Moti BHARAT

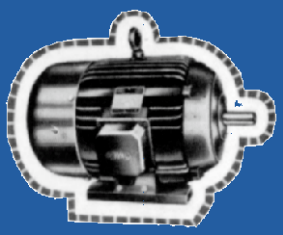
Moti Group Since 1961



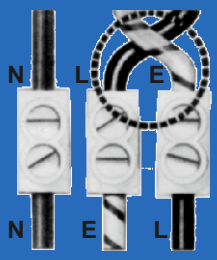
# Always be

# Proactive Safest

# Moti ELCB



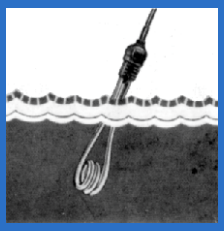
Insulation failure in motors.




Accidental interchange of supply and earth.

Insulation break down due to Fatigue.

Protection against direct contact.



Electrical equipment working with heat and corrosion.

Protection against indirect contact.

NemiParshva® TRADER LLP

The Solution For Safety

## WHAT IS A RCCB ( ELCB )

MOTI Residual Current Circuit Breaker ( RCCB ) is a differential current sensing device used to protect a low voltage circuit in case of a leakage fault . it is sometimes also known as Residual Current Device ( RCD ) or ELCB . It contains a switch device that switched off in a fraction of 20 milisecond. The RCCB ( ELCB ) provides protection from small current leakage arising due to accidental touch by human being or insulation failure, which is not possible by MCB or fuse alone .

## WHY RCCB ( ELCB ) WHEN MCB IS ALREADY PROVIDED

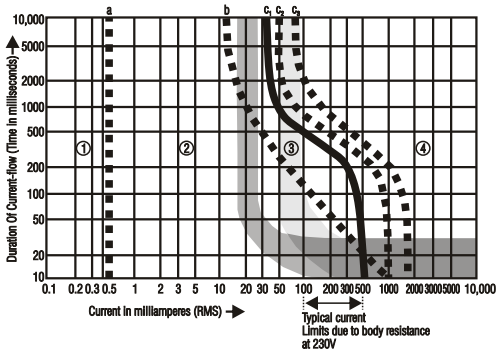
There are two types of electrical faults that are quite dangerous:

1. High current fault arising due to short circuit or low resistance fault and is protected by MCB.
2. Earth leakage arising due to cable insulation failure, accidental touch by human , etc. Such faults cannot be detected by MCB . It can only be detected by RCCB ( ELCB ).

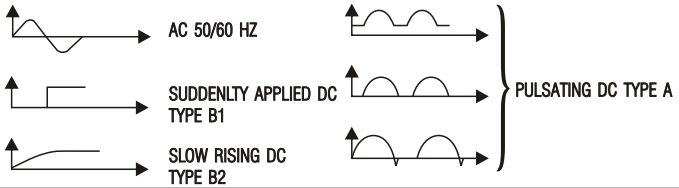
## HOW DOES IT FUNCTION

RCCB works on the principle of kirchhoff's law, that in an electrical circuit the incoming current is the equal to the out going current. RCCB consist of a core balance transformer having primary and secondary windings and a sensitive replay for instantaneous detection fault signal. The primary winding lies in series with the supply mains and load. Secondary winding is connected to very sensitive replay. In a no fault scenario, the magnetized effects of the current carrying conductors cancel each other out, thus there is no residual magnetic field that could induce a voltage in the secondary windings. During the flow of leakage current in the circuit an imbalance is created in the circuit which gives rise to leakage flux in the core. This leakage flux generates an electrical signal that is sensed by the relay and it trips the mechanism thereby disconnecting the supply. When pressing the TEST push button 'T', a fault is simulated via the test resistance & RCCB trips.

### Time/current Zones Of Effects Of A.C. Currents (15 Hz To 100 Hz) On Persons-IEC 479 (1984)




Zone 1 : Usually no reaction effects.
Zone 2 : Usually no harmful physiological effects.
Zone 3 : Usually no organic damage, except for Muscular contractions and breathing difficulty.
Zone 4 : Fibrillation danger-probability 5% upto C2, 50% upto C3, 75% beyond C3.




**Trip-time characteristics of ▭ 30mA & ▭ 100mA**

## TYPES OF RCCB (ELCB)

- **2 POLE RCCB (ELCB):**

  It is used in case of a single phase supply that involves only a live and neutral wire . It is as displayed in image on last page. it contains two ends where the live and neutral wires are connected . A known (HANDLE) is used to switch the RCCB ( ELCB ) back to ON OR OFF Positions . A test button to periodically test the RCCB ( ELCB ) functionality.

- **4 POLE RCCB (ELCB) :**

  It is used in cases of three phase supply connection involving three phase wires and a neutral . it is as displayed in image last page. it consists of two ends where the three phase and neutral wire are connected . besides this it is similar in construction and operation as 2 POLE RCCB ( ELCB ).

## DIFFERENT RATINGS OF RCCB (ELCB)

For your house hold requirements 16A,20A,25A,32A,40A,63A RCCB (ELCB) of 30-100Ma is considered sufficient . 30mA is very sensitive and you may encounter few tripping without any apparent fault . while selecting the rating , one should consult the electrician and should question his selection criteria based on the understanding given above

## PURPOSE OF RCCB (ELCB)

Residual current circuit breaker are aimed at protecting an individual from the risk of electrical shocks, electrocution and fires that are caused due to faulty wiring or earth faults. RCCB (ELCB) is particularly useful in situation where there is a sudden earth fault occurring in the circuit . e.g a person accidentally comes in contact with an open live wire in the circuit . in such situation, in absence of an RCCB (ELCB) in the circuit , an earth fault may occur and the person is at the risk of receiving an electrical shock. However, if the same circuit is protected with RCCB (ELCB) , it will trip the circuit in fraction of second thus preventing the person from receiving an electrical shock . Therefore, it is good and safe practice to install RCCB (ELCB) in your electrical circuit.

## HOW DOES IT PROTECT

As explained above, RCCB(ELCB is meant for protection from earth faults and assosciated risk to human life such as electrical shocks. The underlying fundamental principle behind operation of RCCB (ELCB) is that in ideal situation the current flowing in to the circuit through live (hot) wire should be same as the returning current from the neutral . in case of an earth fault, the current finds a passage to earth through accidental means (such as accidental contact with an open wire etc). as a result the returning current from neutral is reduced. The differential in the current is also known as residual current RCCB(ELCB) is designed such way that is contnously senses and compares for difference (residual current values) in current values between the live and neutral wires. Any small change in the current values on account of such event would trigger the RCCB (ELCB) to trip the circuit . RCCB (ELCB) come in different ratings like 30Ma, 100mA, 300mA.

## Indian electricity rules.

All medium voltage (415 V) and low voltage (230 V) installation of 5 KW And above should provide RCCB mandatory in all Cases. X rays' machine and neon signboard installation Should be protected by RCCB.

### Effect of Earth Leakage on Human Body.

| Current Leakage in mA | Effects of electric shock on adult. |
|---|---|
| From 0.1 to 0.5 mA | No sensation. |
| 1 mA to 2 mA | Threshold (Beginning) of perception |
| From 1 mA to 3 mA | Weak sensation. |
| From 3 mA to 10 mA | Painful sensation. |
| 10 mA | Threshold (Beginning) of muscular contractions in the arms |
| 30 mA | Threshold of respiratory paralysis. |
| 75 mA | Threshold of cardiac fibrillation. (probability 0.5%) |
| 250 mA (1/4 Amp) | Cardiac fibrillation with 99.5% probability. |
| 4 A | (for an exposure time of 5 seconds) Threshold of cardiac paralysis. |
| 5 A | (Sudden stoppage of the heart) Burning of organic tissues. |

## Technical specification:

Standard specification: IS/IEC 12640 Part-1
Approvals: Cml

**No. of poles:** 1P+N(2Pole) & 3P+N (4 Pole)

**Rated current In:** 16, 20, 25, 32, 40 & 63 Amp

**Rated residual operating current In:** 30, 100 and 300 mA

**Non tripping Current range:** 0.5In

**Tripping time at** 1In - 200 ms(mill second)
5In - 40 ms

**Type of Leakage current:** AC fault currents Only

**Surge current withstand capacity:** 250 A (pulse wave shape 8/20 µs)

**Rated residual breaking capacity Im:** 1000 A

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**Rated short-circuit current Inc:** 6000 A

**Rated residual short-circuits current Ic:** 6000 A

**Short-circuit withstand capacity:** 10000 A, in combination with the moti MCB 63 A
or with an upstream fuse gL 100 A

**Rated voltage:** Un 2pole 230 Vac & 4pole 230/400 Vac

**Frequency:** 50 to 60 Hz

**Max. operating voltage $U_{Bmax}$:** Un + 10%

**Operating voltage of test device $U_T$:** 100 $V_{AC}$ up to 264 Vac

**Dielectric Test voltage:** 2.5kv

**Max Nos of electrical operation:** 2000

**Mechanical Operation:** 6000

**Life expectancy:** at least 4000 operations

**Degree of protection:** IP 20, IP 40 in consumer unit

**Mounting position:** optional

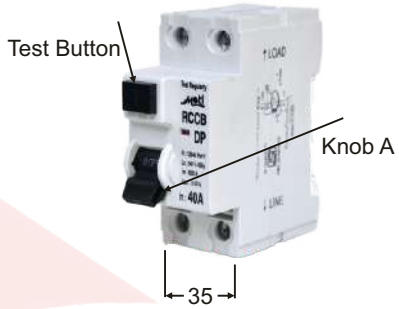
**Cable cross section bottom:** 1.5 up to 35 $mm^2$ for flexible conductor must be

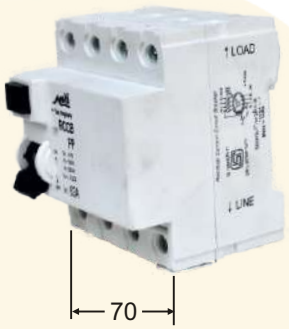
**Top:** 1.5 up to 35 $mm^2$ used wire end ferrule or cable lug

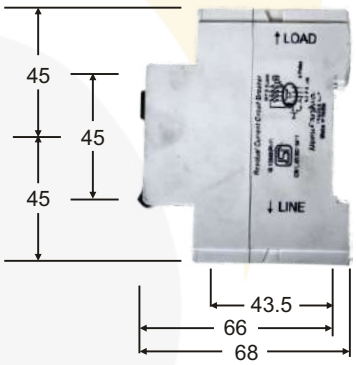
**Terminal Tightening Torque Nm :** 3

**Ambient temperature:** Tmin – 25 °C, Tmax + 55 °C

**All Dimensions in mm :**





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