9F14206	24738-SE M9F13306	24998-SE M9F14306	24751-SE M9F13406	25011-SE M9F14406	
10 A	24644-SE M9F13110	24973-SE M9F14110	24726-SE M9F13210	24986-SE M9F14210	24739-SE M9F13310	24999-SE M9F14310	24752-SE M9F13410	25012-SE M9F14410	
16 A	24646-SE M9F13116	24974-SE M9F14116	24727-SE M9F13216	24987-SE M9F14216	24740-SE M9F13316	25000-SE M9F14316	24753-SE M9F13416	25013-SE M9F14416	
20 A	24647-SE M9F13120	24975-SE M9F14120	24728-SE M9F13220	24988-SE M9F14220	24741-SE M9F13320	25001-SE M9F14320	24754-SE M9F13420	25014-SE M9F14420	
25 A	24648-SE M9F13125	24976-SE M9F14125	24729-SE M9F13225	24989-SE M9F14225	24742-SE M9F13325	25002-SE M9F14325	24755-SE M9F13425	25015-SE M9F14425	
32 A	24649-SE M9F13132	24977-SE M9F14132	24730-SE M9F13232	24990-SE M9F14232	24743-SE M9F13332	25003-SE M9F14332	24756-SE M9F13432	25016-SE M9F14432	
40 A	24650-SE M9F13140	24978-SE M9F14140	24731-SE M9F13240	24991-SE M9F14240	24744-SE M9F13340	25004-SE M9F14340	24757-SE M9F13440	25017-SE M9F14440	
50 A	24651-SE M9F13150	24979-SE M9F14150	24732-SE M9F13250	24992-SE M9F14250	24745-SE M9F13350	25005-SE M9F14350	24758-SE M9F13450	25018-SE M9F14450	
63 A	24652-SE M9F13163	24980-SE M9F14163	24733-SE M9F13263	24993-SE M9F14263	24746-SE M9F13363	25006-SE M9F14363	24759-SE M9F13463	25019-SE M9F14463	
width in 9-mm modules	2		4		6		8		

Miniature circuit breakers

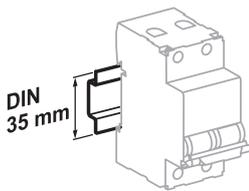
IEC/EN 60947-2: 10 kA, IEC 60898: **6000 A**
C60N - B and C curves

IEC/EN 60947-2: 15 kA, IEC 60898: **10000 A**
C60H - B and C curves

Connection



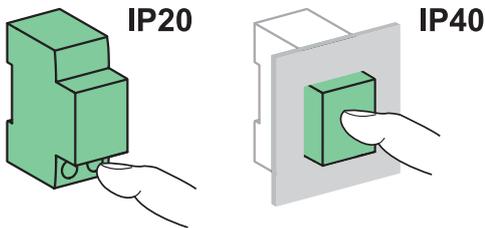
Rating	Tightening torque	Without accessory	
		Copper cables	Rigid, flexible or with ferrule
2 to 25 A	2.5 N.m (22 lb.in)	1 to 25 mm ²	AWG #18 to #3
32 to 63 A	3.5 N.m (31 lb.in)	1.5 to 35 mm ²	AWG #16 to #2



Clip on DIN rail 35 mm



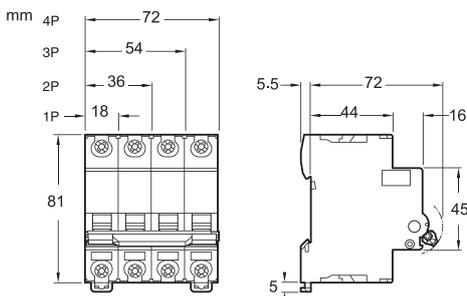
Indifferent position of installation



Technical data

According to IEC/EN 60947-2		
Insulation voltage (U _i)		500 V AC
Pollution degree		3
Rated impulse withstand voltage (U _{imp})		6 kV
Thermal tripping	Reference temperature	50°C / 122°F
Magnetic tripping (I _n)	B curve in alternative current	4 I _n ± 20%
	in direct current	5.7 I _n (± 20%)
C curve	in alternative current	8.5 I _n ± 20%
	in direct current	12 I _n (± 20%)
According to current frequency		50/60 Hz
Utilization category		A
Additional characteristics		
Degree of protection (IEC 60529)	Device only	IP20
	Device in modular enclosure	IP40 Insulation class II
Endurance (O-C)	Electrical	10,000 cycles
	Mechanical	20,000 cycles
Serving temperature		-30°C to +70°C / -22°F to 158°F
Storage temperature		-40°C to +80°C / -40°F to 176°F
Tropicalization (IEC 60068-1)		Treatment 2 (relative humidity 95% at 55°C / 131°F)

Dimensions (mm)



Weight (g)

Circuit-breaker	
Type	C60N , C60H
1P	120 g
2P	240 g
3P	360 g
4P	480 g

Residual current devices

IEC/EN 61008-1, IEC/EN 62423-2

RCCB ID – Residual Current Circuit Breakers – AC, A, A-SI, F & B types



IEC/EN 61008-1, IEC/EN 62423-2

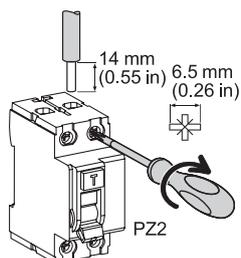
According to the above standard:

- RCCB-ID residual current circuit breakers offer the following functions:
 - protection of persons against electric shock by direct contact (30 mA),
 - protection of persons against electric shock by indirect contact (100, 300 mA),
 - protection of installations against fire risks (300 mA).

Catalog numbers

RCCB-ID residual current circuit breakers								
Type	AC				A			
2P 	Sensitivity	30 mA	100 mA	300 mA	30 mA	100 mA	300 mA	
	Rating	25 A	M9R11225-S	M9R12225-S	M9R14225-S	M9R21225-S	M9R22225-S	M9R24225-S
		32 A	M9R11232-S	M9R12232-S	M9R14232-S	M9R21232-S	M9R22232-S	M9R24232-S
		40 A	M9R11240-S	M9R12240-S	M9R14240-S	M9R21240-S	M9R22240-S	M9R24240-S
		63 A	M9R11263-S	M9R12263-S	M9R14263-S	M9R21263-S	M9R22263-S	M9R24263-S
4P 	Sensitivity	30 mA	100 mA	300 mA	30 mA	100 mA	300 mA	
	Rating	25 A	M9R11425-S	M9R12425-S	M9R14425-S	M9R21425-S	M9R22425-S	M9R24425-S
		32 A	M9R11432-S	M9R12432-S	M9R14432-S	M9R21432-S	M9R22432-S	M9R24432-S
		40 A	M9R11440-S	M9R12440-S	M9R14440-S	M9R21440-S	M9R22440-S	M9R24440-S
		63 A	M9R11463-S	M9R12463-S	M9R14463-S	M9R21463-S	M9R22463-S	M9R24463-S
Voltage rating (Ue)	2P	230 - 240 V						
	4P	400 - 415 V						
Operating frequency	50 Hz							

Connection



Rating	Tightening torque	Copper cables			
		Rigid		Flexible or with ferrule	
25 to 63 A	3.5 N.m / 31 lb.in		1 to 16 mm ²	AWG #18 to #6	 1 to 10 mm ² AWG #18 to #8

Residual current devices

IEC/EN 61008-1, IEC/EN 62423-2

RCCB ID – Residual Current Circuit Breakers – AC, A, A-SI, F & B types (cont.)

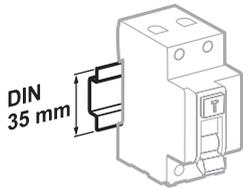


A-SI			F			B			Width in 9-mm modules
30 mA	100 mA	300 mA	30 mA	100 mA	300 mA	30 mA	100 mA	300 mA	
M9R31225-S	M9R32225-S	M9R34225-S	M9R41225-S	M9R42225-S	M9R44225-S	M9R61225-S	M9R62225-S	M9R64225-S	4
M9R31232-S	M9R32232-S	M9R34232-S	M9R41232-S	M9R42232-S	M9R44232-S	M9R61232-S	M9R62232-S	M9R64232-S	
M9R31240-S	M9R32240-S	M9R34240-S	M9R41240-S	M9R42240-S	M9R44240-S	M9R61240-S	M9R62240-S	M9R64240-S	
M9R31263-S	M9R32263-S	M9R34263-S	M9R41263-S	M9R42263-S	M9R44263-S	M9R61263-S	M9R62263-S	M9R64263-S	
30 mA	100 mA	300 mA	30 mA	100 mA	300 mA	30 mA	100 mA	300 mA	8
M9R31425-S	M9R32425-S	M9R34425-S	M9R41425-S	M9R42425-S	M9R44425-S	M9R61425-S	M9R62425-S	M9R64425-S	
M9R31432-S	M9R32432-S	M9R34432-S	M9R41432-S	M9R42432-S	M9R44432-S	M9R61432-S	M9R62432-S	M9R64432-S	
M9R31440-S	M9R32440-S	M9R34440-S	M9R41440-S	M9R42440-S	M9R44440-S	M9R61440-S	M9R62440-S	M9R64440-S	
M9R31463-S	M9R32463-S	M9R34463-S	M9R41463-S	M9R42463-S	M9R44463-S	M9R61463-S	M9R62463-S	M9R64463-S	

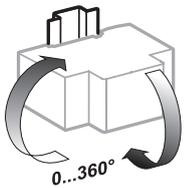
Residual current devices

IEC/EN 61008-1, IEC/EN 62423-2

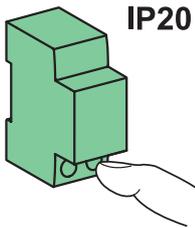
RCCB ID – Residual Current Circuit Breakers – AC, A, A-SI, F & B types (cont.)



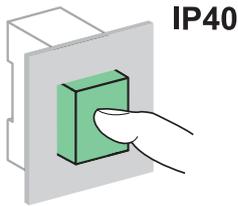
Clip on to 35 mm (1.38 in) DIN rail



Any installation position

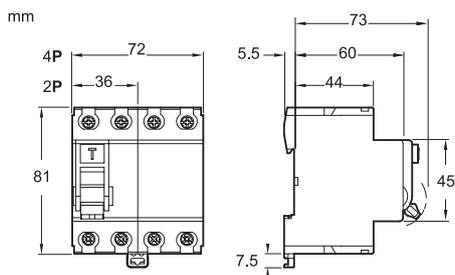


IP20



IP40

Dimensions (mm)



Technical data

According to IEC/EN 60947-2

Insulation voltage (Ui)	440 V
Pollution degree	3
Rated impulse withstand voltage (Uimp)	6 kV

According to IEC/EN 61008-1

Making and breaking capacity (Im/IΔm)	≤40 A	500 A
	63 A	630 A
Impulse current withstand (8/20 μs) without tripping	A, AC, F & B types	250 Å
	A-SI type	3 kÅ

Rated conditional short-circuit current (Inc/IΔc)	with fuse	100 A	10,000 A
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Behaviour in case of voltage drop		Residual current protection down to 0 V according to IEC/EN 61008-1 § 3.3.4
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Additional characteristics

Degree of protection (IEC 60529)	Device only	IP20
	Device in modular enclosure	IP40 Insulation class II
Endurance (O-C)	Electrical	2,000 cycles
	Mechanical	20,000 cycles
Operating temperature	AC type	-5°C to +40°C
	A, A-SI, F & B types	-25°C to +40°C
Storage temperature		-40°C to +60°C
Tropicalization (IEC 60068-1)		Treatment 2 (relative humidity 95% at 55°C)

Weight (g)

Residual current circuit breaker (RCCB)

Type	ID
2P	192 g
4P	324 g

Residual current devices

RCBO - IEC/EN 61009-1 - Residual Current Circuit Breakers with Over-current Protection– AC & A types



IEC/EN 61009-1



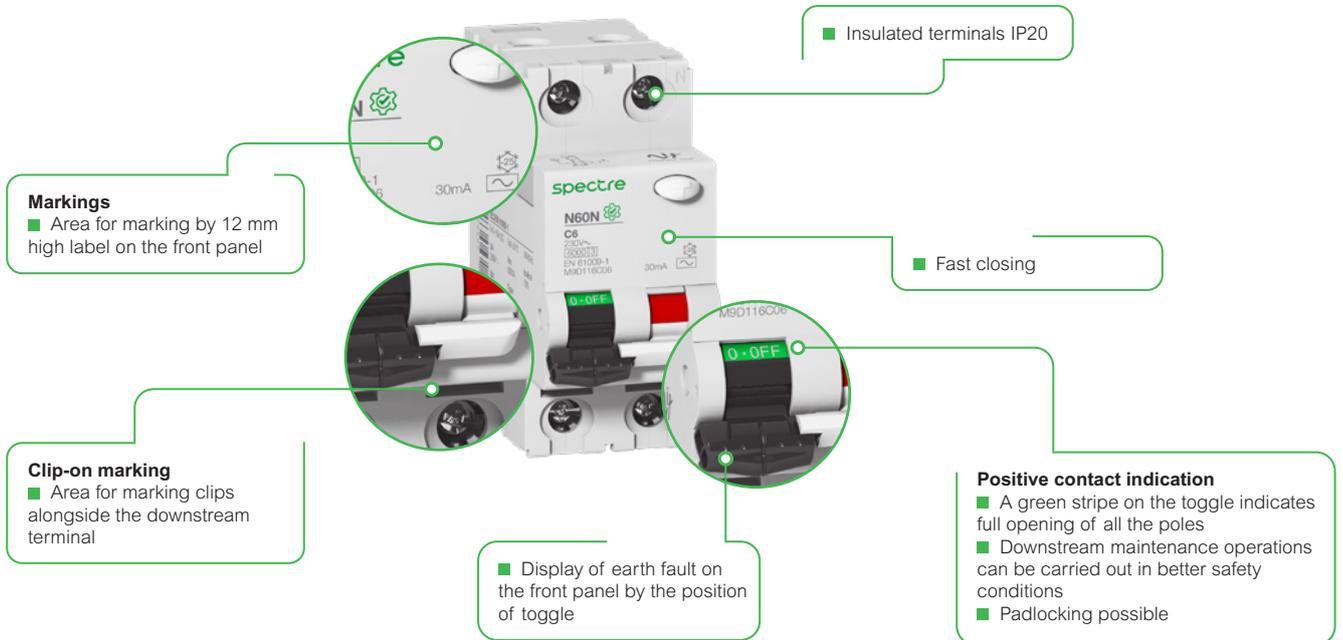
- The N60N residual current device provides complete protection for final circuits (against overcurrents and insulation faults):
 - protection for people against electric shocks by direct contacts (30 mA),
 - protection for people against electric shocks by indirect contacts (100, 300 mA),
 - protection of installations against risk of fire (300 mA).
- The N60N RCBOs are circuit breakers which combine the following functions:
 - circuit protection against short-circuit currents,
 - circuit protection against over-load currents,
 - breaking and industrial disconnections according to IEC/EN 60947-2.

Catalog numbers

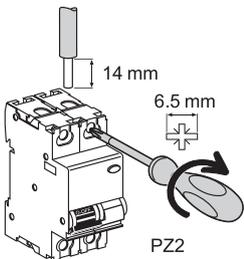
N60N 6000									
Type		AC			A			Width in 9-mm modules	
1P+N	Sensitivity	30 mA	100 mA	300 mA	30 mA	100 mA	300 mA		
	B curve	Rating (In)						4	
		6 A	M9D116B06	M9D126B06	M9D146B06	M9D216B06	M9D226B06		M9D246B06
		10 A	M9D116B10	M9D126B10	M9D146B10	M9D216B10	M9D226B10		M9D246B10
		16 A	M9D116B16	M9D126B16	M9D146B16	M9D216B16	M9D226B16		M9D246B16
		20 A	M9D116B20	M9D126B20	M9D146B20	M9D216B20	M9D226B20		M9D246B20
		25 A	M9D116B25	M9D126B25	M9D146B25	M9D216B25	M9D226B25		M9D246B25
		32 A	M9D116B32	M9D126B32	M9D146B32	M9D216B32	M9D226B32		M9D246B32
	40 A	M9D116B40	M9D126B40	M9D146B40	M9D216B40	M9D226B40	M9D246B40		
	50 A	M9D116B50	M9D126B50	M9D146B50	M9D216B50	M9D226B50	M9D246B50		
	63 A	M9D116B63	M9D126B63	M9D146B63	M9D216B63	M9D226B63	M9D246B63		
	C curve	Rating (In)							4
		6 A	M9D116C06	M9D126C06	M9D146C06	M9D216C06	M9D226C06	M9D246C06	
		10 A	M9D116C10	M9D126C10	M9D146C10	M9D216C10	M9D226C10	M9D246C10	
		16 A	M9D116C16	M9D126C16	M9D146C16	M9D216C16	M9D226C16	M9D246C16	
20 A		M9D116C20	M9D126C20	M9D146C20	M9D216C20	M9D226C20	M9D246C20		
25 A		M9D116C25	M9D126C25	M9D146C25	M9D216C25	M9D226C25	M9D246C25		
32 A		M9D116C32	M9D126C32	M9D146C32	M9D216C32	M9D226C32	M9D246C32		
40 A	M9D116C40	M9D126C40	M9D146C40	M9D216C40	M9D226C40	M9D246C40			
50 A	M9D116C50	M9D126C50	M9D146C50	M9D216C50	M9D226C50	M9D246C50			
63 A	M9D116C63	M9D126C63	M9D146C63	M9D216C63	M9D226C63	M9D246C63			
	B curve	Rating (In)						8	
		6 A	M9D118B06	M9D128B06	M9D148B06	M9D218B06	M9D228B06		M9D248B06
		10 A	M9D118B10	M9D128B10	M9D148B10	M9D218B10	M9D228B10		M9D248B10
		16 A	M9D118B16	M9D128B16	M9D148B16	M9D218B16	M9D228B16		M9D248B16
		20 A	M9D118B20	M9D128B20	M9D148B20	M9D218B20	M9D228B20		M9D248B20
		25 A	M9D118B25	M9D128B25	M9D148B25	M9D218B25	M9D228B25		M9D248B25
		32 A	M9D118B32	M9D128B32	M9D148B32	M9D218B32	M9D228B32		M9D248B32
	40 A	M9D118B40	M9D128B40	M9D148B40	M9D218B40	M9D228B40	M9D248B40		
	C curve	Rating (In)							8
		6 A	M9D118C06	M9D128C06	M9D148C06	M9D218C06	M9D228C06	M9D248C06	
		10 A	M9D118C10	M9D128C10	M9D148C10	M9D218C10	M9D228C10	M9D248C10	
		16 A	M9D118C16	M9D128C16	M9D148C16	M9D218C16	M9D228C16	M9D248C16	
		20 A	M9D118C20	M9D128C20	M9D148C20	M9D218C20	M9D228C20	M9D248C20	
		25 A	M9D118C25	M9D128C25	M9D148C25	M9D218C25	M9D228C25	M9D248C25	
32 A		M9D118C32	M9D128C32	M9D148C32	M9D218C32	M9D228C32	M9D248C32		
40 A	M9D118C40	M9D128C40	M9D148C40	M9D218C40	M9D228C40	M9D248C40			
Voltage rating (Ue)		1P+N	230 - 240 V						
		3P+N	400 - 415 V						
Operating frequency		50/60 Hz							

Residual current devices

RCBO - IEC/EN 61009-1 - Residual Current Circuit Breakers with Over-current Protection– AC & A types (cont.)

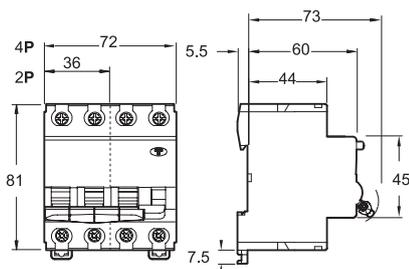


Connection



Type	Connection	Tightening torque	Comb busbar	Copper cables	
				Rigid	Flexible or with ferrule
M9 N60N	Top	2N.m	■	1 to 25 mm ² AWG #18 to #3	1 to 16 mm ² AWG #18 to #6
	Bottom		■		

Dimensions (mm)

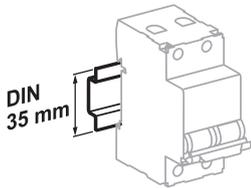


Weight (g)

Residual current device with over-current protection	
Type	N60N
1P+N	195 g
3P+N	375 g

Residual current devices

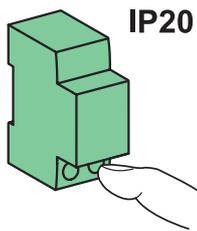
RCBO - IEC/EN 61009-1 - Residual Current Circuit Breakers with Over-current Protection– AC & A types (cont.)



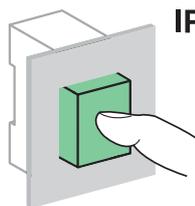
Clip on to 35 mm (1.38 in) DIN rail



Any installation position



IP20



IP40

Technical data

According to IEC/EN 61009-1

Type	N60N	
Insulation voltage (Ui)	440 V	
Pollution degree	3	
Rated impulse withstand voltage (Uimp)	6 kV	
Setting temperature for ratings	30°C	
Earth leakage protection with instantaneous tripping	30, 100, 300 mA	
Magnetic tripping	B curve	Between 3 and 5 In
	C curve	Between 5 and 10 In
Utilization category	A	
8/20 µs impulse withstand current	250 Å	
Limitation class	3	
Rated breaking capacity (Icn)	6000 A	
Rated residual breaking and making capacity (IΔm)	6000 A	
Behaviour in case of voltage drop		Residual current protection down to 0 V according to IEC/EN 61009-1 § 3.3.8

Additional characteristics

Degree of protection (IEC 60529)	Device only	IP20	
	Device in modular enclosure	IP40 Insulation class II	
Endurance (O-C)	Electrical	≤20 A	20,000 cycles
		≥25 A	10,000 cycles
	Mechanical	20,000 cycles	
Overvoltage category (IEC 60364)	IV		
Operating temperature		-25°C to +60°C	
Storage temperature	-30°C to +70°C		
Tropicalization (IEC 60068-1)	Treatment 2 (relative humidity of 95% at 55°C / 131°F)		

Electrical control

TL impulse relays



IEC/EN 60669-2-2



Impulse relays:

- Closing of the impulse relay pole(s) is triggered by an impulse on the coil.
- Having two stable mechanical positions, the pole(s) will be opened by the next impulse. Each impulse received by the coil reverses the position of the pole(s).
- Can be controlled by an unlimited number of pushbuttons.
- Zero energy consumption.

TL

- The impulse relays are used to control, by means of pushbuttons, lighting circuits consisting of:
 - incandescent lamps, low-voltage halogen lamps, etc. (resistive loads)
 - fluorescent lamps, discharge lamps, etc. (inductive loads)

Changeover contact TLi

- This impulse relay has a changeover contact

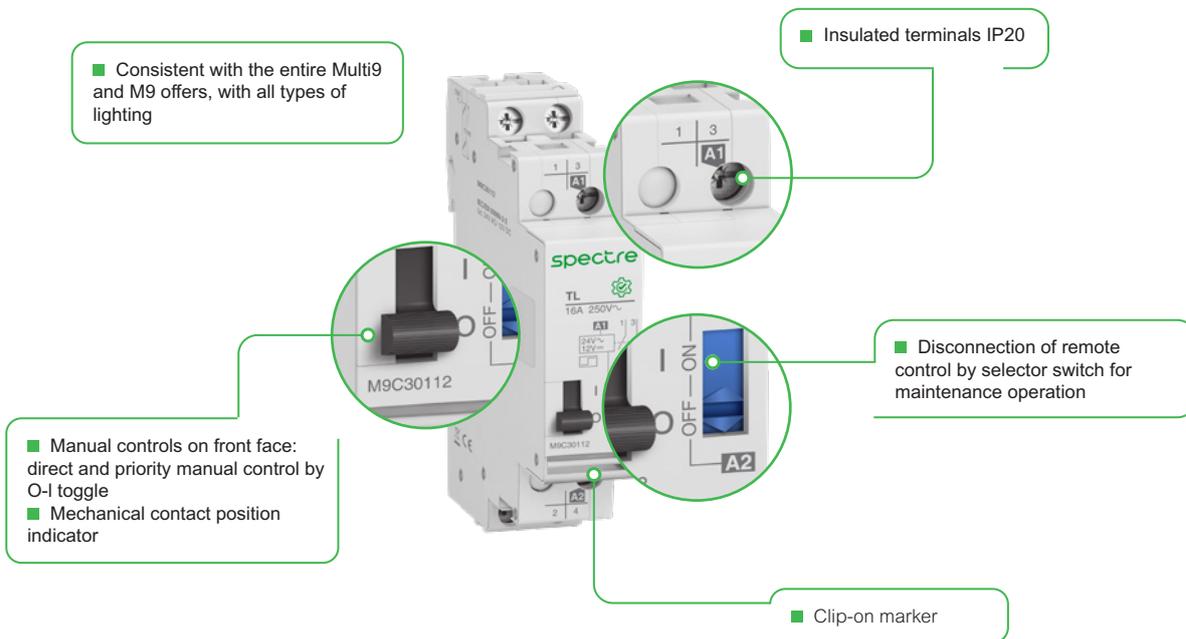
Catalog numbers

TL impulse relays						
Type			1P	2P	3P	4P
			1 NO	2 NO	3 NO	4 NO
Rating (In)	Control voltage (Uc)					
	(V AC)	(V DC)				
	(50/60 Hz)					
16 A	12	6	M9C30011	M9C30012	M9C30013	M9C30014
	24	12	M9C30111	M9C30112	M9C30113	M9C30114
	48	24	M9C30211	M9C30212	M9C30213	M9C30214
	130	48	M9C30311	M9C30312	M9C30313	M9C30314
	230...240	110	M9C30811	M9C30812	M9C30813	M9C30814
32 A	12	6	M9C30031-S	-	-	-
	24	12	M9C30131-S	-	-	-
	48	24	M9C30231-S	-	-	-
	130	48	M9C30331-S	-	-	-
	230...240	110	M9C30831-S	-	-	-
Width in 9 mm modules			2	2	4	4

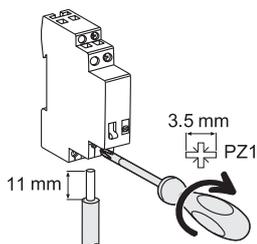
TLi impulse relays						
Type			1P	2P	3P	4P
			1CO	1NO + 1NC	2CO	2NO + 2NC
Rating (In)	Control voltage (Uc)					
	(V AC)	(V DC)				
	(50/60 Hz)					
16 A	12	6	M9C30021	M9C30015	M9C30022	M9C30016
	24	12	M9C30121	M9C30115	M9C30122	M9C30116
	48	24	M9C30221	M9C30215	M9C30222	M9C30216
	130	48	M9C30321	M9C30315	M9C30322	M9C30316
	230...240	110	M9C30821	M9C30815	M9C30822	M9C30816
Width in 9 mm modules			2	2	4	4

Electrical control

TL impulse relays (cont.)

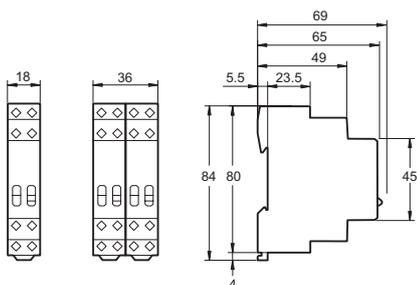


Connection



Type	Rating	Circuit	Tightening torque	Copper cables	
				Rigid	Flexible or with ferrule
TL, TLi	16 A	Control	1 N.m	0.5 to 4 mm ²	1 to 4 mm ²
		Power		1.5 to 4 mm ²	1.5 to 4 mm ²
TL	32 A	Control	1.2 N.m	0.5 to 4 mm ²	1 to 4 mm ²
		Power		2.5 to 6 mm ²	2.5 to 6 mm ²

Dimensions (mm)

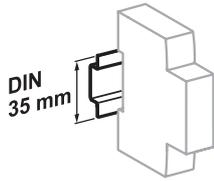


Weight (g)

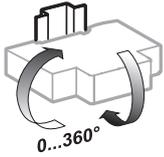
Impulse relay	
Type	TL, TLi
1P	94 g
2P	102 g
3P	210 g
4P	218 g

Electrical control

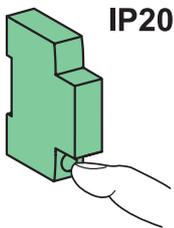
TL impulse relays (cont.)



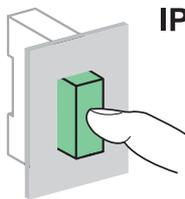
Clip on DIN rail 35 mm (1.38 in)



Indifferent position of installation



IP20

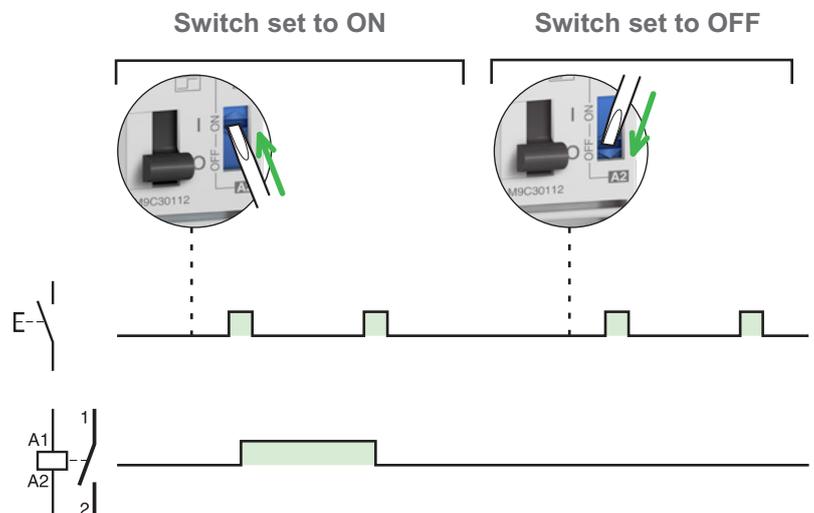


IP40

Technical data

Control circuit		TL and TLi 16 A	TL 32 A
Control voltage (Uc)	Tolerance at 50 Hz	+6 %, -15 %	
	Tolerance at 60 Hz	±6 %	
	Tolerance V DC	+6 %, -10 %	
Dissipated power (during the impulse)	1, 2, 3P: 19 VA	19 VA	
	4P: 38 VA		
Illuminated PB control	Max. current 3 mA		
Operating threshold	Min. 85 % of Un in conformance with IEC/EN60669-2-2		
Duration of the control order	50 ms to 1 s (200 ms recommended)		
Response time	50 ms		
Power circuit			
Voltage rating (Ue)	1P, 2P	24 ...250 V AC	
	3P, 4P	24...415 V AC	
Frequency	50 Hz or 60 Hz		
Maximum number of operations per minute	5		
Maximum number of switching operation a day	100		
Additional characteristics			
Insulation voltage (Ui)	440 V AC		
Pollution degree	3		
Rated impulse withstand voltage (Uimp)	6 kV		
Overvoltage category	IV		
Endurance (O-C)			
Electrical	200,000 cycles (AC21)	50,000 cycles (AC21)	
	100,000 cycles (AC22)	20,000 cycles (AC22)	
Other characteristics			
Degree of protection (IEC 60529)	Device only	IP20	
	Device in modular enclosure	IP40 Insulation class II	
Operating temperature	-5°C to +60°C		
Storage temperature	-30°C to +70°C		
Tropicalization (IEC 60068-1)	Treatment 2 (relative humidity of 95% at 55°C / 131°F)		

Operation



Electrical control

CT modular contactors



IEC/EN 61095, IEC/EN 60947-4-1

CT contactors are available in two versions:

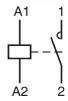
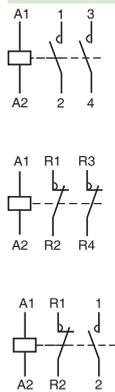
- Contactors without manual operation
- Contactors with manual operation

The breadth of the M9 CT contactor range satisfies most application cases. M9 CT contactors can be combined with auxiliary indication functions.

- M9 CT contactors can be used to remote control applications in alternating current:
 - lighting, heating, ventilation, roller blinds, sanitary hot water,
 - mechanical ventilation systems, etc,
 - load-shedding of non-priority circuits.
- The 3P+N contactor comes with a reinforced neutral pole. It will bring robustness to control single-phase loads requiring group control.



Catalog numbers

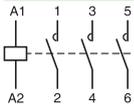
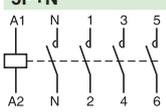
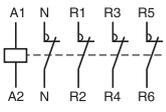
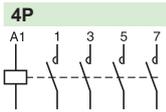
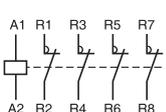
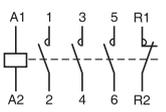
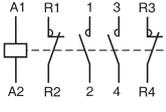
CT contactors												
Type	Rating (In)		Control voltage (Uc)		Contact	Catalog numbers	Width in 9 mm modules					
1P 	AC7a	16 A	5 A	V AC 50 Hz	24	1NO	M9C20111	2				
					130	1NO	M9C20311					
					220...240	1NO	M9C20811					
	25 A	8.5 A	V AC 50 Hz	12	1NO	M9C20031						
				24	1NO	M9C20131						
				48	1NO	M9C20231						
				130	1NO	M9C20331						
				220...240	1NO	M9C20831						
				2P								
				2P 	16 A	5 A	V AC 50 Hz		24	2NO	M9C20112	2
1NO+1NC	M9C20115											
130	2NO	M9C20312										
1NO+1NC	M9C20315											
220...240	2NO	M9C20812										
20 A	6.5 A	V AC 50 Hz	24		1NO+1NC	M9C20815						
					V DC	24	2NO	M9C22212				
					2NC	M9C22216						
					1NO+1NC	M9C22215						
					2NO	M9C20122						
25 A	8.5 A	V AC 50 Hz	24		130	2NO	M9C20322					
					220...240	2NO	M9C20822					
					V DC	24	2NO	M9C22222				
					2NC	M9C22226						
					1NO+1NC	M9C22225						
40 A	15 A	V AC 50 Hz	220...240	12	2NO	M9C20032	4					
				24	2NO	M9C20132						
				2NC	M9C20136							
				1NO+1NC	M9C20135							
				48	2NO	M9C20232						
				130	2NO	M9C20332						
				2NC	M9C20336							
				1NO+1NC	M9C20335							
				220...240	2NO	M9C20832						
				2NC	M9C20836							
				1NO+1NC	M9C20835							
				V DC	24	2NO		M9C22232				
				2NC	M9C22236							
				1NO+1NC	M9C22235							
				63 A	20 A	V AC 50 Hz		24	2NO	M9C20162	4	
		V AC 50 Hz	220...240	2NO	M9C20862							
100 A	-	V AC 50 Hz	220...240	2NO	M9C20882	6						

Electrical control

CT modular contactors (cont.)

Catalog numbers

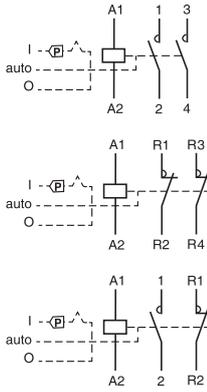
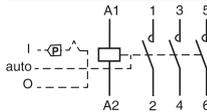
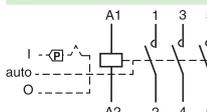
CT contactors

CT contactors							Width in 9 mm modules		
Type	Rating (In)		Control voltage (Uc)		Contact	Catalog numbers			
3P 	AC7a	AC7b	V AC 50 Hz	220...240	3NO	M9C20813	4		
								16 A	5 A
	25 A	8.5 A	V AC 50 Hz	12	24	M9C20133			
					48	M9C20233			
					220...240	M9C20833			
					40 A	15 A		V AC 50 Hz	220...240
	63 A	20 A	V AC 50 Hz	220...240	3NO	M9C20863			
	3P+N  	25 A	8.5 A	V AC 50 Hz	12	4NO		M9C24034	4
						24		M9C24134	
						48		M9C24234	
220...240						4NO	M9C24834		
40 A		15 A	V AC 50 Hz	220...240	4NO	4NC	M9C24837	6	
						63 A	20 A		V AC 50 Hz
						4NC	M9C24847		
						4NO	M9C24864		
						4NC	M9C24867		
4P    	16 A	5 A	V AC 50 Hz	24	4NO	M9C20114	4		
					220...240	4NO		M9C20814	
						2NO+2NC		M9C20818	
	20 A	6.5 A	V AC 50 Hz	220...240	4NO	M9C20824	6		
						25 A		8.5 A	V AC 50 Hz
						24	M9C20134		
						4NC	M9C20137		
						48	M9C20234		
						220...240	4NO		M9C20834
	40 A	15 A	V AC 50 Hz	220...240	4NO	M9C20837	6		
						2NO+2NC		M9C20838	
	63 A	20 A	V AC 50 Hz	24	4NO	M9C20844			
						4NC		M9C20847	
						4NC		M9C20164	
4NO						M9C20167			
100 A	-	V AC 50 Hz	220...240	4NO	M9C20864	12			
					2NO+2NC		M9C20868		
					3NO+1NC		M9C20869		
					4NO	M9C20884			

Electrical control

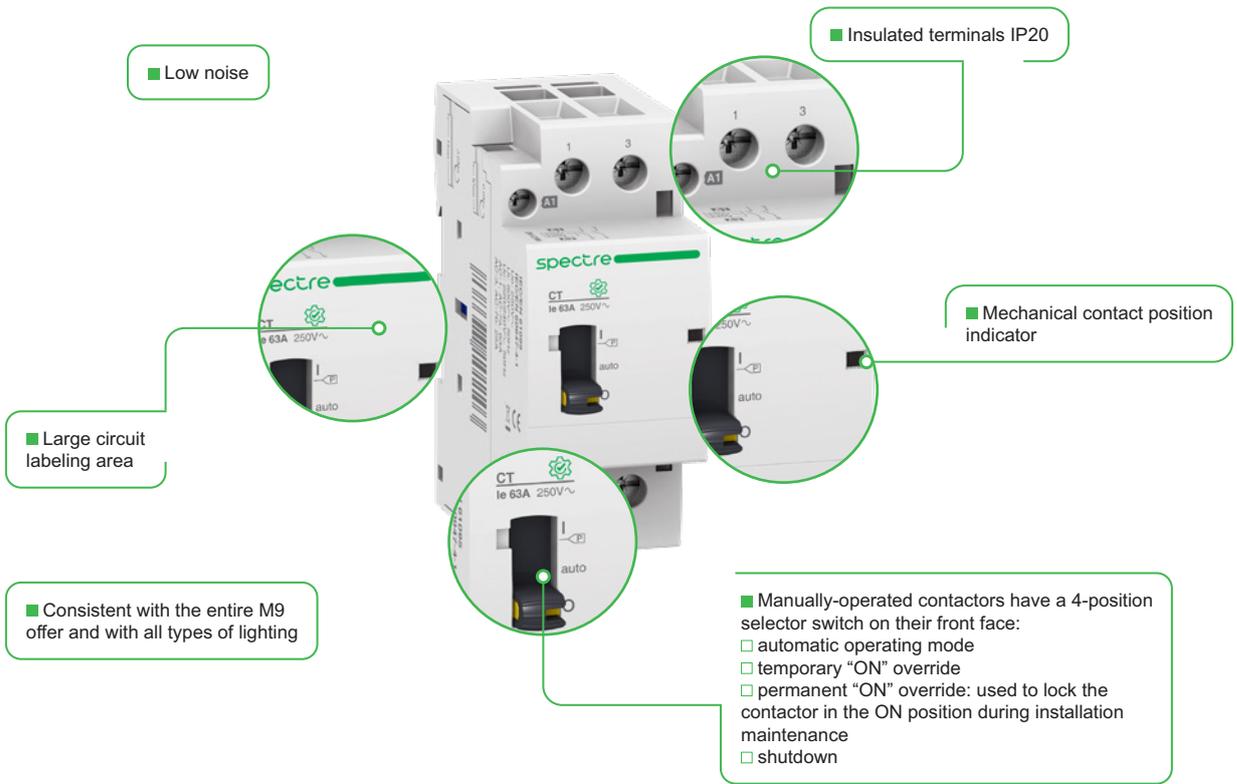
CT modular contactors (cont.)

Catalog numbers

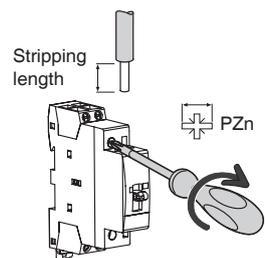
CT manual control contactor							Width in 9 mm modules				
Type	Rating (In)		Control voltage (Uc)		Contact	Catalog numbers					
    		AC7a	AC7b	V AC 50 Hz	220...240	2NO	M9C21812	2			
		16 A	5 A	V DC	24	1NO+1NC	M9C21815				
		20 A	6.5 A	V DC	24	2NO	M9C23212				
						2NC	M9C23216				
						1NO+1NC	M9C23215				
		25 A	8.5 A	V AC 50 Hz	24	2NO	M9C23222				
						2NC	M9C23226				
						1NO+1NC	M9C23225				
		40 A	15 A	V AC 50 Hz	24	2NO	M9C21832				
						2NO	M9C21832				
						2NC	M9C23232				
		63 A	20 A	V AC 50 Hz	24	2NO	M9C23236				
2NO	M9C21142										
1NO+1NC	M9C23235										
   		25 A	8.5 A	V AC 50 Hz	220...240	3NO	M9C21833	4			
		40 A	15 A	V AC 50 Hz	220...240	3NO	M9C21843				
						40 A	15 A		V AC 50 Hz	220...240	3NO
		 		25 A	8.5 A	V AC 50 Hz	24		4NO	M9C21134	4
				40 A	15 A	V AC 50 Hz	220...240		4NO	M9C21834	
									63 A	20 A	
				4NO	M9C21844						
				4NO	M9C21164						
				63 A	20 A	V AC 50 Hz	220...240		4NO	M9C21864	

Electrical control

CT modular contactors (cont.)



Connection



Type	Rating	Stripping length	Circuit	Tightening torque	Copper cables		
					Rigid	Flexible or with ferrule	
CT	PZ1: 4 mm	16 - 100 A	10 mm	Control	0.8 N.m	1.5 to 2.5 mm: 2 x 1.5 mm ²	1.5 to 2.5 mm: 2 x 1.5 mm ²
						16 to 25 A	1.5 to 6 mm ²
	PZ2: 6 mm	40 A - 63 A 100 A	14 mm	Power	3.5 N.m	6 to 25 mm ²	6 to 16 mm ²
6 to 35 mm ²						6 to 35 mm ²	
ACTs	PZ1: 4 mm	-	9 mm	-	0.8 N.m	1.5 to 2.5 mm: 2 x 1.5 mm ²	1.5 to 2.5 mm: 2 x 1.5 mm ²

Electrical control

CT modular contactors (cont.)

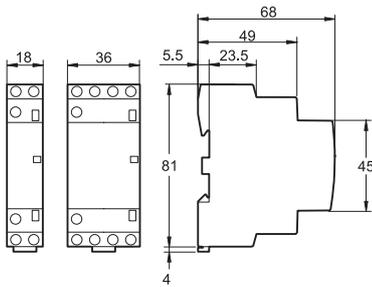
Consumption

CT contactors								
Type								
1P	Rating (In)		Control voltage (Uc)		Consumption		Heat dissipation	
	AC7a	AC7b			Holding	Inrush		
1P	16 A	5 A	V AC 50 Hz	24	2.8 VA	11.5 VA	1.2 W	
				130	2.8 VA	11.5 VA	1.2 W	
				220...240	2.8 VA	11.5 VA	1.2 W	
	25 A	8.5 A	V AC 50 Hz	12	2.8 VA	11.5 VA	1.2 W	
				24	2.8 VA	11.5 VA	1.2 W	
				48	2.8 VA	11.5 VA	1.2 W	
				130	2.8 VA	11.5 VA	1.2 W	
				220...240	2.8 VA	11.5 VA	1.2 W	
	2P							
	2P	16 A	5 A	V AC 50 Hz	24	2.8 VA	11.5 VA	1.2 W
					130	2.8 VA	11.5 VA	1.2 W
					220...240	2.8 VA	11.5 VA	1.2 W
			V DC	24	0.6 VA	7 VA	0.6 W	
20 A		6.5 A	V AC 50 Hz	24	2.8 VA	11.5 VA	1.2 W	
				130	2.8 VA	11.5 VA	1.2 W	
				220...240	2.8 VA	11.5 VA	1.2 W	
			V DC	24	0.6 VA	7 VA	0.6 W	
25 A		8.5 A	V AC 50 Hz	12	3.1 VA	11.5 VA	1.4 W	
				24	3 VA	11.5 VA	1.3 W	
				48	3 VA	11.5 VA	1.3 W	
				130	2.8 VA	11.5 VA	1.2 W	
				220...240	2.8 VA	11.5 VA	1.2 W	
						V DC	24	0.6 VA
40 A		15 A	V AC 50 Hz	220...240	4.1 VA	31 VA	1.6 W	
63 A		20 A	V AC 50 Hz	24	4.8 VA	33 VA	1.6 W	
				220...240	4.1 VA	31 VA	1.6 W	
100 A		-	V AC 50 Hz	220...240	4.1 VA	31 VA	1.6 W	
3P								
3P	16 A	5 A	V AC 50 Hz	220...240	4.1 VA	31 VA	1.6 W	
	25 A	8.5 A	V AC 50 Hz	12	4.8 VA	33 VA	1.6 W	
				24	4.8 VA	33 VA	1.6 W	
				48	4.8 VA	33 VA	1.6 W	
				220...240	4.1 VA	31 VA	1.6 W	
	40 A	15 A	V AC 50 Hz	220...240	7 VA	48 VA	2.1 W	
	63 A	20 A	V AC 50 Hz	220...240	7 VA	48 VA	2.1 W	
3P+N								
3P+N	25 A	8.5 A	V AC 50 Hz	12	4.8 VA	33 VA	1.6 W	
				24	4.8 VA	33 VA	1.6 W	
				48	4.8 VA	33 VA	1.6 W	
				220...240	4.1 VA	31 VA	1.6 W	
	40 A	15 A	V AC 50 Hz	220...240	7 VA	48 VA	2.1 W	
	63 A	20 A	V AC 50 Hz	220...240	7 VA	48 VA	2.1 W	
4P								
4P	16 A	5 A	V AC 50 Hz	24	4.8 VA	33 VA	1.6 W	
				220...240	4.1 VA	31 VA	1.6 W	
	20 A	6.5 A	V AC 50 Hz	220...240	4.1 VA	31 VA	1.6 W	
	25 A	8.5 A	V AC 50 Hz	12	4.8 VA	33 VA	1.6 W	
				24	4.8 VA	33 VA	1.6 W	
				48	4.8 VA	33 VA	1.6 W	
				220...240	4.1 VA	31 VA	1.6 W	
	40 A	15 A	V AC 50 Hz	24	8.4 VA	48 VA	2.1 W	
				220...240	7 VA	48 VA	2.1 W	
	63 A	20 A	V AC 50 Hz	24	8.4 VA	48 VA	2.1 W	
				220...240	7 VA	48 VA	2.1 W	
	100 A	-	V AC 50 Hz	220...240	13 VA	106 VA	4.2 W	

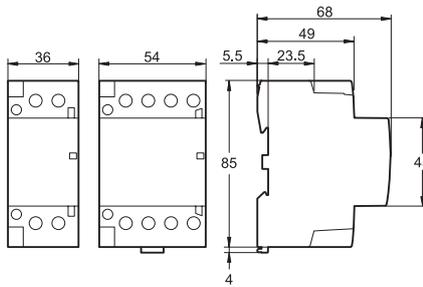
Electrical control

CT modular contactors (cont.)

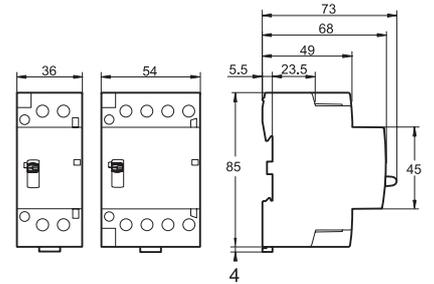
Dimensions (mm)



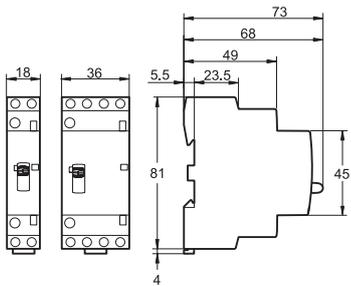
16/20/25A



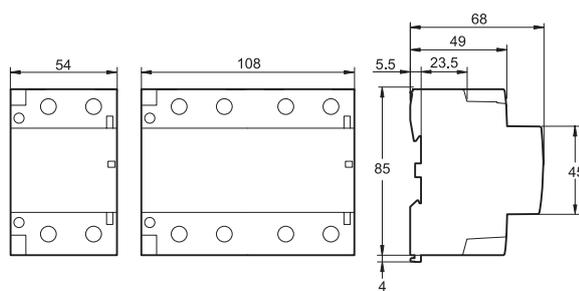
40/63A



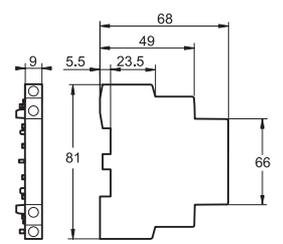
40/63A manual contactor



16/20/25A manual contactor



100A



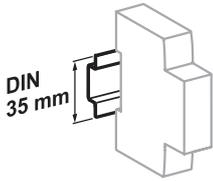
ACTs

Weight (g)

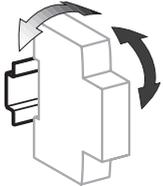
Modular contactors					
Type	Without manual operation			With manual operation	
	16/20/25 A	40/63 A	100 A	16/20/25 A	40/63 A
1P	120	-	-	-	-
2P	125	240	320	130	240
3P	205	330	-	210	335
3P+N	210	335	640	215	340
4P	210	335	640	215	340
ACTs	35				

Electrical control

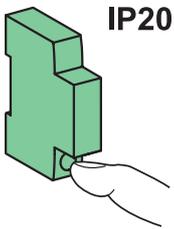
CT modular contactors (cont.)



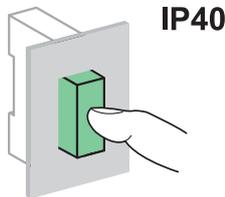
Clip on DIN rail 35 mm (1.38 in)



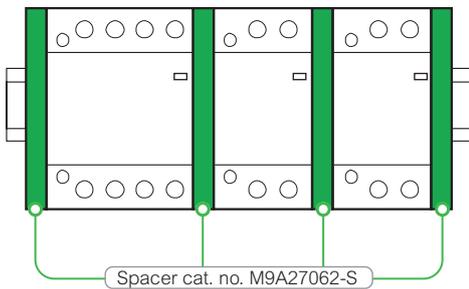
±30° vertical



IP20



IP40



Technical data

Power circuit		
Voltage rating (Ue)	1P, 2P	250 V AC
	3P, 3P+N, 4P	400 V AC
Frequency	50 Hz	
Endurance (O-C)		
Mechanical	1,000,000 cycles	
Electrical	100,000 cycles	
Maximum number of switching operations per minute	6	
Additional characteristics		
Insulation voltage (Ui)	500 V AC	
Pollution degree	2	
Rated impulse withstand voltage (Uimp)	2.5 kV (4 kV for 12/24/48 V AC)	
Degree of protection (IEC 60529)	Device only	IP20
	Device in modular enclosure	IP40
Operating temperature	-5°C to +60°C ⁽¹⁾	
Storage temperature	-40°C to +70°C	
Tropicalization (IEC 60068-1)	Treatment 2 (relative humidity of 95% at 55°C / 131°F)	

ELSV compliance (Extra Low Safety Voltage) for 12/24/48 V AC versions

The product control conforms to the SELV (safety extra low voltage) requirements

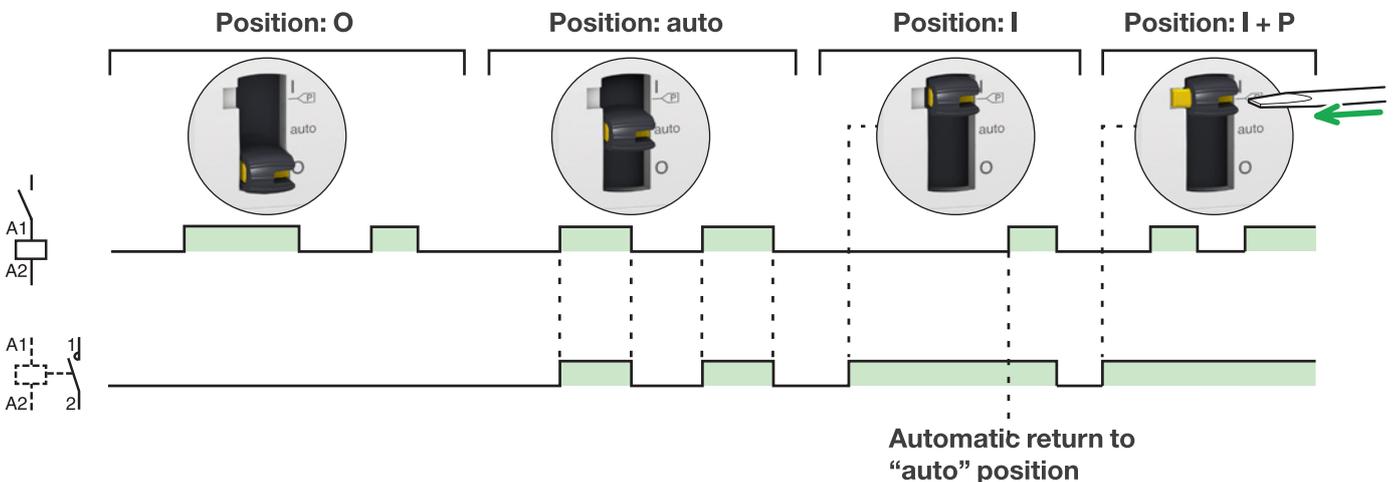
(1) In the case of contactor mounting in a enclosure for which the interior temperature is in range between 50°C and 60°C, it is necessary to use a spacer, cat. no. M9A27062-S, between each contactor

Temperature derating table

M9 CT	Ambient Temperature (°C)		
Rating (A)	≤40	50	60
63	63	59.8	50
40	40	38	32
25	25	23.8	20
16	16	15.2	12.8

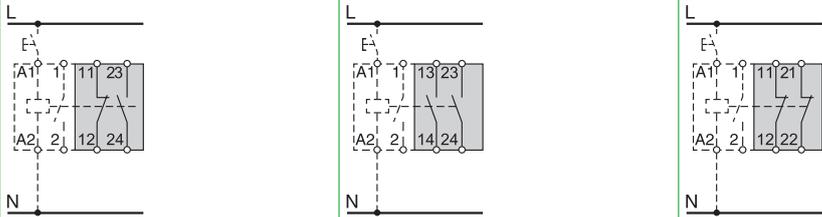
If multiple CTs side by side: install spacer and apply 0.8 coefficient on upper current values.

Operation (Manual control contactor)



Electrical control

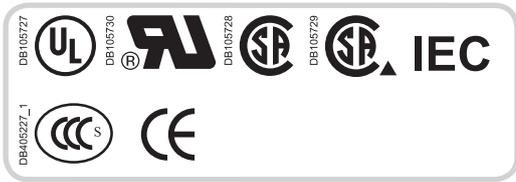
CT modular contactors (cont.)

	Indication		
Auxillaries	ACTs		
Type	Indication With Open/Close auxiliary contact		
			
Function	<ul style="list-style-type: none"> ■ This auxiliary allows indication of the "open" or "closed" position of the contactor power contacts 		
Wiring diagrams			
Mounting	<ul style="list-style-type: none"> ■ Mounted to the right of CT 		
Catalog numbers	M9C15914	M9C15916	M9C15918
Technical specifications			
Control voltage (Ue)	V AC V DC	24...240 24...130	
Frequency	Hz	50/60	
Width in 9 mm (0.35 in) modules		1	
Auxiliary contact (breaking capacity)		<ul style="list-style-type: none"> ■ Minimum: 10 mA at 24 V DC/AC ■ Maximum: <ul style="list-style-type: none"> □ 5 A at 230 V AC, AC12 □ 2 A at 230 V AC, AC15 □ 1 A at 130 V DC, DC13 	
Number of contcts		1NO + 1NC	2NO
Operating temperature		-5 to +50°C	
Storage temperature		-40 to +70°C	

	Security		
Accessories	Spacer		
			
Function	<ul style="list-style-type: none"> ■ Required to reduce temperature rise of modular devices installed side by side. ■ Recommended to separate electronic devices (thermostat, programmable clock, etc.) from electromechanical devices (relays, contactors). 		
Use	<ul style="list-style-type: none"> ■ Bag of 5 		
Catalog numbers	M9A27062-S		
Technical specifications			
Width in 9 mm modules		1	

Auxiliaries

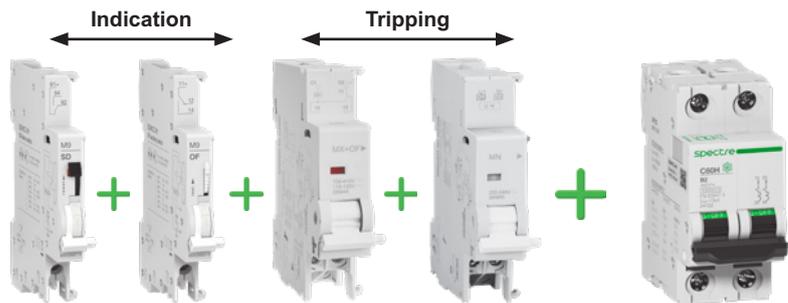
Electrical auxiliaries



Compliance with electrical auxiliaries standards

- UL 489 Branch circuit protection File #E215117.
- CSA C22.2 No. 5 Branch circuit protection File #179014.
- UL 1077 Supplementary Protection File #E90509.
- CSA C22.2 No. 235 Supplementary Protection File #179014.
- IEC 60947-1 and IEC 60947-5-1 circuit breakers.
- CE Marked.

- The electrical auxiliaries provide the remote tripping or position (open/closed/tripped) indication functions of these devices in the event of an electrical fault.
- They clip on (no tool required) to the left-hand side of associated device.
- The SD+OF auxiliary is a two-in-one product consisting of SD and OF auxiliaries in a single device.



Combination table

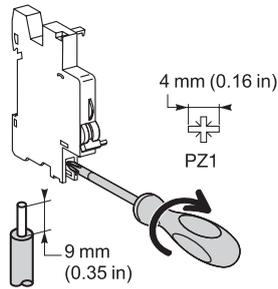
Indication auxiliaries	Tripping auxiliaries	Devices
 <p>3</p>	 <p>2</p>	 <p>C60</p>
1 SD+OF maxi	1 SD+OF maxi	
1 OF maxi	1 (SD+OF or SD or OF) maxi	 <p>N60</p>
	2 maxi	



Tripping devices must be installed first.
If two tripping devices are used: the MN under voltage release must be installed first
Indication auxiliaries: install the SD auxiliaries first

Auxiliaries

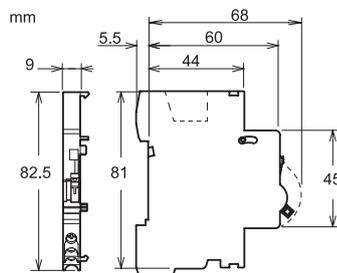
Electrical auxiliaries (cont.)



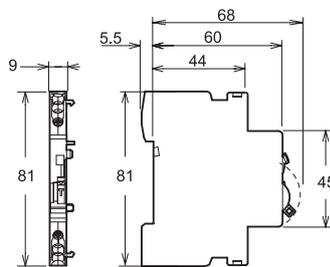
Connection

Type	Tightening torque	Copper cables
		Rigid
Indication and tripping auxiliaries	1 N.m / 9 lb.in	2 cables, 1.5 mm ² / #16 AWG or 1 cable, 2.5 mm ² / #14 AWG

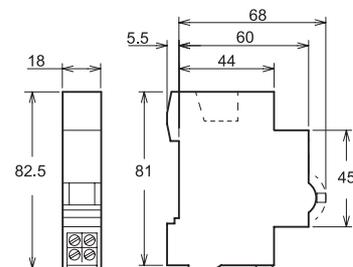
Dimensions (mm)



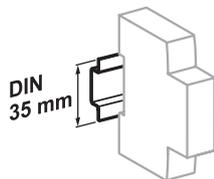
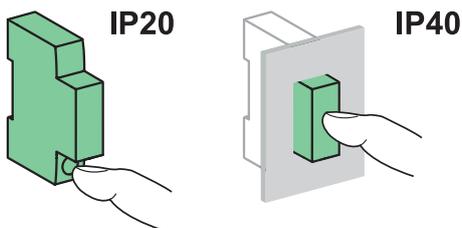
OF, SD



OF-SD



MX, MN, MN⊗, MX+OF, MNx MNx



Clip on DIN rail 35 mm (1.38 in)



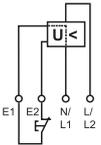
Indifferent position of installation

Weight (g)

Electrical auxiliary	
Type	Weight (g)
MN	66 g
MN⊗	66 g
MNx	73 g
MX	60 g
MX+OF	65 g
OF	30 g
SD	30 g
OF-SD	40 g

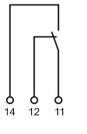
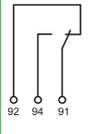
Auxiliaries

Electrical auxiliaries (cont.)

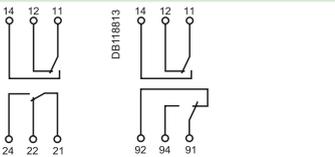
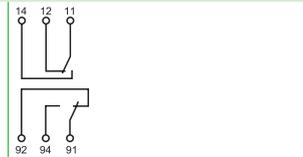
		Tripping							
Auxiliaries	MN	MN [®]	MNx						
Type	Undervoltage release Instantaneous	Delayed	Independent of the supply voltage						
									
Trademark	Schneider Electric	Schneider Electric	Schneider Electric						
Function	<ul style="list-style-type: none"> Causes the device with which it is associated to trip when its input voltage decreases (between 70% and 35% of U_n). Prevents the device from closing until its input voltage has been restored 	<ul style="list-style-type: none"> No tripping in the event of transient voltage dips (up to 0.2 s) 	<ul style="list-style-type: none"> Tripping of the associated device by opening of the control circuit (e.g. push-button, dry contact) A drop in the supply voltage does not trip the associated device A locking push-button control allows the circuit protected (e.g. machine control) to be placed in safety configuration 						
Wiring diagrams									
Utilization	<ul style="list-style-type: none"> Emergency stop via a normally-closed pushbutton Improves the safety of the power supply circuits of several machines by preventing "uncontrolled" restarting 	<ul style="list-style-type: none"> Fail-safe emergency stop Insensitive to the variation in the control circuit voltage to improve continuity of service Important: before any servicing operation switch off the main power supply (voltage presence terminals E1/E2) 							
Catalog numbers	M9A27108	M9A27107	M9A26960	M9A26961	M9A26959	M9A26963	M9A26969	M9A26971	
Technical specifications									
Rated voltage (U_e)	V AC	24	120	220...240	48	115	200...240	230	400
	V DC	24			48		-	-	
Operating frequency	Hz	50/60				400	50/60	50/60	
Pollution degree		3					3	3	
Mechanical state indicator light, red		On front face					On front face	On front face	
Test function		-					-	-	
Width in 9 mm (0.35 in) modules		2					2	2	
Operating current		-					-	-	
Number of contacts		-					-	-	
Operating temperature		-25... +50°C / -13...122°F					-25... +50°C / -13...122°F	-25... +50°C / -13...122°F	
Storage temperature		-40... +85°C / -40...185°F					-40... +85°C / -40...185°F	-40... +85°C / -40...185°F	
Standards									
IEC/EN 60947-1		■					■	■	
IEC/EN 60947-5-1		-					-	-	
EN 60947-2		■					■	-	
EN 62019-2		-					-	-	
		■					■	-	
		■					■	-	
		■					■	-	
		-					-	-	
		■					■	■	

Auxiliaries

Electrical auxiliaries (cont.)

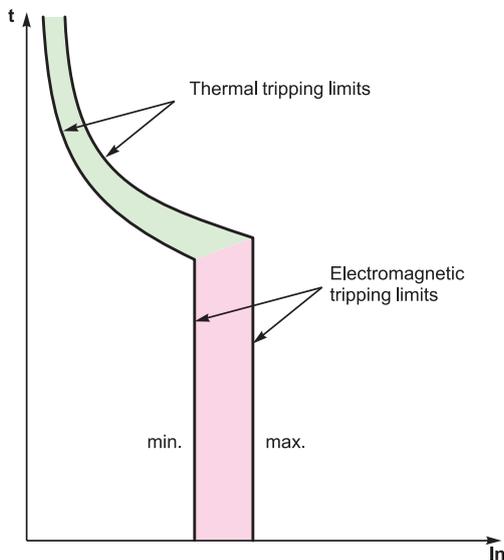
Schneider Electric				Indication					
Auxiliaries	MX		MX+OF		OF		SD		
Type	Shunt release			With open/closed auxiliary contact		open/closed auxiliary contact	Electrical fault indicating contact		
									
Trademark	Schneider Electric		Schneider Electric		Schneider Electric		Schneider Electric		
Function	<ul style="list-style-type: none"> ■ Tripping the associated device when it is powered on 			<ul style="list-style-type: none"> ■ Includes an open/closed contact (OF contact) to indicate the "open" or "closed" position of the associated device 		<ul style="list-style-type: none"> ■ Changeover contact indicating the "open" or "closed" position of the associated device 		<ul style="list-style-type: none"> ■ Changeover contact indicating the position of the associated device in the event of: <ul style="list-style-type: none"> □ electrical fault □ action on the tripping auxiliary 	
Wiring diagrams									
Utilization	<ul style="list-style-type: none"> ■ Emergency stop via a normally-open pushbutton 			<ul style="list-style-type: none"> ■ Emergency stop via a normally-open pushbutton Remote indication of the position of the associated device 		<ul style="list-style-type: none"> ■ Remote indication of the position of the associated device 		<ul style="list-style-type: none"> ■ Remote electrical fault tripping indication of the associated device 	
Catalog numbers	M9A26476	M9A26477	M9A26478	M9A26946	M9A26947	M9A26948	M9A26924	M9A26927	
Technical specifications									
Rated voltage (Ue)	V AC	100...415	48	12...24	100...415	48	12...24	240...415	240...415
	V DC	110...130	48	12...24	110...130	48	12...24	24...130	24...130
Operating frequency	Hz	50/60		50/60		50/60		50/60	
Pollution degree		3		3		3		3	
Mechanical state indicator light, red		On front face		On front face		-		On front face	
Test function		-		-		On front face		On front face	
Width in 9 mm (0.35 in) modules		2		2		1		1	
Operating current		-		3 A / 415 V AC 6A / ≤ 240 V AC		3 A / 415 V AC 6A / ≤ 240 V AC			
Number of contacts		-		1 NO/NC		1 NO/NC		1 NO/NC	
Operating temperature		-25... +50°C / -13...122°F		-25... +50°C / -13...122°F		-25... +50°C / -13...122°F		-25... +50°C / -13...122°F	
Storage temperature		-40... +85°C / -40...185°F		-40... +85°C / -40...185°F		-40... +85°C / -40...185°F		-40... +85°C / -40...185°F	
Standards									
IEC/EN 60947-1		■		■		-		-	
IEC/EN 60947-5-1		-		-		■		■	
EN 60947-2		-		-		-		-	
EN 62019-2		-		-		■		■	
		■		■		■		■	
		■		■		■		■	
		■		■		■		■	
		-		■		■		■	
		■		■		■		■	

Spectre

OF+OF / OF+SD	OF	SD	OF-SD
Double open/closed or fault indicating contact	open/closed auxiliary contact	Electrical fault indicating contact	Double open/closed or fault indicating contact
			
Schneider Electric	Spectre	Spectre	Spectre
<p>■ The OF+OF / OF+SD auxiliary is a two-in-one product: choice of OF or SD contact via the selector switch</p>	<p>■ Changeover contact indicating the "open" or "closed" position of the associated device</p>	<p>■ Changeover contact indicating the position of the associated device in the event of:</p> <ul style="list-style-type: none"> <input type="checkbox"/> electrical fault <input type="checkbox"/> action on the tripping auxiliary 	<p>■ The OF-SD auxiliary is a two-in-one product</p>
 <p>OF position SD position</p>			
<p>■ Remote position and/or fault tripping indication of the associated device</p>	<p>■ Remote indication of the position of the associated device</p>	<p>■ Remote electrical fault tripping indication of the associated device</p>	<p>■ Remote position and/or fault tripping indication of the associated device</p>
M9A26929	M9A26924-S	M9A26927-S	M9A26929-S
240...415	240...415	240...415	240...415
24...130	24...130	24...130	24...130
50/60	50/60	50/60	50/60
3	3	3	3
On front face	-	On front face	On front face
On front face	On front face	On front face	On front face
1	1	1	1
	3 A / 415 V AC 6A / ≤ 240 V AC		
1 NO/NC + 1 NO/NC	1 NO/NC	1 NO/NC	1 NO/NC + 1 NO/NC
-25... +50°C / -13...122°F	-25... +50°C / -13...122°F	-25... +50°C / -13...122°F	-25... +50°C / -13...122°F
-40... +85°C / -40...185°F	-40... +85°C / -40...185°F	-40... +85°C / -40...185°F	-40... +85°C / -40...185°F
-	-	-	-
■	■	■	■
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■	-	-	-
■	-	-	-
■	-	-	-

Technical information

Circuit breakers tripping curves



The following curves show the total fault current breaking time, depending on its amperage. For example: based on the curve on "Circuit breakers tripping curves", page 20, a C60 circuit breaker of curve C, 20 A rating, will interrupt a current of 100 A (5 times the rated current I_n) in:

- 1 second at least
- 7 seconds at most.

The circuit breakers' tripping curves consist of two parts:

- tripping of overload protection (thermal tripping device): the higher the current, the shorter the tripping time
- tripping of short-circuit protection (magnetic tripping device): if the current exceeds the threshold of this protection device, the breaking time is less than 10 milliseconds.

For short-circuit currents exceeding 20 times the rated current, the time-current curves do not give a sufficiently precise representation. The breaking of high short-circuit currents is characterized by the current limiting curves, in peak current and in energy. The total breaking time can be estimated at 5 times the value of the ratio $(I^2t)/(I)^2$.

Verification of the selectivity between two circuit breakers

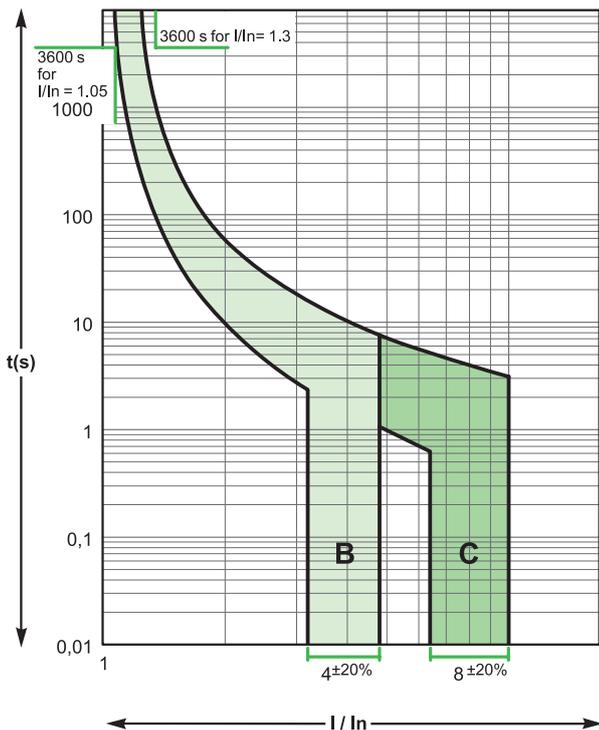
By superimposing the curve of a circuit breaker on that of the circuit breaker installed upstream, one can check whether this combination will be selective in cases of overload (selectivity for all current values, up to the magnetic threshold of the upstream circuit breaker). This verification is useful when one of the two circuit breakers has adjustable thresholds; for fixed-threshold devices, this information is provided directly by the selectivity tables.

To check selectivity on short circuit, the energy characteristics of the two devices must be compared.

Alternative current 50/60 Hz

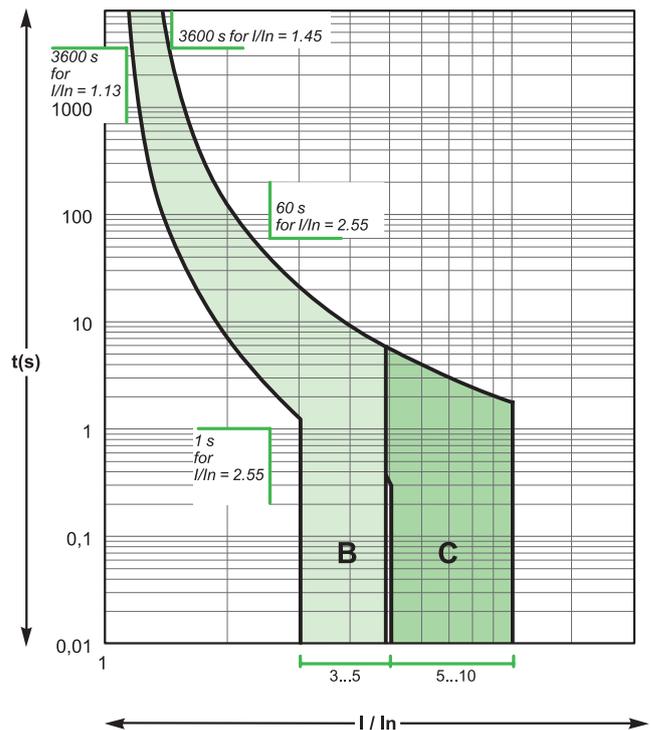
C60N, C60H

According to IEC/EN 60947-2 (reference temperature 50°C)
Curves B & C



C60N, C60H

According to IEC/EN 60898-1 (reference temperature 30°C)
Curves B & C



Technical information

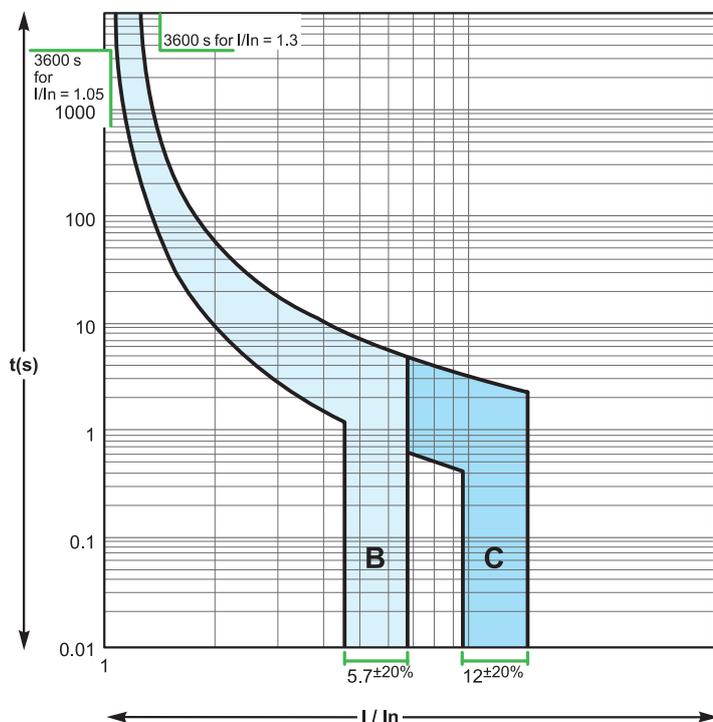
Circuit breakers tripping curves (cont.)

Direct current

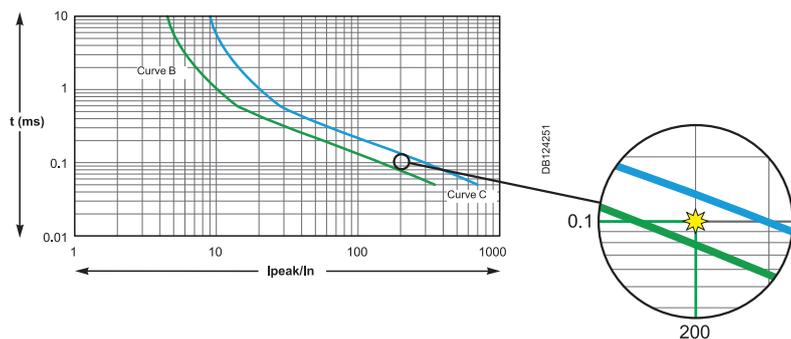
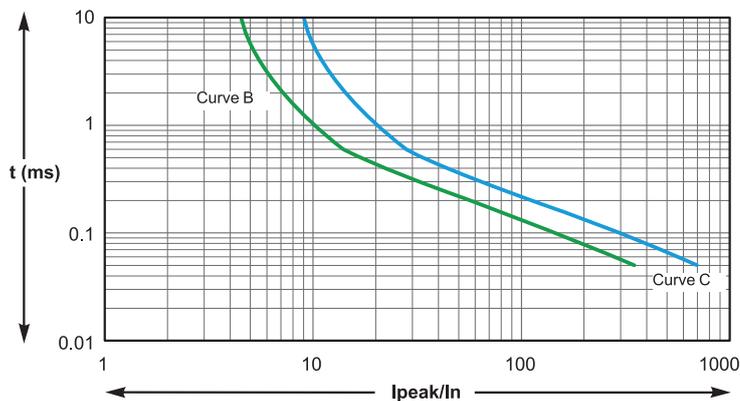
C60N, C60H

According to IEC/EN 60947-2 (reference temperature 50°C)

Curves B & C



C60N, C60H



The circuit-breaker characteristics chosen depend on the type of load downstream of the installation.

The rating depends on the size of the cables to be protected and the curves depend on the load inrush current.

Product selection according to the load inrush current

When certain “capacitive” loads are switched on, very high inrush currents appear during the first milliseconds of operation. The left graphs show the average non-tripping curves of our products for this time range (50 μ s to 10 ms).

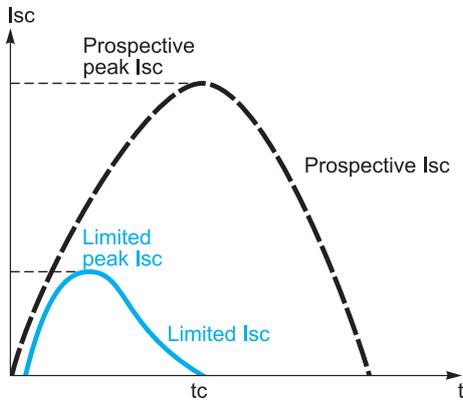
This information allows us to select the most appropriate product, according to the load specifications: curve and rating.

Example

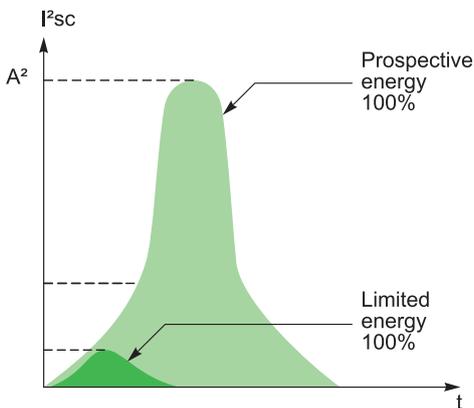
When a C60 is used with a load with current peaks in the order of 200 I_n during the first 0.1 millisecond, a curve C product must be installed.

Technical information

Short-circuit current limiting



Prospective current and real limit current.



Definition

The limiting capacity of a circuit breaker is its ability to lessen the effects of a short-circuit on an electrical installation by reducing the current amplitude and the dissipated power.

Benefits of limiting

Long installation service life

Thermal effects

Lower temperature rise at the conductor level, hence increased service life for cables and all components that are not self-protected (e.g. switches, contactors, etc.)

Mechanical effects

Lower electrodynamic repulsion forces, hence less risk of deformation or breakage of electrical contacts and busbars.

Electromagnetic effects

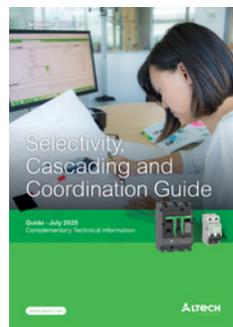
Less interference on sensitive equipment located in the vicinity of an electric circuit.

Savings through cascading

Cascading is a technique derived directly from current limiting: downstream of a current-limiting circuit breaker it is possible to use circuit breakers of breaking capacity lower than the prospective short-circuit current (in line with the cascading tables). The breaking capacity is heightened thanks to current limiting by the upstream device. Substantial savings can be achieved in this way on switchgear and enclosures.

Discrimination of protection devices

The circuit breakers' current limiting capacity improves discrimination with the protection devices located upstream: this is because the required energy passing through the upstream protection device is greatly reduced and can be not enough to cause it to trip. Discrimination can thus be natural without having to install a time-delayed protection device upstream.



Scan this QR code to download Selectivity, Cascading and Coordination Guide.



Technical information

Short-circuit current limiting (cont.)

U_e: 380-415 V AC

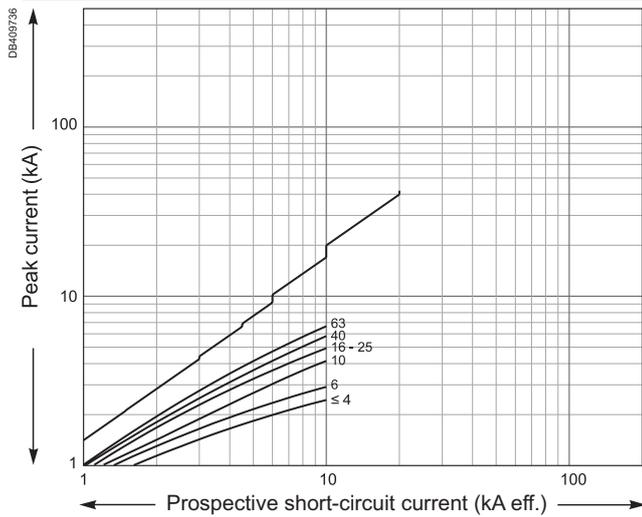
Limitation curves for network

U_e: 380-415 V AC (Ph/N 220-240 V AC)

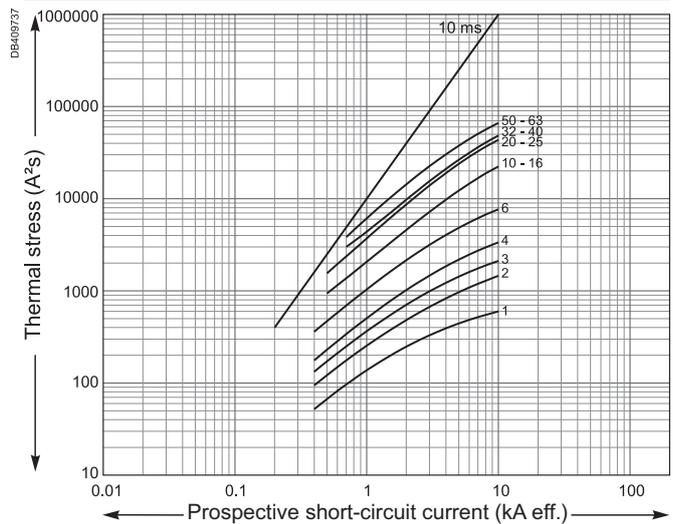
C60N

1P / 2P / 3P / 4P

Peak current



Thermal stress



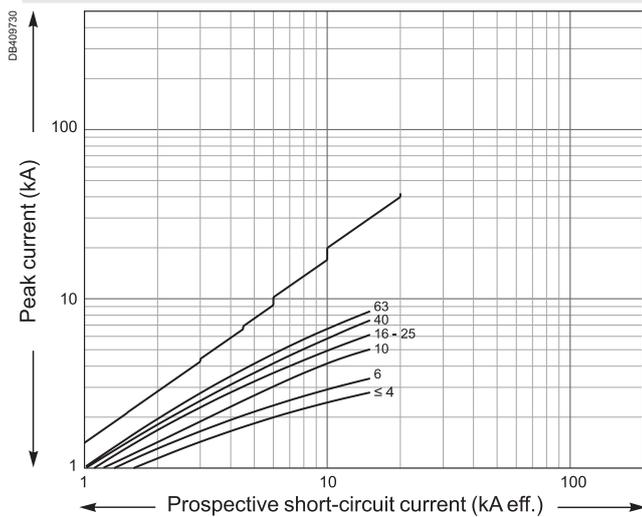
Limitation curves for network

U_e: 380-415 V AC (Ph/N 220-240 V AC)

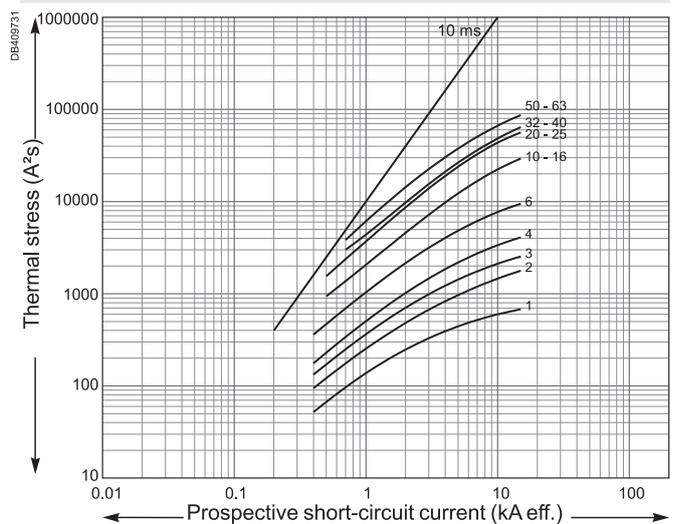
C60H

1P / 2P / 3P / 4P

Peak current



Thermal stress



Technical information

Miniature circuit breakers

for DC applications up to 240 V DC

This application sheet is intended to provide guidance for selecting the best protection and control components for a given DC system. It covers DC systems supplied by rectifier (AC/DC or DC/DC converter) and/or battery, isolated from or connected to earth.

The main voltages are 24 V DC, 48 V DC, 110 V DC and 220 V DC.

Selection of devices in DC can be challenging due to the diversity of voltage levels and earthing system.

In this document we will consider the following systems.

IT	TN	Midpoint earthed (not distributed)	- (or +) earthed
Isolated from earth + and - conductors protected and disconnected	- (or +) earthed + and - conductors protected and disconnected	Midpoint earthed (not distributed) + and - conductors protected and disconnected	- (or +) earthed + (or -) conductor only protected and disconnected

Disconnection of one or two polarities in TN ?

IEC 60364 Electrical Installation Rules (Chapter 42) can be applied to protect and break only the polarity that is not earthed in TN, but both + & - conductors are "active" conductors, so we recommend disconnecting both polarities.

Positive or negative polarity earthed in TN ?

According to IEC 60479-1 upward current is twice as dangerous as downward current so for protection against electric shock it is recommended to earth the negative pole. (In some DC applications the positive polarity can be earthed for galvanic corrosion reason).

Calculation of the short-circuit current (Isc) at the terminals of a battery

When a short-circuit occurs at its terminals, a battery discharges a current given by ohm's law:

$$I_c = \frac{V_b}{R_i}$$

where V_b = the maximum discharge voltage (battery 100% charged)
 and R_i = the internal resistance equivalent to the sum of the cell resistances (figure generally given by the manufacturer in terms of Ampere-hour capacity of the battery).

example

What is the short-circuit current at the terminals of standing battery with the following characteristics:
 capacity: 500 Ah
 maximum discharge voltage: 240V (110 cells of 2.2 V)
 discharge current: 300 A
 autonomy: 30 mm
 internal resistance: 0.5 mΩ per cell



$$R_i = 110 \times 0.5 \times 10^{-3}$$

$$I_{sc} = \frac{240}{66 \times 10^{-3}} = 4.4 \text{ kA}$$

As the above calculation shows, the short-circuit current is relatively weak.

Note: If the internal resistance is not known, the following approximate formula can be used:

$I_{sc} = kC$, where C is the capacity of the battery expressed in Ampere-hours, and k is a coefficient close to 10 but in any case always lower than 20.

Technical information

Miniature circuit breakers

for DC applications up to 240 V DC (cont.)

Circuit breaker selection

Selection of a circuit breaker depends essentially on the distribution-system parameters presented below which are used to determine the corresponding characteristics:

- Type of system - determines the type of product and the number of poles connected in series for each polarity.
- Rated voltage - determines the number of series poles taking part in current interruption.
- Nominal current - determines the rated current of the circuit breaker.
- Maximum short-circuit current at the point of installation - determines the breaking capacity.

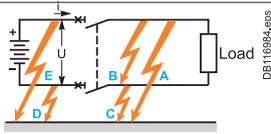
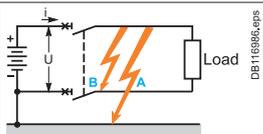
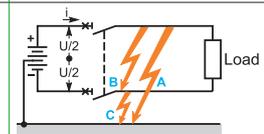
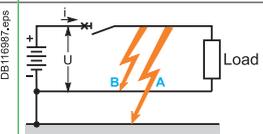
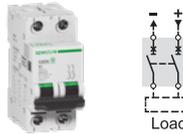
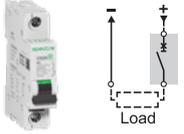
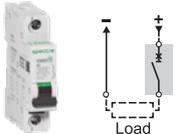
Types of system			
	Earthed systems	Isolated systems	
	The source has one earthed polarity ⁽¹⁾	The source has an earthed mid-point	
Diagrams and various faults			
Fault analysis (neglecting resistance of earth electrodes)			
Fault A	<ul style="list-style-type: none"> ■ Maximum I_{sc} at U ■ Only protected polarity concerned ■ All poles of protected polarity must have breaking capacity $\geq I_{sc \text{ max. at U}}$ 	<ul style="list-style-type: none"> ■ Maximum I_{sc} at U/2 ■ Only positive polarity concerned ■ All poles of positive polarity must have breaking capacity $\geq I_{sc \text{ max. at U/2}}$ 	<ul style="list-style-type: none"> ■ No consequences ■ The fault must be indicated by an IMD (insulation-monitoring device) and cleared (standard IEC/EN 60364)
Fault B	<ul style="list-style-type: none"> ■ Maximum I_{sc} at U ■ If only one polarity (the positive here) is protected, all poles of protected polarity must have breaking capacity $\geq I_{sc \text{ max. at U}}$ ■ If both polarities are protected, to enable disconnection, all poles of the two polarities must have breaking capacity $\geq I_{sc \text{ max. at U}}$ 	<ul style="list-style-type: none"> ■ Maximum I_{sc} at U ■ Both polarities are concerned ■ All poles of the two polarities must have breaking capacity $\geq I_{sc \text{ max. at U}}$ 	<ul style="list-style-type: none"> ■ Maximum I_{sc} at U ■ Both polarities are concerned ■ All poles of the two polarities must have breaking capacity $\geq I_{sc \text{ max. at U}}$
Fault C	<ul style="list-style-type: none"> ■ No consequences 	<ul style="list-style-type: none"> ■ Same as fault A ■ All poles of the ■ Negative polarity must have breaking capacity $\geq I_{sc \text{ max. at U/2}}$ 	<ul style="list-style-type: none"> ■ Same as fault A with the same obligations
Double fault A and D or C and E	<ul style="list-style-type: none"> ■ Double fault not possible, system trips on first fault 	<ul style="list-style-type: none"> ■ Double fault not possible, system trips on first fault 	<ul style="list-style-type: none"> ■ Maximum I_{sc} at U ■ Only positive polarity (cases A and D) or negative polarity (C and E) concerned ■ All poles of each polarity must have breaking capacity $\geq I_{sc \text{ max. at U}}$
Most unfavorable cases			
	Fault A and fault B (if only one polarity is protected)	Fault B	Double fault A and D or C and E

Technical information

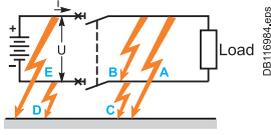
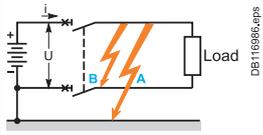
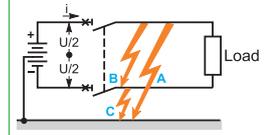
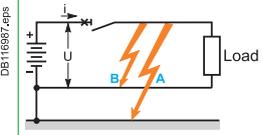
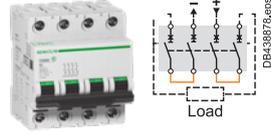
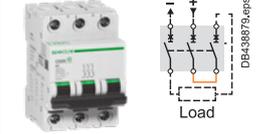
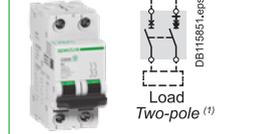
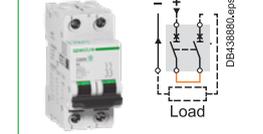
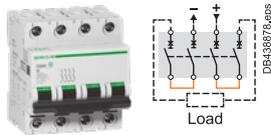
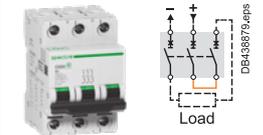
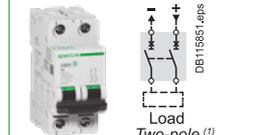
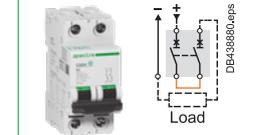
Miniature circuit breakers

for DC applications up to 240 V DC (cont.)

A. circuit breaker selection for 24/48 V DC according to method of earthing

Ue = 24/48 V DC						
Method of earthing	IT	TN				
	Isolated from earth + and - conductors protected and disconnected 	- (or +) earthed + and - conductors protected and disconnected 	Midpoint earthed (not distributed) + and - conductors protected and disconnected 	- (or +) earthed + (or -) conductor protected and disconnected 		
Breaking capacity	Rating					
Isc ≤ 10 kA	In ≤ 63 A					
		C60N/H 2P		C60N/H 1P		
Isc ≤ 20 kA	In ≤ 63 A					
		C60H 2P		C60H 1P		

B. circuit breaker selection for 110 V DC according to method of earthing

Ue = 110 V DC						
Method of earthing	IT	TN				
	Isolated from earth + and - conductors protected and disconnected 	- (or +) earthed + and - conductors protected and disconnected 	Midpoint earthed (not distributed) + and - conductors protected and disconnected 	- (or +) earthed + (or -) conductor protected and disconnected 		
Breaking capacity	Rating					
Isc ≤ 20 kA	In ≤ 63 A					
		C60N/H 4P	C60N/H 3P	C60N/H 2P	C60N/H 2P	
Isc ≤ 25 kA	In ≤ 63 A					
		C60H 4P	C60H 3P	C60H 2P	C60H 2P	

Note: This table is applicable for 125 V DC floating battery voltage.

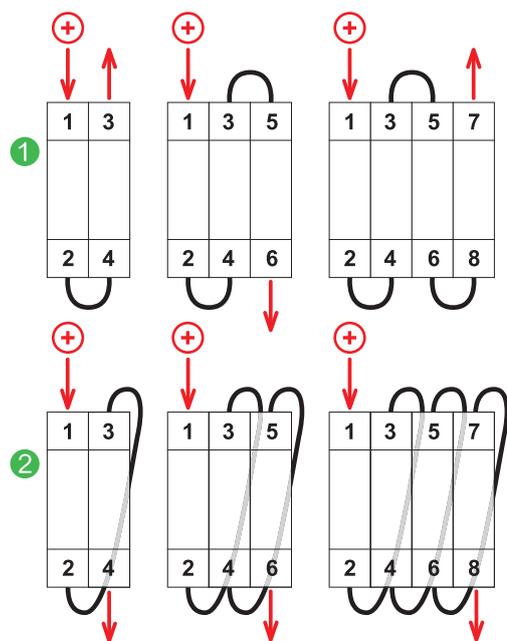
Technical information

Miniature circuit breakers

for DC applications up to 240 V DC (cont.)

C. circuit breaker selection for 240 V DC according to method of earthing

U _e = 240 V DC				
Method of earthing	IT	TN		
	Isolated from earth + and - conductors protected and disconnected	- (or +) earthed + and - conductors protected and disconnected	Midpoint earthed (not distributed) + and - conductors protected and disconnected	- (or +) earthed + (or -) conductor protected and disconnected
	DB116894.eps	DB116896.eps	DB116897.eps	DB116895.eps
Breaking capacity	Rating			
I _{sc} ≤ 10 kA	In ≤ 63 A			
		C60N/H 4P (2x2P serie)	C60N/H 4P (1P+3P serie)	C60N/H 4P (4P serie)
I _{sc} ≤ 15 kA	In ≤ 63 A			
		C60H 4P (2x2P serie)	C60H 4P (1P+3P serie)	C60H 4P (4P serie)



Pole connection

Series connection

Series connection of the poles, by dividing the voltage per pole, optimizes the circuit breaking performance for high-voltage networks. Series connection of the poles of a circuit breaker used in direct current therefore makes it possible to:

- Divide the network voltage by the number of poles
- Have the rated current for each pole
- Have the circuit breaker's breaking capacity for all the poles.

Direction of cabling and cable length

In the case of series connection, the direction of cabling has a major impact on the performance of the products.

Usually the first product cabling method ① will be used.

For special applications where there is only a single possible current direction, the second cabling method ② is preferable, especially for electrical endurance properties.

Subsequently the cable cross section and length combination should be optimized, depending on the loads. Generally, a greater length and cross section improves performance.

Rating (In)	Cross section (mm ²)	Min. shunt length (mm)
≤ 63 A	≤ 16	500
	25	200
	35	100

Note: this table gives the minimum cable (shunt) lengths optimizing the equipment's performance according to the cable cross sections.

Influence of ambient temperature

Influence of temperature on the operation

Devices	Characteristics influenced by temperature	Temperature	
		Mini	Maxi
C60N, C60H	Tripping on overload	-30°C	+70°C
N60N RCBOs	Tripping on overload	-25°C	+60°C
RCCB-ID	Maximum operating current	-25°C	+40°C

Note: the temperature considered is the temperature viewed through the device.

Circuit breakers

High temperatures

- A rise in temperature decreases the tripping current of the thermal protection.
- Protection is still ensured: the tripping threshold remains lower than the current acceptable by the cable (I_2)
- To prevent nuisance tripping, it should be checked that this threshold remains higher than the maximum operating current (I_B) of the circuit, defined by:
 - the rated load currents,
 - the coefficients of expansion and simultaneity of use.

If the temperature is sufficiently high for the tripping threshold to become lower than the operating current I_B , switchboard ventilation should be provided for.

Low temperatures

- A fall in temperature increases the tripping current of the thermal protection.
- There is no risk of nuisance tripping: the threshold remains higher than the maximum operating current of the circuit (I_B) demanded by the loads.
- It should be checked that the cable remains suitably protected, i.e. that its acceptable current (I_2) is higher than the values shown in the following tables (in amperes).

When the ambient temperature could vary within a broad range, both these aspects must be taken into account:

- the difference between the maximum operating current of the circuit (I_B) and the tripping threshold of the circuit breaker for the minimum ambient temperature,
- the difference between the strength of the cable (I_2) and the maximum tripping threshold of the circuit breaker for the maximum ambient temperature.

Maximum permissible current

- The maximum current allowed to flow through the device depends on the ambient temperature in which it is placed.
- The ambient temperature is the temperature inside the enclosure or switchboard in which the devices are installed.
- The reference temperature is in a halftone colour for the different devices.
- When several devices operating simultaneously are mounted side by side in a small enclosure, a temperature rise in the enclosure results in a reduction in the operating current. A reduction coefficient of 0.8 will then have to be assigned to the rating (already derated, if applicable, depending on the ambient temperature).

Technical information

Influence of ambient temperature (cont.)

■ Example:

Depending on the ambient temperature and the method of installation, the table below shows how to determine, for a C60, the operating currents not to be exceeded for ratings 25 A, 32 A and 40 A (reference temperature 50°C).

Operating current not to be exceeded (A)								
Installation conditions (IEC 60947-2)	C60 alone			Several C60 in the same enclosure (calculate with the reduction coefficient indicated below)				
	Ambient temperature (°C)	35°C	50°C	65°C	35°C	50°C	65°C	
Type	Nominal rating (A)	Actual rating (A)						
C60	25	26.7	25	23.2	26.7 x 0.8 = 21.4	25 x 0.8 = 20	23.2 x 0.8 = 18.6	
	32	34	32	29.9	34 x 0.8 = 27	32 x 0.8 = 25.6	29.9 x 0.8 = 24	
	40	42.9	40	36.9	42.9 x 0.8 = 34.3	40 x 0.8 = 32	36.9 x 0.8 = 29.5	

C60N, C60H derating tables

Territory/Industry (IEC 60947-2)

C60N, C60H	Ambient temperature (°C)																				
Rating	-30	-25	-20	-15	-10	-5	0	+5	+10	+15	+20	+25	+30	+35	+40	+45	+50	+55	+60	+65	+70
2A	2.55	2.59	2.56	2.52	2.49	2.45	2.41	2.37	2.34	2.3	2.26	2.22	2.17	2.13	2.09	2.04	2	1.95	1.91	1.88	1.84
4A	4.9	4.86	4.81	4.76	4.7	4.65	4.59	4.54	4.48	4.42	4.37	4.31	4.25	4.19	4.13	4.06	4	3.94	3.87	3.81	3.74
6A	7.93	7.82	7.71	7.6	7.49	7.38	7.27	7.15	7.03	6.91	6.79	6.66	6.54	6.41	6.27	6.14	6	5.86	5.71	5.56	5.42
10A	13.3	13.2	13	12.8	12.6	12.4	12.2	12	11.8	11.6	11.4	11.2	10.9	10.7	10.5	10.2	10	9.8	9.5	9.2	9
16A	20	19.8	19.5	19.3	19.1	18.8	18.6	18.4	18.1	17.9	17.6	17.3	17.1	16.8	16.6	16.3	16	15.7	15.4	15.1	14.8
20A	26.9	26.6	26.2	25.8	25.4	25	24.6	24.2	23.7	23.3	22.9	22.4	22	21.5	21	20.5	20	19.5	18.9	18.4	17.9
25A	32.9	32.5	32.1	31.6	31.1	30.7	30.2	29.7	29.2	28.7	28.2	27.7	27.2	26.7	26.1	25.6	25	24.4	23.8	23.2	22.6
32A	41.5	41.1	40.5	40	39.4	38.9	38.3	37.7	37.1	36.5	35.9	35.3	34.7	34	33.4	32.7	32	31.3	30.6	29.9	29.1
40A	53.7	52.9	52.2	51.4	50.6	49.8	49	48.2	47.3	46.5	45.6	44.7	43.8	42.9	42	41	40	39	37.9	36.9	35.8
50A	65	64.3	63.5	62.6	61.7	60.8	59.9	59	58.1	57.1	56.2	55.2	54.2	53.2	52.1	51.1	50	48.9	47.8	46.7	45.5
63A	85.5	84.6	83.3	82	80.7	79.4	78	76.7	75.3	73.9	72.4	70.9	69.4	67.9	66.3	64.7	63	61.3	59.5	57.8	56

Household (IEC 60898-1)

C60N, C60H	Ambient temperature (°C)																				
Rating	-30	-25	-20	-15	-10	-5	0	+5	+10	+15	+20	+25	+30	+35	+40	+45	+50	+55	+60	+65	+70
2A	2.36	2.33	2.3	2.27	2.24	2.22	2.19	2.16	2.13	2.1	2.06	2.03	2	1.97	1.93	1.9	1.87	1.83	1.79	1.76	1.72
4A	4.59	4.54	4.5	4.45	4.4	4.35	4.3	4.26	4.21	4.15	4.10	4.05	4	3.95	3.89	3.84	3.78	3.73	3.67	3.61	3.55
6A	8.68	8.49	8.29	8.09	7.89	7.68	7.46	7.24	7.01	6.77	6.52	6.27	6	5.72	5.43	5.12	4.79	4.43	4.05	3.62	3.13
10A	12.1	11.96	11.8	11.6	11.5	11.3	11.1	10.9	10.8	10.6	10.4	10.2	10	9.8	9.6	9.4	9.2	9	8.8	8.5	8.3
16A	18.6	18.4	18.2	18	17.8	17.6	17.4	17.1	16.9	16.7	16.5	16.2	16	15.8	15.5	15.3	15	14.8	14.5	14.2	14
20A	24.4	24.1	23.7	23.4	23	22.7	22.3	22	21.6	21.2	20.8	20.4	20	19.6	19.2	18.7	18.3	17.8	17.4	16.9	16.4
25A	30	29.6	29.2	28.8	28.4	28	27.6	27.2	26.8	26.3	25.9	25.5	25	24.5	24.1	23.6	23.1	22.6	22.1	21.6	21
32A	40.7	39.8	39.2	38.5	37.9	37.2	36.5	35.8	35.1	34.3	33.6	32.8	32	31.2	30.4	29.5	28.6	27.7	26.8	25.6	24.6
40A	51.1	50.1	49.2	48.4	47.5	46.7	45.8	44.9	43.9	43	42	41	40	39	37.9	36.8	35.6	34.5	33.2	31.8	30.5
50A	64.2	63	61.9	60.8	59.7	58.6	57.4	56.3	55.1	53.8	52.6	51.3	50	48.7	47.3	45.8	44.4	42.8	41.3	39.5	37.9
63A	82.3	80.7	79.2	77.8	76.3	74.7	73.2	71.6	69.9	68.3	66.6	64.8	63	61.1	59.2	57.2	55.2	53.1	50.8	48.7	46.6



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