

Practical No. 14: Connect ELCB in electrical circuit breaker and check its operation at normal and abnormal conditions.

I Practical Significance:

ELCB is a life -saving device which is designed to prevent human life from electric shocks. Connection of switchgears plays important role in engineering. Correct connection is necessary for operating equipment safely. This device provides the safety in an electrical installation. Therefore, it is essential to know the working of this component.

II Industry/ Employer Expected Outcomes(s):

Select proper rating of MCB for different electrical applications.

III Course Level Learning Outcomes(s):

Use electrical safety devices in electrical circuit.

IV Laboratory Learning Outcomes(s):

Connection of ELCB in electrical circuit.

V Relevant Affective Domain related outcome(s):

Follow safety electrical rules for safe practices.

VI Relevant Theoretical Background:

An Earth-leakage circuit breaker (ELCB) is a safety device used in electrical installations with high Earth impedance to prevent injury to humans and animals due to electric shock. It detects small stray voltages on the metal enclosures of electrical equipment, and interrupts the circuit if a dangerous voltage is detected.

It monitors the leakage current that flows out of the circuit through any unintended path. The ELCB disconnects the power when earth leakage is detected. It helps detect current leaks and insulation failures in the electrical circuits that would cause electrical shocks to anyone coming into contact with the circuit.

There are two types of ELCB: voltage operated and current operated. Current operated ELCBs are widely used. The current operated ELCBs are also called as RCCB (Residual current circuit breaker). Basically, it works on the principle of Kirchhoff's Current Law (KCL) i.e. incoming current is equal to outgoing current. Residual current is the difference between line current and neutral current.

At the event of earth leakage, current find the earth path, hence imbalance occurs between line current and neutral current. The coil in toroidal transformer senses residual current which connected to relay.

XI Resources Used (Students should write the required resources):

S.No.	Name of resources	Broad Specifications	Quantity
1	ELCB	Single phase 2.	1
2	Digital multimeter	3 1/2 digit display	1
3	Ammeter	0-5 A, 0-10 A	2
4	Resistive load	Suitable size	1
5	Auto transformer	Single phase	1

XII Actual Procedure followed

1. Connect the ELCB as shown in fig.
2. record the observation in ammeter.
3. If knife switch is not available, then remove neutral wire of load & touch to earth terminal of ICOP.

XIII Observation table:

Before operating knife switch

Sr. No.	Current through live wire	Current through neutral wire
1	2.72	2.63
2	2.89	2.80
3	3.14	2.93
4	3.31	3.14
5	3.48	3.35

After operating knife switch

Sr. No.	Current through live wire	Current through neutral wire
1	0	0
2	0	0
3	0	0
4	0	0

XIV Results:

to connect ELCB in electrical circuit breaker & check its operation at normal & abnormal conditions.

XV Interpretation of Results:

to connect ELCB in electrical circuit breaker & check its operation at normal & abnormal conditions.

XVI Conclusions and recommendation:

Hence, we have studied in this practical to connect ELCB in electrical circuit breaker & check its operation at normal and abnormal conditions.

XVII Practical Related Questions: (Use separate sheet for answer)

1. What is ELCB also known as?
2. State the working principle of ELCB?
3. State how the ELCB differ from MCB.
4. Is ELCB trip in the event of short circuit in an electric circuit?
5. Name the device used for earth leakage and over current protection.

Q.1. Earth leakage circuit breaker:
The metal housing of the electrical appliances is always connected to earth.

2. Connecting the metallic frame of electric machines, conduct pipes etc. to the ground is called as earthing type of earthing.

3. ELCB is a voltage operation line that is used for the act of current voltage and others.

4. It depends on has the share circuit source p.t is from to neutral voltage level.

5. Residual current circuit breaker with overcurrent protection (RCBO)