Technical Catalogue

Miniature Circuit Breaker
Residual Current Devices

BTB ELECTRIC

Miniature Circuit Breaker
Residual Current Devices
MA / MO / MR / MS

MCB, RCBO, and RCCB are vital for electrical safety. MCBs protect against overcurrent, while RCBOs offer combined protection from overcurrent and earth leakage. RCCBs focus on preventing shocks and fire hazards caused by leakage currents. Proper selection and maintenance ensure their effectiveness in minimizing risks.

BTB Electric provides reliable MCBs, RCBOs, and RCCBs for diverse applications.

Contents

MA63
MA125
Series

Miniature Circuit Breaker

Application scope

The Miniature Circuit Breaker (MCB) is an automatic electrical switch designed to prevent damage to electrical circuits due to excess current. It trips during overloads or short circuits, safeguarding against electrical faults and equipment failures. Widely used in homes, factories, commercial centers, and other settings, MCBs play a crucial role in ensuring electrical safety and preventing potential hazards.

Applied Standards and Certifications

- IEC/EN 60898-1: Circuit-breakers for overcurrent protection for household and similar installations.
- IEC/EN 60947-2: Low-voltage switchgear and controlgear.

Certified by the DEKRA certification body and featuring the KEMA-KEUR mark, our MA series MCB ensures adherence to quality and safety standards for reliable performance in various applications.

Ambient temperature

- Storage: -30°C ~ +65°C
- Operation: -5°C ~ +55°C

Altitude

Below 2,000m above sea level

Humidity

95%

Salient features

- Miniature circuit breakers feature precisely molded cases and covers made of flame-retardant, high-strength thermoplastic material with a high melting point, low water absorption, and excellent dielectric strength and temperature resistance.
- The switching mechanism is independent, manual, and trip-free, meaning the breaker trips internally even if the operating knob is held in the ON position for enhanced reliability.
- The arc extinguishing device comprises an 11-plate arc chute. When the arc is subjected to the magnetic field and guided by the arc guide, it moves into the arc trough where it is rapidly separated and extinguished. The tripping mechanism is of the thermal magnetic type.

Image and structure

Selection table



Model	MA63E	MA63S	MA125E	MA125S
Reference Standard	IEC/EN 60898-1	IEC/EN 60898-1	IEC/EN 60947-2	IEC/EN 60947-2
No. of Poles	1P, 1PN, 2P, 3P, 3PN, 4P	1P, 1PN, 2P, 3P, 3PN, 4P	1P, 1PN, 2P, 3P, 3PN, 4P	1P, 1PN, 2P, 3P, 3PN, 4P
Rated Current (In)	1, 2, 3, 4, 6, 10, 13, 16, 20, 25, 32, 40, 45, 50, 63 A	1, 2, 3, 4, 6, 10, 13, 16, 20, 25, 32, 40, 45, 50, 63 A	40, 50, 63, 80, 100, 125 A	40, 50, 63, 80, 100, 125 A
Rated Voltage (Ue)	AC 240/415 V	AC 240/415 V	AC 240/415 V	AC 240/415 V
Rated Frequency (F)	50/60 Hz	50/60 Hz	50/60 Hz	50/60 Hz
Breaking capacity	6 kA (Ics=100% Icn)	10 kA (Ics=75% Icn)	6 kA (Ics=100% Icu)	10 kA (Ics=75% Icu)
Magnetic Release Setting	(3-5) In - B Curve (5-10) In - C Curve (10-20) In - D Curve	(3-5) In - B Curve (5-10) In - C Curve (10-20) In - D Curve	Ii = 10In	Ii = 10In
Rated Insulation Voltage (Ui)	500V	500V	690V	690V
Rated Impulse Voltage (Uimp)	4 kV	4 kV	4 kV	4 kV
Dielectric Strength	2000 V	2000 V	1890 V	1890 V
Electrical Endurance	10000	10000	5000	5000
Mechanical Endurance	20000	20000	10000	10000
Energy Limit Class	3	3	-	-
Terminal Capacity (max)	35 mm^2	35 mm^2	50 mm^2	50 mm^2
Tightening Torque	2.5 Nm	2.5 Nm	2.5 Nm	2.5 Nm
Vibration	3 g	3 g	3 g	3 g
Shock Resistance	40 mm free fall	40 mm free fall	40 mm free fall	40 mm free fall
Protection Class	IP20	IP20	IP20	IP20
Positive Contact Indication	Red-ON, Green-OFF	Red-ON, Green-OFF	Red-ON, Green-OFF	Red-ON, Green-OFF
Net Weight/Pole in kg	0.102 kg	0.103 kg	0.152 kg	0.155 kg
Dimensions (H x D x W) / Pole in mm	83.8x69.9x17.8 mm	83.8x69.9x17.8 mm	84.2x69.9x26.8 mm	84.2x69.9x26.8 mm
Mounting	Clip on DIN Rail (35 mm x 7.5 mm)	Clip on DIN Rail (35 mm x 7.5 mm)	Clip on DIN Rail (35 mm x 7.5 mm)	Clip on DIN Rail (35 mm x 7.5 mm)
Installation Position	Vertical / Horizontal	Vertical / Horizontal	Vertical / Horizontal	Vertical / Horizontal
Case & Cover	Molded, flame retardant thermoplastic material	Molded, flame retardant thermoplasticmaterial	Molded, flame retardant thermoplastic material	Molded, flame retardant thermoplastic material
Busbar Connections Top/Bottom Side	Pin / Fork type	Pin / Fork type	Pin / Fork type	Pin / Fork type

Selection table

Model	MA125Eb	MA125Sb	MA125Hb
Reference Standard	IEC/EN 60898-1	IEC/EN 60898-1	IEC/EN 60898-1
No. of Poles	1P, 1PN, 2P, 3P, 3PN, 4P	1P, 1PN, 2P, 3P, 3PN, 4P	1P, 1PN, 2P, 3P, 3PN, 4P
Rated Current (In)	63, 80, 100, 125 A	63, 80, 100, 125 A	63, 80, 100, 125 A
Rated Voltage (Ue)	AC 240/415 V	AC 240/415 V	AC 240/415 V
Rated Frequency (F)	50/60 Hz	50/60 Hz	50/60 Hz
Breaking capacity	Icn = Icn1 = 6kA, Ics = 6 kA	Icn = Icn1 = 10kA, Ics = 7.5kA	Icn = Icn1 = 15kA, Ics = 10kA
Magnetic Release Setting	(3-5) In - B Curve (5-10) In - C Curve (10-20) In - D Curve	(3-5) In - B Curve (5-10) In - C Curve (10-20) In - D Curve	(3-5) In - B Curve (5-10) In - C Curve (10-20) In - D Curve
Rated Insulation Voltage (Ui)	500V	500V	500V
Rated Impulse Voltage (Uimp)	4 kV	4 kV	4 kV
Dielectric Strength	2000 V	2000 V	2000 V
Electrical Endurance	5000	5000	5000
Mechanical Endurance	10000	10000	10000
Energy Limit Class	1	1	3
Terminal Capacity (max)	50 mm^2	50 mm^2	50 mm^2
Tightening Torque	2.5 Nm	2.5 Nm	2.5 Nm
Vibration	3 g	3 g	3 g
Shock Resistance	40 mm free fall	40 mm free fall	40 mm free fall
Protection Class	IP20	IP20	IP20
Positive Contact Indication	Red-ON, Green-OFF	Red-ON, Green-OFF	Red-ON, Green-OFF
Net Weight/Pole in kg	0.195 kg	0.195 kg	0.205 kg
Dimensions (H x D x W) / Pole in mm	89.5 x 76.4 x 26.8 mm	89.5 x 76.4 x 26.8 mm	89.5 x 76.4 x 26.8 mm
Mounting	Clip on DIN Rail (35 mm x 7.5 mm)	Clip on DIN Rail (35 mm x 7.5 mm)	Clip on DIN Rail (35 mm x 7.5 mm)
Installation Position	Vertical / Horizontal	Vertical / Horizontal	Vertical / Horizontal
Case & Cover	Molded, flame retardant thermoplastic material	Molded, flame retardant thermoplasticmaterial	Molded, flame retardant thermoplastic material
Busbar Connections Top/Bottom Side	Pin / Fork type	Pin / Fork type	Pin / Fork type

Characteristics curves

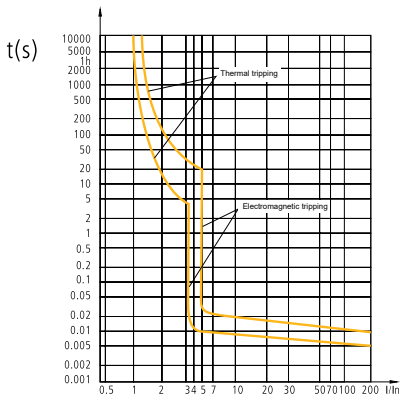
According to IEC/EN 60898-1	Thermal Tripping			Magnetic Tripping		
	No Tripping	Tripping	Time	Hold	Trip	Time
	I1	I2	t	I4	I5	t
B Curve	1.13 x In		≥ 1h	3 x In		≥ 0.1 s
		1.45 x In	< 1h		5 x In	< 0.1 s
C Curve	1.13 x In		≥ 1h	5 x In		≥ 0.1 s
		1.45 x In	< 1h		10 x In	< 0.1 s
D Curver	1.13 x In		≥ 1h	10 x In		≥ 0.1 s
		1.45 x In	< 1h		20 x In	< 0.1 s
I3 = 2.55 x In	1 s < t < 60s for In ≤ 32 A 1 s < t < 120s for In > 32 A					

According to IEC/EN 60947-2	Thermal Tripping			Magnetic Tripping		
	No Tripping	Tripping	Time	Hold	Trip	Time
	I1	I2	t	I4	I5	t
In < 63A	1.05 x In		≥ 1h	8xIn		≥ 0.2s
		1.30 x In	< 1h		12 x In	< 0.2s
In ≥ 63A	1.05xI n		≥ 2h	8xIn		≥ 0.2s
		1.30xI n	< 2h		12 x In	< 0.2s
I3 = 2, 3, 4, 5 x In	According to the operating characteristic curve					

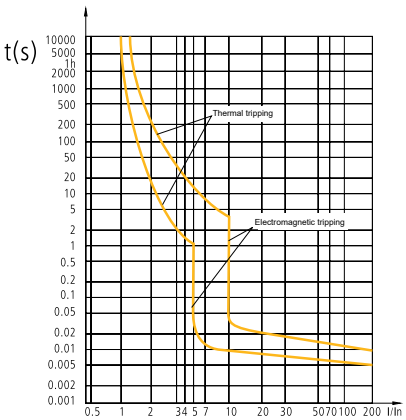
Tripping characteristics

According to IEC/EN 60898-1

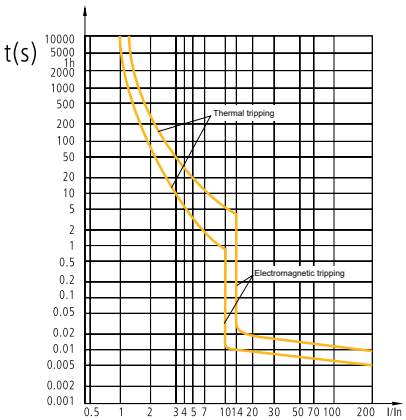
Miniature Circuit Breakers (MCBs) are available in 'B', 'C', and 'D' curve types, each with different tripping characteristics to suit various applications.



'B' Curve: designed for protecting electrical circuits with equipment that does not cause surge current, such as lighting and distribution circuits. The short circuit release is set to (3-5) times the rated current (In)



'C' Curve: intended for protecting electrical circuits with equipment that causes surge current, such as inductive loads and motor circuits. The short circuit release is set to (5-10) times the rated current (In)



'D' Curve: for protection of electrical circuits which causes high inrush current, typically 12-15 times the thermal rated current (transformers, X-ray machines etc.) Short circuit release is set to (10-20)In

According to IEC/EN 60947-2

- Protection range:

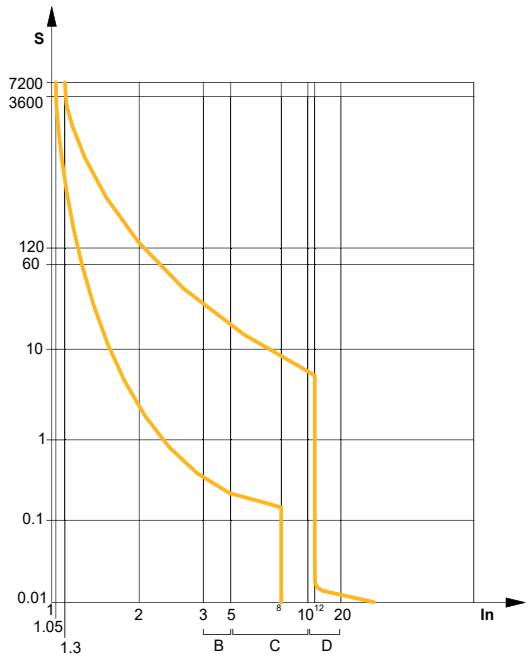
Protection of conventional load and power distribution cable and industrial power distribution system.

- Rated current:

40 ~ 125A

- Tripping characteristic:

- Default instantaneous tripping range 10In (8-12)In
- Also the instantaneous shear range follows B, C, D curves as illustrated by the side line (Option).



Temperature compensation

According to IEC/EN 60898-1

Rated Current (A)	Ambient Temperature (°C)												
	-5°C	0°C	5°C	10°C	15°C	20°C	25°C	30°C	35°C	40°C	45°C	50°C	55°C
1	1.27	1.23	1.9	1.15	1.14	1.08	1.04	1.00	0.96	0.92	0.89	0.85	0.81
2	2.53	2.46	3.8	2.3	2.28	2.15	2.08	2.00	1.92	1.85	1.77	1.7	1.62
3	3.8	3.68	5.7	3.46	3.42	3.23	3.11	3.00	2.89	2.77	2.66	2.54	2.43
4	5.06	4.91	7.6	4.61	4.56	4.3	4.15	4.00	3.85	3.7	3.54	3.39	3.24
6	7.6	7.37	11.4	6.91	6.84	6.46	6.23	6.00	5.77	5.54	5.32	5.09	4.86
10	12.66	12.28	19	11.52	11.4	10.76	10.38	10.00	9.62	9.24	8.86	8.48	8.1
13	16.46	15.96	24.7	14.98	14.82	13.99	13.49	13.00	12.51	12.01	11.52	11.02	10.53
16	20.26	19.65	30.4	18.43	18.24	17.22	16.61	16.00	15.39	14.78	14.18	13.57	12.96
20	25.32	24.56	38	23.04	22.8	21.52	20.76	20.00	19.24	18.48	17.72	16.96	16.2
25	31.65	30.7	47.5	28.8	28.5	26.9	25.95	25.00	24.05	23.1	22.15	21.2	20.25
32	40.51	39.3	60.8	36.86	36.48	34.43	33.22	32.00	30.78	29.57	28.35	27.14	25.92
40	50.64	49.12	76	46.08	45.6	43.04	41.52	40.00	38.48	36.96	35.44	33.92	32.4
45	56.97	55.26	85.5	51.84	51.3	48.42	46.71	45.00	43.29	41.58	39.87	38.16	36.45
50	63.3	61.4	95	57.6	57	53.8	51.9	50.00	48.1	46.2	44.3	42.4	40.5
63	79.76	77.36	119.7	72.82	71.82	67.79	65.39	63.00	60.61	58.21	55.82	53.42	51.03
80	92.32	90.56	88.8	87.04	85.28	83.52	81.76	80.00	78.24	76.48	74.72	72.96	71.2
100	115.4	113.2	111.0	108.8	106.6	104.4	102.2	100.0	97.8	95.6	93.4	91.2	89.0
125	144.3	141.5	138.8	136.0	133.3	130.5	127.8	125.0	122.3	119.5	116.8	114.0	111.3

According to IEC/EN 60947-2

Rated Current (A)	Ambient Temperature (°C) @30°C						Ambient Temperature (°C) @50°C			
	30°C	35°C	40°C	45°C	50°C	55°C	50°C	55°C	60°C	65°C
40	40.00	38.50	37.00	35.00	33.11	31.45	40.00	38.48	36.80	34.90
50	50.00	48.00	45.50	43.50	41.59	39.76	50.00	47.98	45.35	43.35
63	63.00	60.50	57.50	54.50	51.67	49.03	63.00	60.48	57.40	54.40
80	80.00	76.50	73.50	69.60	65.91	62.42	80.00	76.50	73.40	69.45
100	100.00	96.00	91.50	87.00	82.74	78.60	100.00	96.00	91.35	86.80
125	125.00	120.00	114.00	108.80	103.80	99.02	125.00	119.95	113.88	108.72

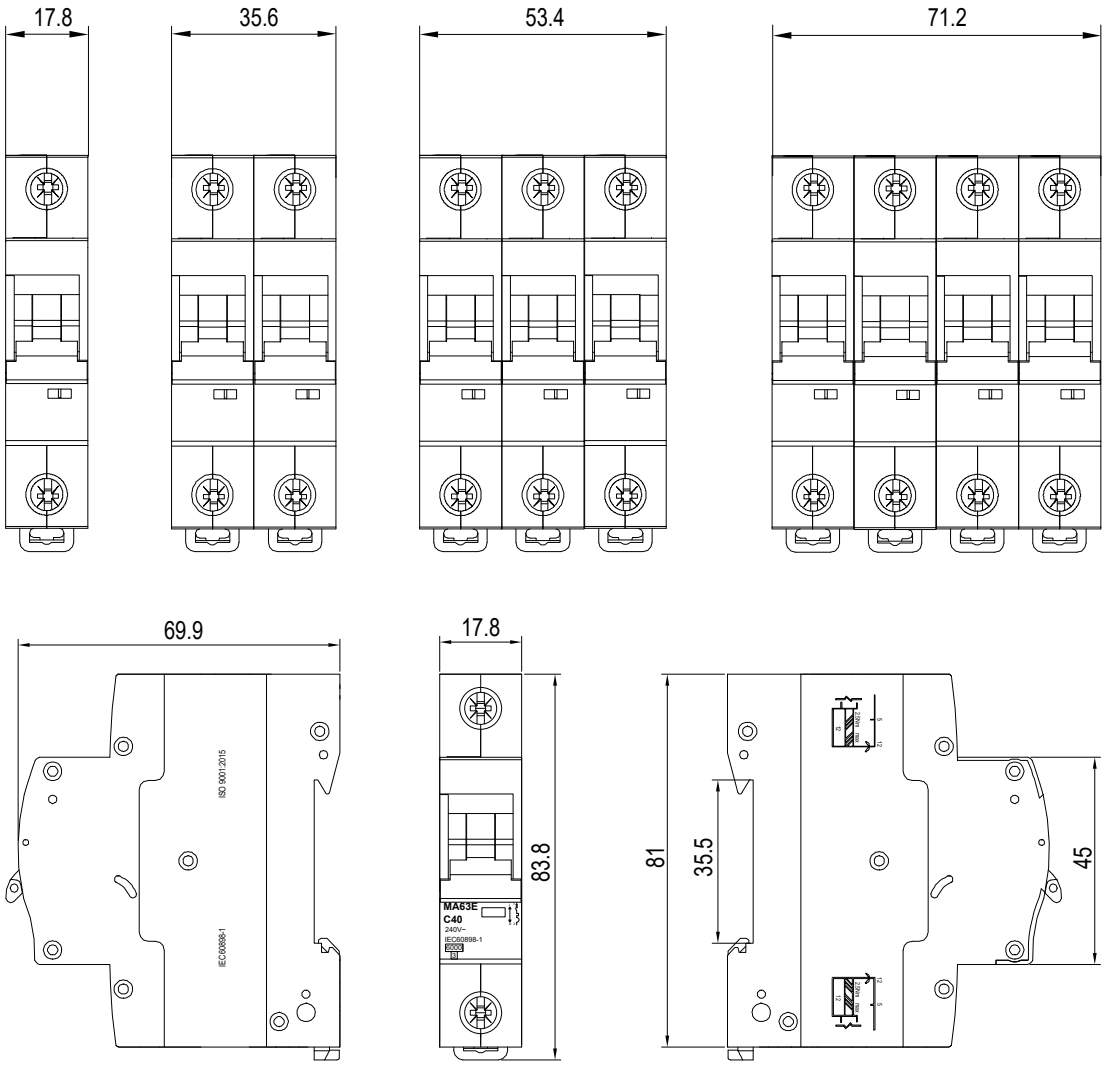
Cold resistance & power loss details

Rated Current In (A)	6	10	16	20	25	32	40	50	63	80	100	125
Cold Resistance (mΩ)	25.1	12	8.2	4.6	3.8	2.6	2.0	1.65	1.4	1.00	0.82	0.68
Power Loss per Pole (W)	1.4	1.6	2.3	2.5	3.1	3.5	3.8	5.0	5.5	7.5	8.5	10.5

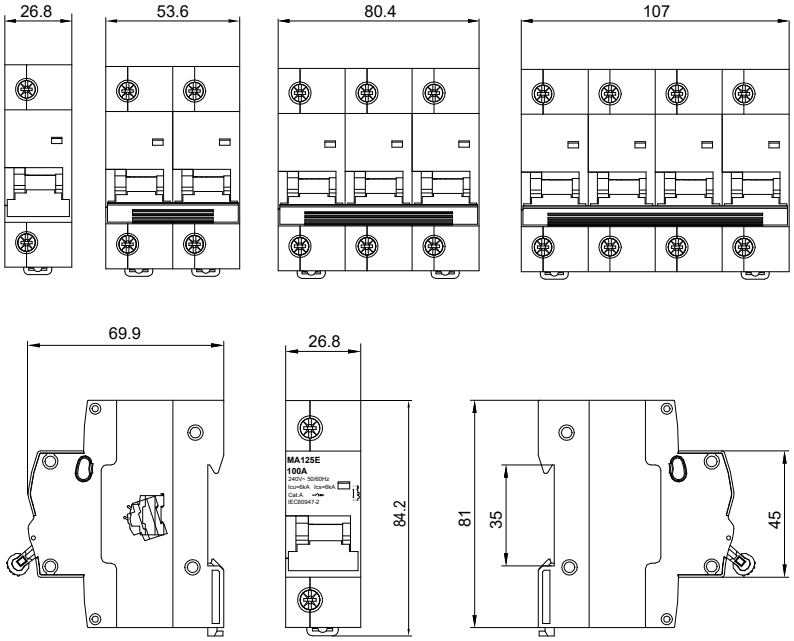
- The power loss value declared at rated current
- Tolerance ±5%

Dimensions (mm)

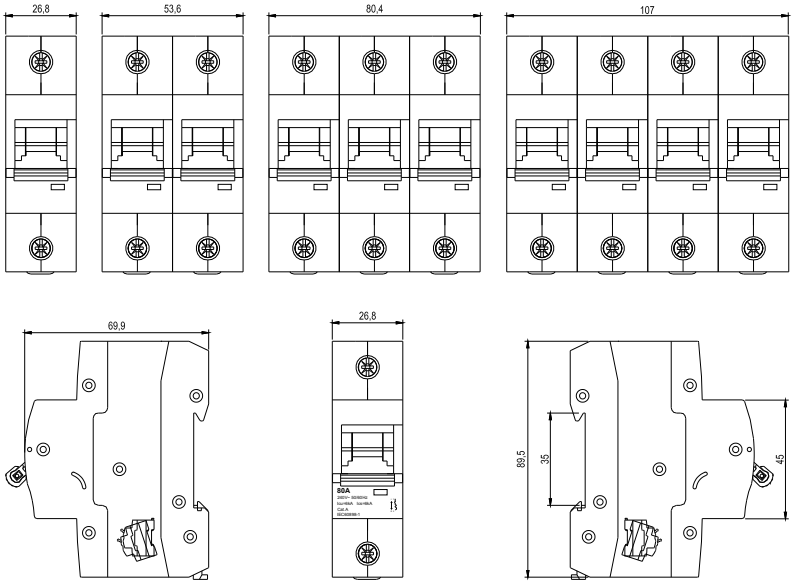
Frame 63



Frame 125 - According to IEC/EN60947-2



Frame 125 - According to IEC/EN60898-1



Ordering guidelines

Model **MA63E2PC40**	**MA**	Type MCB
	63	Frame: **63**, 125
	E	**E**conomy (6kA) Standard (10kA) High capacity (15kA)
	b	The special version adds b, the popular version leaves it blank
	2P	Number of Poles 1P, 1N, **2P**, 3P, 3N, 4P
	C	B Curve (3-5In) **C** Curve (5-10In) D Curve (10-20In) 10In will be blank (IEC60947-2 standard applies)
	40	Rated Current 1, 2…**40**…125A

MR63
MR100
MO32
MO63
Series

Residual Current Circuit Breaker

Residual Current Circuit Breaker with Overcurrent

Application scope

Residual current circuit breaker (RCCB) detects earth leakage in a circuit. It monitors the difference between the current flowing through the phase and neutral wires. When there is an imbalance, it trips to protect against electrical hazards.

RCBO is a step up from a RCCB, providing additional protection. RCBOs trip when overloading or short circuiting occurs, whereas RCCBs do not.

Applied Standards and Certifications

- IEC/EN 61008-1 Residual current operated circuit-breakers without integral overcurrent protection for household and similar use.
- IEC/EN 61009-1 Residual current operated circuit-breakers with integral overcurrent protection for household and similar uses.

Ambient temperature

- Storage: -30°C ~ +65°C
- Operation: -5°C ~ +55°C

Altitude

Below 2,000m above sea level

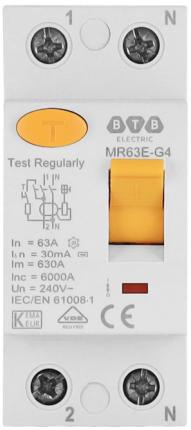
Humidity

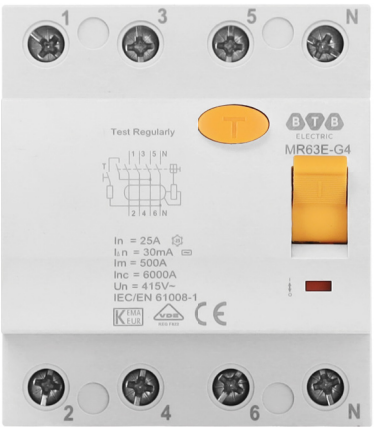
95%

Salient features

- The RCCB works on the current balance principle. The supply conductors, i.e. the phases and the neutral, are passed through a toroid and form the primary windings of a current transformer. Its secondary winding is connected to a highly sensitive electromagnetic trip relay, which operates the trip mechanism.
- In a normal circuit, sum of the currents in phases, is equal to the current in the neutral and the vector sum of all currents is equal to zero. If there is any insulation fault in the current and leakage current flows to earth, the currents do not balance and their vector sum is not equal to zero. This imbalance is detected by the core balanced current transformer, and the RCCB is tripped and supply to load is interrupted. The trip mechanism is operated at a residual current between 50-100 % of its rated tripping current.
- An RCBO combines the protections provided by an MCB and an RCCB.

Image and structure



Selection table

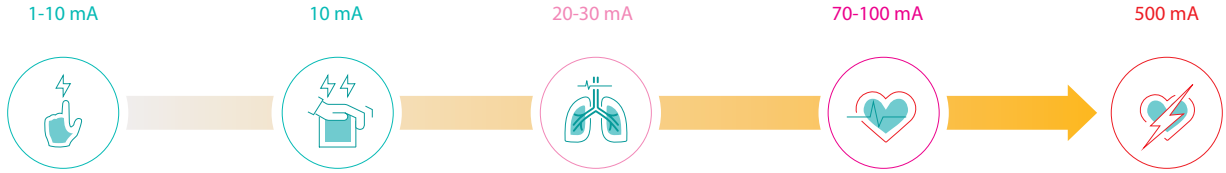
Model	MR63 / MR100	MO32 / MO63
Reference Standard	IEC/EN 61008-1	IEC/EN 61009-1
No. of Poles	1PN (2P), 3PN (4P)	1PN
Rated Current (In)	16, 20, 25, 32, 40, 50, 63, 80, 100 A	6, 10 16, 20, 25, 32, 40, 63 A
Rated Voltage (Ue)	AC 240/415 V	AC 240 V
Rated Frequency (f)	50/60 Hz	50/60 Hz
Rated Conditional Short Circuit Current	6kA, 10 kA (Inc)	6 kA (Ics=100%Icn)
Rated Residual Operating Current (IΔc)	30 mA, 100 mA, 300 mA	10 mA, 30 mA, 100 mA, 300 mA
Type of trip	Electro-magnetic release	Electronic & Thermal-magnetic
Magnetic Release Setting	-	(3-5) In - B Curve (5-10) In - C Curve
Trip Time at IΔc	≤ 100 ms	≤ 100 ms
Detactuin of Wave Form	AC, A	AC, A
Rated Insulation Voltage (UI)	500 V	500 V
Rated Impuls e Voltage (Uimp)	4 kV	4 kV
Electrical Endurance	10000	10000
Mechanical Endurance	20000	20000
Terminal Capacity (max)	35 mm^2	16 / 25 mm^2
Tightening Torque	2.5Nm	1.2Nm
Vibration	3 g	3 g
Shock Resistance	40 mm free fall	40 mm free fall
Protection Class	IP20	IP20
Positive Contactindication	Red-ON, Green-OFF	Red-ON, Green-OFF
Net Weight	0.216 kg for 1PN 0.330 kg for 3PN	0.125 kg for MO32 0.205 kg for MO63
Dimensions (H x D x W)/Pole in mm	84.5 x 74.5 x 35.5 mm for 1PN 84.5 x 74.5 x 71 mm for 3PN	83.8 x 72.6 x 17.8 mm for MO32 84.3 x 72.6 x 35.6 mm for MO63
Mounting	Clip on DIN Rail (35 mm x 7.5 mm)	Clip on DIN Rail (35 mm x 7.5 mm)
Installation Position	Vertical / Horizontal	Vertical / Horizontal
Case & Cover	Molded, flame retardant thermoplastic material	Molded, flame retardant thermoplastic material
Busbar Connections	Pin / Fork type	Pin / Fork type

Standard use environment

The use of exposed, substandard, badly wired, wrongly connected or damaged equipment as well as frayed or badly repaired cables reduces the safety of an installation and increases the risk of person receiving an electric shock. RCCBs are electrical devices which afford a very high degree of protection against the risks of electrocution and fire caused by earth faults.

Protection Against Electrocution

Electrocution is a passage of current through human body, which is dangerous. The flow of current through human body affects vital functions of breathing & heartbeat. Effect of electric current through human body has been well researched and following chart summarizes the results:



1-10 mA	10 mA	20-30 mA	70-100 mA	500 mA
Prickling sensations	Muscle contraction: the person remains “stuck” to the conductor	Muscle contraction can cause respiratory paralysis	Cardiac fibrillation; the heart begins to vibrate and no longer beats at a steady rate. This situation is dangerous since it is irreversible	Immediate cardiac arrest resulting in death

Absolutely, electrocution risks are not solely determined by the current but also by the contact voltage. When a person touches an object with a different electrical potential, it can result in current flowing through the body. Human bodies have defined limits for safe voltage exposure:

- Under normal dry conditions, the safe voltage limit is 50 V.
- In damp environments, where conductivity increases, the safe voltage limit reduces to 25 V.

By employing a correctly selected Residual Current Circuit Breaker (RCCB), the risk of electrocution can be mitigated. RCCBs are designed to detect even small currents flowing to the earth, thereby swiftly interrupting the circuit and reducing the likelihood of electrocution, particularly in situations where there is a difference in electrical potential between objects.

Protection Against Indirect Contact

Absolutely, MCBs are primarily designed to protect against overcurrents caused by overload or short circuits and may not respond promptly to small earth leakage currents. To ensure compliance with wiring regulations and enhance safety measures, the earth fault loop impedance, measured in ohms, multiplied by the rated tripping current of the RCCB in amperes should not exceed 50. This requirement ensures that the RCCB can effectively detect and respond to earth faults, providing an additional layer of protection against electrical hazards such as electrocution and fire.

Example

That’s correct. For an RCCB with a rated tripping current of 30 mA, the maximum permissible earth fault loop impedance can be calculated using the formula:

$$Zs(max) = \frac{50}{In} = \frac{50}{0.03} = 1.666$$

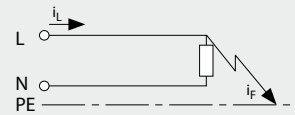
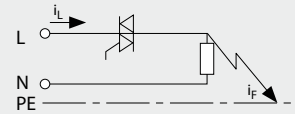
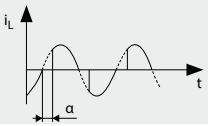
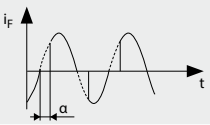
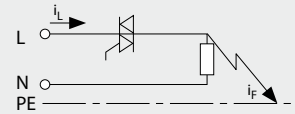
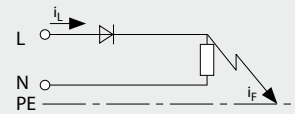
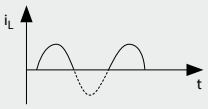
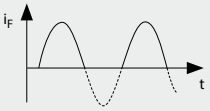
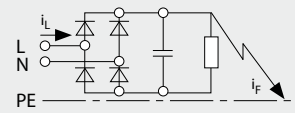
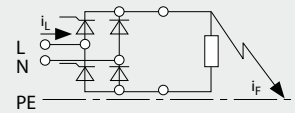
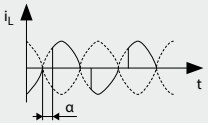
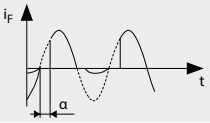
So, the maximum permissible earth fault loop impedance $Zs(max)$ would be 1,666 ohms. This calculation ensures that the RCCB can effectively detect and respond to earth faults within the specified safety parameters.

Protection Against Fire

That's a crucial point to emphasize. Faulty wiring can lead to fires, and oftentimes, the current flowing to earth is the culprit. Even a small fault current, less than 1 amp, can be enough to start a fire. Traditional overload protective devices like fuses or MCBs may not detect such low currents effectively. However, a properly selected RCCB can detect these fault currents and swiftly interrupt the power supply, significantly reducing the risk of fire initiation.

Rated Tripping Current of the RCCB	Maximum Permissible Earth Fault Loop Impedance in
10 mA	5,000
30 mA	1,666
100 mA	500
300 mA	166

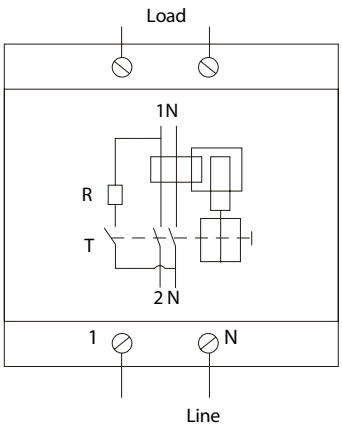
Selection of RCCB type

Type			Circuit	Load Current	Residual Current
A	AC	1			
		2			
		3			
		4			
		5			
		6			

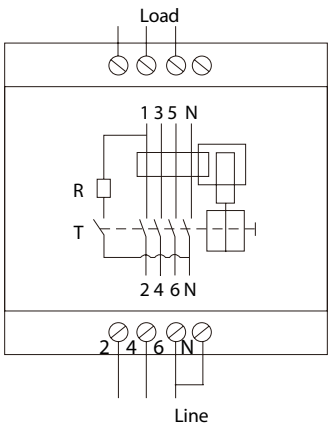
Device is suitable for electronic equipment with input current circuits 1 to 6 in below table

Wiring diagram

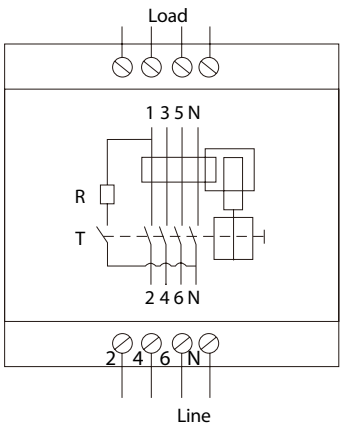
For Single Phase - 2 Wire



For Three Phase - 3 Wire



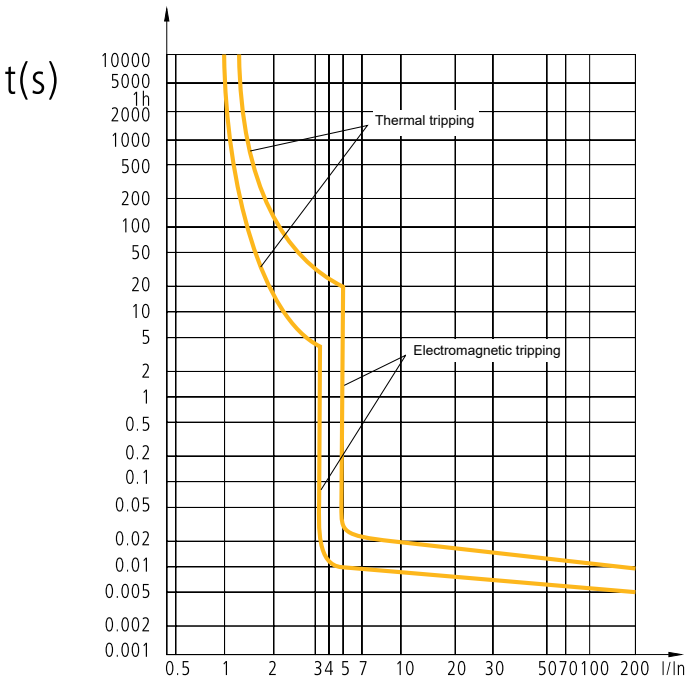
For Three Phase - 4 Wire



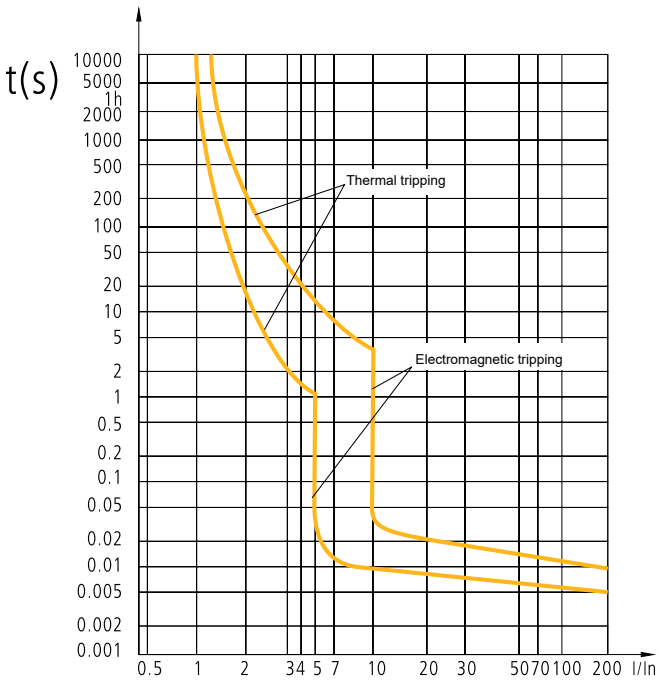
Breaking time of residual current

In(A)	IΔc (A)	Max. breaking time			
		IΔc	2IΔc	5IΔc	5A, 10A, 50A, 100A
6, 10, 16, 20, 25, 32, 40, 50, 63, 80, 100A	0.01, 0.03, 0.1, 0.3	100ms	80ms	40ms	40ms

Tripping characteristics for RCBO



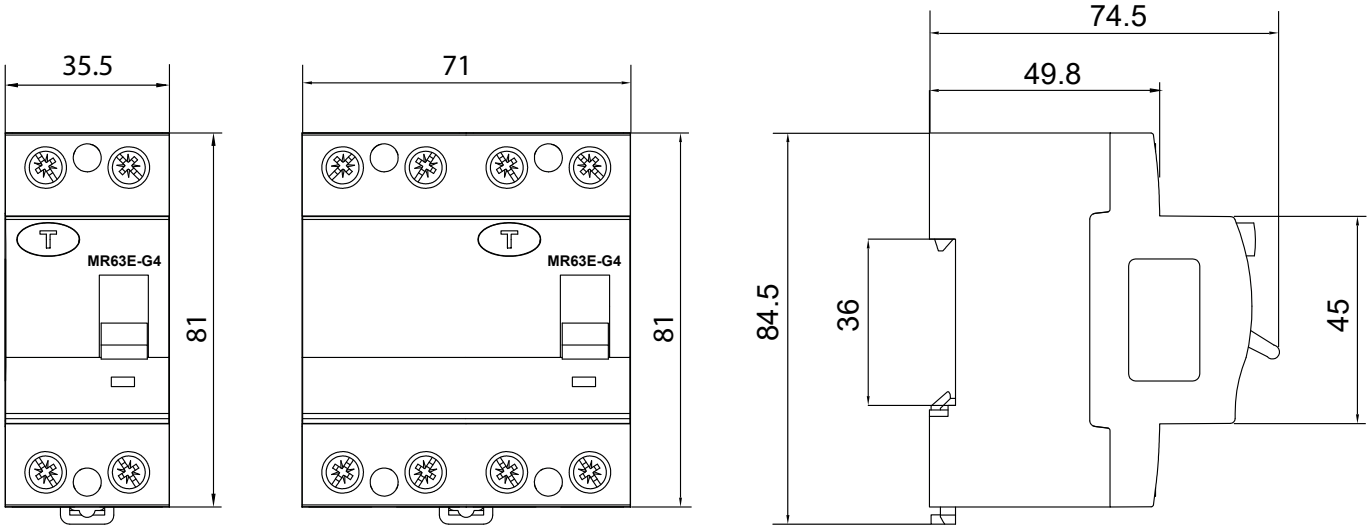
'B' Curve: for protection of electrical circuits with equipment that does not cause surge current (such as lighting and distribution circuits). Short circuit release is set to (3-5) times the rated current (In)



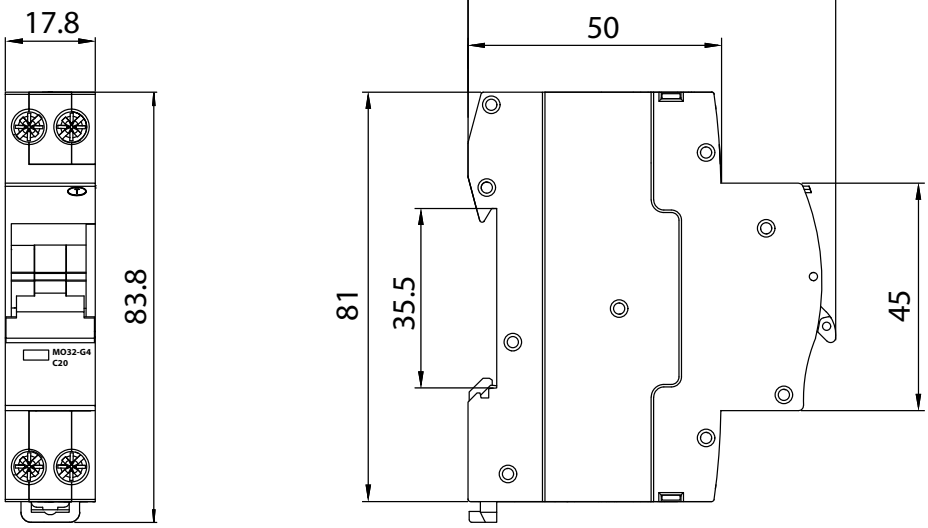
'C' Curve: for protection of electrical circuits with equipment that causes surge current, such as inductive loads and motor circuits. Short circuit release is set to (5-10) times the rated current (In)

Dimensions (mm)

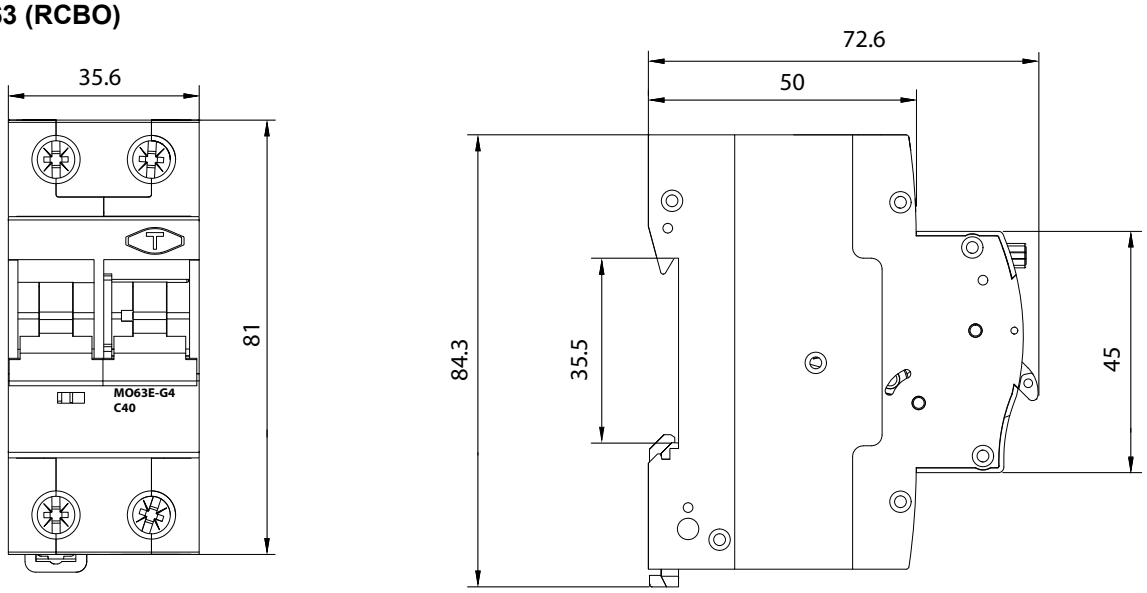
For MR (RCCB)



For MO32 (RCBO)



For MO63 (RCBO)



Ordering guidelines

Model **MO63EG41PN40ACB**	**MO**	MR type RCCB **MO** type RCBO
	63	Frane: 32, **63**, 80
	E	**E**conomy 6kA Standard 10kA
	G4	**G4** - 30mA G6 - 100mA G7 - 300mA
	1PN	Number of Poles **1PN**, 3PN
	40	Rated Current 16…**40**…80A
	AC	**AC** type A type
	B	**B** Curve B (3-5In) C Curve C (5-10In)

MS50E
MO50E
Series

Safety Breaker
Earth Leakage Breaker

Application scope

The **Safety Breaker** is commonly used in residential, commercial, and industrial settings to protect against overloads and short circuits, ensuring safety for both people and equipment. The **Earth Leakage Breaker (ELB)** is primarily applied in homes and buildings to prevent electric shocks from leakage currents, particularly in high-risk areas such as bathrooms and kitchens.

Applied Standards and Certifications

- The Safety Breaker is manufactured in accordance with IEC 60898-1 standards.
- The Earth Leakage Breaker is manufactured in accordance with IEC 61009 standards.

CB CE

Ambient temperature

- Storage: -30°C ~ +65°C
- Operation: -5°C ~ +55°C

Altitude

Below 2,000m above sea level

Humidity

95%

Salient features

- The **Safety Breaker** is a critical device designed to automatically disconnect electrical circuits during overloads, short circuits, or leakage currents, providing essential protection for both people and equipment. It features advanced protections against overloads and short circuits. This device helps maintain a stable power supply, prevents electrical fires and explosions, and ensures the safety of the entire electrical system.
- The **Earth Leakage Breaker (ELB)** is designed to detect and automatically disconnect electrical circuits when leakage currents to the ground are detected, protecting users from electric shocks. It offers key features such as leakage current detection, automatic circuit disconnection, and overload protection in some models. ELB prevents electrical fires, protects electrical devices, and ensures overall system safety by quickly responding to potential hazards

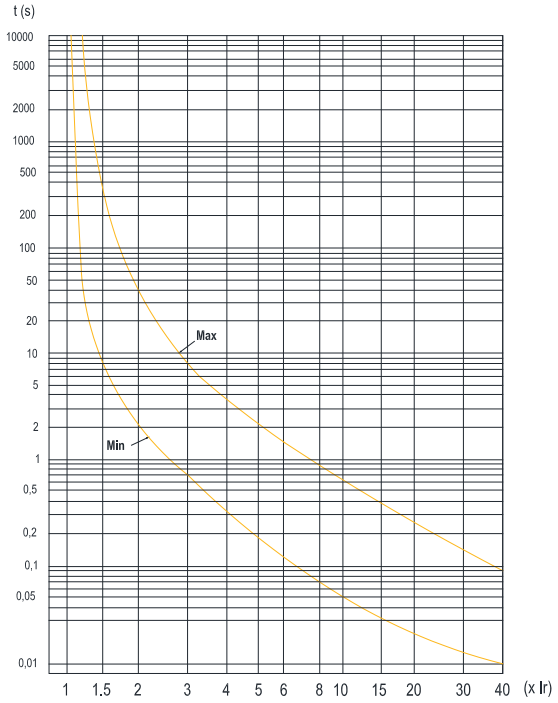
Image and structure

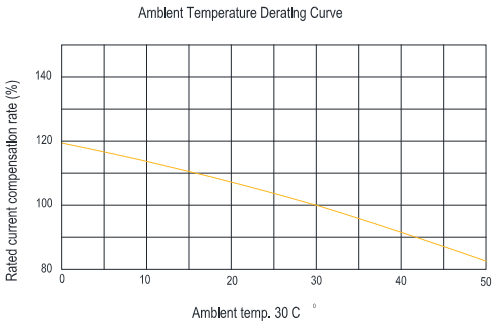
Selection table

Model	MS50E	MO50E
Reference Standard	IEC/EN 60898-1	IEC/EN 61009-1
No. of Poles	2P (2P1E)	1PN (2P2E)
Rated Current (In)	10, 15, 20, 32, 40, 50 A	10, 15, 20, 32, 40 A
Rated Voltage (Ue)	AC 240 V	AC 240 V
Rated Frequency (f)	50/60 Hz	50/60 Hz
Breaking capacity	1.5 kA (Icn=Ics)	1.5 kA (Icn=Ics)
Leakage type	-	Type AC
Rated Residual Operating Current (IΔc)	-	30 mA
Trip Time at IΔc	-	≤ 100 ms
Type of trip	Thermal Protection	Electronic & Thermal Protection
Rated Insulation Voltage (Ui)	500 V	500 V
Rated Impuls e Voltage (Uimp)	4 kV	4 kV
Dielectric Strength	1.5 kV	1.5 kV
Electrical Endurance	4000	4000
Mechanical Endurance	10000	10000
Terminal Capacity (max)	16 mm^2	16 mm^2
Tightening Torque	1.2Nm	1.2Nm
Shock Resistance	40 mm free fall	40 mm free fall
Protection Class	IP20	IP20
Net Weight	0.105 kg	0.123 kg
Dimensions (H x D x W)/Pole in mm	70 x 52 x 32 mm	70 x 52 x 32 mm
Mounting	Install on flat surface	Install on flat surface
Installation Position	Vertical/Horizontal	Vertical/Horizontal
Case & Cover	Molded, ame-retardant thermoplastic material	Molded, ame-retardant thermoplastic material
Busbar Connections	Pin/Fork type	Pin/Fork type

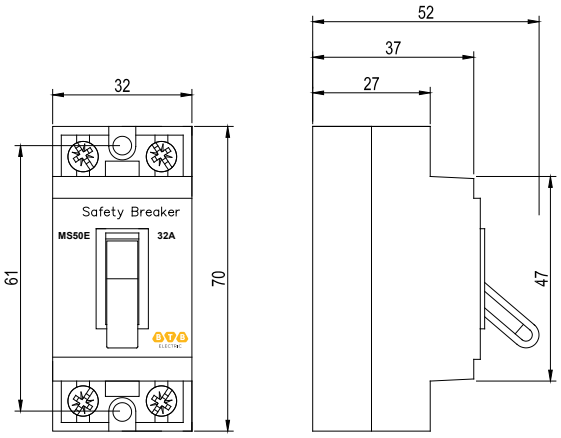
Tripping characteristics

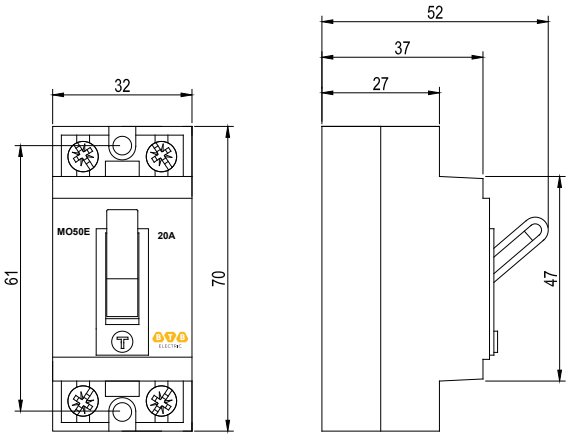
According to IEC/EN 60898-1





Dimensions (mm)





Ordering guidelines

Model **MS50E1PN20**	**MO**	MS type Safety Breaker **MO** type Earth Leakage Breaker
	50	Frame: **50**
	E	**E**conomy 1.5kA Standard 2.5kA
	1PN	Number of Poles **1PN**, 2P
	20	Rated Current 10, 15, **20**, 32, 40A

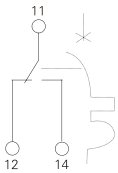
AUX
SHT
ALT
UVT
Series

Circuit Breaker Accessory

Technical data

Standard	IEC/EN 62019
Rated insulation voltage U	500V
Rated voltage	AC 230V
Rated frequency (Hz)	50/60Hz
Utilization category	AC14, AC15
Ambient temperature (°C)	-5~+40, max 95%humidity
Electric endurance	4000
Mechanical endurance	10000 2000V/1min
Dielectric strength	2000V/1min
Protection degree	IP20

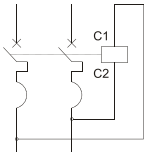
Auxiliary contact



- Mounted on the left side of the MCB and RCBO, the indicator displays the status of “ON” or “OFF”, providing visual feedback for both the MCB and RCBO.
- Terminal Connection Height: 8.8mm
- Breaking capacity: 6A at 230VAC; 6A at 400V

Frame	Contact	Model
63	1NO1NC	AUX11MA63
125	1NO1NC	AUX11MA125

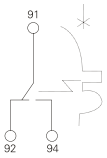
Shunt trip



- Operating voltage: 230VAC or 400VAC
- Operate voltage range: 70-110% Us
- Mounted on the left side of MCB/RCBO, used to trip the combined MCB/RCBO via remote control device.
- Terminal Connection Height: 19mm

Frame	Model	
	AC230V	AC400V
63	SHTP7MA63	SHTV7MA63
125	SHTP7MA125	SHTV7MA125

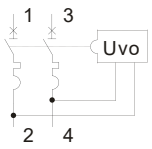
Alarm switch



- Used to connect ON/OFF auxiliary contact, functioning as a circuit breaker ON/OFF indicator in case of a fault (tripping)
- Terminal Connection Height: 8.8mm
- Breaking capacity: 6A at 230VAC; 6A at 400V

Frame	Contact	Model
63	1NO1NC	ALT11MA63
125	1NO1NC	ALT11MA125

MN Over-voltage / Under-voltage trip



- Operating voltage: 230VAC
- Over-voltage tripping range: 280V ±5%
- Under-voltage tripping range: 170V ±5%.
- Mounted on the left side of the circuit breaker, it activates the combined device to trip in case of under-voltage or over-voltage, effectively preventing the device from closing operation under abnormal power voltage conditions.
- Terminal Connection Height: 19mm

Frame	Model
63	UVTP7MA63
125	UVTP7MA125

Storage

Ambient temperature: -20~60°C

Altitude: Below 1,000 m above sea level

Relative humidity: Within 45% ~ 85%

The surrounding environment may affect the insulation function and endurance of the molded case and earth leakage circuit breakers, so it's essential to accurately check the environmental conditions before application.

Do not store in places with corrosive gas. Avoid leaving it around gases containing sulfur, ammonia, or other corrosive substances.

Avoid storing the circuit breaker in areas with high humidity for extended periods.

Do not leave it exposed to direct sunlight for extended periods of time.

Avoid storing the circuit breaker in dusty environments. Use a cover or packaging material to prevent dust accumulation on the circuit breaker.

Avoid storing the circuit breaker in areas with high or low temperatures. The storage temperature should be maintained between -30°C and +65°C.

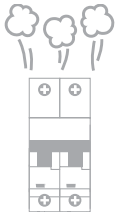
Handling and Maintenance Inspection

Installation

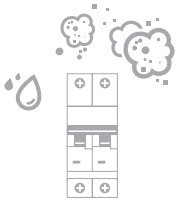
Installation Precautions

Install the circuit breaker in a place that satisfies the following environmental conditions. Installing the circuit breaker in places and environment other than the following may cause malfunction of circuit breaker, fire and others.

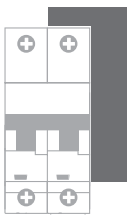
- Ambient temperature ranging from -5°C to +55°C (with a 24-hour average temperature not exceeding 45°C).
- Relative humidity should be maintained between 45% and 95%.
- Excessive vibration or impact should be avoided.
- Altitude to be below 2,000 m
- To be used in an environment without excessive water vapor, oil vapor, smoke, dust, alkaline, corrosive materials, and other contaminants.
- To avoid direct exposure to sunlight.



The arc gas exhaust hole must not be blocked, as it may reduce the breaking capacity

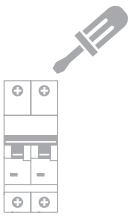


Attention should be paid to dust, metal fragments, and other debris. After installation, ensure that protection covers are covered during work.



The insulation plate attached to the bottom of the circuit breaker must not be separated, as it may compromise insulation and reduce insulation performance.

Connection Precautions



When fastening the terminal screw, it should be tightened according to the specified torque. Incomplete tightening of the terminal screw may cause overheating, so each terminal screw must be fully tightened according to the specified torque to prevent damage to the terminal screw and the circuit breaker case.

Exposed conductors must be insulated. Insulating tubes or insulating tape must be used to ensure complete insulation between the bare conductors of the MCCB. Failure to insulate the terminals may result in secondary short-circuits during short-circuit accidents.

In the case of a 4-pole circuit breaker, the neutral wire of a 3-phase 4-wire system must be connected to the N phase. Failure to do so may result in improper function during overcurrent situations, potentially leading to fire hazards.

The use of lubricant at the terminal screw part is prohibited. Lubricant reduces the friction of the screw, causing it to loosen over time, which can result in an increase in temperature and potential hazards.

The stud must not be deformed during wiring. Excessive force should not be applied to the stud at the conductor connecting part of the rear connection type..

The conductor must be firmly fixed in a flat state. For connecting conductors, the electromagnetic force generated by extremely high fault currents requires secure fixing.

Maintenance inspection

Initial Inspection

- Ensure no residues of steel plate, wire grinded materials, or other conductor foreign substances are left around the circuit breaker terminal.
- Inspect the cover and base for cracks or damage.
- Verify the tightness of the terminal fastening part.
- Confirm the rated voltage and breaking capacity of the circuit breaker.
- Measure the insulation resistance with a 500V insulation-resistance tester; it should be above 5 MΩ.

Withstand voltage

Main Circuit		Auxiliary Circuit or Control Circuit	
Rated Insulation Voltage	Test Voltage (Effective Value of Interchange)	Rated Insulation Voltage of Operational Circuit	Test Voltage (Effective Value of Interchange)
Ui 300 V	2,000 V for 1 min	Uis 60 V	1,000 V for 1 min
300 < Ui 600 V	2,500 V for 1 min	60 V < Uis 600 V	2-Uis 1,000 V (min. 1,500 V) for 1 min

Regular Inspection

Inspections should be conducted one month before or after the commencement of equipment operation to maintain circuit breaker performance and prevent unexpected accidents. Following this, regular inspections are required based on the environmental conditions.

Standard inspection period

Extent	Environment	Standard of Inspection Period
Standard Usage State	Clean and dry air environment	Within 10 years after installation: Once every 2-3 years
		More than 10 years after installation: Once a year
		More than 15 years after installation: Once every 6 months
	Locations without corrosive gases, even if dust is present	Within 10 years after installation: Once a year
		More than 10 years after installation: Once every 6 months
		More than 15 years after installation: Once a month
Bad Environment	Areas free from sulfurous acid, hydrogen sulfide, salinity, vapor, and similar contaminants	Within 5 years after installation: Once every 6 months
		More than 5 years after installation: Once a year
	Environments with particularly high levels of corrosive gases	Once a month

BTB ELECTRIC

REALVALUE FORLIFE

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