



Residual Current Circuit Breaker

IEC61008 

RCCB

From Bungalows to High Risers, from Trade Centres to Hotels, from Clinics to Hospitals, from elevators to escalators electricity is the foremost requirement. Electricity has become an integral part of our life so common to our daily requirements that we forget its intricacies and hazardous behaviour.

Day after day we come across many un to do events hampering human lives due to negligent usage of electricity. Even large number of Industrial and Domestic fire is attributed to and caused by electricity.






Faulty insulated equipments or wrong usage of electrical devices cause current to flow through insulation to the earth. This is leakage current. This current poses two severe risk factors which are:

Fire Risk

Electrocution Risk

Residual Current Circuit Breaker provides the function of isolation switching and earth leakage protection of electrical circuits. It also provides the indirect protection of the operator's body against the dangerous effects of electric current. It is also a protective device against fire caused by the electrical circuit fault.

Physiological Effect of Electric Current on Human Body

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

As per Indian Electricity Rules 1956 at all installations with load above 5 KW use of RCCB is compulsory



Highlights

A state-of-the art product fit for Industrial, Residential and Commercial applications.

It is one piece residual current circuit breaker which is used both for control and isolation of electrical circuits. It provides total protection to all living beings against direct and indirect contact as well as to installations, big or small, against insulation faults.

Majority of mishaps occur due to current leakage consequently leading to fire. RCCB of the required rating instantly detects this leakage and terminates the supply reducing the risk of any kind of fire.

- Provides protection against earth fault/leakage current and also fulfill the function of isolation.
- Automatically measures and disconnect the circuit when earth fault/leakage current occurs and exceeds the rated sensitivity.
- High short-circuit current withstand capacity - 10kA
- Dual termination possible for cable and comb type busbar connection
- Equipped with finger protected connection terminals (Ip20)
- Fire resistant plastic parts to withstand abnormal heating and strong impact
- Independent of power supply and line voltage. Also free from external voltage fluctuation.
- Incorporates a filtering device for prevention of nuisance tripping due to transient voltage
- High current rating up to 63A



IEC61008



Characteristics

Standards	EN/IEC 6108-1		
Residual tripping characteristics			AC
Tripping time at I _{0n}	Instantaneous	ms	<40
	Selective	ms	>150
Rated current	A	25, 40, 63	
Rated residual current I _{0n}	mA	30, 100, 300	
Calibration temperature	°C	30	
Number of poles versus modules	1		
Rated voltage U _n	2P AC	V	240
	4P AC	V	415
Frequency	Hz	50/60	
Maximum service voltage U _{bmax}	V	2P=265 / 4P=455	
Minimum service voltage U _{bmin}	V	2P=100 / 4P=190	
Power supply	Top / Bottom		
Rated making and breaking capacity (I _m)	A	500 (or 10xI _n)	
Residual making and breaking capacity (I _{Δm})	A	500 (or 10xI _n)	
Conditional short-circuit capacity (I _{nc})	A	10000 fuse 100A gLgG	
Conditional residual short-circuit capacity (I _{Δc})	A	10000 fuse 100A gLgG	
Grid distance (safety distance between two devices)	mm	35	
Isolator application	yes		
Insulation degree	Insulation voltage	V (DC)	440
	Shock voltage (1.2/50μs)	kV	6
	Insulation resistance	mΩ	1000
	Dielectric strength	V	2500
Shock resistance (in x, y, z direction) (EN / IEC 60077/16.3)	40g, 18 shocks 5 ms		
Vibration resistance (in x, y, z direction; EN / IEC 60068-2-6)	1.5g, 30 min, 0...80Hz		
Endurance	electrical at U _n , I _n	10000	
	mechanical at U _n , I _n	20000	
Protection degree (outside/inside electrical enclosure) with door	IP20 / IP40		
Self extinguish degree (according to UI94)	V2		
Tropicalisation (acc. to EN/IEC 60068-2, DIN 40046)	°C/RH	+55 / 95%	
Pollution degree (acc. EN/IEC 60947-1)	3		
Operating temperature	AC (-5 ... +60)		
Storage temperature	°C	-25...+70	
Terminals capacity	Rigid cable min/max (top)	mm ²	1.5/35
	Flexible cable min*/max (top)	mm ²	1.5/25
	Rigid cable min/max (bottom)	mm ²	1.5/35
	Flexible cable min*/max (bottom)	mm ²	1.5/25
	(*Flexible cable 0.75/1/1.5 mm ² with cable lug)		
Busbars systems	Pin	yes	
	Fork	yes	
CE marking	yes		
Torque	Top / Bottom	Nm	5/5

Applications



Wiring Diagram



I_n / I_{Δn}



Terminal Connection

Performance

Type AC



Thermal setting I _n	A	25, 40, 63
Residual current I _{Δn}	mA	30, 100, 300
Rated voltage AC U _n	V	2P : 240; 4P : 415
Minimum operating voltage U _{brmin}	V	2P : 100; 4P : 190
Mechanical/electrical endurance	20000 / 10000	
Tropicalisation acc.to		
EN/IEC 60068-2-28/2-30 and DIN 40046	95%RH at 55°C	
Terminal capacity Δlexible/rigid cable	mm ²	25/35
Poles	2, 4	
Nuisance tripping resistance	250A 8/20us; 200A 0.5us - 100kHz	
Ambient temperature	°C	-5 upto 40
Weight	g	2P : 220; 4P : 385

Short-circuit Capacity

Acc. to EN/IEC 61008-1	I _m = 500A
Making and breaking capacity	I _{Δm} ≥ 500A from 16 upto 40A
	I _{Δm} = 10I _n from 63 upto 100A
Short-circuit capacity	I _{nc} = 10000A at 240/415V fuse 80A gG

Normal operation and mounting requirement

1. Ambient temperature -5 °C ~ +40°C •Altitude above sea level less than 2000 m.
2. Humidity not exceeding 50% at 40°C and not exceeding 90% at 25°C.
3. Installation class II or III.
4. Pollution degree 3.
5. All equipments used should be properly earthed.
6. For right operation should ensure that the neutral conductor on the load side of the RCCB must not be linked to earth. Otherwise tripping may be impaired or nuisance tripping may occur.
7. Installation method DIN Rail mounting type.
8. Product should be installed vertically at the place where there shall be no severe impact and vibration.
9. The product is switched on when the handle is at upper position.

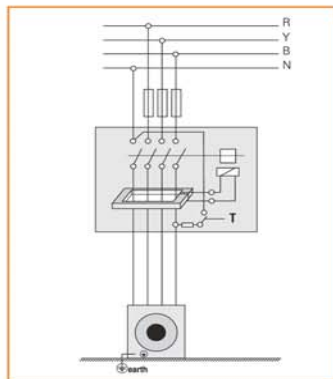
RCCB Tripping Cause Detection & Remedy

1. Switch OFF all the MCBs connected to the circuit downstream the RCCB.
2. Switch ON the RCCB and switch ON the MCBs one by one.
3. During switching ON of a particular circuit RCCB keeps tripping frequently.
4. In this circuit the fault persists.
5. Isolate the faulty circuit, correct the fault. Now the RCCB will not trip.

Working Principle

The RCCB works on the current balance principle. The supply conductors 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 current in phases, is equal to the current in the neutral and the vector sum of all current is equal to zero. If there is any insulation fault in the current and leakage current flows to earth, the current 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.



Sensitivity Selection Criteria

Sensitivity	Application
30mA	Designed for additional protection against direct contact. The 30 mA RCCB protects against leakage currents and indirect contact with earth loop impedance up to 1667 Ohms.
100mA	Is suitable for protection against indirect contact and leakage current for larger installations. The 100 mA RCCB's operate within 30 ms, but do not provide the same level of personal protection as the 30 mA units. The 100 mA RCCB protects against leakage currents and indirect contact with earth loop impedance up to 500 ohms.
300mA	A less sensitive protection device suitable for large installations having high levels of leakage current. 300 mA RCCB's protect against leakage current and indirect contact up to 167 ohms earth loop impedance.

Selection

Description		Rated Current	Sensitivity	Reference
Double Pole		25	30mA 100mA 300mA	E100002P25A30 E100002P25A100 E100002P25A300
		40	30mA 100mA 300mA	E100002P40A30 E100002P40A100 E100002P40A300
		63	30mA 100mA 300mA	E100002P63A30 E100002P63A100 E100002P63A300
Four Pole		25	30mA 100mA 300mA	E100004P25A30 E100004P25A100 E100004P25A300
		40	30mA 100mA 300mA	E100004P40A30 E100004P40A100 E100004P40A300
		63	30mA 100mA 300mA	E100004P63A30 E100004P63A100 E100004P63A300

Dimensional Drawing

