

Loadline

Circuit Protection Devices





Dorman Smith Switchgear Limited

With over 130 years of experience in switchgear design and production Dorman Smith Switchgear Limited continues to provide high quality equipment for low-voltage electrical distribution and circuit protection.

Our product range begins with single-pole and neutral distribution board systems and continues up to custom designed, factory built low-voltage electrical switchboards for a broad range of commercial, industrial and retrofit applications.

We continue to build on our extensive technical knowledge and awareness of customer and market demands, operating conditions and current regulations.

This breadth of experience supports the development and manufacturing techniques of our electrical products to exceed the industry standards.



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MV Frame

Switch Disconnectors

Overview

Switch Disconnectors are used in every installation. This device combines the functionality of the two foregoing devices; Switch Disconnectors are used for making, carrying, breaking and isolation of current within a circuit . M series Switch disconnectors are available in 1/2/3/4 Poles from 16-125A. Din rail mounted and modular design.

Technical Data

Product Name	Modular Switch Disconnectors
Frame	MV Frame
Standards	EN/IEC 60947-3
Pole	1P, 2P, 3P, 4P
Rated Operational current Ie	16, 20, 25, 32, 40, 50, 63, 80, 100, 125A
Rated short-time withstand current Icw(kA)	12Ie, t-1s
Rated short-time making capacity Icm (kA)	20Ie, t-0.1s
Rated insulation voltage Ui (V)	690
Rated Impulse withstand voltage, Uimp(V)	6000V
Rated voltage Ue(V)	
AC single pole Ue	240
AC multi-pole Ue	415
Frequency Hz	50/60
Utilization category	AC-22A
Accessories	
Mechanical endurance	10000
Electrical endurance	1500
Protection degree	IP20
Ambient Temperature	
Operating Temperature °C	-25...+50, Max 95% Humidity
Storage Temperature °C	-40...+70
Terminal Type	Lug type and Pin type
Altitude (Meters)	Max, 2000
Installation - DIN-rail Mounting (EN 50022)	Mounting on 35mm DIN rail
Terminal Size mm ²	Cables upto 50mm ²

Switch Disconnecter

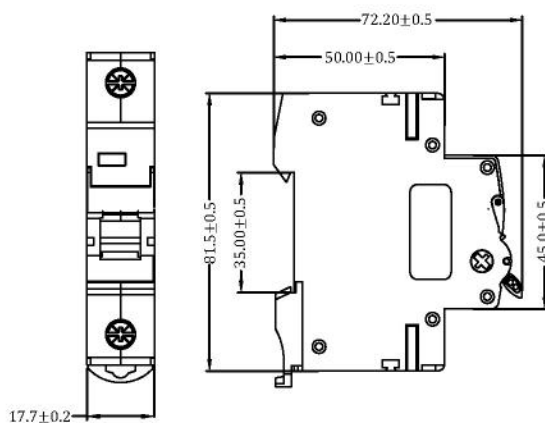
Product Selection

Current Rating (A)	1 Pole	2 Pole	3 Pole	4 Pole
16	MV1P16	MV2P16	MV3P16	MV4P16
20	MV1P20	MV2P20	MV3P20	MV4P20
25	MV1P25	MV2P25	MV3P25	MV4P25
32	MV1P32	MV2P32	MV3P32	MV4P32
40	MV1P40	MV2P40	MV3P40	MV4P40
50	MV1P50	MV2P50	MV3P50	MV4P50
63	MV1P63	MV2P63	MV3P63	MV4P63
80	MV1P80	MV2P80	MV3P80	MV4P80
100	MV1P100	MV2P100	MV3P100	MV4P100
125	MV1P125	MV2P125	MV3P125	MV4P125

Note: For 40°C ambient temperature, add '4' at the end of the Cat. no.



Dimensions



Loadline

MS, MT & MSN Frame

Miniature Circuit Breakers

Overview

In general terms, circuit breakers are thermal/magnetic electromechanical devices that provide current making, carrying and breaking functions and will 'trip' to interrupt a circuit under abnormal conditions. MCBs are equipped with positive contact indication flags: red indicates that the contact(s) are closed, green indicates the open state. The contact(s) will open when tripped due to abnormal circuit conditions or can be manually put into the open state by use of a handle. These devices are used to provide protection and control of circuits against overload and short circuit conditions. Dorman Smith supplies MCBs with various breaking capacities, particularly for ratings of 6kA and 10kA. The lower rated devices are used typically in domestic installations, e.g. in consumer units (SPN DBs), whereas the higher rated devices are suitable for a range of commercial and industrial circuit protection applications.

M series MCBs are the wide range of miniature circuit breakers. These breakers provides a compact solution for maximum circuit protection and available with thermal-magnetic tripping device. MCB accessory range consisting of auxiliary contacts, Alarm switches, Shunt trips, under voltage releases and padlocking devices.

The thermal and magnetic trip functions cater for different circuit abnormalities and operate as follows:

Thermal Trip Function:

The purpose of this form of protection is to interrupt the circuit upon sensing an overload current. Typically, a bi-metallic strip is used such that it will deflect due to differential expansion of the dissimilar metals in response to the heating effect caused by the passage of current through it. The higher the current, the greater will be the heating effect and the more the deflection. At a preset point the physical deflection will be sufficient to actuate the tripping mechanism, opening the contact(s) and interrupting the circuit.

	Test Current(a.c.)	Tripping time	Applications
B	3In	$t \geq 0.1s$	Only for resistive loads such as : -electrical heating -water heating -cookers
	5In	$t < 0.1s$	
C	5In	$t \geq 0.1s$	Usual loads such as : -lighting -socket outlets -small motors
	10	$int < 0.1s$	
D	10	$int \geq 0.1s$	Control and protection of circuits having important transient inrush currents (large motors)
	20	$int < 0.1s$	

Miniature Circuit Breakers

Magnetic Trip Function:

The purpose of this form of tripping is to protect against the effects of short circuit fault currents. A wire coil or solenoid is used to provide this function, operating the trip mechanism when the over-current reaches a preset magnitude. As the fault current rapidly increases, the magnetic field also increases, energising the coil and moving a cam that is part of the contact assembly to fully open the contact(s) thereby interrupting the circuit.

Test Current (a.c.)	Tripping time
1.13I _n	t ≥ 1h (I _n ≤ 63A) t ≥ 2h (I _n > 63A)
1.45I _n	t < 1h (I _n ≤ 63A) t < 2h (I _n > 63A)
2.55I _n	1s < t < 60s (I _n ≤ 32A) 1s < t < 120s (I _n > 32A)

Characteristics:

MCBs are designed according to one of three distinct tripping characteristics designated B, C or D. These designations relate to the magnetic trip setting and indicate the multiple of nominal current that will be tolerated by the device before tripping. The following details illustrates these characteristics with typical duties and applications. The nominal rated current is denoted by the symbol I_n.

B' Curve:

B type MCBs provides protection to electrical circuits with equipment that does not cause surge current (Light duty, resistive loads). Short circuit release level set at 3-5 I_n

C' Curve:

C type MCBs provides protection to electrical circuits with equipment that does not cause surge current (Fluorescent lights, small motors, inductive loads). Short circuit release level set at 5-10 I_n

D' Curve:

D type MCBs provides protection to electrical circuits with equipment that does not cause high inrush current (Sodium lights, large motors (>3kW), large inductive loads and transformers). Short circuit release level set at (10-20)I_n

Energy Let-through

An important facet of circuit protection devices is the extent to which they limit the amount of electrical energy they allow to pass through them. This applies to fuses as well as to circuit breakers.

When an electric current flows through a resistance for a certain time, energy is produced in the form of heat. This thermal effect can be measured using the formula: I² x R x t, to give a quantity in 'watt seconds'. The unit of measurement for energy is the Joule, which is equivalent to one watt second.

For all practical purposes, the resistance is treated as constant and negligible; therefore the commonly accepted term for energy let-through of a device is I²t since this will always be proportional to the true thermal effect. The I²t term is referred to as the Joule Integral since the results are expressed in integral form.

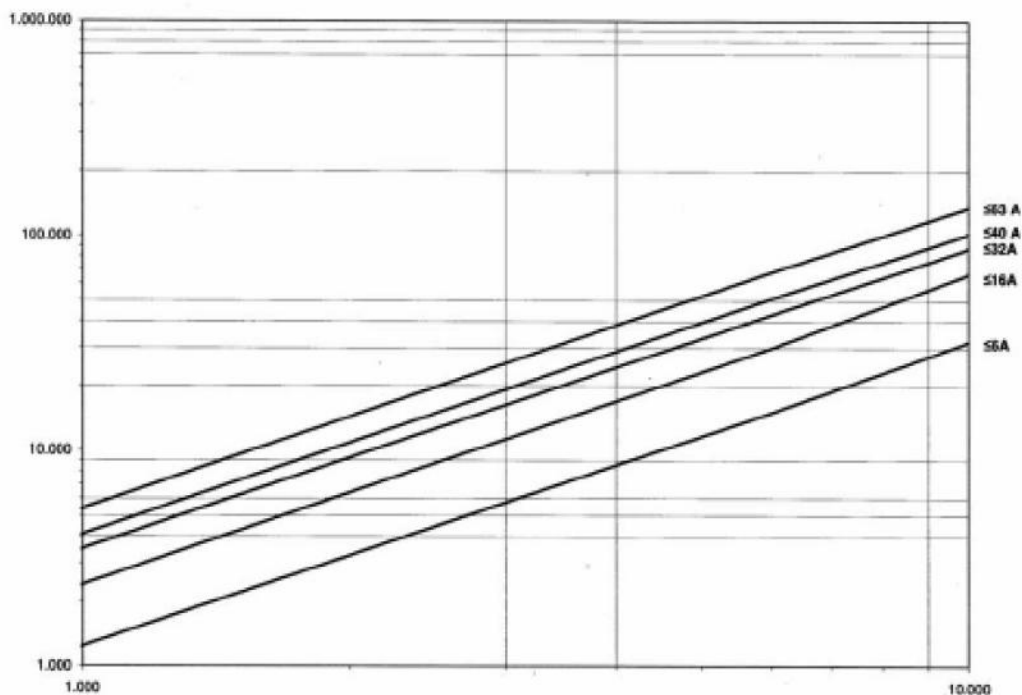
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MS, MT & MSN Frame

Miniature Circuit Breakers

Under short-circuit fault conditions there is the potential for considerable energy to be let through by a circuit protection device. Knowledge of the energy let-through characteristics of circuit protection devices is useful for comparison between different devices and also with regard to the selection of devices that are required to act in co-ordination to produce the levels of discrimination required for fault clearance.

The I^2t characteristics of circuit breakers are depicted as curves, graphed against values of prospective short-circuit current. These characteristics are relevant to both MCBs and MCCBs as depicted in the following graphs.



Within the IEC/EN 60898 standard, circuit breakers with 'B' and 'C' characteristics are categorised into energy limiting classes 1, 2 and 3, with Class 3 denoting devices having the lowest energy let-through. The appropriate energy class is marked within a square box on conforming devices. Dorman Smith's MCBs are categorised within Class 3.

The following table indicates the maximum energy let-through values permissible in each class, stated in watt-seconds. In practice, compliance with the standard is checked on the circuit breakers with the highest applicable rated current within the range, normally 40A.

Rated short-circuit capacity	Current rating(A)	Class 1 I^2t B type and C type	Class 2 I^2t		Class 3 I^2t	
			B type	C type	B type	C type
6kA	1 - 16	No limits specified	100000	120000	35000	42000
	20 - 32		130000	160000	45000	55000
	40		156000	192000	54000	66000
10kA	1 - 16		240000	290000	70000	84000
	20 - 32		310000	370000	90000	110000
	40		372000	444000	208000	132000

Miniature Circuit Breakers - 6kA

Technical Data

- Available
- Not Available

Product Name	Miniature Circuit Breakers - 6kA	
Frame	MS Frame	
Standards	EN/IEC 60898-1	
Pole	1P, 2P, 3P, 4P, 1P+N	
Tripping Characteristics	B,C & D	
Protection	Overload and short circuit	
Trpping Type	Thermal/ Magnetic release	
Thermal operating Limit in AC Voltage	(1.13 - 1.45) x I _n	
Thermal operating Limit in DC Voltage	(1.13 - 1.45) x I _n	
Magnetic operating Limit in AC Voltage	B: (3-5) x I _n C: (5-10) x I _n D: (10-20) x I _n	
Magnetic operating Limit in DC Voltage	B: (4-7) x I _n C: (7-15) x I _n	
Rated current I _n	1, 2, 4, 6, 10, 16, 20, 25, 32, 40, 50, 63A	
Rated breaking capacity I _{cn}	6kA	
Rated insulation voltage U _i (V)	690	
Rated Impulse withstand voltage, U _{imp} (V)	4000V	
Rated voltage U _e (V)		
AC single pole U _e	240	
AC multi-pole U _e	415	
DC single pole U _n	220	
DC multi-pole U _n	440	
Frequency Hz	50/60	
Accessories		
Auxiliary Contact	•	
Shunt Trip (24 DC, 40V DC, 230 AC)	•	
Alarm Switch	•	
Over/Under Voltage Release	•	
Mechanical endurance	10000	
Electrical endurance	4000	
Protection degree	IP20	
Energy Limiting class	Class 3 4A to 32A Class 1 40A to 63A	
Ambient Temperature		
Operating Temperature °C	-5....+50, Max 95% Humidity	
Storage Temperature °C	- 40.... +70	
Terminal Type	Lug type and Pin type	
Altitude (Meters)	Max, 2000	
Installation - DIN-rail Mounting (EN 50022)	Mounting on 35mm DIN rail	
Terminal Size mm ²	16mm ² flexible or 25mm ² rigid up to 25A rating 25mm ² flexible or 35mm ² rigid for 32A to 63A rating	

Loadline

MS & MSN Frame

Miniature Circuit Breakers - 6kA

Single Pole MCBs

Current Rating (A)	B Type Cat. No.	C Type Cat. No.	D Type Cat. No.
1	MS1PB01	MS1PC01	MS1PD01
2	MS1PB02	MS1PC02	MS1PD02
4	MS1PB04	MS1PC04	MS1PD04
6	MS1PB06	MS1PC06	MS1PD06
10	MS1PB10	MS1PC10	MS1PD10
16	MS1PB16	MS1PC16	MS1PD16
20	MS1PB20	MS1PC20	MS1PD20
25	MS1PB25	MS1PC25	MS1PD25
32	MS1PB32	MS1PC32	MS1PD32
40	MS1PB40	MS1PC40	MS1PD40
50	MS1PB50	MS1PC50	MS1PD50
63	MS1PB63	MS1PC63	MS1PD63



Double Pole MCBs

Current Rating (A)	B Type Cat. No.	C Type Cat. No.	D Type Cat. No.
1	MS2PB01	MS2PC01	MS2PD01
2	MS2PB02	MS2PC02	MS2PD02
4	MS2PB04	MS2PC04	MS2PD04
6	MS2PB06	MS2PC06	MS2PD06
10	MS2PB10	MS2PC10	MS2PD10
16	MS2PB16	MS2PC16	MS2PD16
20	MS2PB20	MS2PC20	MS2PD20
25	MS2PB25	MS2PC25	MS2PD25
32	MS2PB32	MS2PC32	MS2PD32
40	MS2PB40	MS2PC40	MS2PD40
50	MS2PB50	MS2PC50	MS2PD50
63	MS2PB63	MS2PC63	MS2PD63



Miniature Circuit Breakers - 6kA

Triple Pole MCBs

Current Rating (A)	B Type Cat. No.	C Type Cat. No.	D Type Cat. No.
1	MS3PB01	MS3PC01	MS3PD01
2	MS3PB02	MS3PC02	MS3PD02
4	MS3PB04	MS3PC04	MS3PD04
6	MS3PB06	MS3PC06	MS3PD06
10	MS3PB10	MS3PC10	MS3PD10
16	MS3PB16	MS3PC16	MS3PD16
20	MS3PB20	MS3PC20	MS3PD20
25	MS3PB25	MS3PC25	MS3PD25
32	MS3PB32	MS3PC32	MS3PD32
40	MS3PB40	MS3PC40	MS3PD40
50	MS3PB50	MS3PC50	MS3PD50
63	MS3PB63	MS3PC63	MS3PD63



Four Pole MCBs

Current Rating (A)	B Type Cat. No.	C Type Cat. No.	D Type Cat. No.
1	MS4PB01	MS4PC01	MS4PD01
2	MS4PB02	MS4PC02	MS4PD02
4	MS4PB04	MS4PC04	MS4PD04
6	MS4PB06	MS4PC06	MS4PD06
10	MS4PB10	MS4PC10	MS4PD10
16	MS4PB16	MS4PC16	MS4PD16
20	MS4PB20	MS4PC20	MS4PD20
25	MS4PB25	MS4PC25	MS4PD25
32	MS4PB32	MS4PC32	MS4PD32
40	MS4PB40	MS4PC40	MS4PD40
50	MS4PB50	MS4PC50	MS4PD50
63	MS4PB63	MS4PC63	MS4PD63



Note: For 40°C ambient temperature, add '4' at the end of the Cat. no.

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MS & MSN Frame

Miniature Circuit Breakers - 6kA

Single Pole + Neutral MCBs

Current Rating (A)	B Type Cat. No.	C Type Cat. No.	D Type Cat. No.
1	MSN2PB01	MSN2PC01	MSN2PD01
2	MSN2PB02	MSN2PC02	MSN2PD02
4	MSN2PB04	MSN2PC04	MSN2PD04
6	MSN2PB06	MSN2PC06	MSN2PD06
10	MSN2PB10	MSN2PC10	MSN2PD10
16	MSN2PB16	MSN2PC16	MSN2PD16
20	MSN2PB20	MSN2PC20	MSN2PD20
25	MSN2PB25	MSN2PC25	MSN2PD25
32	MSN2PB32	MSN2PC32	MSN2PD32
40	MSN2PB40	MSN2PC40	MSN2PD40
50	MSN2PB50	MSN2PC50	MSN2PD50
63	MSN2PB63	MSN2PC63	MSN2PD63

Available breaking capacity-3kA,4.5kA,6kA

Terminal Size mm -16mm flexible or 25mm rigid

Note: For 40 °C ambient temperature, add '4' at the end of the Cat. no.

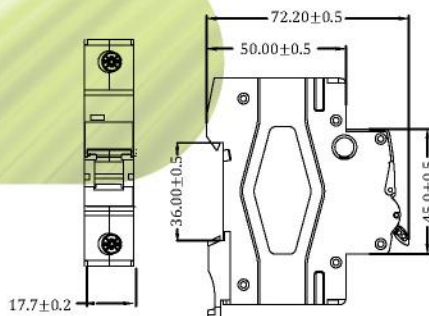


MS/1P/C/16

Criteria

- Rated current In (A)
- Characteristics - (B, C, D)
- Poles (1P/2P/3P & 4P)
- Product loadline Miniature circuit breakers 6kA

Dimensions



Miniature Circuit Breakers - 10kA

Technical Data

Product Name	Miniature Circuit Breakers - 10kA
Frame	MT Frame
Standards	EN/IEC 60898-1
Pole	1P, 2P, 3P, 4P
Tripping Characteristics	B, C & D
Protection	Overload and Short Circuit
Trpping Type	Thermal/ Magnetic release
Thermal operating Limit in AC Voltage	(1.13 - 1.45) x In
Thermal operating Limit in DC Voltage	(1.13 - 1.45) x In
Magnetic operating Limit in AC Voltage	B: (3-5) x In C : (5-10) x In D : (10-20) x In
Magnetic operating Limit in DC Voltage	B: (4-7) x In C : (7-15) x In
Rated current In	1, 2, 4, 6, 10, 16, 20, 25, 32, 40, 50, 63A
Rated breaking capacity Icn	10kA
Rated insulation voltage Ui (V)	500
Rated Impulse withstand voltage, Uimp (V)	6000V
Rated voltage Ue (V)	
AC single pole Ue	240
AC multi-pole Ue	415
DC single pole Un	220
DC multi-pole Un	440
Frequency Hz	50/60
Accessories	
Auxiliary Contact	•
Shunt Trip (24 DC, 40V DC, 230 AC)	•
Alarm Switch	•
Over/Under Voltage Release	•
Mechanical endurance	10000
Electrical endurance	4000
Protection degree	IP20
Energy Limiting class	Class 3 4A to 32A Class 1 40A to 63A
Ambient Temperature	
Operating Temperature °C	-5....+50, Max 95% Humidity
Storage Temperature °C	- 40.... +70
Terminal Type	Lug type and Pin type
Altitude (Meters)	Max, 2000
Installation - DIN-rail Mounting (EN 50022)	Mounting on 35mm DIN rail
Terminal Size mm ²	16 mm ² flexible or 25 mm ² rigid up to 25A rating 25 mm ² flexible or 35 mm ² rigid for 32A to 63A rating

Loadline

MT Frame

Miniature Circuit Breakers - 10kA

Single Pole MCBs

Current Rating (A)	B Type Cat. No.	C Type Cat. No.	D Type Cat. No.
1	MT1PB01	MT1PC01	MT1PD01
2	MT1PB02	MT1PC02	MT1PD02
4	MT1PB04	MT1PC04	MT1PD04
6	MT1PB06	MT1PC06	MT1PD06
10	MT1PB10	MT1PC10	MT1PD10
16	MT1PB16	MT1PC16	MT1PD16
20	MT1PB20	MT1PC20	MT1PD20
25	MT1PB25	MT1PC25	MT1PD25
32	MT1PB32	MT1PC32	MT1PD32
40	MT1PB40	MT1PC40	MT1PD40
50	MT1PB50	MT1PC50	MT1PD50
63	MT1PB63	MT1PC63	MT1PD63



Double Pole MCBs

Current Rating (A)	B Type Cat. No.	C Type Cat. No.	D Type Cat. No.
1	MT2PB01	MT2PC01	MT2PD01
2	MT2PB02	MT2PC02	MT2PD02
4	MT2PB04	MT2PC04	MT2PD04
6	MT2PB06	MT2PC06	MT2PD06
10	MT2PB10	MT2PC10	MT2PD10
16	MT2PB16	MT2PC16	MT2PD16
20	MT2PB20	MT2PC20	MT2PD20
25	MT2PB25	MT2PC25	MT2PD25
32	MT2PB32	MT2PC32	MT2PD32
40	MT2PB40	MT2PC40	MT2PD40
50	MT2PB50	MT2PC50	MT2PD50
63	MT2PB63	MT2PC63	MT2PD63



Note: For 40°C ambient temperature, add '4' at the end of the Cat. no.

Miniature Circuit Breakers - 10kA

Triple Pole MCBs

Current Rating (A)	B Type Cat. No.	C Type Cat. No.	D Type Cat. No.
1	MT3PB01	MT3PC01	MT3PD01
2	MT3PB02	MT3PC02	MT3PD02
4	MT3PB04	MT3PC04	MT3PD04
6	MT3PB06	MT3PC06	MT3PD06
10	MT3PB10	MT3PC10	MT3PD10
16	MT3PB16	MT3PC16	MT3PD16
20	MT3PB20	MT3PC20	MT3PD20
25	MT3PB25	MT3PC25	MT3PD25
32	MT3PB32	MT3PC32	MT3PD32
40	MT3PB40	MT3PC40	MT3PD40
50	MT3PB50	MT3PC50	MT3PD50
63	MT3PB63	MT3PC63	MT3PD63



Four Pole MCBs

Current Rating (A)	B Type Cat. No.	C Type Cat. No.	D Type Cat. No.
1	MT4PB01	MT4PC01	MT4PD01
2	MT4PB02	MT4PC02	MT4PD02
4	MT4PB04	MT4PC04	MT4PD04
6	MT4PB06	MT4PC06	MT4PD06
10	MT4PB10	MT4PC10	MT4PD10
16	MT4PB16	MT4PC16	MT4PD16
20	MT4PB20	MT4PC20	MT4PD20
25	MT4PB25	MT4PC25	MT4PD25
32	MT4PB32	MT4PC32	MT4PD32
40	MT4PB40	MT4PC40	MT4PD40
50	MT4PB50	MT4PC50	MT4PD50
63	MT4PB63	MT4PC63	MT4PD63

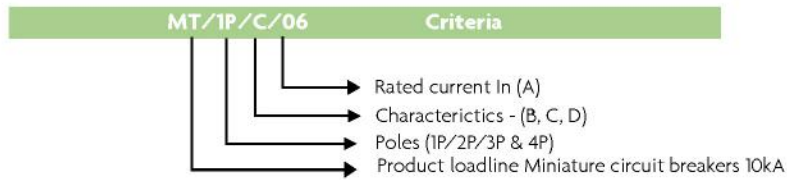


Note: For 40°C ambient temperature, add '4' at the end of the Cat. no.

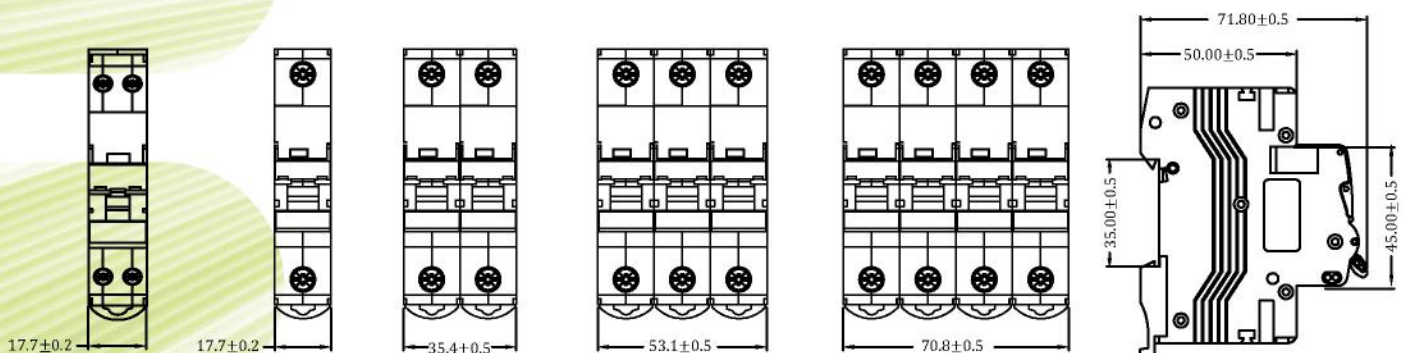
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MT Frame

Miniature Circuit Breakers - 10kA



Dimensions



High Current MCBs - 10kA

MT Frame - Technical Data

• Available
 - Not Available

Product Name	High Current MCBs - 10kA
Frame	MT Frame
Standards	EN/IEC 60947 - 2
Pole	1P, 2P, 3P, 4P
Tripping Characteristics	C
Protection	Overload and Short Circuit
Trpping Type	Thermal/Magnetic release
Thermal operating Limit in AC Voltage	$(1.05 - 1.30) \times I_n$
Magnetic operating Limit in AC Voltage	$C : (8 - 12) \times I_n$
Rated current I_n	32, 40, 50, 63, 80, 100, 125A
Rated breaking capacity I_{cn}	10kA
Rated insulation voltage U_i (V)	690
Rated Impulse withstand voltage, U_{imp} (V)	4000V
Rated voltage U_e (V)	
AC single pole U_e	240
AC multi-pole U_e	415
DC single pole U_n	220
DC multi-pole U_n	440
Frequency Hz	50/60
Utilization category	A
Accessories	
Auxiliary Contact	•
Shunt Trip (24 DC, 40V DC, 230 AC)	•
Alarm Switch	•
Over/Under Voltage Release	•
Mechanical endurance	7000
Electrical endurance	1000
Protection degree	IP20
Ambient Temperature	
Operating Temperature °C	-5....+50, Max 95% Humidity
Storage Temperature °C	- 40.... +70
Terminal Type	Pin type
Altitude (Meters)	Max, 2000
Installation - DIN-rail Mounting (EN 50022)	Mounting on 35mm DIN rail
Terminal Size mm ²	1.5 to 35mm ² flexible cable 1 to 50mm ² rigid cables

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MT Frame

High Current MCBs - 10kA

Single Pole MCBs

Current Rating (A)	C Type Cat. No.
32	MT1PC32H
40	MT1PC40H
50	MT1PC50H
63	MT1PC63H
80	MT1PC80H
100	MT1PC100H
125	MT1PC125H



Double Pole MCBs

Current Rating (A)	C Type Cat. No.
32	MT2PC32H
40	MT2PC40H
50	MT2PC50H
63	MT2PC63H
80	MT2PC80H
100	MT2PC100H
125	MT2PC125H



Triple Pole MCBs

Current Rating (A)	C Type Cat. No.
32	MT3PC32H
40	MT3PC40H
50	MT3PC50H
63	MT3PC63H
80	MT3PC80H
100	MT3PC100H
125	MT3PC125H



Note: For 40°C ambient temperature, add '4' at the end of the Cat. no.

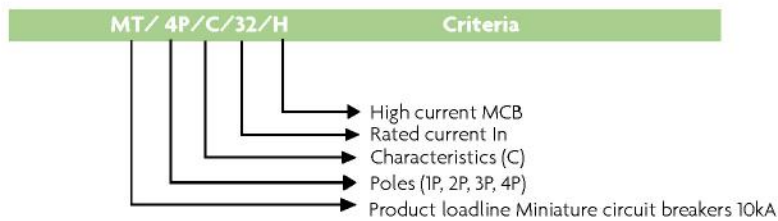
High Current MCBs - 10kA

Four Pole MCBs

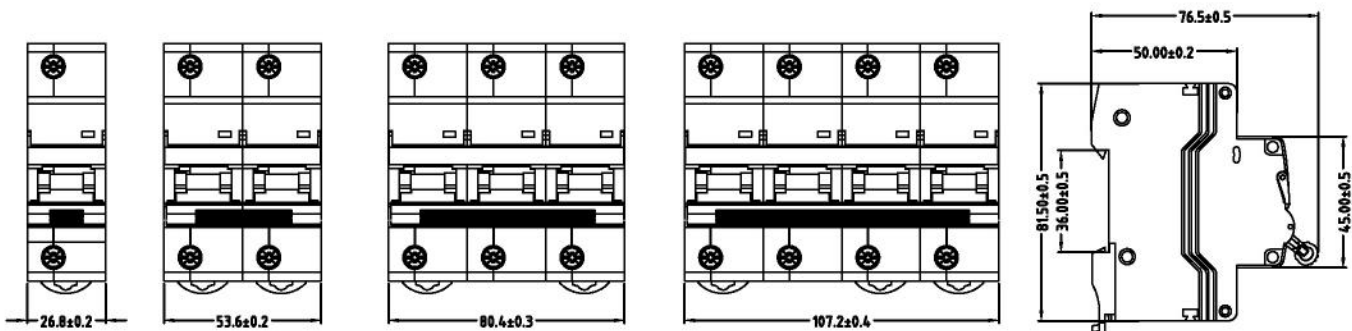
Current Rating (A)	C Type Cat. No.
32	MT4PC32H
40	MT4PC40H
50	MT4PC50H
63	MT4PC63H
80	MT4PC80H
100	MT4PC100H
125	MT4PC125H



Note: For 40°C ambient temperature, add '4' at the end of the Cat. no.



Dimensions



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MS & MT Frame

MCB Add-on Accessories

MCB Add-on Functions

Various accessories can be added to MCBs to enable remote access and signalling. For example, the contact status could be relayed to an alarm annunciator panel or SCADA system; the circuit breaker could be controlled also from the SCADA system.



Auxiliary Contacts

Relaying of contact status can be achieved by the addition of an auxiliary contact and the contact form selected to suit the remote system input requirements. Mounted on the left side of the MCB, indicating "ON", "OFF" status of combined MCB.



General Technical Data

Standard	EN / IEC 60947-5-1
Rated insulation voltage (Ui)	500V
Electric endurance	5000
Mechanical endurance	5000
Dielectric strength	2kV/1min
Protection degree	IP20

Rated voltage	Contact capacity	Cat No 6kA MCB	Cat No 10kA MCB
400V AC	3A	M6AUX4	MAUX4
230V AC	6A	M6AUX	MAUX
24V DC	6A	M6AUX24	MAUX24
48V DC	2A	M6AUX48	MAUX48

Mounted on the left side of the MCB

MCB Add-on Accessories

Shunt Trip

The addition of a shunt trip allows remote access to the breaker operation, permitting the supervisory system to manually trip the breaker. The shunt trip actuator is a coil that is normally de-energised in the closed (on) state. When activated, the shunt trip will force the breaker to its 'off' state and the toggle handle and indicator flag will move to this corresponding position.



General Technical Data

Standard	EN / IEC 60947-5-1
Rated insulation voltage (Ui)	500V
Electric endurance	4000
Mechanical endurance	4000
Operating voltage range	70-100%
Dielectric strength	2kV/1min
Protection degree	IP20

Rated voltage	Contact capacity	Cat No 6kA MCB	Cat No 10kA MCB
400V AC	3A	M6ST4	MST4
230V AC	6A	M6ST	MST
24V DC	6A	M6ST24	MST24
48V DC	2A	M6ST48	MST48

Loadline

MS & MT Frame

MCB Add-on Accessories

Over and Under voltage Release

If the supply voltage dropped to a low level and devices tripped, a dangerous situation could exist if the devices were automatically reset. For example, motors could suddenly restart or other operating machinery set in motion without warning. In the event that the mains voltage should drop significantly below its normal operating range, typically to less than 170V ffl 5%, an undervoltage release will force the breaker to its 'off' state and the toggle handle and indicator flag will move to this corresponding position. Only when the supply has returned to, typically, at least 90% of normal operating voltage will the under-voltage release allow the breaker to be closed. In other condition if the main voltage raise above normal operating voltage range more than 280V ffl 5%, the release will force the breaker to its 'off' state and the toggle handle and indicator flag will move to this corresponding position



General Technical Data

Standard	EN / IEC 60947-5-1
Rated insulation voltage (Ui)	500V
Electric endurance	4000
Mechanical endurance	4000
Operating voltage range	220V -260V
Dielectric strength	2kV/1min
Protection degree	IP20

Rated voltage	Cat No 6kA MCB	Cat No 10kA MCB
230V AC	M6UOT	MUOT

MCB Add-on Accessories

Alarm Contact

Relaying of trip status can be achieved by the addition of an alarm contact and the contact form selected to suit the remote system input requirements. Mounted on the left side of the MCB, indicating "ON", "OFF" status of combined MCB in case of fault tripping.



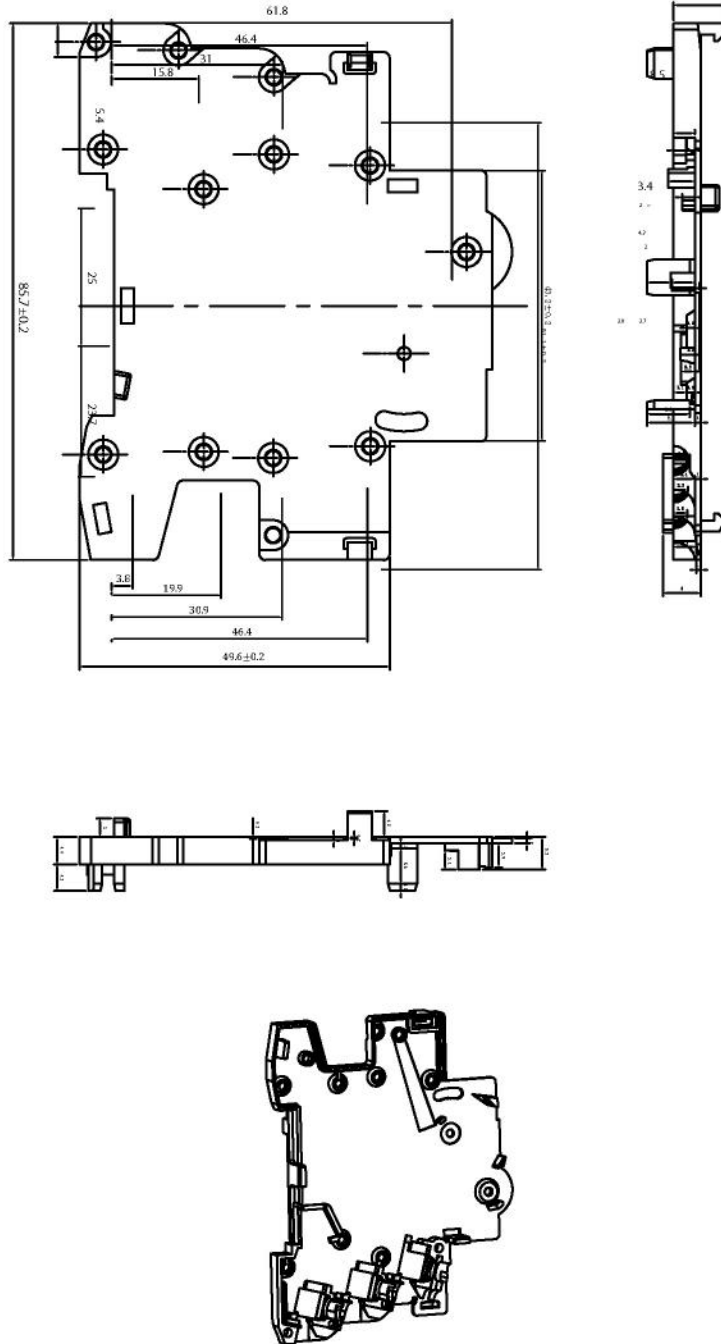
General Technical Data

Standard	EN / IEC 60947-5-1
Rated insulation voltage (Ui)	500V
Electric endurance	4000
Mechanical endurance	4000
Dielectric strength	2kV/1min
Protection degree	IP20

Rated voltage	Contact capacity	Cat No 6kA MCB	Cat No 10kA MCB
400V AC	3A	M6AL4	MAL4
230V AC	6A	M6AL	MAL
24V DC	6A	M6AL24	MAL24
48V DC	2A	M6AL48	MAL48

Mounted on the left side of the MCB

Loadline



Residual Current Circuit Breakers

Overview

Since security is becoming more and more important due to better protection for humans, animals and higher fire safety, additional protection is being constantly developed and improved. Currents of low magnitude caused by unintentional 'leakage' paths to earth can cause deterioration within circuit wiring and components with the potential to create a rapidly escalating situation that will permit the current to reach dangerous levels.

Special forms of circuit breakers are designed to use the detection of earth leakage or 'residual' current to limit the effects of this type of fault. This is where the Residual Current Circuit Breakers RCCBs come in.

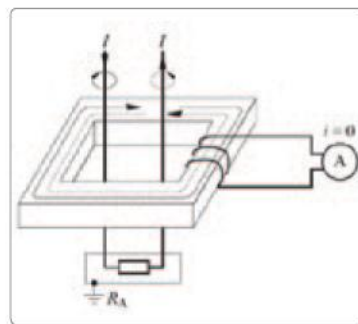
The generic term 'residual current device' is used to describe a range of circuit protection devices that include the functions of sensing and measurement of a leakage current, with subsequent tripping when the magnitude of the residual current reaches a preset level. Use of RCCBs is recommended where an increased risk of electrical shocks can appear (bathrooms, other humid and wet rooms, children's rooms, workshops...).

Protective residual current circuit breakers can be used in all systems, electrical installations, where neutral conductor (N conductor) and earth conductor (PE conductor) are separated. In old installations, in certain countries, where neutralization is still used, wherein the N and PE conductors are joined, such protection switch cannot be used. Residual current devices are a commonly established way of protection against indirect contact with live parts, fires and direct contact with live parts in different types of installations. Performance is primarily related to grounding systems known as TT, TN and IT systems. The RCCB device combines the functions of a switch with those of a residual current device. It is often used in place of an incoming switch disconnecter with the advantage that it functions also as a residual current protection device. The disadvantage, however, is that a residual fault will cause the device to operate interrupting ALL downstream circuits even when these circuits remain in a healthy state.

Note that an RCCB should not be used as the sole means to provide complete protection. It has no overload or short circuit protection and must therefore, be further protected by an upstream device having these capabilities. Frequently, the RCCB is used in consumer units and distribution boards to protect sub-circuits in a split load configuration. In these applications

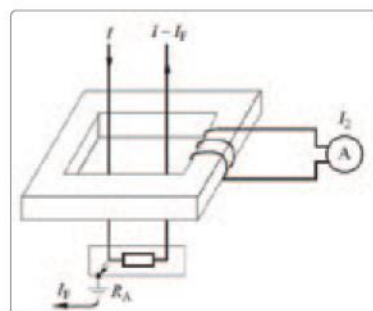
Operating principle of RCCB

In the case when the sum of incoming and outgoing currents through the primary winding is equal to 0, on the secondary side of the transformer the current will not be induced and the device will not switch off.



Relay

In the case, when the sum of incoming and outgoing currents through the primary winding is not equal to 0 and varies for the value of fault current I_F current I_2 is induced on the secondary winding and it triggers the RCCB through the relay.



Relay

Residual Current Circuit Breakers

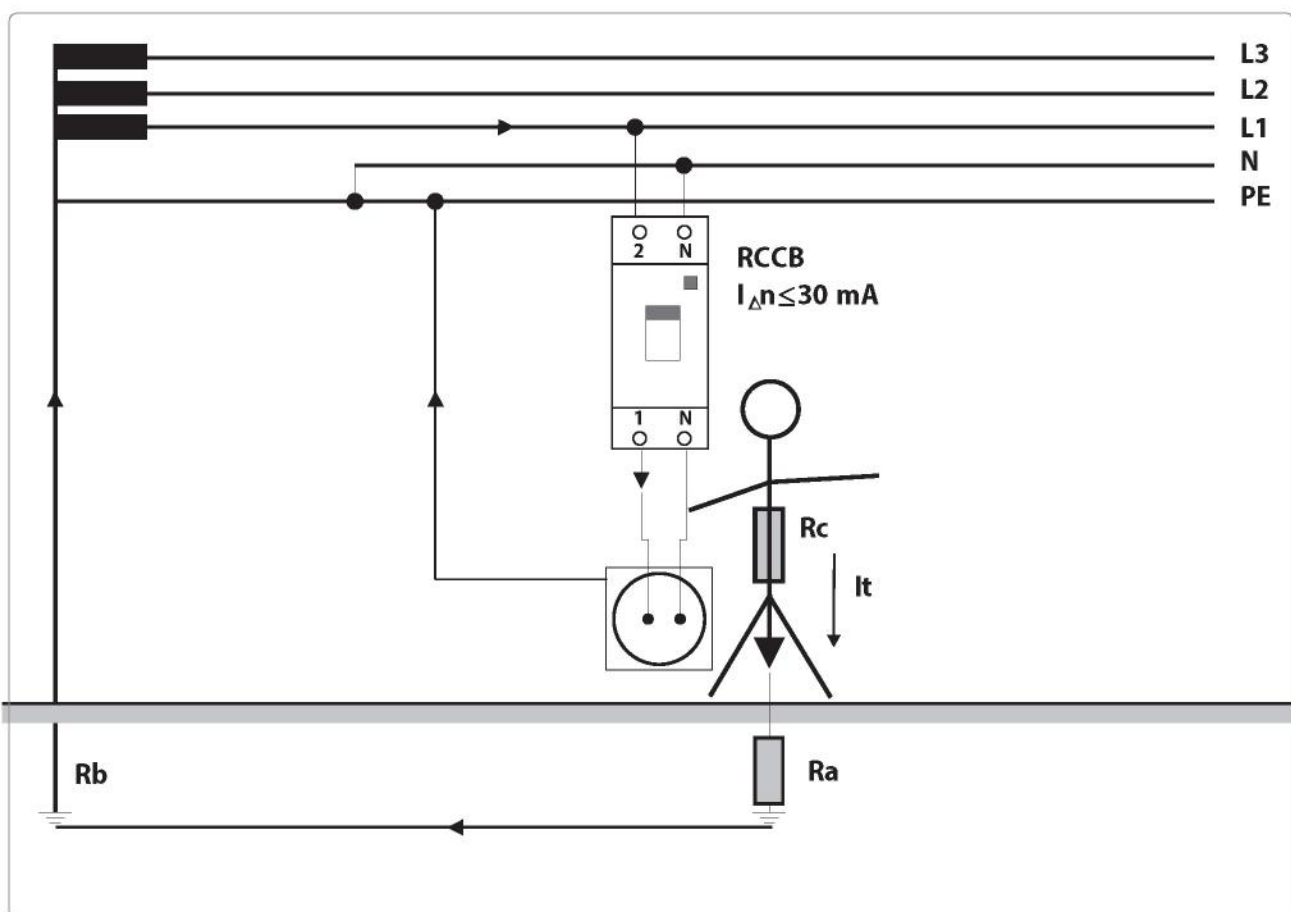
According to the sensitivity, there are three types of RCCBs for protection as follows:

- $\leq 30\text{mA}$: Protection against direct contact with live parts - "human protection"
- $\leq 100\text{mA}$: Protection against indirect contact with live parts - "basic protection"
- $\leq 300\text{mA}$: fire protection

Technical requirements for residual current circuit breakers are prescribed in international standard IEC 61008 and European standard EN 61008. Main criteria for selection are as follows:

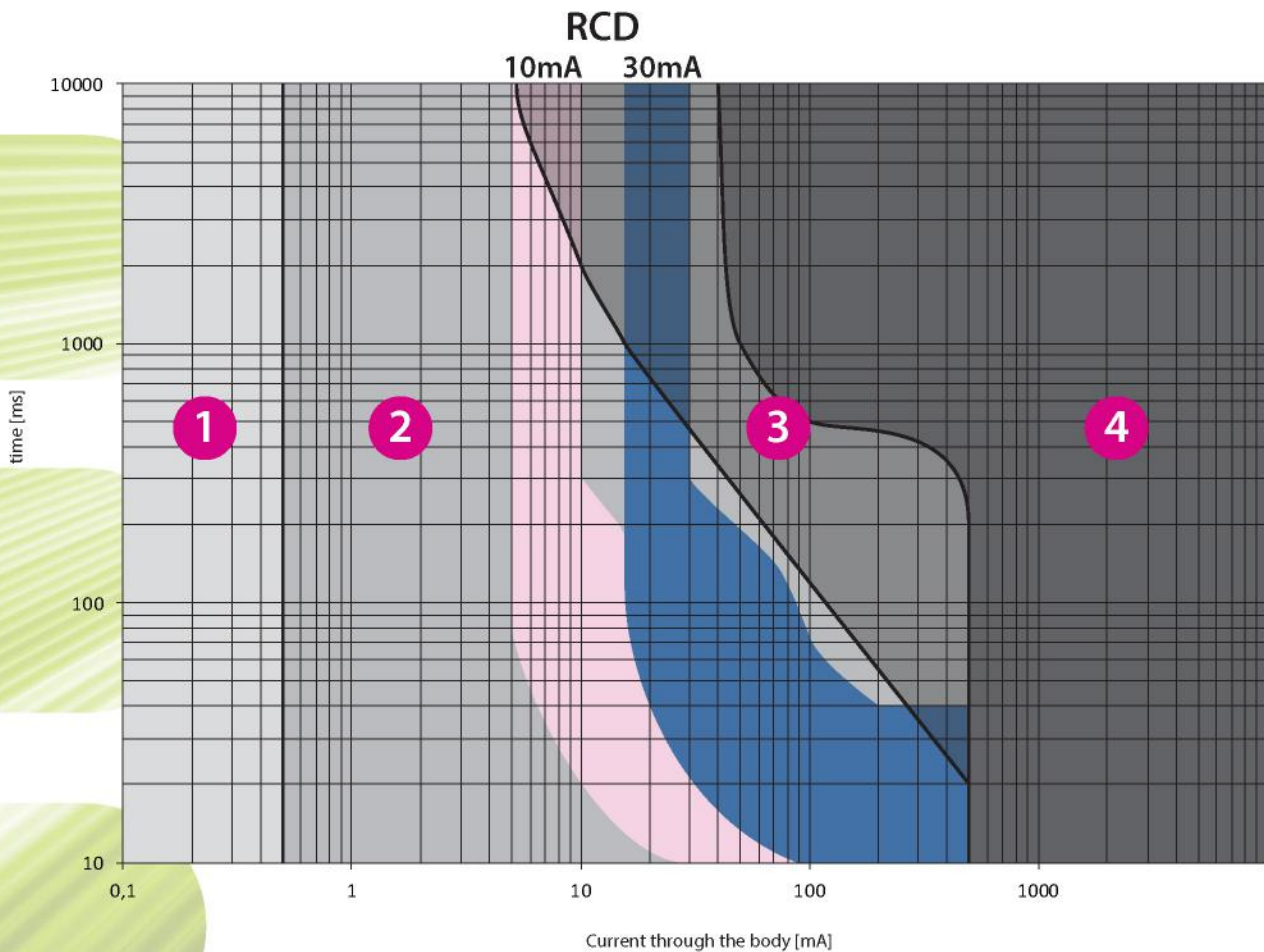
- Number of poles: 4 -pole , 2-pole
- Rated current : 16A , 25A , 40A , 63A , 80A , 100A , 125A
- Rated Residual Current: 10 mA , 30 mA , 100mA , 300mA , 500mA ,
- Breaking times: instantaneous, short-time delayed , selective
- Type of residual current:
 - pure sine residual current, 50/60Hz: AC type
 - pure sine and pulsating direct residual current, 50/60Hz: A type

1/1n



Direct contact occurs when a human body directly touches live parts. If we assume that the resistance of human body is approximately $1k\Omega$, which of course depends on conductivity of human skin, then if we touch voltage of 230V, 230mA of current flows through our body.

Such a current can already be life-threatening. Influence of the current on human body:



- 1: Area where influence is imperceptible
- 2: Area where there is no detectable adverse effects and muscle contraction
- 3: Area where muscle contraction can be detected, but there is no danger to the heart
- 4: Where you start having heart problems.

Residual Current Circuit Breakers






As you can see all RCCBs with rated residual current equal or less than 10mA are under the limit where influences on human body can occur. Because of that, they are especially suitable for use in bathrooms, children rooms, schools, hospitals, kindergartens...

RCCBs with residual current equal or less than 30mA are used for additional protection against electrical impacts.

Residual current circuit breakers - RCCBs

Residual current circuit breakers differ on types of sensing the residual current and tripping times.

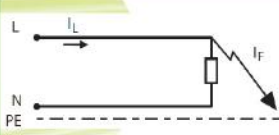
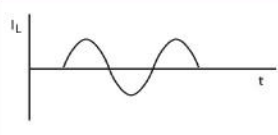
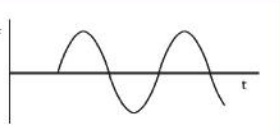


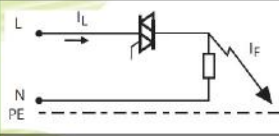
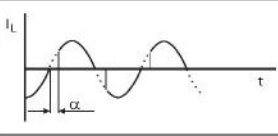
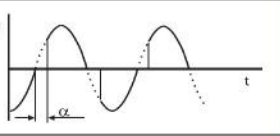
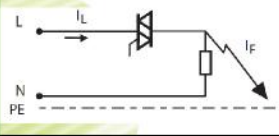
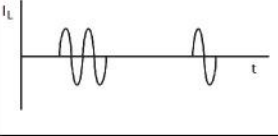
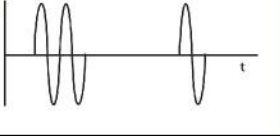
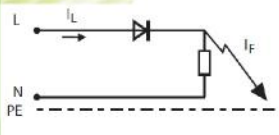
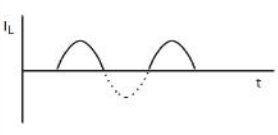
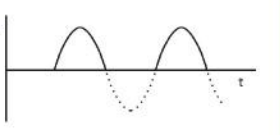
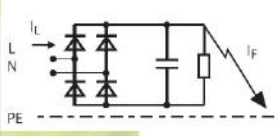
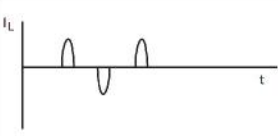
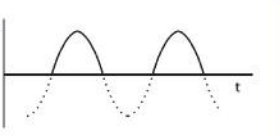
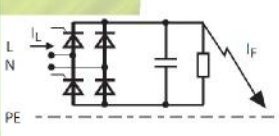
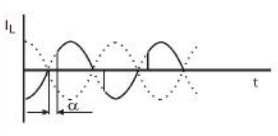
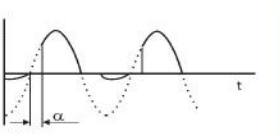
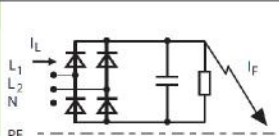
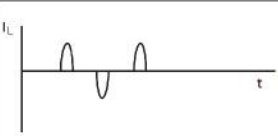
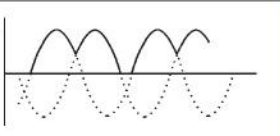
Levels of tripping currents compared to rated residual current:

Type of residual current	Current wave form	AC Type RCCB	A Type RCCB	Value of tripping current
Sinusoidal AC residual current		✓	✓	0,5 ... 1,0 $I_{\Delta n}$
Pulsating DC residual current		✗	✓	0,35 ... 1,4 $I_{\Delta n}$
Delay angle		✗	✓	0,25 ... 1,4 $I_{\Delta n}$
		✗	✓	0,11 ... 1,4 $I_{\Delta n}$
Pulsating DC residual current + smooth DC residual current of value 6mA		✗	✓	max 1,4 $I_{\Delta n}$ + 6mA
Smooth DC residual current		✗	✗	0,5 ... 2,0 $I_{\Delta n}$

Above table shows data about levels of tripping currents compared with rated residual current and in relation with different types of RCCBs.

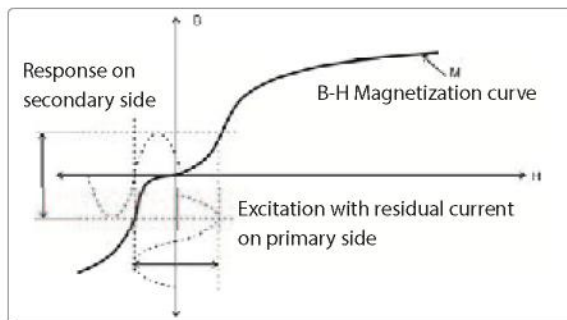
Types of RCCB according to the form of residual current

According to the fact, that there can appear different forms of residual currents in the circuits, depends what kind of rectifier circuit is used, it is necessary to select a proper type of the RCCB. Overview of possible errors in the rectifier circuit and appropriateness of the selected RCCB.

	Connection	Normal main current	Fault earth current	AC	A
1					
2				✓	✓
3				✓	✓
4					✓
5					✓
6					✓
7					✓

AC type

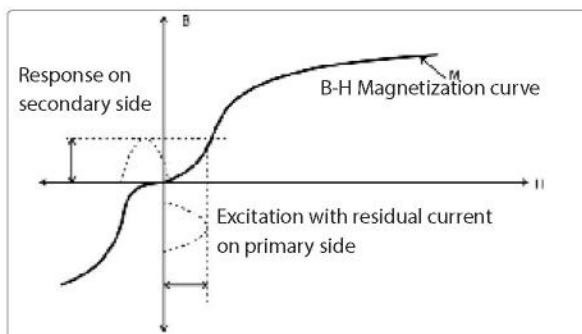
Residual current circuit breakers sensitive only to pure sinus signals are the most basic ones.
 Operation mode of AC-type residual transformer:



Above is shown a B-H magnetization curve of residual transformer. Magnetic field strength depends on excitation with residual current. Inside the core of the transformer appears a magnetic flux B, in accordance with the shape of B-H curve. Because of the height of magnetic flux, voltage is induced on secondary side which generates a switching current in switching relay.

A type

Operation mode when residual current appears as a result of half-wave oriented current:



As you can see, the response on secondary side is two times smaller, which means that we have to increase this signal in some way. This can be achieved with a special circuit on the secondary side of transformer, which is shown on the next page.

Loadline

ME Frame

Residual Current Circuit Breakers

In general we can say that A type RCCB works perfectly for sinusoidal and pulsating DC residual currents for frequencies of 50Hz and up to the third harmonic frequency, while at higher frequencies up to 1 kHz and above, the sensitivity of the A type protection switch is falling.

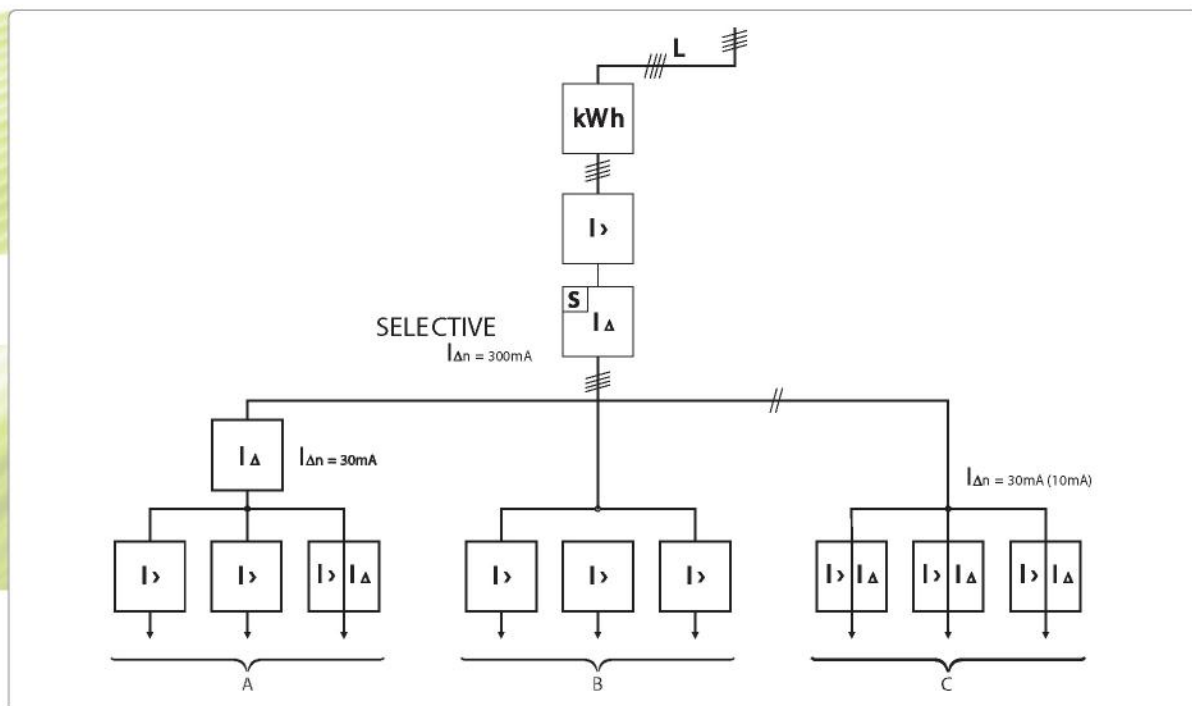
At this point we should mention that functionality of RCCBs AC and A type is known as “voltage independent”, so they do not require a power supply for their functionality. To put it even more simply, in case of disconnection of the neutral conductor, RCCB still works properly and in accordance with all its prescribed technical specifications. This is particularly important for protection against indirect contact, ie. in providing “general” protection.

Applications to use RCCB

Use of RCCB in installations

Classic installation in residential and similar conditions includes installation of only one RCCB, positioned immediately after the main fuse. This RCCB provides only the main protection. The problem of such an installations is that, when an error occurs or in the case of occurrence of residual current on one of the lines, the entire installation will be without power. This is from the modern life perspective and the requirements for power availability inadmissible.

Today, modern installation requires the use of several different residual current devices, as shown below. Consumers in the installation are divided into several groups.



Group A: consumers who require a high degree of protection (30mA): kitchen, living room...

Group B: consumers, where the possibility of touching live parts is lower: lighting

Group C: consumers who require a high level of protection and the availability of electricity: children's rooms, bathrooms, home workshops... In this case each line requires additional protection of 30mA or even 10mA.

- Available
- Not Available

Residual Current Circuit Breakers

Technical Data

Product Name	Residual Current Circuit Breakers
Frame	ME Frame
Standards	EN/IEC 61008-1
Pole	1P+N, 3P+N
Behavior to d.c. components	Type AC
Protection	Earth Leakage
Tripping Type	Electro-magnetic release
Rated Current I_n	16,20,25,32,40,50,63,80,100A
Rated Sensitivity current I_{Δn}	10mA for 16A to 25A, 30mA, 100mA, 300mA for 16A to 100A
Rated conditional short-circuit Current I_{nc}	10kA
Rated residual making and breaking capacity I_{Δm}	500A for I _n =16, 25, 32, 40A 10 x I _n for 63, 80, 100A
Rated residual non-operating current I_{Δn}	0.5 x I _n
Rated residual current off-time at I_{Δn}	±0.1s
Rated Impulse withstand voltage, U_{imp}(V)	4000V
Rated voltage U_e(V)	
AC single pole U_e	240
AC multi-pole U_e	415
Frequency Hz	50/60
Accessories	
Mechanical endurance	2000
Electrical endurance	1000
Protection degree	IP20
Ambient Temperature	
Operating Temperature °C	-5....+50, Max 95% Humidity
Storage Temperature °C	- 40.... +70
Terminal Type	Lug type and Pin type
Altitude (Meters)	Max, 2000
Installation - DIN-rail Mounting (EN 50022)	Mounting on 35mm DIN rail
Terminal Size mm²	Cables up to 35mm

Loadline

ME Frame

Residual Current Circuit Breakers

Two Pole RCCBs

Current	Sensitivity	Type	Cat. No.
16	10	AC	ME16/10/2
25	10	AC	ME25/10/2
16	30	AC	ME16/30/2
25	30	AC	ME25/30/2
32	30	AC	ME32/30/2
40	30	AC	ME40/30/2
63	30	AC	ME63/30/2
80	30	AC	ME80/30/2
100	30	AC	ME100/30/2
16	100	AC	ME16/100/2
25	100	AC	ME25/100/2
32	100	AC	ME32/100/2
40	100	AC	ME40/100/2
63	100	AC	ME63/100/2
80	100	AC	ME80/100/2
100	100	AC	ME100/100/2
16	300	AC	ME16/300/2
25	300	AC	ME25/300/2
32	300	AC	ME32/300/2
40	300	AC	ME40/300/2
63	300	AC	ME63/300/2
80	300	AC	ME80/300/2
100	300	AC	ME100/300/2

Note: For 40°C ambient temperature, add '4' at the end of the Cat. no.

For type A add A at the end of the cat No.



Residual Current Circuit Breakers

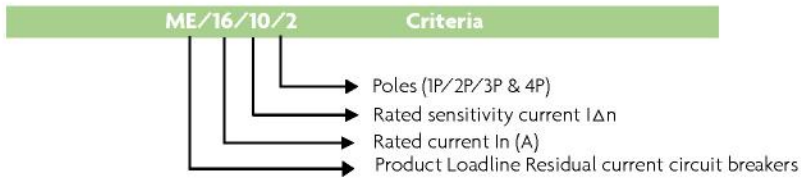
Four Pole RCCBs

Current Rating (A)	Sensitivity	Type	Cat. No.
16	10	AC	ME16/10/4
25	10	AC	ME25/10/4
16	30	AC	ME16/30/4
25	30	AC	ME25/30/4
32	30	AC	ME32/30/4
40	30	AC	ME40/30/4
63	30	AC	ME63/30/4
80	30	AC	ME80/30/4
100	30	AC	ME100/30/4
16	100	AC	ME16/100/4
25	100	AC	ME25/100/4
32	100	AC	ME32/100/4
40	100	AC	ME40/100/4
63	100	AC	ME63/100/4
80	100	AC	ME80/100/4
100	100	AC	ME100/100/4
16	300	AC	ME16/300/4
25	300	AC	ME25/300/4
32	300	AC	ME32/300/4
40	300	AC	ME40/300/4
63	300	AC	ME63/300/4
80	300	AC	ME80/300/4
100	300	AC	ME100/300/4

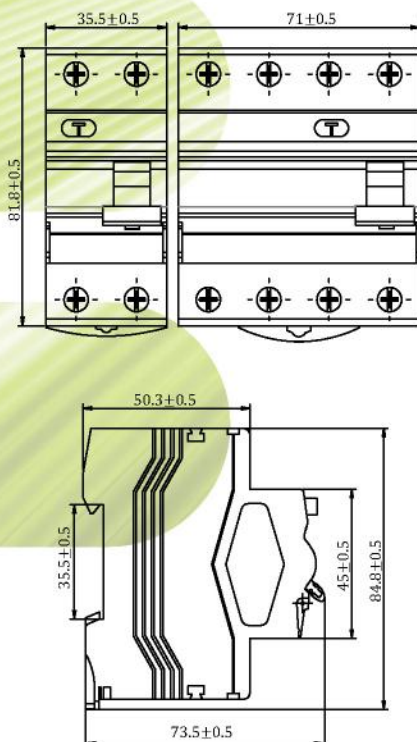


Note: For 40°C ambient temperature, add '4' at the end of the Cat. no.

For type A add A at the end of the cat No.



Dimensions:



Residual Circuit Breaker with Overload

Overview

The RCBO combines the functions of an MCB with those of a residual current device. It will therefore provide protection against overload, short circuit and earth leakage.

These devices are furnished with a 'test' pushbutton on the front face of the module. Operation of this button will simulate the presence of a residual fault and the test should be made frequently, say once per month, to assure continued correct functionality of the device.

RCBOs are available in two 'types', type AC and type A. These refer to the types of circuit for which the devices are suitable.

Type AC: for use with residual sinusoidal ac, whether applied as a step or ramp

Type A: for use with either residual sinusoidal ac or residual chopped (pulsating) dc, whether applied as a step or ramp

Single Module RCBOs are single module width devices used in place of or alongside MCBs in outgoing circuits,

Technical Data

▪ Available
- Not Available

Product Name	Residual Circuit Breaker with Overload Single Model
Frame	ME Frame
Standards	EN/IEC 61008-1
Pole	1P + N1 Module
Tripping Characteristics	B & C
Behavior to d.c. components	Type AC
Protection	Overload, Short Circuit & Earth Leakage
Tripping Type	Electronics
Magnetic Operating Limit in AC Voltage	B:(3-5) x I _n C: (5-10) x I _n
Rated Current I_n	6,10,16,20,25,32,40, 50A
Rated Sensitivity current I_{Δn}	10mA, 30mA, 100mA, 300mA
Rated breaking capacity I_{cn}	6kA & 10kA
Rated residual making and breaking capacity I_{Δm}	500A
Rated residual current off-time at I_{Δn}	±0.1s
Rated Impulse withstand voltage, U_{imp}(V)	4000V
Rated voltage U_e(V)	
AC single pole U_e	240
Frequency Hz	50/60
Accessories	
Mechanical endurance	20000
Electrical endurance	10000
Protection degree	IP20
Energy limiting class	Class 3
Ambient Temperature	
Operating Temperature °C	-25..+50, Max 95% Humidity
Storage Temperature °C	-40..+70
Terminal Type	Lug type and Pin type
Altitude (Meter)	Max, 2000
Installation - DIN-rail Mounting (EN 50022)	Mounting on 35mm DIN rail
Terminal Size mm	16mm flexible cable 25 mm rigid cables

Residual Circuit Breaker with Overload Single Model

Loadline
MR Frame

6kA Single Module

Current Rating (A)	Sensitivity	Type	B Type Cat. No.	C Type Cat. No.
6	10	AC	MR1PSB0610	MR1PSC0610
10	10	AC	MR1PSB1010	MR1PSC1010
16	10	AC	MR1PSB1610	MR1PSC1610
20	10	AC	MR1PSB2010	MR1PSC2010
25	10	AC	MR1PSB2510	MR1PSC2510
32	10	AC	MR1PSB3210	MR1PSC3210
40	10	AC	MR1PSB4010	MR1PSC4010
6	30	AC	MR1PSB0630	MR1PSC0630
10	30	AC	MR1PSB1030	MR1PSC1030
16	30	AC	MR1PSB1630	MR1PSC1630
20	30	AC	MR1PSB2030	MR1PSC2030
25	30	AC	MR1PSB2530	MR1PSC2530
32	30	AC	MR1PSB3230	MR1PSC3230
40	30	AC	MR1PSB4030	MR1PSC4030
6	100	AC	MR1PSB06100	MR1PSC06100
10	100	AC	MR1PSB10100	MR1PSC10100
16	100	AC	MR1PSB16100	MR1PSC16100
20	100	AC	MR1PSB20100	MR1PSC20100
25	100	AC	MR1PSB25100	MR1PSC25100
32	100	AC	MR1PSB32100	MR1PSC32100
40	100	AC	MR1PSB40100	MR1PSC40100



Note: For 40°C ambient temperature, add '4' at the end of the Cat. no.
For type A add A at the end of the cat No.

Loadline

MR Frame

Residual Circuit Breaker with Overload Single Model

10kA Single Module

Current Rating (A)	Sensitivity	Type	B Type Cat. No.	C Type Cat. No.
6	10	AC	MR1PTB0610	MR1PTC0610
10	10	AC	MR1PTB1010	MR1PTC1010
16	10	AC	MR1PTB1610	MR1PTC1610
20	10	AC	MR1PTB2010	MR1PTC2010
25	10	AC	MR1PTB2510	MR1PTC2510
32	10	AC	MR1PTB3210	MR1PTC3210
40	10	AC	MR1PTB4010	MR1PTC4010
6	30	AC	MR1PTB0630	MR1PTC0630
10	30	AC	MR1PTB1030	MR1PTC1030
16	30	AC	MR1PTB1630	MR1PTC1630
20	30	AC	MR1PTB2030	MR1PTC2030
25	30	AC	MR1PTB2530	MR1PTC2530
32	30	AC	MR1PTB3230	MR1PTC3230
40	30	AC	MR1PTB4030	MR1PTC4030
6	100	AC	MR1PTB06100	MR1PTC06100
10	100	AC	MR1PTB10100	MR1PTC10100
16	100	AC	MR1PTB16100	MR1PTC16100
20	100	AC	MR1PTB20100	MR1PTC20100
25	100	AC	MR1PTB25100	MR1PTC25100
32	100	AC	MR1PTB32100	MR1PTC32100
40	100	AC	MR1PTB40100	MR1PTC40100



Note: For 40°C ambient temperature, add '4' at the end of the Cat. no.

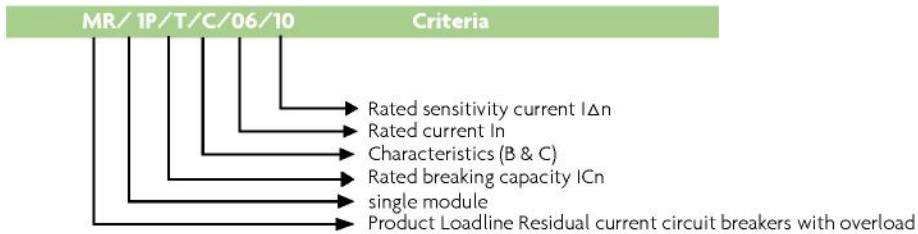
For type A add A at the end of the cat No.

Residual Circuit Breaker with Overload

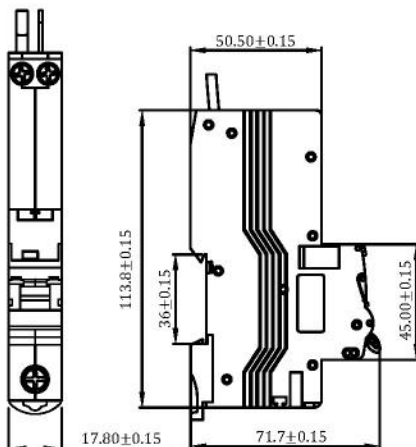
Single Model

Loadline

MR Frame



Dimensions



Technical Data

▪ Available
- Not Available

Product Name	MCBs with Residual Current Circuit Breakers 2P/3P/4P Model
Frame	MSR Frame
Standards	EN/IEC 61009-1
Pole	1P+N, 2P,3P,3P+N,4P
Tripping Characteristics	B/C/D
Protection	Overload, Short circuit & Earth Leakage
Tripping Type	
Ground Fault	Electronic
Over Current	Thermal Magnetic
Rated current In	6,10,16,20,25,32,40,50,63A
Rated Sensitivity current I Δ n	30mA, 100mA, 300A
Rated breaking capacity Icn	6KA
Rated residual making and breaking capacity I Δ m	500A
Rated residual current off-time at I Δ n	±0.1s
Rated Impulse withstand voltage, Uimp (V)	4000V
Rated voltage Ue (V)	
AC single pole Ue	240/415v AC
Frequency Hz	50/60
Accessories	
Mechanical endurance	20000
Electrical endurance	10000
Protection degree	IP20
Energy Limiting class	Class 3
Ambient Temperature	
Operating Temperature °C	-25...+115, Max 95% Humidity
Storage Temperature °C	-40...+70
Terminal Type	Lug type and Pin type
Altitude (Meters)	Max, 2000
Installation - DIN-rail Mounting (EN 50022)	Mounting on 35mm DIN rail
Terminal Size mm ²	16mm ² flexible cable 25mm ² rigid

MCBs with Residual Current Circuit Breakers 1P, 2P, 3P Model



Current Rating (A)	Sensitivity	B Type cat. No.	C Type cat. No.	D Type cat. No.
6	30	MSR2PB0630	MSR2PC0630	MSR2PD0630
10	30	MSR2PB1030	MSR2PC1030	MSR2PD1030
16	30	MSR2PB1630	MSR2PC1630	MSR2PD1630
20	30	MSR2PB2030	MSR2PC2030	MSR2PD2030
25	30	MSR2PB2530	MSR2PC2530	MSR2PD2530
32	30	MSR2PB3230	MSR2PC3230	MSR2PD3230
40	30	MSR2PB4030	MSR2PC4030	MSR2PD4030
50	30	MSR2PB5030	MSR2PC5030	MSR2PD5030
63	30	MSR2PB6330	MSR2PC6330	MSR2PD6330
6	100	MSR2PB06100	MSR2PC06100	MSR2PD06100
10	100	MSR2PB10100	MSR2PC10100	MSR2PD10100
16	100	MSR2PB16100	MSR2PC16100	MSR2PD16100
20	100	MSR2PB20100	MSR2PC20100	MSR2PD20100
25	100	MSR2PB25100	MSR2PC25100	MSR2PD25100
32	100	MSR2PB32100	MSR2PC32100	MSR2PD32100
40	100	MSR2PB40100	MSR2PC40100	MSR2PD40100
50	100	MSR2PB50100	MSR2PC50100	MSR2PD50100
63	100	MSR2PB63100	MSR2PC63100	MSR2PD63100
6	300	MSR2PB06300	MSR2PC06300	MSR2PD06300
10	300	MSR2PB10300	MSR2PC10300	MSR2PD10300
16	300	MSR2PB16300	MSR2PC16300	MSR2PD16300
20	300	MSR2PB20300	MSR2PC20300	MSR2PD20300
25	300	MSR2PB25300	MSR2PC25300	MSR2PD25300
32	300	MSR2PB32300	MSR2PC32300	MSR2PD32300
40	300	MSR2PB40300	MSR2PC40300	MSR2PD40300
50	300	MSR2PB50300	MSR2PC50300	MSR2PD50300
63	300	MSR2PB63300	MSR2PC63300	MSR2PD63300

Current Rating (A)	Sensitivity	B Type cat. No.	C Type cat. No.	D Type cat. No.
6	30	MSR3PB0630	MSR3PC0630	MSR3PD0630
10	30	MSR3PB1030	MSR3PC1030	MSR3PD1030
16	30	MSR3PB1630	MSR3PC1630	MSR3PD1630
20	30	MSR3PB2030	MSR3PC2030	MSR3PD2030
25	30	MSR3PB2530	MSR3PC2530	MSR3PD2530
32	30	MSR3PB3230	MSR3PC3230	MSR3PD3230
40	30	MSR3PB4030	MSR3PC4030	MSR3PD4030
50	30	MSR3PB5030	MSR3PC5030	MSR3PD5030
63	30	MSR3PB6330	MSR3PC6330	MSR3PD6330
6	100	MSR3PB06100	MSR3PC06100	MSR3PD06100
10	100	MSR3PB10100	MSR3PC10100	MSR3PD10100
16	100	MSR3PB16100	MSR3PC16100	MSR3PD16100
20	100	MSR3PB20100	MSR3PC20100	MSR3PD20100
25	100	MSR3PB25100	MSR3PC25100	MSR3PD25100
32	100	MSR3PB32100	MSR3PC32100	MSR3PD32100
40	100	MSR3PB40100	MSR3PC40100	MSR3PD40100
50	100	MSR3PB50100	MSR3PC50100	MSR3PD50100
63	100	MSR3PB63100	MSR3PC63100	MSR3PD63100
6	300	MSR3PB06300	MSR3PC06300	MSR3PD06300
10	300	MSR3PB10300	MSR3PC10300	MSR3PD10300
16	300	MSR3PB16300	MSR3PC16300	MSR3PD16300
20	300	MSR3PB20300	MSR3PC20300	MSR3PD20300
25	300	MSR3PB25300	MSR3PC25300	MSR3PD25300
32	300	MSR3PB32300	MSR3PC32300	MSR3PD32300
40	300	MSR3PB40300	MSR3PC40300	MSR3PD40300
50	300	MSR3PB50300	MSR3PC50300	MSR3PD50300
63	300	MSR3PB63300	MSR3PC63300	MSR3PD63300

Current Rating (A)	Sensitivity	B Type cat. No.	C Type cat. No.	D Type cat. No.
6	30	MSR3PB0630N	MSR3PC0630N	MSR3PD0630N
10	30	MSR3PB1030N	MSR3PC1030N	MSR3PD1030N
16	30	MSR3PB1630N	MSR3PC1630N	MSR3PD1630N
20	30	MSR3PB2030N	MSR3PC2030N	MSR3PD2030N
25	30	MSR3PB2530N	MSR3PC2530N	MSR3PD2530N
32	30	MSR3PB3230N	MSR3PC3230N	MSR3PD3230N
40	30	MSR3PB4030N	MSR3PC4030N	MSR3PD4030N
50	30	MSR3PB5030N	MSR3PC5030N	MSR3PD5030N
63	30	MSR3PB6330N	MSR3PC6330N	MSR3PD6330N
6	100	MSR3PB06100N	MSR3PC06100N	MSR3PD06100N
10	100	MSR3PB10100N	MSR3PC10100N	MSR3PD10100N
16	100	MSR3PB16100N	MSR3PC16100N	MSR3PD16100N
20	100	MSR3PB20100N	MSR3PC20100N	MSR3PD20100N
25	100	MSR3PB25100N	MSR3PC25100N	MSR3PD25100N
32	100	MSR3PB32100N	MSR3PC32100N	MSR3PD32100N
40	100	MSR3PB40100N	MSR3PC40100N	MSR3PD40100N
50	100	MSR3PB50100N	MSR3PC50100N	MSR3PD50100N
63	100	MSR3PB63100N	MSR3PC63100N	MSR3PD63100N
6	300	MSR3PB06300N	MSR3PC06300N	MSR3PD06300N
10	300	MSR3PB10300N	MSR3PC10300N	MSR3PD10300N
16	300	MSR3PB16300N	MSR3PC16300N	MSR3PD16300N
20	300	MSR3PB20300N	MSR3PC20300N	MSR3PD20300N
25	300	MSR3PB25300N	MSR3PC25300N	MSR3PD25300N
32	300	MSR3PB32300N	MSR3PC32300N	MSR3PD32300N
40	300	MSR3PB40300N	MSR3PC40300N	MSR3PD40300N
50	300	MSR3PB50300N	MSR3PC50300N	MSR3PD50300N
63	300	MSR3PB63300N	MSR3PC63300N	MSR3PD63300N

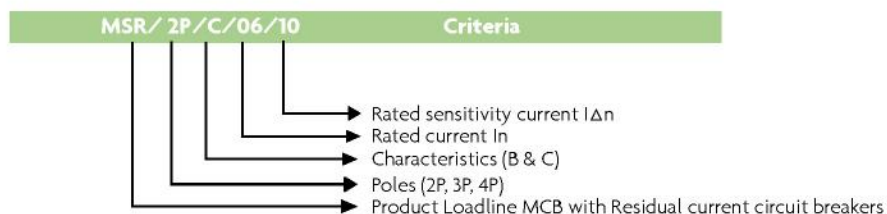


Current Rating (A)	Sensitivity	B Type cat. No.	C Type cat. No.	D Type cat. No.
6	30	MSR4PB0630	MSR4PC0630	MSR4PD0630
10	30	MSR4PB1030	MSR4PC1030	MSR4PD1030
16	30	MSR4PB1630	MSR4PC1630	MSR4PD1630
20	30	MSR4PB2030	MSR4PC2030	MSR4PD2030
25	30	MSR4PB2530	MSR4PC2530	MSR4PD2530
32	30	MSR4PB3230	MSR4PC3230	MSR4PD3230
40	30	MSR4PB4030	MSR4PC4030	MSR4PD4030
50	30	MSR4PB5030	MSR4PC5030	MSR4PD5030
63	30	MSR4PB6330	MSR4PC6330	MSR4PD6330
6	100	MSR4PB06100	MSR4PC06100	MSR4PD06100
10	100	MSR4PB10100	MSR4PC10100	MSR4PD10100
16	100	MSR4PB16100	MSR4PC16100	MSR4PD16100
20	100	MSR4PB20100	MSR4PC20100	MSR4PD20100
25	100	MSR4PB25100	MSR4PC25100	MSR4PD25100
32	100	MSR4PB32100	MSR4PC32100	MSR4PD32100
40	100	MSR4PB40100	MSR4PC40100	MSR4PD40100
50	100	MSR4PB50100	MSR4PC50100	MSR4PD50100
63	100	MSR4PB63100	MSR4PC63100	MSR4PD63100
6	300	MSR4PB06300	MSR4PC06300	MSR4PD06300
10	300	MSR4PB10300	MSR4PC10300	MSR4PD10300
16	300	MSR4PB16300	MSR4PC16300	MSR4PD16300
20	300	MSR4PB20300	MSR4PC20300	MSR4PD20300
25	300	MSR4PB25300	MSR4PC25300	MSR4PD25300
32	300	MSR4PB32300	MSR4PC32300	MSR4PD32300
40	300	MSR4PB40300	MSR4PC40300	MSR4PD40300
50	300	MSR4PB50300	MSR4PC50300	MSR4PD50300
63	300	MSR4PB63300	MSR4PC63300	MSR4PD63300

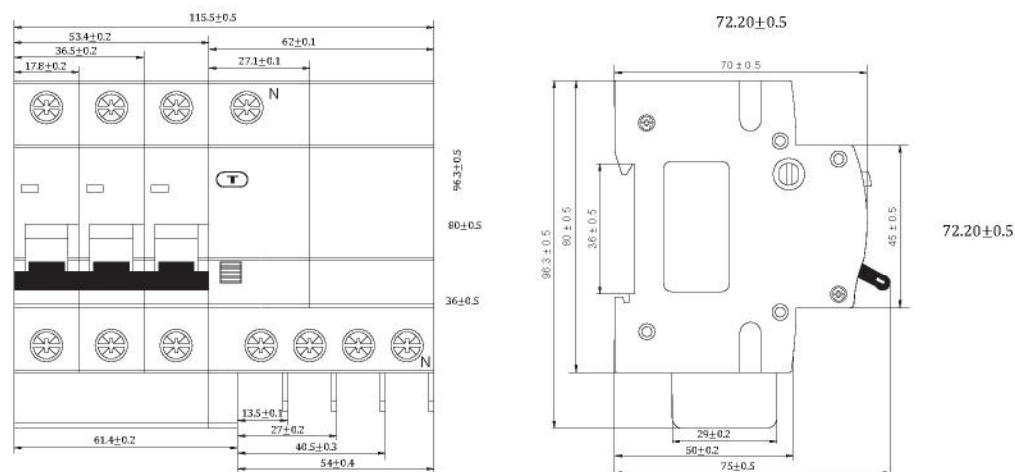


2. Overcurrent protecting details

No	Rated current of release(A)	Initial state	Initial state	Initial state	Initial state	Initial state
1	1 - 63	cold state	1.13In	t 1h	Non-trip	
2	1 - 63	upon the previous test	1.45In	t 1h	trip	Setting current up to specific value steadily in 5S
3	In 32	cold state	2.55In	1s<t<60s	trip	
	In 32	cold state	2.55In	1s<t<120s	trip	
4	1 - 63	cold state	3In	t≤0.1s	Non-trip	B type
	1 - 63	cold state	5In	t≤1.1s	trip	B type
	1 - 63	cold state	5In	t≤0.1s	Non-trip	C type
	1 - 63	cold state	10In	t≤1.1s	trip	C type
	1 - 63	cold state	10In	t≤0.1s	Non-trip	D type
	1 - 63	cold state	20In	t≤1.1s	trip	D type



Dimensions:



Modular Contactors

Contactors are simply electromechanically controlled switches. A contactor acts as an interposing relay which, when its coil is energised, operates one or more sets of contacts that are able to carry currents of sufficient magnitude to switch power equipment such as large banks of lights, highly inductive lamps, motors and large solenoids. The current required to operate the coil is minimal, therefore a contactor can be controlled by light duty contacts in a timer, pushbutton or other control device.

Generally, contactors have no latching facility, i.e. once the coil is de-energised the contact state returns to its normal 'at res' condition. However, whilst there is no mechanical latching, electrical latching can be easily accomplished by using a separate relay contact to hold on the supply to the contactor's coil.

Selection Criteria

The correct choice of contactor depends upon a number of parameters within the intended application.

These include:

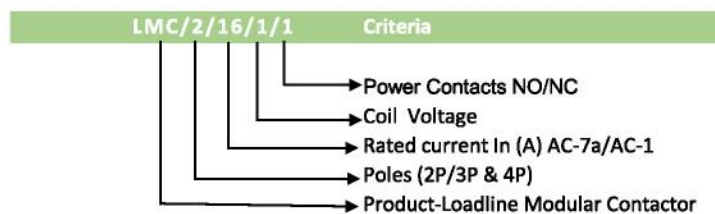
- 1-The form of power supply
- 2-The magnitude of the power to be switched
- 3-The type of load to be controlled
- 4-The control voltage required
- 5-The frequency of switching

Since the device operates by its coil being energised for possibly lengthy periods, considerable internal heat can be generated. For this reason, a venting insert must be placed between alternate pairs of contactors or between a contactor and any other adjacent circuit device.

Modular contactor



Details of Dorman Smith- Modular Contactor Code



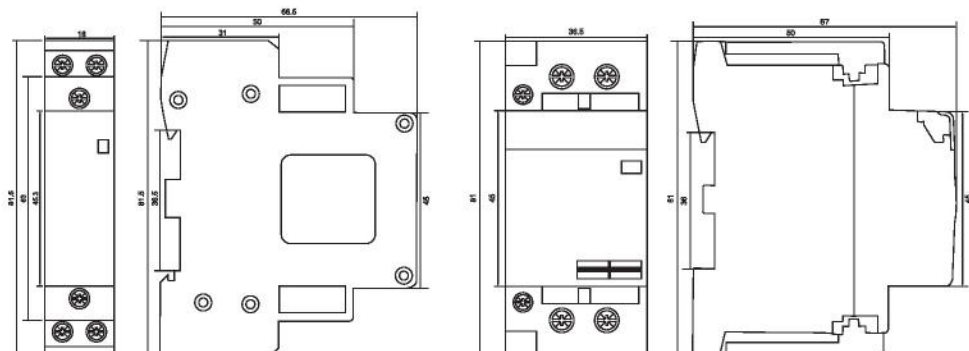
Coil Voltage	Code
24V ac	1
240V ac	2
CONTACTS	
Code	
2 NO	1
2 NC	2
1NO + 1NC	3
3 NO	4
3 NC	5
2NO + 1NC	6
2NC + 1NO	7
4 NO	8
4 NC	9
3NC+1NO	10
2NO + 2NC	11
3NO + 1NC	12



2 Pole

Cat No.	Rated current In(A)		Contact position	Control voltage (Vac)	Rated control power in (KW)	
	AC-7a/AC-1	AC-7b/AC-3			AC-7a/240V	AC-7b/240V
LMC/2/16/2/1	16	5.5	2NO	240	3.2	1.0
LMC/2/20/2/1	20	7	2NO	240	4	1.2
LMC/2/25/2/1	25	8.5	2NO	240	5	1.4
LMC/2/32/2/1	32	12	2NO	240	6.5	2
LMC/2/40/2/1	40	15	2NO	240	8.5	2.5
LMC/2/63/2/1	63	25	2NO	240	13	4
LMC/2/16/1/1	16	5.5	2NO	24	3.2	1.0
LMC/2/20/1/1	20	7	2NO	24	4	1.2
LMC/2/25/1/1	25	8.5	2NO	24	5	1.4
LMC/2/32/1/1	32	12	2NO	24	6.5	2
LMC/2/40/1/1	40	15	2NO	24	8.5	2.5
LMC/2/63/1/1	63	25	2NO	24	13	4

Overall and mounting dimensions



3 Pole



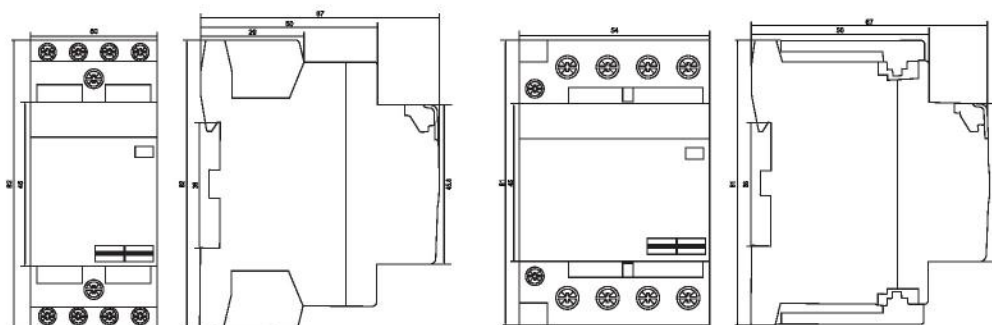
Cat No.	Rated current In(A)		Contact position	Control voltage (Vac)	Rated control power in (KW)	
	AC-7a/AC-1	AC-7b/AC-3			AC-7a / 415V	AC-7b / 415V
LMC/3/16/2/4	16	5.5	3NO	240	10	3
LMC/3/20/2/4	20	7	3NO	240	13	3.5
LMC/3/25/2/4	25	8.5	3NO	240	15	4
LMC/3/32/2/4	32	12	3NO	240	21	6.5
LMC/3/40/2/4	40	15	3NO	240	26	7.5
LMC/3/63/2/4	63	25	3NO	240	40	13
LMC/3/16/1/4	16	5.5	3NO	24	10	3
LMC/3/20/1/4	20	7	3NO	24	13	3.5
LMC/3/25/1/4	25	8.5	3NO	24	15	4
LMC/3/32/1/4	32	12	3NO	24	21	6.5
LMC/3/40/1/4	40	15	3NO	24	26	7.5
LMC/3/63/1/4	63	25	3NO	24	40	13

4 Pole



Cat No.	Rated current In(A)		Contact position	Control voltage (Vac)	Rated control power in (KW)	
	AC-7a/AC-1	AC-7b/AC-3			AC-7a / 415V	AC-7b / 415V
LMC/4/16/2/8	16	5.5	4NO	240	10	3
LMC/4/20/2/8	20	7	4NO	240	13	3.5
LMC/4/25/2/8	25	8.5	4NO	240	15	4
LMC/4/32/2/8	32	12	4NO	240	21	6.5
LMC/4/40/2/8	40	15	4NO	240	26	7.5
LMC/4/63/2/8	63	25	4NO	240	40	13
LMC/4/16/1/8	16	5.5	4NO	24	10	3
LMC/4/20/1/8	20	7	4NO	24	13	3.5
LMC/4/25/1/8	25	8.5	4NO	24	15	4
LMC/4/32/1/8	32	12	4NO	24	21	6.5
LMC/4/40/1/8	40	15	4NO	24	26	7.5
LMC/4/63/1/8	63	25	4NO	24	40	13

Overall and Mounting dimensions



Loadline Timer

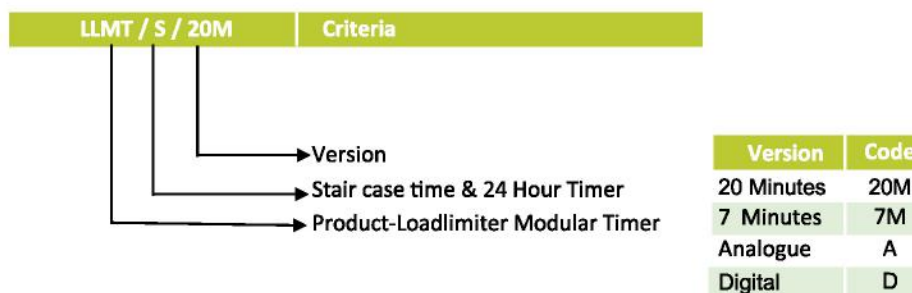
Overview

Dorman smith range of Time Switches provides a variety of feature & benefits such as Controlling, opening and closing of electrical circuits according to a program & switching time. Also available with Internal battery to enable the timing function in case of power failure, Daily and weekly versions, Simple design. These Timers are suitable for any residential or commercial lighting control application etc.,

Construction and Feature

- Suitable to control wide range lightings include incandescent lamp,
- halogen lamp and fluorescent lamp
- Simple time setting
- With time delay
- Extremely compact and modular size

Details of Dorman Smith Code - Staircase Timers



Staircase Timer

Dorman Smith staircase timer switch is used to control lighting on a staircase, corridor or lobby. A single action turns on the lights and they remain on for enough time to ascend or descend the staircase. These timers turn off the lights automatically. The Staircase Timers are available in two types. Electromechanical and Electronic versions with a 0.5-20 min & 0.5-7 min adjustable delay and 16A NO contacts. A pulse switch for on/off control is also provided.



LLMT/S/20M

Technical Data

- Type : electromechanical type with time delay
- Time setting range: 20 minutes
- Min.setting interval: 0.5 minutes
- Toggle switch: manual/automatic
- Controlled lighting load:
 - Incandescent lamp: 2300W
 - Halogen lamp: 2300W
- Fluorescent lamp:
 - Uncompensated 2300w
 - Compensated in series: 2300w
 - Compensated in parallel: 1300w
- Switching: reset after 30s



LLMT/S/7M

Technical Data

- Type: electronic time delay
- Time setting range: 7 minutes
- Min.setting interval: 0.5 minutes
- Slide switch: manual/automatic
- Controlled lighting load:
 - Incandescent lamp: 2300W
 - Halogen lamp: 2300W
- Fluorescent lamp load with electronic ballast: 1300W
- Switching: immediate reset

Overall and Mounting dimensions



LLMT/S/20M

LLMT/S/7M

Loadline Timer

24 Hour Timers

LLMT/24/A Quartz time switch with power reserve

24 Hours Timer switch is used to “ON” or “OFF” electric circuit at selected times operating through a relay or contactor. Time switches are used to save energy by switching loads automatically as per real time. Two version available Digital and Analogue version

Construction and Feature

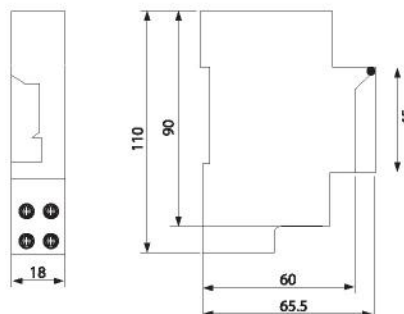
- Available with or without power reserve
- 24 hour dial with 15 min segments
- Permanent ON/OFF switch
- Switching status indication



Technical Data

- Drive: quartz-controlled motor
- Frequency: 50/60Hz
- Accuracy: within $\pm 1s$ per day at 20°C
- Reserve: 70 hours
- Rated voltage: 110/240V AC
- Rated frequency: 50/60Hz
- Consumption: 2.5VA
- Contact: 1NO
- Contact capacity:
 - 16A/250V AC (COS $\varphi=1$)
 - 4A/250V AC (COS $\varphi=0.6$)
- Electrical endurance: 10^5 times
- Mechanical endurance: 10^7 times
- 24 hours
- 96 segments
- Min. programmable interval: 15 minutes
- Ambient temperature: -10°C - +50°C
- Connection terminal: pillar terminal with clamp
- Connection capacity: rigid conductor 6mm²
- Installation:
 - On symmetrical DIN rail
 - Panel mounting

Overall and Mounting Dimensions



24 Hour Timers

LLMT/24/D Time Switch

Construction and Feature

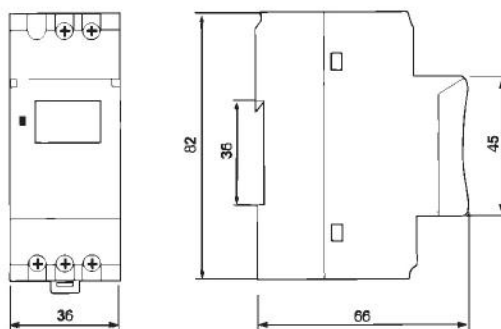
- Compact modular size
- LCD Display
- Equipped with back-up battery
- Permanent switch ON/OFF

Technical Data

- Type: electronic with LCD display
- Rated voltage: 220/240VAC
- Rated frequency: 50/60Hz
- Contact: 1NO+1NC
- Consumption: maximum 4VA
- Contact capacity:
 - 16A/250V AC (COS ϕ) =1)
 - 2.5A/250V AC (COS ϕ) =0.6)
- Incandescent lamp: 1000W
- Electrical endurance: 10^5 times
- Mechanical endurance: 10^7 times
- Time basis: quartz
- 24 hours + week program
- Working precision: ≤ 2 sec/day(25°C)
- Min.programmable interval: 1 minute
- Power reserve: min. 15 days
- Ambient temperature: -10°C to +50°C
- Humidity: 35-8 %RH
- Connection terminal: pillar terminal with clamp
- Connection capacity: rigid conductor 6mm²
- Installation:
 - On symmetrical DIN rail
 - Panel mounting

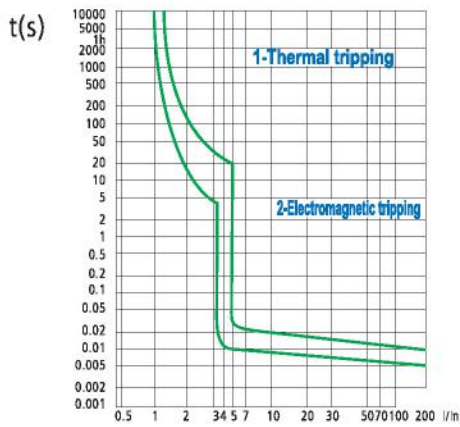


Overall and Mounting Dimensions

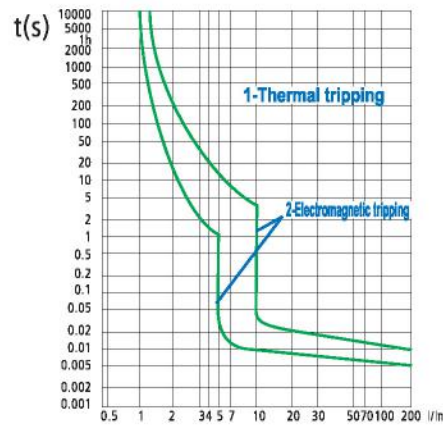


Characteristic Curves

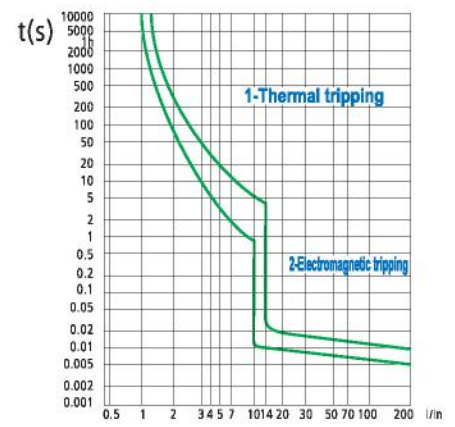
MS Frame



B type

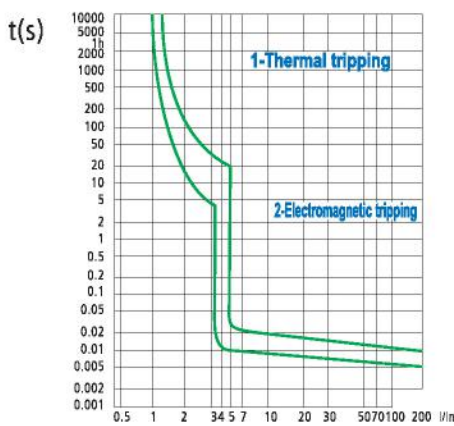


C type

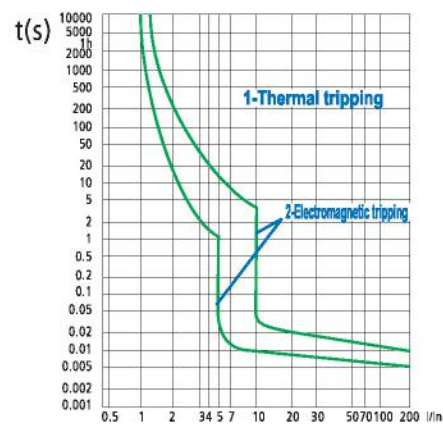


D type

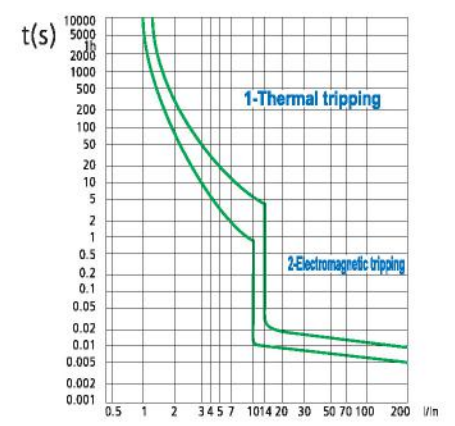
MT Frame



B type

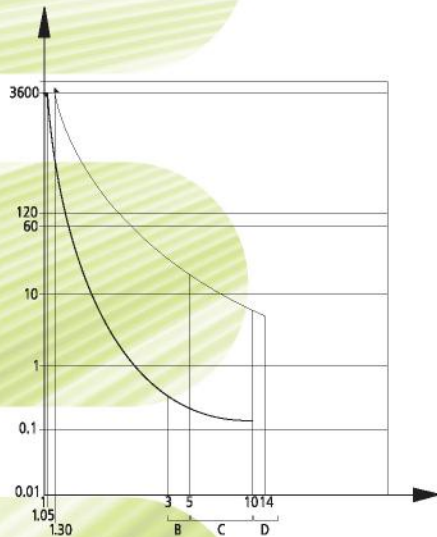
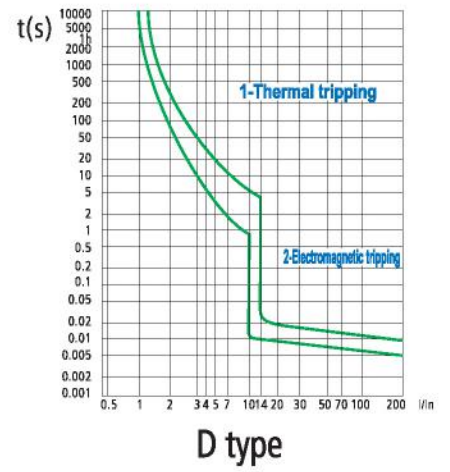
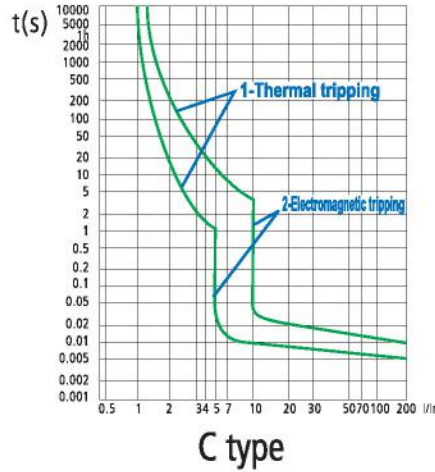
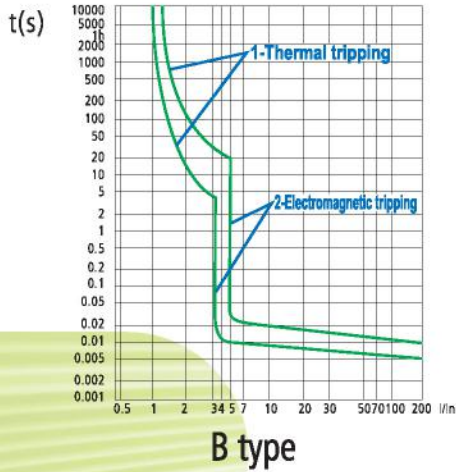


C type



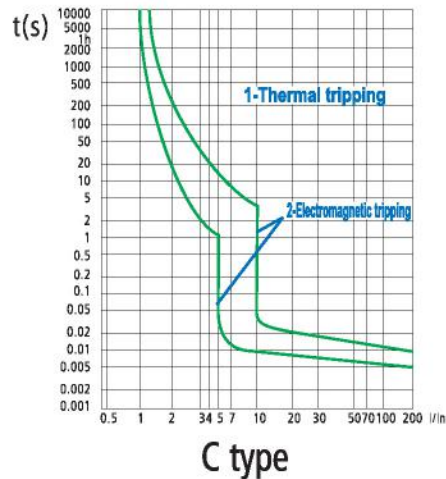
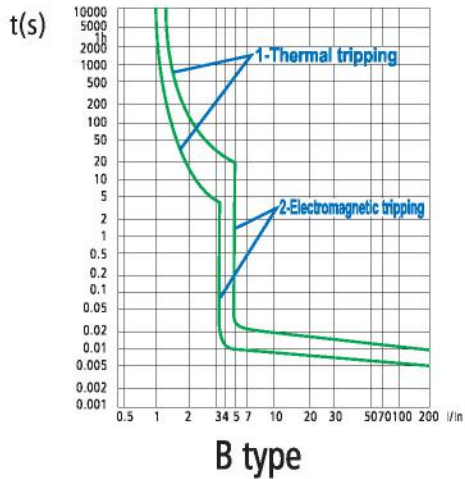
D type

High Current MT Frame

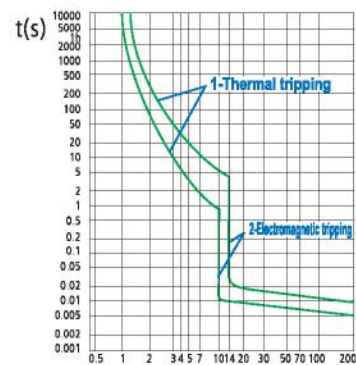
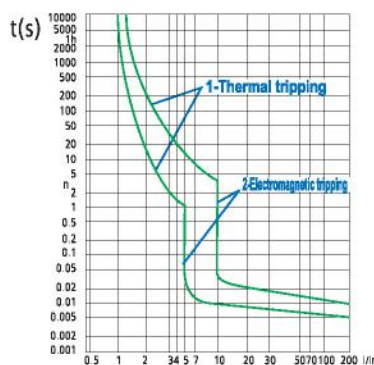
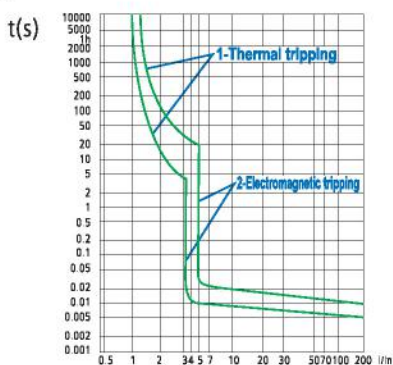


Characteristic Curves

MR Frame



Curves



Tripping time of residual current

I _n (A)	I _n (A)	Max. Breaking times			
		I _n	I _n	I _n	5A,10A,20A,50A,100A,200A,500A
6-63	0.03,0.1,0.3	0.1s	0.08s	0.04s	0.04s



Loadline



Loadline

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