RESIDUAL CURRENT CIRCUIT BREAKER (16 A-63 A)

The flow of current through electrical facilities always involves risks. Poorly insulated equipment, faulty wires and incorrect use of an electrical device can cause current to flow through the wrong path (i.e. through the insulation/human body) to the earth.

RCCB (also popularly known as ELCB) is a mechanical switching device designed to make, carry and break currents under normal service conditions and to cause the opening of the contacts when the leakage current attains a given value under specified conditions. Havells offers a wide range of RCCBs for protecting human life against fatal electric shocks as well as for providing protection against fire caused by earth faults.

Features

- Type AC and Type A RCCB
- Simple and Robust operating mechanism
- Rotary handle with ON/OFF indication in FP
- Dual termination for Bus Bar as well as cable connection
- Advance Neutral
- Test button for regular inspection
- Conditional Short-circuit current capacity 10 kA
- ISI and CE marking. RoHS Complaint, 'Green Product'

Range

16 A - 63 A

Sensitivity

30 mA, 100 mA & 300 mA

Execution

Double Pole (2P)
Four Pole (4P)

Specification

IS 12640 Part 1/ IEC 61008-1 /EN 61008 - 1

Safety Terminals

To avoid improper cable termination, the safety terminals guide the cable towards the cage terminal for systematic termination

Large Cable Terminals

Suitable for copper and aluminum cables, these terminals are compatible with cables upto 35 mm^2 cross section area

Bi Stable Clip

Every device is provided with a dual position DIN rail clip, so it becomes much easier to change a device from a device bank connected to a bus-bar, without disturbing the existing wiring

Cooler Operation

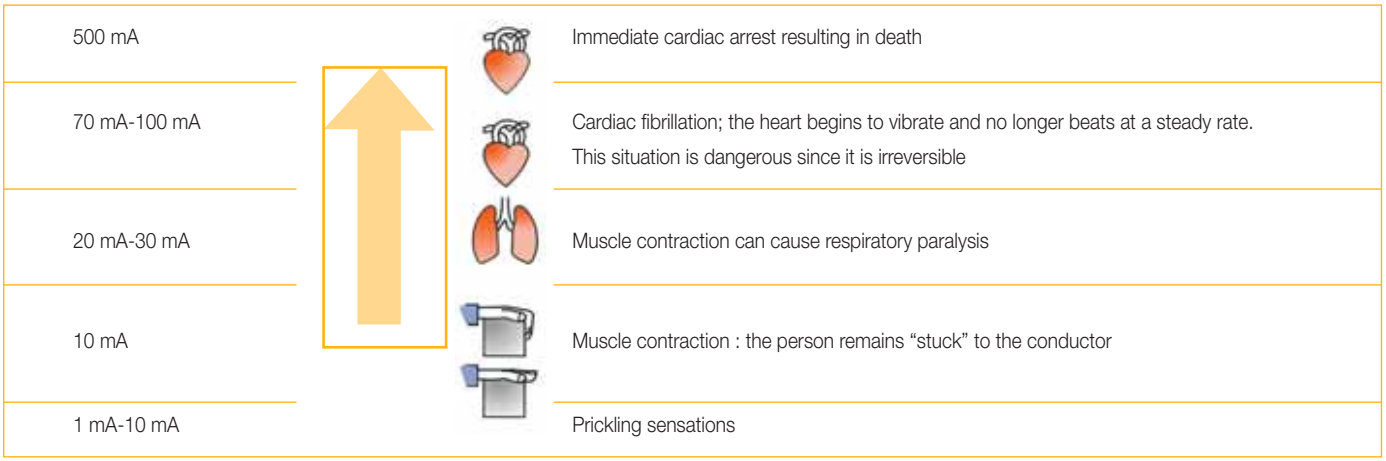
Grooves provided on outer body, so that when individual poles are placed adjacent to each other in a distribution board it forms a very effective channel for better air circulation, resulting into a cooler operation

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:



However, electrocution should not be viewed in terms of "current" alone, but in terms of "contact voltage". A person gets electrocuted by coming in contact with an object that has a different potential from his/her own. The difference in potential causes the current to flow through the body.

The human body has known limits:

- Under normal dry conditions, voltage limit = 50 V
- In damp surroundings, voltage limit = 25 V

A correctly chosen RCCB can detect small currents flowing to earth and reduces the risk of electrocution.

Protection Against Indirect Contact

Over current protection devices like MCB are unable to act promptly on small earth leakage currents. To comply with wiring regulations, the earth fault loop impedance in Ohms, multiplied by the rated tripping current of the RCD in amperes must not exceed 50.

Example

For an RCD with a rated tripping current of 30 mA, the maximum permissible earth fault loop impedance is calculated as follows: Zs (max) = 50 / IΔn = 50/0.03 = 1,666 Ω

Protection Against Fire

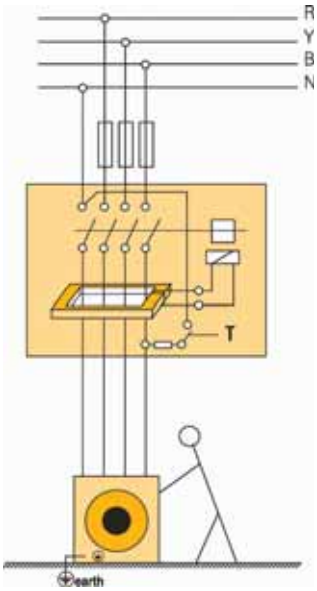
The majority of fires which occur as a result of faulty wiring are started by current flowing to earth. Fire can be started by fault current of less than 1 ampere. The normal domestic overload protective device such as a fuse or MCB will not detect such a small current. A correctly chosen RCD will detect this fault current and interrupt the supply, hence, reducing the risk of a fire starting.

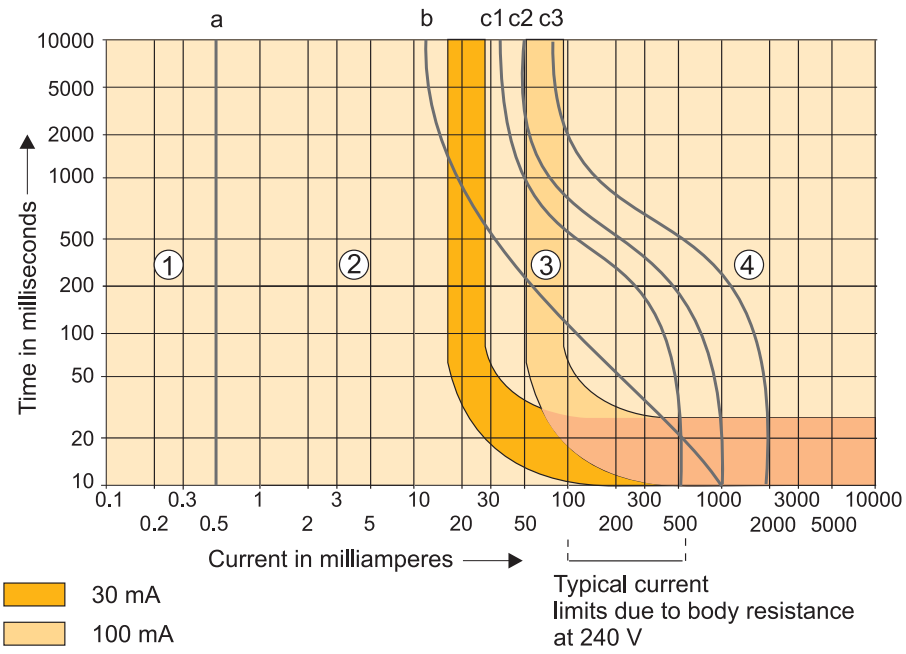
Rated Tripping Current of the RCD (IΔn)	Maximum permissible earth fault loop impedance (Ohms)
10 mA	5,000 Ω
30 mA	1,666 Ω
100 mA	500 Ω
300 mA	166 Ω

Working Principle

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 healthy 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, 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.





Zone	Physiological Effects
Zone 1	Usually no reactions
Zone 2	Usually no harmful physiological effects
Zone 3	Usually no organic damage to be expected. Likelihood of muscular contraction and difficulty in breathing, reversible disturbances of formation and conduction of impulse in the heart and transient cardiac arrest without ventricular fibrillation increases with current magnitude and time.
Zone 4	In addition to the effects of Zone 3, probability if ventricular fibrillation increased upto 5% (curve C_2) upto 50% (curve C_3) and above 50% beyond curve C_3. It increases with magnitude and time, and pathophysiological effects such as cardiac arrest, breathing arrest and heavy burns may occur.

Sensitivity Selection

• 30 mA

A 30 mA RCCB will provide a high degree of protection against electrocution in an accidental shock hazard situation. The current flowing through human body could be between 80 mA and 240 mA depending on the resistance of the human body and the voltage across it.

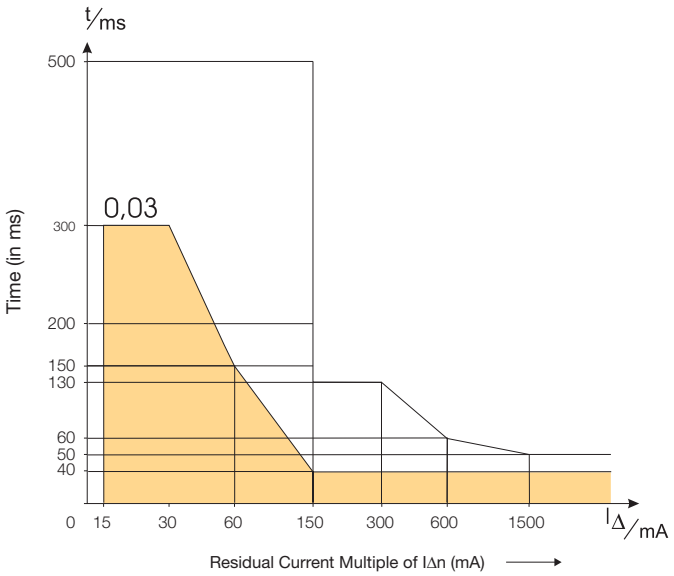
To be within zone of the IEC curve, It is necessary for the RCCB to operate within 50 ms at 240 mA and 150 ms at 80 mA. Both these conditions are satisfied by 30 mA RCCB.

For households, individual outlets, wet areas and temporary installations, RCCB with sensitivity not exceeding 30 mA is advisable.

• 100 mA

A 100 mA RCCB will normally give high degree of protection against electrocution but there is a possibility that the shock current could fall below the tripping level of RCCB. This could occur if additional resistances to that of human body are included in the earth path.

Actuation Time Characteristics



The 100 mA RCCB protects against leakage currents and indirect contact with earth loop impedance up to 500 Ohm.

• 300/500 mA

A 300/500 mA RCCB may be used where only fire protection is required. e.g., on lighting circuits, where the risk of electric shock is small. 300/500 mA RCCB will not give any protection against electrocution.

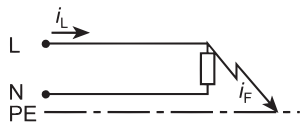
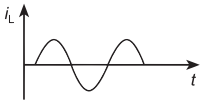
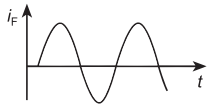
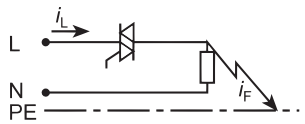
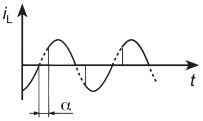
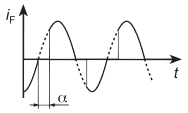
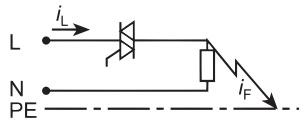
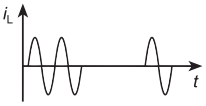
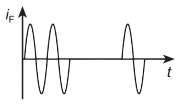
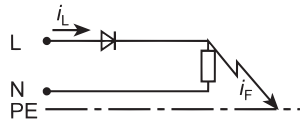
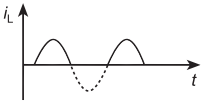
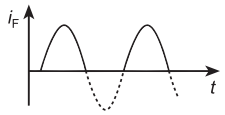
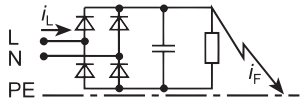
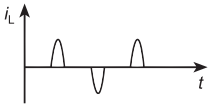
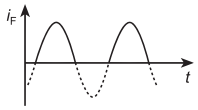
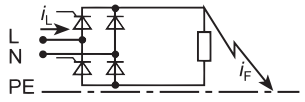
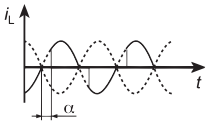
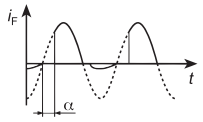
Selection of RCCB Type

RCCB Type AC

AC Type RCCB are used for residual sinusoidal alternating current.

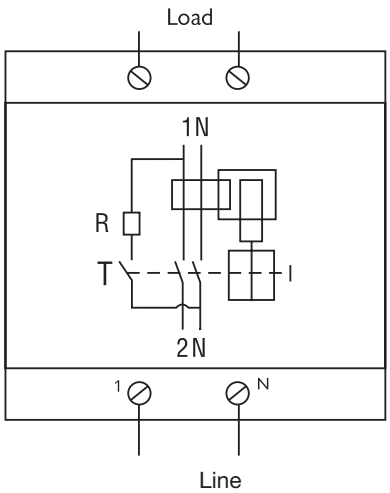
RCCB Type A

A Type RCCB is used for residual sinusoidal alternating currents and residual pulsating direct currents, whether suddenly applied or slowly rising. It can therefore handle the residual current waveforms which can occur in the power supply units of single-phase loads with electronic components (e.g. ECG, dimmer switches). This type of residual current protective device is suitable for electronic equipment with input current circuits 1 to 6 in table 1.

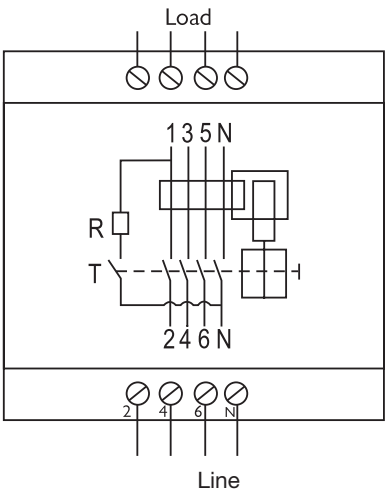
Suitable RCD-Type			Circuit	Load Current	Residual Current
A	AC	1			
		2			
		3			
		4			
		5			
		6			

Wiring Diagram

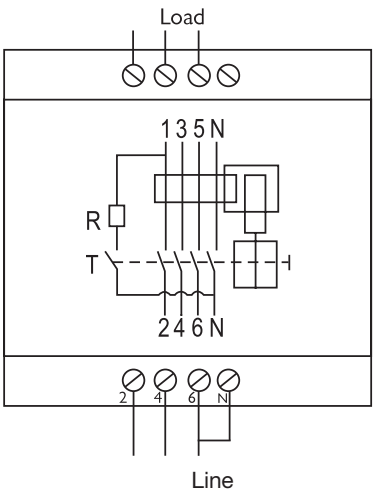
For Single Phase - 2 Wire



For Three Phase - 4 Wire



For Three Phase - 3 Wire

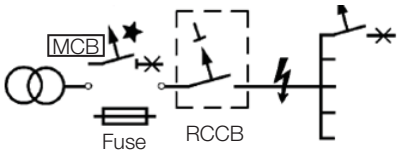


The Havells range of four pole RCCBs can be used to provide residual current protection in 3 phase, 3 wire circuits (no neutral), however a link from the neutral to an incoming should be made on the supply side of the RCCB, to enable the operation of the RCCB.

Technical Specifications	DP	FP
Standard	IS 12640 Part 1/IEC 61008-1/EN 61008-1	IS 12640 Part 1/IEC 61008-1/EN 61008-1
Type	A, AC	A, AC
Rated Current (In)	16 A, 25 A, 32 A, 40 A, 63 A	25 A, 40 A, 63 A(Type AC) 16 A, 25 A, 32 A, 40 A, 63 A(Type A)
Sensitivity (In)	30 mA, 100 mA, 300 mA*	30 mA, 100 mA, 300 mA*
Rated Voltage (Un)	240 V~	415 V~
Rated Insulation Voltage (Ui)	690 V	690 V
Rated Frequency	50 Hz	50 Hz
Conditional short circuit capacity (Inc)**	10 kA	10 kA
Residual Making Breaking Capacity	500 A or 10 In whichever is greater	500 A or 10 In whichever is greater
Ambient Temperature	-25°C to +55°C	-25°C to +55°C
Shock Resistance	40 mm free fall	40 mm free fall
Vibration Resistance	3 G	3 G
Electrical /Mechanical (No. of operations)	10000	10000
Mounting	Din Rail (35 mm x 7.5 mm)	Din Rail (35 mm x 7.5 mm)
Degree of Protection	IP 20	IP 20
Terminal Capacity (max)	35 mm^2	35 mm^2

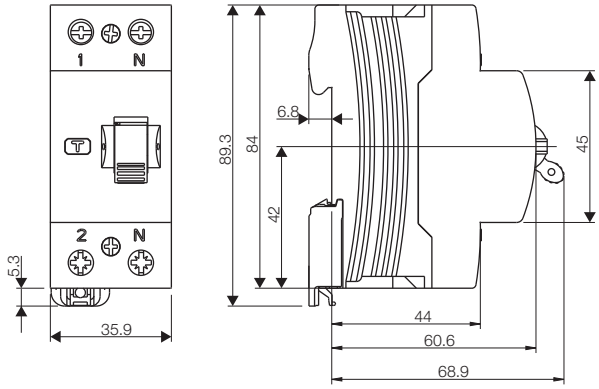
*500 mA is available on request

** In combination with an upstream SCPD (Fuse gL/MCB) of same or higher rating w.r.t. RCCB, to achieve the minimum values of I2t and Ip to be withstood by the RCCB (as per IEC)"

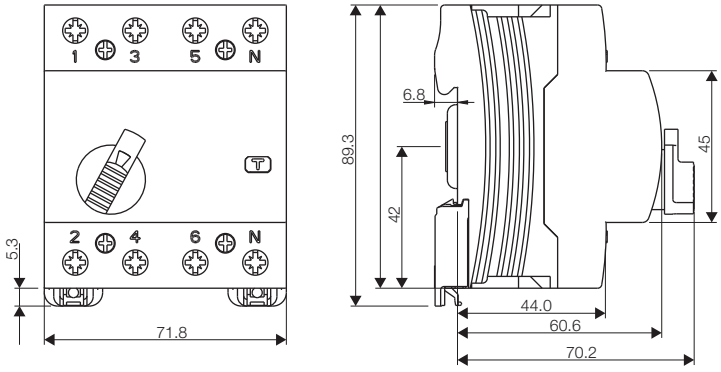


Dimensions (in mm)

2 POLE



4 POLE



RCCB - 'AC' Type

RCCB - 'AC' Type DP
(In accordance with IS 12640-1 & IEC 61008-1) 240 V, 50 Hz with 10 kA conditional short circuit capacity

Rating	30 mA Cat. No.	100 mA Cat. No.	300 mA Cat. No.
16 A	DHRGCTDF030016	DHRGCTDF100016	DHRGCTDF300016
25 A	DHRGCTDF030025	DHRGCTDF100025	DHRGCTDF300025
32 A	DHRGCTDF030032	DHRGCTDF100032	DHRGCTDF300032
40 A	DHRGCTDF030040	DHRGCTDF100040	DHRGDTDF300040
63 A	DHRGCTDF030063	DHRGCTDF100063	DHRGCTDF300063

RCCB - 'AC' Type FP
(In accordance with IS 12640-1 & IEC 61008-1) 415 V, 50 Hz with 10 kA conditional short circuit capacity

Rating	30 mA Cat. No.	100 mA Cat. No.	300 mA Cat. No.
25 A	DHRGCRFF030025	DHRGCRFF100025	DHRGCRFF300025
40 A	DHRGCRFF030040	DHRGCRFF100040	DHRGCRFF300040
63 A	DHRGCRFF030063	DHRGCRFF100063	DHRGCRFF300063

RCCB - 'A' Type

RCCB - 'A' Type DP
(In accordance with IS 12640-1 & IEC 61008-1) 240 V, 50 Hz with 10 kA Conditional short circuit capacity

Rating	30 mA Cat. No.	100 mA Cat. No.	300 mA Cat. No.
16 A	DHRMAMDF030016	DHRMAMDF100016	DHRMAMDF300016
25 A	DHRMAMDF030025	DHRMAMDF100025	DHRMAMDF300025
32 A	DHRMAMDF030032	DHRMAMDF100032	DHRMAMDF300032
40 A	DHRMAMDF030040	DHRMAMDF100040	DHRMAMDF300040
63 A	DHRMAMDF030063	DHRMAMDF100063	DHRMAMDF300063

RCCB - 'A' Type FP
(In accordance with IS 12640-1 & IEC 61008-1) 415 V, 50 Hz with 10 kA Conditional short circuit capacity

Rating	30 mA Cat. No.	100 mA Cat. No.	300 mA Cat. No.
16 A	DHRMAMFF030016	DHRMAMFF100016	DHRMAMFF300016
25 A	DHRMAMFF030025	DHRMAMFF100025	DHRMAMFF300025
32 A	DHRMAMFF030032	DHRMAMFF100032	DHRMAMFF300032
40 A	DHRMAMFF030040	DHRMAMFF100040	DHRMAMFF300040
63 A	DHRMAMFF030063	DHRMAMFF100063	DHRMAMFF300063

RESIDUAL CURRENT CIRCUIT BREAKER (80 A-100 A)

The flow of current through electrical facilities always involves risks. Poorly insulated equipment, faulty wires and incorrect use of an electrical device can cause current to flow through the wrong path (i.e. through the insulation/human body) to the earth.

RCCB (also popularly known as ELCB) is a mechanical switching device designed to make, carry and break currents under normal service conditions and to cause the opening of the contacts when the leakage current attains a given value under specified conditions. Havells offers a wide range of RCCBs for protecting human life against fatal electric shocks as well as for providing protection against fire caused by earth faults.

Features

- Conditional short circuit capacity 10 kA
- Different knob position to indicate whether it is switched by a fault or manually switched OFF (Mid Trip)
- Test button for regular inspection
- Positive contact indication
- Dual termination for simultaneous connection of bus-bars and wires.
- CE marking. RoHS Complaint, 'Green Product'

Range

80 A - 100 A

Sensitivity

30 mA, 100 mA & 300 mA

Execution

Double Pole (2P)
Four Pole (4P)

Specification

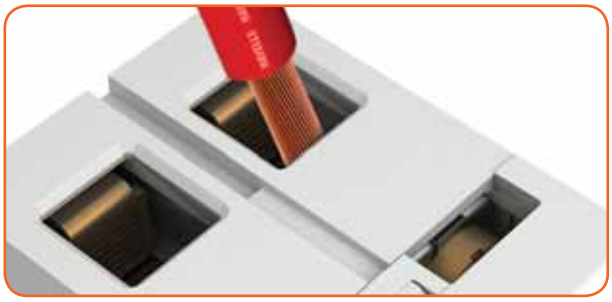
IS 12640 Part 1/IEC 61008-1 / EN 61008 - 1

Mid Trip

Different knob position to indicate whether the device is Switched OFF by a fault or Switched OFF manually

Positive Contact Indication

It clearly indicates true contact position through Flag Indication (Red-ON, Green-OFF) thus enhancing safety



Large Cable Terminals

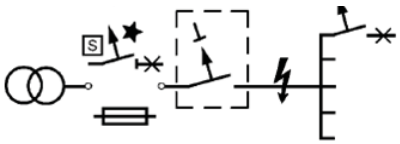
The terminals are suitable for cables up to 50 mm^2 cross section area thus making it suitable for copper and aluminium cables

Test Button

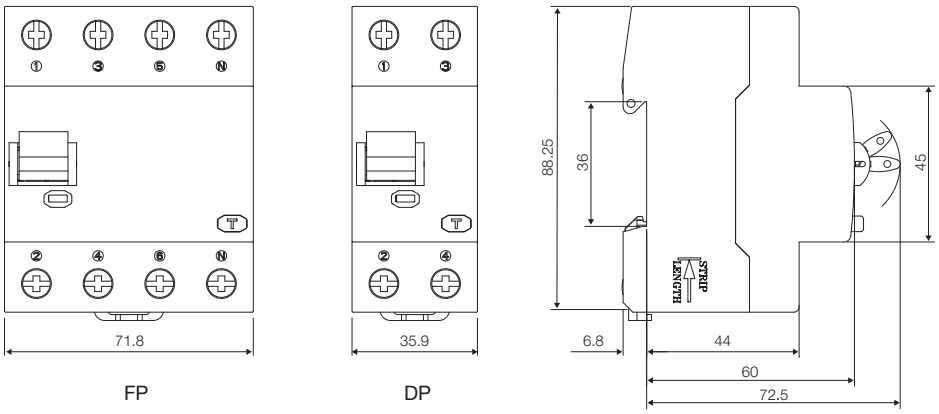
Test button for regular inspection/testing

Technical Specification		DP	FP
Specification Reference		IEC 61008-1 & IS 12640-1	IEC 61008-1 & IS 12640-1
Type		AC	AC
Rated current (In)		80 A, 100 A	80, 100
Sensitivity (IDn)		30 mA, 100 mA, 300 mA	30, 100, 300
Rated Voltage (Ue)		240 V~	415 V~
Rated Insulation voltage (Ui)		690 V	690 V
Rated Frequency		50 Hz	50 Hz
Trip Time		IΔn <300 ms, 5 IΔn <40 ms	IΔn <300 ms, 5 IΔn <40 ms
Conditional short circuit Capacity**		10 kA	10 kA
Residual Making Breaking capacity		10 In (A)	10 In (A)
Ambient Working Temperature		-25°C to +55°C	-25°C to +55°C
Shock Resistance		40 mm free fall	40 mm free fall
Vibration Resistance		5 G	5 G
Electrical Endurance	(No. of operations)	>2000	>2000
Mechanical Endurance	(No. of operations)	>3000	>3000
Mounting		Din Rail (35 mm x7.5 mm)	Din Rail (35 mm x7.5 mm)
Degree of protection		IP 20	IP 20
Terminals Capacity (Max)		50 mm^2	50 mm^2

** In combination with an upstream SCPD (Fuse gL/MCB) of same or higher rating w.r.t. RCCB, to achieve the minimum values of I2t and Ip to be withstood by the RCCB (as per IEC)"



Dimensions (in mm)



FP DP

Higher Rating RCCB

Higher Rating RCCB (80 A-100 A) DP
(In accordance with IS 12640-1 & IEC 61008-1) 415 V, 50 Hz with 10 kA Conditional short circuit capacity

Rating	30 mA Cat. No.	100 mA Cat. No.	300 mA Cat. No.
80 A	DHRMCMDF030080	DHRMCMDF100080	DHRMCMDF300080
100 A	DHRMCMDF030100	DHRMCMDF100100	DHRMCMDF300100

Higher Rating RCCB (80 A-100 A) FP
(In accordance with IS 12640-1 & IEC 61008-1) 415 V, 50 Hz with 10 kA Conditional short circuit capacity

Rating	30 mA Cat. No.	100 mA Cat. No.	300 mA Cat. No.
80 A	DHRMCMFF030080	DHRMCMDF100080	DHRMCMDF300080
100 A	DHRMCMFF030100	DHRMCMDF100100	DHRMCMDF300100