

Smart Creative

Smart Low Voltage Products For OEM Applications

2006

English Edition



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Introduction

Smart Creative:

Merlin Gerin @mart

The world is opening to OEMs. With these new opportunities come new demands. That's particularly true with circuit breakers where diverse domestic and international standards and regulations combine with a widening variety of applications. The result: keeping pace with the needs of your customers and building a more profitable domestic and export business become critical and complex challenges.

As part of the Schneider Electric family, Merlin Gerin continues to offer the best electric distribution solution to customers. In July 2005, to industrial sector, we launched a dedicated OEM series: @mart LV products, including the @mart MCB and @mart MCCB.

From now on, the two core brands of Schneider Electric: Merlin Gerin & Telemecanique marry to offer not only the best industrial automation solution, but also the best low voltage distribution solution to OEM customers.





Merlin Gerin

Smart LV products-Dedicate to OEM customers

Brand
Performance
Solution
Service

Telemecanique

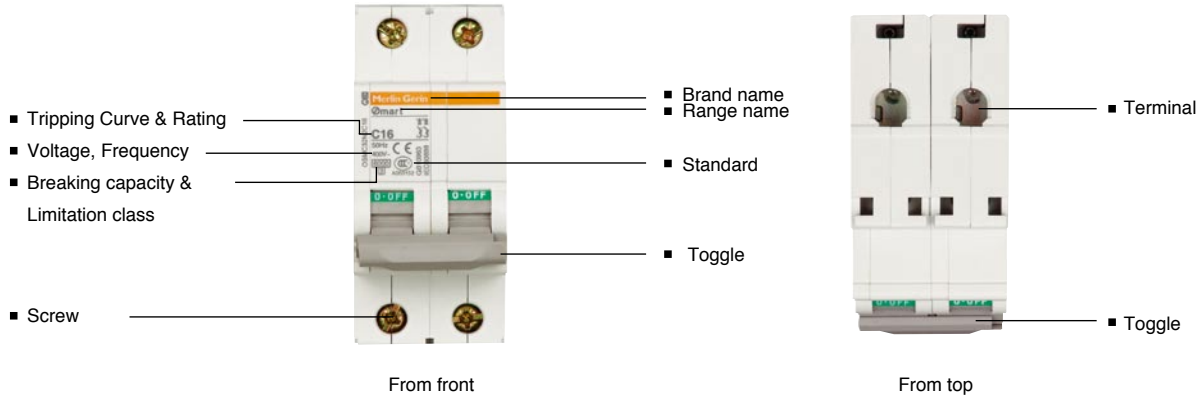
TE industrial automation products - to OEM customers



Smart Miniature Circuit Breaker

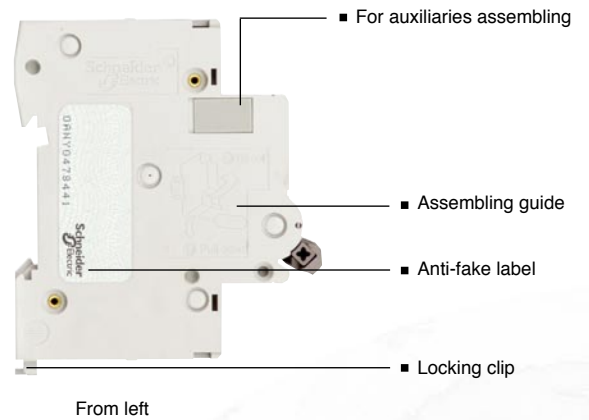
What is Smart MCB

Product



Marking

OSM	C32N	1	C	10	
Range	Name	Poles	Tripping curve	Rating	
Smart	C32N	1 : 1P 2 : 2P 3 : 3P 4 : 4P	C : C curve D : D curve	1 : 1A 20 : 20A 2 : 2A 25 : 25A 3 : 3A 32 : 32A 4 : 4A 40 : 40A 6 : 6A 50 : 50A 10 : 10A 63 : 63A 16 : 16A	



Smart Range Name



It appears on all the LV products which are dedicated to OEM customers, as well as on their packagings

Packaging



Smart Miniature Circuit Breaker Architecture

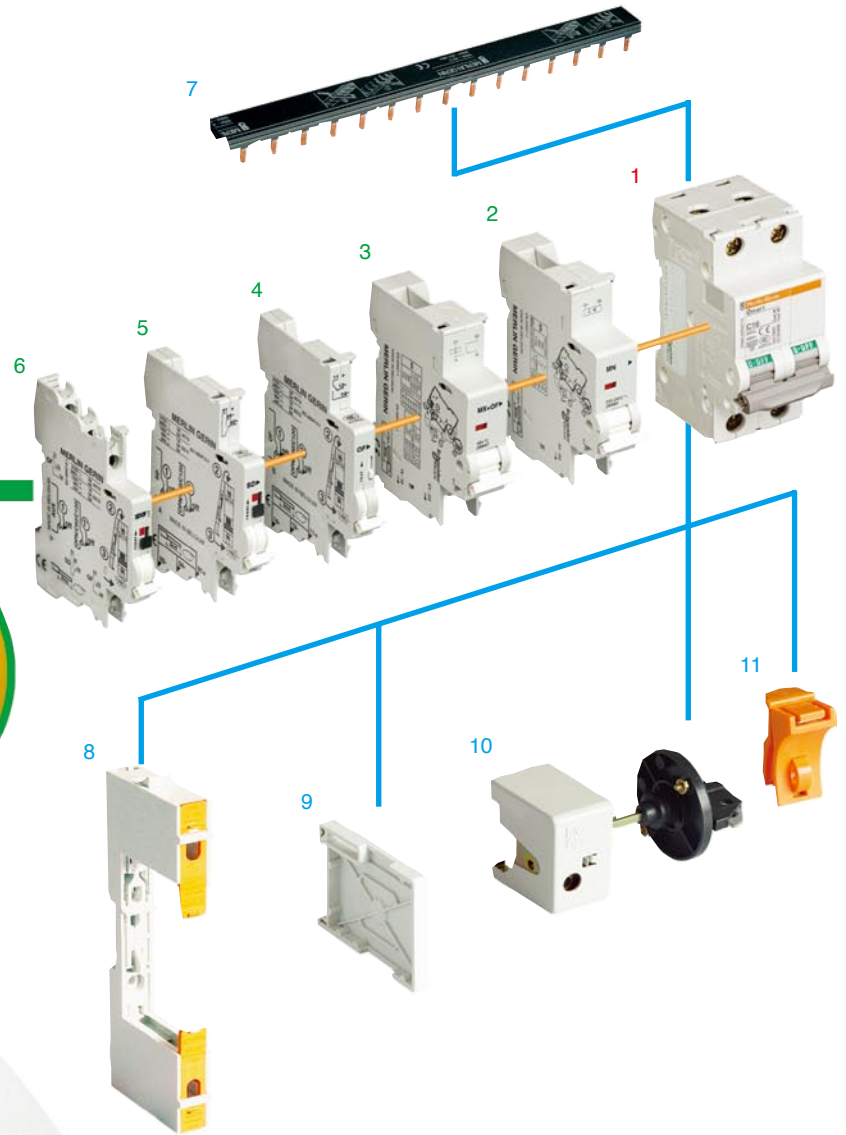


Machine



Control panel

LV products



1. Smart MCB
2. MN under voltage release / MN time-delayed under voltage Release, or MV Voltage threshold release
3. MX/MX+OF voltage shunt release
4. OF auxiliary contact
5. SD fault indicating switch
6. OF+SD/OF auxiliary contact
7. Comb busbar
8. Dividable Mounting Plate
9. Spacer
10. Rotary handle
11. Padlocking Facility

Smart Miniature Circuit Breaker

OSMC32N

C,D curve

IEC60898: 6000A

Function

- The circuit-breakers combine the following functions:
 - protection of circuits against short-circuit currents
 - protection of circuits against overload currents
 - control
 - isolation protection of persons against indirect contact with TN and IT neutral systems

Tripping curves

C curve

Cables feeding conventional loads.

- Power circuit
- ratings: 1 to 63 A set at 30°C
- tripping curve: the magnetic trip units operate between 5 and 10 I_n.

D curve

Loads with high inrush currents (motors, transformers).

- Power circuit
- ratings: 1 to 63 A set at 30°C
- tripping curve: the magnetic trip units operate between 10 and 14 I_n.

Technical data according to IEC 60898

- Power circuit:
 - voltage rating (U_e): 440V AC
 - breaking capacity:
 - according to IEC 60898, I_{cu} ultimate breaking capacity (O-CO cycle):

Rating (A)	Type	Voltage (V)	Breaking capacity I _{cn} (A)
1...63	1P	230/400	6000
	2P, 3P,4P	400	6000

- limitation class (IEC 60898): 3.

Generals 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 operating handle. This indicator shows opening contacts of all the poles.
- Number of cycles (O-C): 20 000.
- Environment:
 - tropicalisation: treatment 2 (relative humidity: 95% at 55)
 - weight (g):

Type	1P	2P	3P	4P
	110	220	340	450


- Connection: tunnel terminals for the following cables:
 - 16 mm² flexible or 25 mm² rigid up to 25A ratings
 - 25 mm² flexible or 35 mm² rigid for 32 to 63A ratings

Smart Miniature Circuit Breaker

OSMC32N

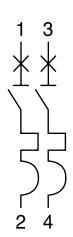


OSMC32N1C16

Type	Rating (A)	Width in mod of 9mm	Ref. No.	
			C curve	D curve
1P 	1	2	OSMC32N1C1	OSMC32N1D1
	2	2	OSMC32N1C2	OSMC32N1D2
	3	2	OSMC32N1C3	OSMC32N1D3
	4	2	OSMC32N1C4	OSMC32N1D4
	6	2	OSMC32N1C6	OSMC32N1D6
	10	2	OSMC32N1C10	OSMC32N1D10
	16	2	OSMC32N1C16	OSMC32N1D16
	20	2	OSMC32N1C20	OSMC32N1D20
	25	2	OSMC32N1C25	OSMC32N1D25
	32	2	OSMC32N1C32	OSMC32N1D32
	40	2	OSMC32N1C40	OSMC32N1D40
	50	2	OSMC32N1C50	OSMC32N1D50
	63	2	OSMC32N1C63	OSMC32N1D63

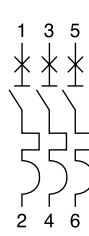


OSMC32N2C16

2P 	1	4	OSMC32N2C1	OSMC32N2D1
	2	4	OSMC32N2C2	OSMC32N2D2
	3	4	OSMC32N2C3	OSMC32N2D3
	4	4	OSMC32N2C4	OSMC32N2D4
	6	4	OSMC32N2C6	OSMC32N2D6
	10	4	OSMC32N2C10	OSMC32N2D10
	16	4	OSMC32N2C16	OSMC32N2D16
	20	4	OSMC32N2C20	OSMC32N2D20
	25	4	OSMC32N2C25	OSMC32N2D25
	32	4	OSMC32N2C32	OSMC32N2D32
	40	4	OSMC32N2C40	OSMC32N2D40
	50	4	OSMC32N2C50	OSMC32N2D50
	63	4	OSMC32N2C63	OSMC32N2D63

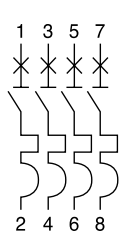


OSMC32N3C16

3P 	1	6	OSMC32N3C1	OSMC32N3D1
	2	6	OSMC32N3C2	OSMC32N3D2
	3	6	OSMC32N3C3	OSMC32N3D3
	4	6	OSMC32N3C4	OSMC32N3D4
	6	6	OSMC32N3C6	OSMC32N3D6
	10	6	OSMC32N3C10	OSMC32N3D10
	16	6	OSMC32N3C16	OSMC32N3D16
	20	6	OSMC32N3C20	OSMC32N3D20
	25	6	OSMC32N3C25	OSMC32N3D25
	32	6	OSMC32N3C32	OSMC32N3D32
	40	6	OSMC32N3C40	OSMC32N3D40
	50	6	OSMC32N3C50	OSMC32N3D50
	63	6	OSMC32N3C63	OSMC32N3D63



OSMC32N4C16

4P 	1	8	OSMC32N4C1	OSMC32N4D1
	2	8	OSMC32N4C2	OSMC32N4D2
	3	8	OSMC32N4C3	OSMC32N4D3
	4	8	OSMC32N4C4	OSMC32N4D4
	6	8	OSMC32N4C6	OSMC32N4D6
	10	8	OSMC32N4C10	OSMC32N4D10
	16	8	OSMC32N4C16	OSMC32N4D16
	20	8	OSMC32N4C20	OSMC32N4D20
	25	8	OSMC32N4C25	OSMC32N4D25
	32	8	OSMC32N4C32	OSMC32N4D32
	40	8	OSMC32N4C40	OSMC32N4D40
	50	8	OSMC32N4C50	OSMC32N4D50
	63	8	OSMC32N4C63	OSMC32N4D63

Smart Miniature Circuit Breaker

Electrical Auxiliaries

MX/MX+OF, MN, MN \square , MV

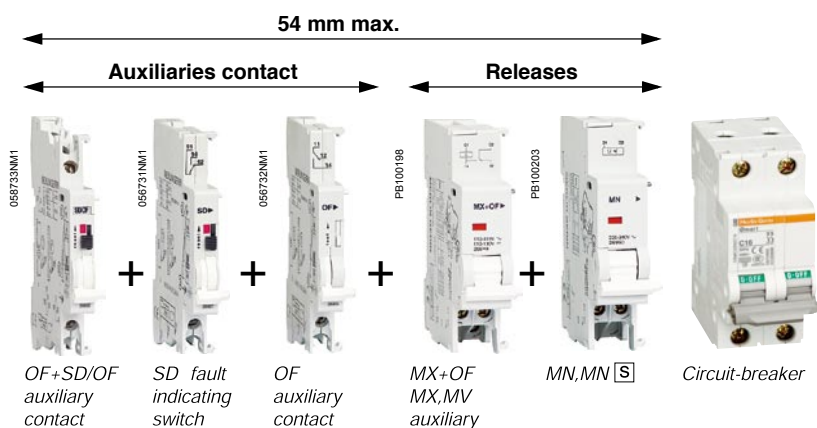
Function

They remotely trip or indicate circuit-breakers, without Vigi module.

Description

- They are mounted to the left of the circuit-breaker within a maximum width of 54 mm.
- Fixed using clips (no tools) onto the left side of the circuit-breaker.

Auxiliary combination



- A maximum of 3 indication auxiliaries OF, SD on the same circuit-breaker.
- A maximum of 2 changeover auxiliaries (OF+SD/OF) on the same circuit-breaker.
- A maximum of 1 OF+SD/OF switch over auxiliary and 1 indication auxiliary OF or SD on the same circuit-breaker.
- A maximum of 2 tripping auxiliaries (MX+OF, MX, MN, MN \square , MV) on the same circuit-breaker.

Type	Voltage (V AC or DC)	Power (W or VA)
MX/MX+OF	415V AC	400
	230V AC	130
	110V AC	35
	DC	45
	48V AC	32
	DC	32
	24V AC	135
	DC	135
	12V AC	30
	DC	30
MN	220...240V AC	3.5
	48V AC	1.6
	DC	1.1
MN \square	220V AC	3.6
MV	230V AC	128



Tripping

Tripping indication on front panel by means of a red indicator.

- Auxiliaries conform standard IEC 60947-1.

MX+OF shunt trip release

Controls tripping of the device with which it is combined when energised.

It is fit out with a changeover contact (O + C) to indicate the circuit-breaker's position.

It is fit with a self-interrupting contact allowing the control circuit to remain on (latching emergency stop).

MX shunt release

Controls tripping of the device with which it is combined at power-up.

It is fitted with a self-interrupting contact allowing the control circuit to remain on (latching emergency stop).

MN release

Controls tripping of the device with which it is combined when its supply voltage drops (threshold between 70 and 35% of the U_n).

It allows the device to be manually closed if the voltage exceeds 85% of the nominal voltage.

- Use:
 - emergency stop pushbutton
 - safety on supply circuits of several machines by preventing the "non-controlled" restart of all the motors.

MN^S selective release

Undervoltage release that controls the opening of the device with which it is combined.

0.3 s time-delay on voltage dip: avoids tripping on brownouts or momentary voltage drops.

MV voltage threshold release

Especially designed to monitor the voltage between the neutral and phase(s) conductors.

It cuts off the supply by opening the protected device when a threshold level for overvoltage lasting more than a few tenths of a second is exceeded.

Connection

- Using screw clamp terminals:
 - for 1 or 2 cables of a max. of 2.5 mm²
 - 1.5 mm² with end.
- Visible markers near the terminals.

Remote indication

- All auxiliary contacts conform to standard IEC 60947-2.

OF open/closed contact

- Changeover contact that indicates the "open" or "closed" position of the device.
- Test button on front panel enables verification of the indication circuit, without having to operate the device.

SD fault indicating switch

- Changeover contact that indicates the "tripped" position of the device.
- Fault indication (SD) on front panel by means of a mechanical indicator.
- Always mount to the left of one or more tripping auxiliaries.

OF+SD/OF changeover contact

- Double changeover contact indicates:
 - the "open" or "closed" position of the circuit-breaker (OF)
 - the "tripped" position of the device (SD).
- 2 circuits:
 - upper: OF
 - lower: SD or OF.
- Function choice using the rotary changeover switch on the right side.
- Selected function is indicated on the front panel.
- Fault indication (SD) on front panel by means of a mechanical red indicator.
- Always mount to the left of one or more tripping auxiliaries.

Connection

- Using screw clamp terminals:
 - for 1 or 2 cables of a max. of 2.5 mm²
 - 1.5 mm² with end.
- Visible markers near the terminals.

Smart Miniature Circuit Breaker

Electrical Auxiliaries

MX, MX+OF, MN, MN[S], MV, OF, SD,OF+SD/OF



26476



26946



26960



917132



26927



26924



26929

Type	Voltage (V AC)	(V DC)	Width (in mod of 9mm)	Ref. no.
MX shunt release				
	110...415	110...130	2	26476
	48	48	2	26477
	12/24	12/24	2	26478

MX+OF shunt release				
	110...415	110...130	2	26946
	48	48	2	26947
	12/24	12/24	2	26948

minimum voltage MN or MN[S] release				
MN release	220...240		2	26960
	48	48	2	26961
MN[S] selectif release	220...240		4	26963

	220...240		2	26960
	48	48	2	26961

MV voltage threshold release				
	230		2	917132

	230		2	917132
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SD fault indicating switch				
			1	26927

			1	26927
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OF open/closed contact				
			1	26924

			1	26924
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OF+SD/OF change over contact				
			1	26929

			1	26929
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Smart Miniature Circuit Breaker

Connection Accessories

Function

Accessories simplify the implementation of Smart MCB

- Delivered with 2 side plates IP 2.
- Outgoers can be marked.
- Cutting marks of busbars and insulating material.
- Self-extinguishing insulating material.
- Unused teeth can be isolated using tooth cover ends.

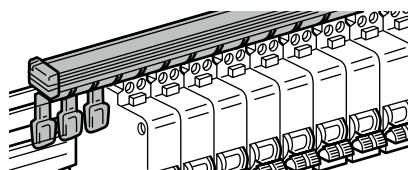
Technical data

1P, 2P, 3P and 4P comb busbars for Smart MCB

- Supply by using semi-rigid cable directly in the device's tunnel:
- cross-section of 25 mm² for Smart MCB all ratings.
- Using 25 mm semi-rigid cable when using the connector ref. no. **14885**.
- Permissible current at 40° C:
- Rated insulation voltage: 500 V (as in IEC 60664).
- Short-circuit current withstand: compatible with the breaking capacity of modular Merlin Gerin circuit-breakers.



14881,14882,14883 and 14884



14888



14885

Type	number of busbars	number of mod (mod 18mm)	Ref. no.
1P	1	12	14881
	2	24	14891
2P	1	12	14882
	2	24	14892
3P	1	12	14883
	2	24	14893
4P	1	12	14884
	2	24	14894

Accessories	Ref. no.
side plates (set of 40)	
for 1 P, 2P comb busbars	14886
for 3 P, 4P comb busbars	14887
tooth cover ends (set of 40)	
for 1 P, 2P, 3P, 4P comb busbars	14888
insulated connectors (set of 4)	
for 25 mm ² cable	14885

Smart Miniature Circuit Breaker

Connection Accessories



Function

The accessories simplify integration of the circuit-breakers.

Description

Rotary handle

- front or lateral control of 2, 3 and 4-pole circuit-breakers
- degree of protection: IP 40, IK 10
- installation:
 - circuit-breaker switching sub-assembly ref. 27046 is fixed onto the circuit-breaker
 - disconnectable handle: ref. 27047 is mounted on the front face on the mobile panel or the enclosure door
 - fixed handle: ref. 27048 is fixed onto the enclosure's lateral side
- a complete rotary handle is made up of a circuit-breaker switching sub-assembly ref. 27046, handle ref. 27047 or handle ref. 27048.

Dividable mounting plate ≤ 63 A

- allows isolation with positive break indication
- can be locked using a padlock with a max. \varnothing of 8 mm, which is not supplied, when the circuit-breaker is removed
- mounting possibilities:
 - in a vertical or horizontal position
 - centre distance between two rows: min. of 200 mm
 - in Prisma enclosure or cabinet
- only on single circuit-breaker (without earth leakage module or auxiliary)
- connection: tunnel terminals for cable of up to 35 mm².

Padlocking accessory

- allows the device to be locked in the "open" or "closed" position (using padlock with max. \varnothing of 8 mm, not supplied)

Functional opening of the front plate or the door is still possible when the device is locked in the "open" position.

Spacer

Can be used for:

- aligning devices
- completing rows
- separating devices in case of excessive overheating.



27046+27048



26996



26970



27062

Type		Ref. no.
rotary handle	circuit-breaker switching sub-assembly (fixed onto circuit-breaker)	27046
	extended, disconnectable handle (mounted onto mobile panel or door)	27047
	front or lateral fixed handle (mounted onto panel)	27048
	dividable mounting plate (for 1 pole)	26996
	centre fixing distance between 2 rows: 200 mm	
padlocking accessory	(bag of 2)	26970
spacer	in wide of 9 mm	27062

Relevant Products

C32H-DC Circuit-Breakers

Function

The circuit-breakers combine the following functions:

- protection of circuits against short-circuit currents,
- protection of circuits against overload currents,
- control,
- isolation.

C32H-DC circuit-breakers are used in circuits with a DC supply (emergency lighting, automatic systems, electrolysis, telephony, etc.)

Description

technical data

- power circuit:
 - voltage rating:
 - 1P 127 VDC,
 - 2P 250 VDC
 - ratings: 1 to 40 A set at 40 °C
 - breaking capacity:
 - according to IEC 947-2 (O-CO cycle):

Rating (A)	Type	Voltage (V)	Break. Cap. (kA)
1...40	1P	127	10
	2P	127	20
	2P	250	10

number of cycles (O-C): 10 000

at L/R ≤ 0.015s

- it is essential that the polarities be respected in relation to the power supply

■ environment:

- tropicalisation: treatment 2 (relative humidity: 95 % at 55 °C

v weight (g):

type	1P	2P
	127	250

- connection: tunnel terminals for 16 mm² flexible cables or 25 mm² rigid cables
- installation: Multi 9 or Prisma enclosures

C curve

use

cables feeding conventional loads

technical data

- power circuit:
 - tripping curve:
 - the magnetic trip units operate between 7 and 10 I_n.

Catalogue numbers



20536

Type	Rating (A)	Width in mod. of 9 mm	Ref.no.
C32H-DC C curve			
1P or	1	2	20531
	2	2	20532
	3	2	20533
	6	2	20534
	10	2	20535
	16	2	20536
	20	2	20537
	25	2	20538
	32	2	20539
	40	2	20540



20550

2P or	1	4	20541
	2	4	20542
	3	4	20543
	6	4	20544
	10	4	20545
	16	4	20546
	20	4	20547
	25	4	20548
	32	4	20549
	40	4	20550

Relevant Products

C32H-DC Electrical Auxiliaries



functions

Remote tripping and indication of C32H-DC circuit-breakers.

description

Auxiliary Combinations

- Mounted to the left of the circuit-breaker (SD and OF).
- Mounted to the right of the circuit-breaker (MX + OF and MN).



*SD fault
indicating
switch*

*OF
auxiliary
contact*

Circuit-breaker

*MX + OF
shunt
trip
release*

*MN
undervoltage
release*

Remote tripping

By means of an MX shunt trip or MN undervoltage release.

MX + OF shunt trip release

When energised, trips and opens the circuit breaker with which it is associated:

- fitted with a cut-off contact
- fitted with an O + F contact that indicates the "open" or "closed" position of the circuit - breaker.

MN undervoltage release

When its supply voltage drops (between 70 and 35%) it trips and opens the circuit breaker with which it is associated, and prevents reclosing of this circuit-breaker until its supply voltage is restored:

- complies with IEC 947-2 and IEC 157-1 standards
- use:
 - emergency stop via push button
 - safety feature on circuit supplying several machines preventing uncontrolled restarting of the motors.

MN[S] time-delayed undervoltage release

Undervoltage release controlling opening of the circuit-breaker with which it is associated. Allows a 0.5 second time delay on a short supply interruption or voltage drop.

Technical data

- consumption of releases

Type	Voltage (V CA or V CC)		(W or VA)
MX	AC	pick-up	240
	DC	pick-up	200
MN	AC	holding	4,1
	DC	holding	4,1
MN[S]	AC	holding	4,1
	DC	holding	4,1

Remote indication

OF contact

- this auxiliary contact installed to the left of the circuit-breaker indicates the "open" or "closed" position of the circuit-breaker.

SD fault indicating switch

- this auxiliary switch installed to the left of the circuit-breaker indicates the "tripped on fault" position of the circuit-breaker.

visualisation of the fault on the front panel by mechanical indicator lamp.

Technical data

- breaking capacity of the auxiliary switches

Voltage (V AC or DC)	Rating (A)
415 V AC	3
≤ 240 V AC	6
130 V DC	1
≤ 48 V DC	2
≤ 24 V DC	6

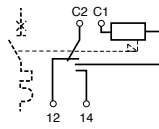
Technical data common to the auxiliaries

connection: terminal pads for two 1.5 mm² cables or one 2.5 mm² cable.



27136

Type	Control Voltage (V AC)	(V DC)	Width. in mod of 9 mm	Ref.no.
MX + OF shunt trip release				
	220... 415...		2	27136
	110... 220...	110... 125	2	27137
	24... 48	24... 48	2	27138



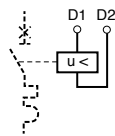
MX

MN undervoltage release

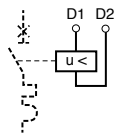


27140

Instantaneous	220... 240	220... 240	2	27140
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time-delayed <input type="checkbox"/>	220... 240	220... 240	2	27143
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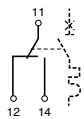


OF auxiliary contact



27132

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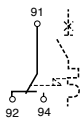


SD fault indicating switch



27135

			1	27135
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Function

New type fixed surge arrestors, have bigger In & higher operating voltage .They are recommended on TNC, TNS and TT system. They have fast response time, better up. Innovatively adopt electronics alarming system.

Application

Incoming protection

- ST65 for a very high risk level
- ST40 for high risk level

Secondary protection

- ST20 used for a secondary protection of loads should placed in a cascading configuration with the incoming SPD

N-PE protection

- ST G module ensure the N-PE protection

Description

Technical Data

- Frequency: 50...60Hz
- Ic at Up:
- 1P/2P/3P/4P: <800mA
- 1P+N/3P+N/N-PE: 0mA
- electronics alarming system
- Green: Normal work
- Red: To be replaced
- Terminal connection
- flexible cable: 2.5-25mm²
- rigid cable:2.5-35 mm²
- flexible or rigid cable 10 mm² if installed with lightning rod
- operating temperature:-20°C to +60°C
- storage temperature:-40°C to +70°C
- protection class
- terminal IP20
- Standard
- IEC61643-11 II test
- GB18802.1
- GB50343
- ST 65r/65
- I_{max} (8/20μs): 65KA
- I_n (8/20μs): 35KA
- ST 65r with remote control contact
- 11 common, 12 Normally closed, 14 Normally open
- Max switching current: 2A
- working voltage: AC 250V, DC 220V
- switching volume: 62.5VA
- ST 40r/40
- I_{max} (8/20μs): 40KA
- I_n (8/20μs): 20KA
- ST 40r with remote control contact
- 11 common, 12 Normally closed, 14 Normally open
- Max switching current: 2A
- working voltage: AC 250V, DC 220V
- switching volume: 62.5VA
- ST 20
- I_{max} (8/20μs): 20KA
- I_n (8/20μs): 10KA
- ST G
- I_{max} (8/20μs): 65/40/20KA
- I_n (8/20μs): 35/20/10KA

Smart Relevant Products

Surge Protective Device

ST



916618

Type 1P	Un (V)	Uc (V)		Up (kV)	Width (9mm multiple)	Ref.no.
		L-N	L-PE			
ST 65 1P	230	340	340	2.0	2	916600
ST 40 1P	230	340	340	1.5	2	916609
ST 20 1P	230	340	340	1.2	2	916618



916621

Type 2P	Un (V)	Uc (V)		Up (kV)	Width (9mm multiple)	Ref.no.
		L-N	L-PE			
ST 65 2P	230		340	2.0	4	916603
ST 40 2P	230		340	1.5	4	916612
ST 20 2P	230		340	1.2	4	916621



916613

Type 3P	Un (V)	Uc (V)		Up (kV)	Width (9mm multiple)	Ref.no.
		L-N	L-PE			
ST 65 3P	230/400		340	2.0	8	916604
ST 40 3P	230/400		340	1.5	8	916613
ST 20 3P	230/400		340	1.2	8	916622



916624

Type 4P	Un (V)	Uc (V)		Up (kV)	Width (9mm multiple)	Ref.no.
		L-N	L-PE			
ST 65r 4P	230/400		340	2.0	8	916607
ST 65 4P	230/400		340	2.0	8	916608
ST 40r 4P	230/400		340	1.5	8	916616
ST 40 4P	230/400		340	1.5	8	916617
ST 20 4P	230/400		340	1.2	8	916624



916620

Type 1P+N	Un (V)	Uc (V)		Up (kV)	Width (9mm multiple)	Ref.no.
		L-N	L-PE			
ST 65 1P+N	230	340	440	2.0	4	916602
ST 40 1P+N	230	340	440	1.5	4	916611
ST 20 1P+N	230	340	440	1.2	4	916620



916623

Type 3P+N	Un (V)	Uc (V)		Up (kV)	Width (9mm multiple)	Ref.no.
		L-N	L-PE			
ST 65r 3P+N	230/400	340	440	2.0	8	916605
ST 65 3P+N	230/400	340	440	2.0	8	916606
ST 40r 3P+N	230/400	340	440	1.5	8	916614
ST 40 3P+N	230/400	340	440	1.5	8	916615
ST 20 3P+N	230/400	340	440	1.2	8	916623



916619

Type NPE	Un (V)	Uc (V)		Up (kV)	Width (9mm multiple)	Ref.no.
		L-N	N-PE			
ST 65G 1P	230		260	0.8	2	916601
ST 40G 1P	230		260	0.5	2	916610
ST 20G 1P	230		260	0.4	2	916619

Tripping Curves



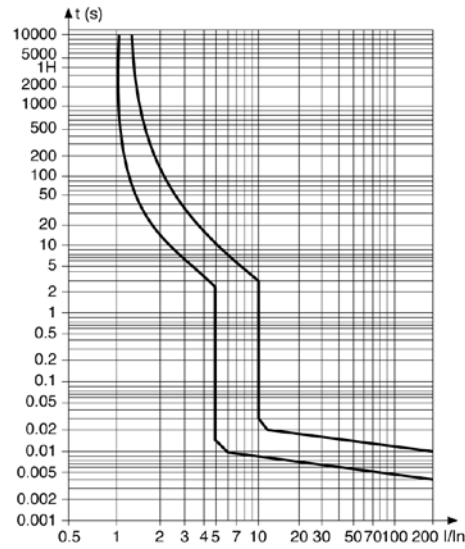
OSMC32N

C,D curve, as in standard IEC 60898. The operating range of the magnetic release is as follow:

for C curve: 5~10 I_n

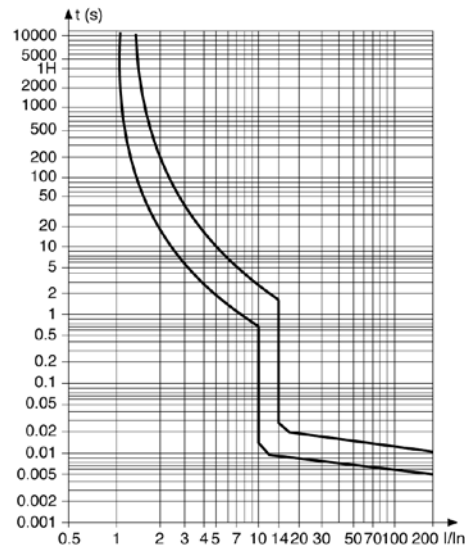
for D curve: 10~14 I_n

The curves show the cold thermal tripping limits when poles are charged and the electromagnetic tripping limits with 2 charged poles.



OSMC32N

C curve



OSMC32N

D curve

Temperature Derating

The maximum permissible current in a device depends on the ambient temperature in which it is placed. Ambient temperature is the temperature inside the enclosure or switchboard in which the devices have been installed. The reference temperature is in the coloured column for the various circuit-breakers.

OSMC32N

Temperature (°C)	20	25	30	35	40	45	50	55	60	65	70
rating (A)											
1	1.05	1.02	1.00	0.98	0.95	0.92	0.90	0.87	0.84	0.81	0.78
2	2.08	2.04	2.00	1.96	1.92	1.88	1.84	1.80	1.74	1.65	1.59
3	3.18	3.09	3.00	2.91	2.82	2.70	2.61	2.49	2.37	2.28	2.16
4	4.22	4.11	4.00	3.89	3.77	3.65	3.52	3.39	3.26	3.12	2.97
6	6.29	6.15	6.00	5.85	5.69	5.53	5.37	5.20	5.02	4.84	4.65
10	10.69	10.35	10.00	9.64	9.26	8.86	8.45	8.02	7.56	7.07	6.55
16	16.82	16.42	16.00	15.57	15.13	14.68	14.22	13.73	13.23	12.72	12.17
20	20.98	20.49	20.00	19.49	18.97	18.44	17.89	17.32	16.73	16.12	15.49
25	26.24	25.63	25.00	24.35	23.69	23.01	22.30	21.58	20.82	20.04	19.23
32	33.56	32.79	32.00	31.19	30.36	29.50	28.62	27.71	26.77	25.80	24.79
40	42.01	41.02	40.00	38.96	37.88	36.78	35.64	34.46	33.24	31.98	30.66
50	52.59	51.31	50.00	48.65	47.27	45.84	44.36	42.84	41.26	39.61	37.90
63	66.56	64.81	63.00	61.14	59.22	57.24	55.19	53.06	50.84	48.52	46.08

OSMC32N

Temperature (°C)	-30	-25	-20	-15	-10	-5	0	5	10	15	30
rating (A)											
1	1.26	1.24	1.22	1.20	1.18	1.16	1.14	1.11	1.09	1.07	1.00
2	2.49	2.45	2.42	2.38	2.34	2.30	2.26	2.22	2.18	2.13	2.00
3	3.94	3.87	3.80	3.73	3.66	3.58	3.51	3.43	3.35	3.26	3.00
4	5.18	5.09	5.00	4.91	4.82	4.72	4.63	4.53	4.43	4.32	4.00
6	7.59	7.47	7.35	7.22	7.10	6.97	6.84	6.71	6.57	6.43	6.00
10	13.63	13.36	13.09	12.82	12.54	12.25	11.95	11.65	11.34	11.02	10.00
16	20.44	20.10	19.77	19.42	19.07	18.72	18.35	17.98	17.60	17.22	16.00
20	25.30	24.90	24.49	24.08	23.66	23.24	22.80	22.36	21.91	21.45	20.00
25	31.74	31.24	30.72	30.20	29.67	29.12	28.57	28.01	27.43	26.85	25.00
32	40.48	39.84	39.19	38.53	37.86	37.18	36.49	35.78	35.05	34.32	32.00
40	50.89	50.07	49.24	48.40	47.54	46.66	45.77	44.86	43.93	42.98	40.00
50	64.00	62.95	61.89	60.80	59.70	58.57	57.43	56.26	55.06	53.84	50.00
63	82.09	80.67	79.22	77.75	76.26	74.73	73.17	71.57	69.94	68.27	63.00

C32H-DC

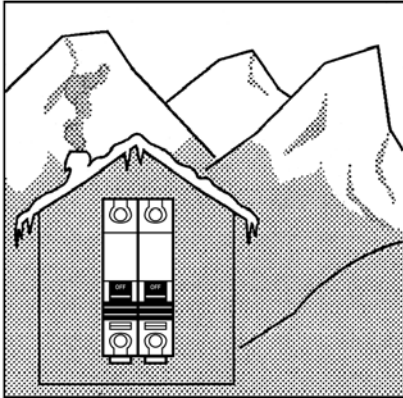
Temperature (°C)	20	25	30	35	40	45	50	55	60
rating (A)									
1	1.1	1.1	1	1	1	0.95	0.9	0.9	0.9
2	2.2	2.2	2.1	2.1	2	1.95	1.9	1.8	1.7
3	3.3	3.3	3.2	3.1	3	2.9	2.8	2.7	2.6
6	6.6	6.5	6.3	6.1	6	5.8	5.7	5.5	5.3
10	11	10.7	10.5	10.3	10	9.7	9.5	9	8.5
16	17.6	17.4	17	16.5	16	15.4	15	14.4	13.9
20	22	21.5	21	20.5	20	19.5	19	18.5	18
25	27.5	27	26	25.5	25	24	23.5	23	22
32	35.5	35	34	33	32	31	30	29	28
40	44.5	43.5	42.5	41	40	38.5	37	36	34

The table below shows how to determine the following for a OSMC32N depending on the ambient temperature and the installation mode:

- the service current which must not be exceeded for a rating of 20 A (reference temperature 30°C)
- the ratings which must be adopted (in bold) to allow a service current of 20 A. service current which must not be exceeded (A)

Installation conditions	Single OSMC32N		Several OSMC32N in the same enclosure (calculated using the reduction coefficient indicated below)	
	30°C	30°C	40°C	4°C
OSMC32N nominal rating (A)	real rating (A)	real rating (A)	real rating (A)	real rating (A)
20	20	19	20 x 0.8 = 16	19 x 0.8 = 15.2
25	25	23.7	25 x 0.8 = 20	23.7 x 0.8 = 18.96
32	32	30.4	32 x 0.8 = 25.6	30 x 0.8 = 24

High altitude temperature derating

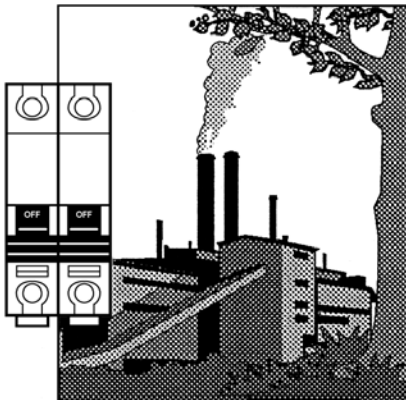


Influence of altitude on the circuit breaker's characteristics

The IEC 60947.2 construction standard stipulates the dielectric characteristics to be respected. It follows that altitude has no effect on the characteristics of circuit breakers up to 2000 m. Any higher, and it is necessary to take the fall in dielectric withstand and the air's cooling powers into account. The circuit breaker, designed to work in these conditions, should be built or used in accordance with an agreement which should be drawn up between the constructor and the user. The table below shows corrections that are to be made depending on altitude.

Altitude (m)	2000	3000	4000
dielectric withstand (V)	2500	2200	1950
maximum operating voltage (V)	440	440	440
thermal rating	In	0.96In	0.93In

Derating in chemical atmospheres



Metal parts

- chlorine Cl₂
- nitrogen dioxide NO₂
- sulphurous hydrogen H₂S
- sulphurous an hydride SO₂

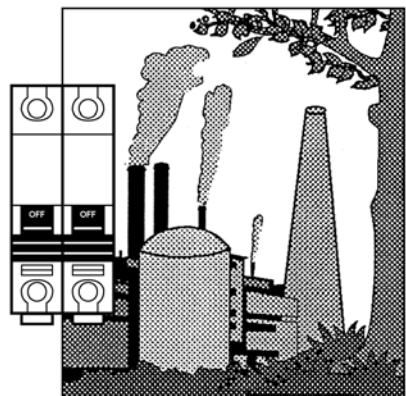
Copper

- The copper sulphur Cu₂S layer's thickness doubles in the presence of chlorine compared with a normal environment
- The same happens with nitrogen dioxide

Silver

The silver or silver-plated contacts go black and create an insulating layer of sulphur in the presence of an hydride or sulphurous hydrogen. This insulating sulphur causes excessive overheating of contacts and eventually leads to their destruction.

The presence of chlorine, for example in humid areas, mixed with sulphurous hydrogen increases the thickness of the silver sulphur by 7 and adding sulphurous hydrogen and nitrogen dioxide increases the thickness of sulphurous silver by 20.



Practical advice

- Devices which are installed in oil refineries, steel works, paper mills, synthetic fibre (nylon) factories and in general in sulphur chemical factories, will be exposed to sulphurising which chemists refer to as oxidation by analogy with the chemical reaction which causes oxidation by oxygen.
- It must not be thought that the devices installed in "technical" areas are protected from this oxidation process. Air intakes, which keep the area's pressure higher than the atmospheric pressure, are "too short"; often the air drawn in is clearly less polluted than the air near the ground, but it is polluted enough for the devices to go black five or six years after their installation.
- There is no cure for this oxidation, just advice: a device's nominal rating is multiplied by 0.6 or a maximum of 0.8 if it is to be installed in a factory where sulphurous gas may be released, the aim being to prevent overheating which speeds up the oxidation reaction.

Circuits supplied with DC current choosing a circuit-breaker

The choice of circuit-breaker type, for protection of a DC installation, depends mainly on the following criteria:

- nominal current which is used to choose current rating
- nominal voltage which is used to determine the number of serial-connected poles contributing to breaking
- the maximum short-circuit current at the installation point, used to define breaking capacity
- the type of network (see below)

types of network	earthed networks		unearthed networks	
	the source has an earthed polarity	the source has an earthed mid-point		
diagrams and various possible faults				
analysis of each fault	fault A	maximum I _{sc} only the positive polarity is concerned	I _{sc} close to maximum I _{sc} only the positive polarity is concerned at half voltage U/2	no effect
	fault B	maximum I _{sc} both polarities are concerned	maximum I _{sc} both polarities are concerned	maximum I _{sc} both polarities are concerned
	fault C	no effect	same as fault A but this time the negative polarity is concerned	no effect
the most unfavourable case	fault A	faults A and C	fault B	
distribution of the breaking poles	all the poles effectively contributing to breaking are serial-connected on the positive polarity ⁽¹⁾⁽²⁾	on each polarity provide the number of poles required to break maximum I _{sc} at voltage U/2	distribute the number of poles required for breaking on each polarity	

(1) or negative if it is the positive polarity that is earthed

(2) provide an additional pole on the earthed polarity if the aim is isolation

OSMC32N breaking capacity in DC current

Type	Rating (A)	Breaking capacity (Magnetic Threshold Overrating Coefficient
		25/48V	125V	250V	
OSMC32N C	1-63	15(1P)	20(2P)	50(4P)	1.38
OSMC32N D	1-40	10(1P)	20(3P)		1.38
C32H-DC	1-40		10(1P) 20(2P)	10(2P)	DC special

Smart MCB can be used in DC system, but the work is voltage & breaking capacity are different with the AC system

Short-circuit current at the terminals of an accumulator battery

When its terminals are short-circuited, an accumulator battery delivers a current given by Ohm's law:

$$I_{sc} = \frac{V_b}{R_i}$$

V_b = maximum discharge voltage (battery charged at 100 %).

R_i = internal resistance equivalent to all the cells (value normally given by the manufacturer according to battery Ampere/hour capacity).

Example

What is the short-circuit current at the terminals of a stationary battery with the following characteristics:

- capacity: 500 Ah
- maximum discharge voltage: 240 V (110 x 2.2 V cells)
- discharge current: 300 A
- backup time: 1/2 hour
- internal resistance: 0.5 mΩ per cell

240 V DC
300 A
500 Ah
R_i = 0.5 mΩ/cell



Answer

$$R_i = 110 \times 0.5 \times 10^{-3} = 55 \cdot 10^{-3}$$

$$I_{sc} = 240 / 55 \times 10^{-3} = 4.4 \text{ kA}$$

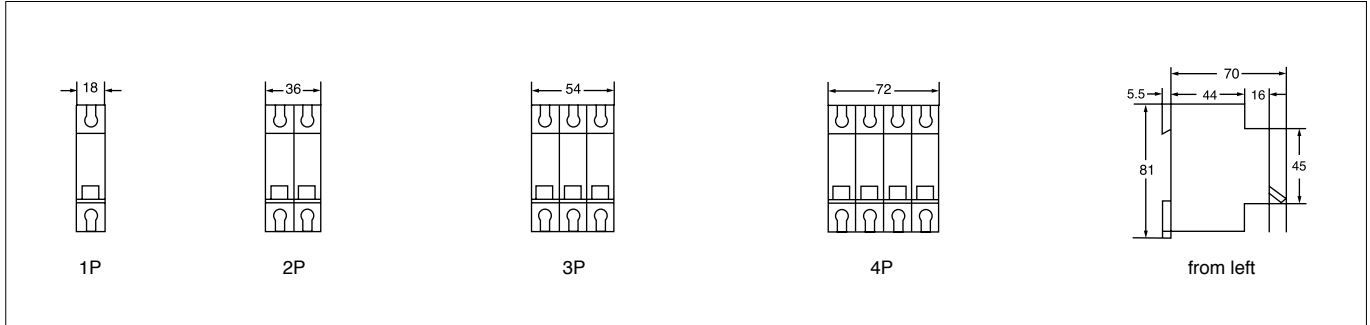
As shown in the calculation above, short circuit currents are relatively small.

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

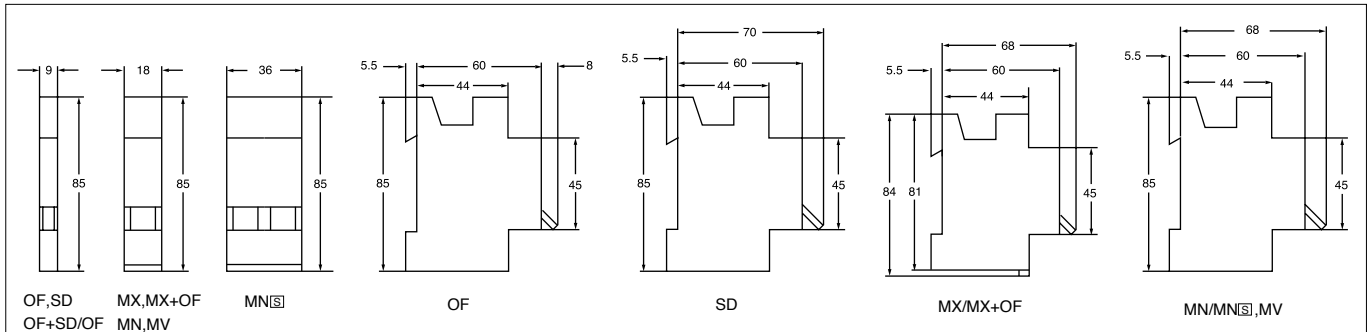
I_{sc} = kC where C is the battery capacity expressed in Ampere/hour and k is a coefficient close to 10 and in all cases always less than 20.



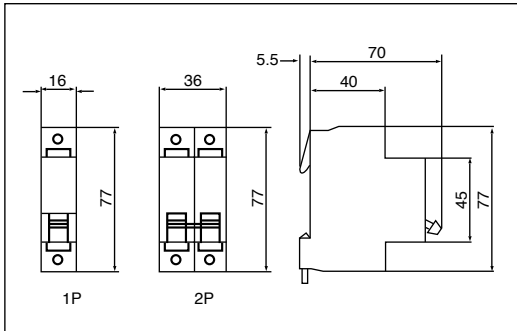
OSMC32N



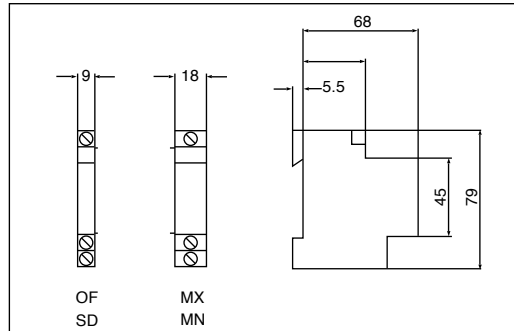
OSMC32N Electrical auxiliaries OF, SD, OF + SD/OF, MX, MX+OF, MN, MN[□], MV



C32H-DC



C32H-DC Electrical auxiliaries



Smart Application Sectors



Textile



Telecom



Locomotive



Plastic



Plastic



Construction machine



Packaging



Machine tools



Automobile



Printing



HVAC



Machine tools



Steel



Textile