



Operation Manual

EECC Earth Fault Indicator



Model: EECC-EFI

WWW.EECL.SA



Version	Date	Formulation / Revision	Make	Verify
V1.0	2024.12.03	First Published	Fatema	Saleem
V1.1	2025.01.20	Addition of Automatic Reset	Fatema	Saleem
V1.2	2025.02.05	New Trip Current, Delay Values	Ahmed	Saleem



CONTENTS

1. Safety Requirements	1
2. General Instructions	2
3. General Description	3
4. Functional Description	4
5. Technical Specifications	5
6. Connector Definition	6
7. DIP Switches setting	6
8. Working Concept	8
9. Installation.....	9
10. Package List	9
11. Order Placement Tips	11



1. Safety Requirements

1. This Operation Manual serves as a guide for personnel to ensure the correct operation, maintenance, transportation, and storage of the EECC-EFI.
2. When operating the device, it is important to follow not only the instructions in this manual but also the general requirements outlined in the guidelines and regulations for power line operations.
3. When installing the device and supervising operations, it is essential to follow the safety regulations applicable to relay protection and automation equipment.
4. The device may only be operated by individuals who have reviewed this manual and passed the safety rules and electrical installation operation test for power stations and substations.

2. General Instructions

After unpacking, inspect the contents of the package to ensure there is no visible mechanical damage and that the terminals are intact.

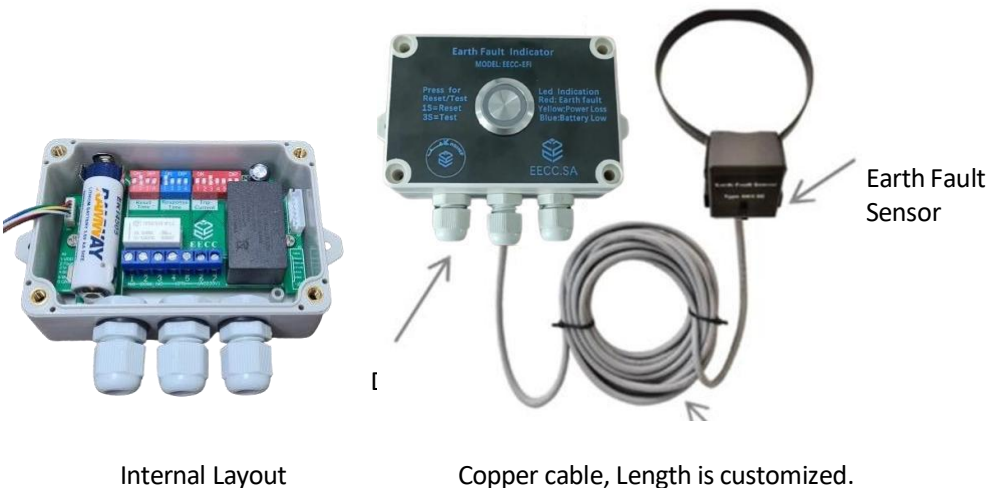


3. General Description

EECC-EFI, is an Earth Fault Indicator, widely used in various ring main unit equipments. Underground earth fault indicator devices are essential tools used in electrical power systems to detect and locate earth faults (ground faults) in underground cables. These devices help in maintaining the reliability and safety of the electrical distribution network by quickly identifying fault locations, thereby reducing downtime, and facilitating faster repair times.

EECC-EFI technology uses electromagnetic induction signal processed using a single chip microcontroller. It is equipped with AC power loss indication, battery low power alarm indication; low-power design, high-capacity lithium battery power supply, long battery life (more than 10 years); external structure designed with external bracket for easier mounting.

Outlook:





4. Functional Description

- ❖ **Earth Fault Alarm Indication:** When the earth fault sensor readings shows an earth fault current, where the ground current is higher than or equal to the tripping current threshold, then the display unit will result the earth fault **RED** LED blinking.
- ❖ **Low Voltage Battery Indication:** Battery status can be tested by pressing the **Test/Reset** for 5s resulting in a **BLUE** colored LED to blink, as shown below in the table,

Blinking times	Battery Status
1	GOOD
5	WEAK (Replace the Battery)

- ❖ **Power Loss Alarm Indication:** When the AC supply is lost, the EFI activates a **YELLOW** colored blinking LED to indicate the Power Loss Alarm.
- ❖ **Automatic Fault Reset:** Automatic Time Fault Reset: After an earth fault occurs, the EFI automatically resets the alarm after a settable period if the fault is no longer active, helping to reset the system without manual intervention.
- ❖ **Automatic Power Restoration Fault Reset:** After an earth fault occurs causing the power supply to be lost, the EFI automatically resets the alarm after the power supply has been restored, helping to reset the system without manual intervention.
- ❖ **Automatic Reset Upon Transients:** In Automatic mode, the EFI performs automatic transient fault rest within 10s by observing the availability of AC power supply.
- ❖ **Manual reset:** After an earth fault occurs, the EFI earth fault indication can be manually reset by pressing the **Test/Reset** Button one click.



5. Technical Specifications

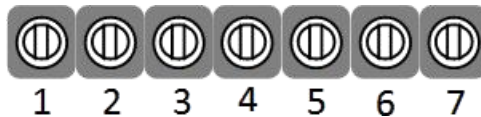
Voltage Range		AC100V-40.5KV	Battery life		≥10 year
Frequency		50HZ/60HZ	Low voltage alarm of battery		≤2.9V
Earth fault alarm current		10-25-50-80-100 -125-250A.	Earth fault sensor copper cable length		5m, or customized
Alarm current accuracy		±10%	Response time of Earth fault		20-40-60-70-100 ms.
Rated frequency withstand voltage		2KV/1min			
Reset time (settable)		1-2-4-8-12H	Work Environment	Temperature	-40°C~+85°C
				Humidity	≤95%RH
Battery Type	ER14505	(LiSOCl2) 3.6V/2700mAh	Earth fault sensor (Cable, Diameter)	A	CT100 (Special Order)
				B	CT150 Standards
Current Consumption	Standby	10μA		C	CT300 (Special Order)
	Working	≤1mA			
Protection Level	Display unit	IP 65			
	Sensor CT	IP 67			

CT over current Protection		800A overcurrent threshold protection	
CT encapsulation	Taking A, B epoxy resin sealing with durable, chemically inert, UV	CT belt material	Stainless steel SS430.
Indication Visibility Distance	Night: 80 m Day: 10 m	Voltage Surge Protection	Taking Optical Coupler isolation between display unit and CT for 45kv
CT Voltage	45kv Max.		
Terminal Connectors	2.54mm		
RTU Connector Type	JST PH 2.0MM 7P		



6. Connector Definition

❖ Terminal Connectors



Pin 1-2: Normally Open Contact.

Pin 2-3: Normally Closed Contact.

Pin 4-5: Current Sensor (CT).

Pin 6-7: Power Supply Input (100-250VAC).



❖ RTU Interface Connector



RTU Connector Logic Level	Output	Earth Fault:	0~1.5V–Low(Normal). 1.6~3.3V+High(EarthFaultDetected).
	Output	Voltage Loss:	0~1.5V–Low(Normal). 1.6~3.3V+High(MainsVoltageLost).
	Output	Low Battery:	0~1.5V–Low(Normal). 1.6~3.3V+High(LowBattery).
Reset	Input	Test/Reset	3.3V (Normal) Short with GND for 5s for Test Short with GND for 1s for Reset
+5v	Output	Power Supply	5VDC 1000mAh Optional Power Supply for RTU or I/O module.



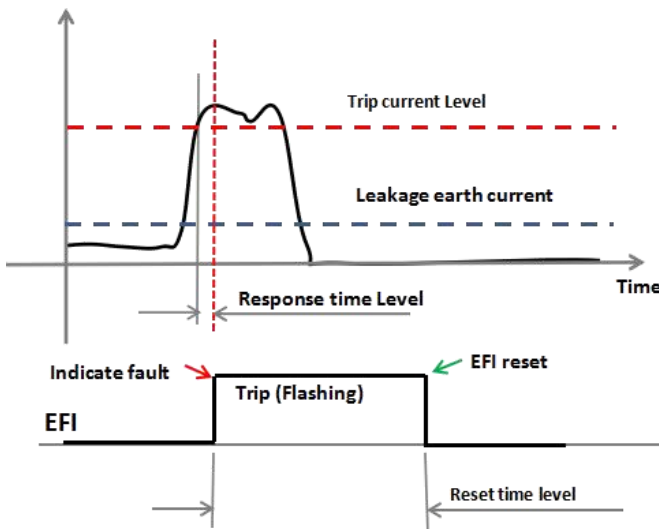
7. DIP Switches setting

DIP SWITCHES		
Trip Current (A)	Reset Time (H)	Response Time (ms)
1 = 10	1 = Automatic	0 = 20
2 = 25	2 = 2 hours	1 = 40
3 = 50	3 = 4 hours	2 = 70
4 = 80	4 = 10 hours	3 = 80
5 = 100		4 = 100
6 = 125	" 0" means all DIP level on "OFF" Only Selected DIP should be kept "ON"	
7 = 250		

- 1- Trip Current must be selected carefully to prevent false alarms due to inrush current when circuit breakers are closed.
- 2- If only Automatic is selected on Reset Time DIP switches, the EFI will set the reset timer on 1h in cases of AC main absence to prevent end-less blinking.

8. Working Concept

EECC-EFI can sense Earth Fault in power transmission lines by monitoring the waveform of zero sequence current simultaneously resulting in real time detection when the earth fault current exceeds the settable accepted tripping current.

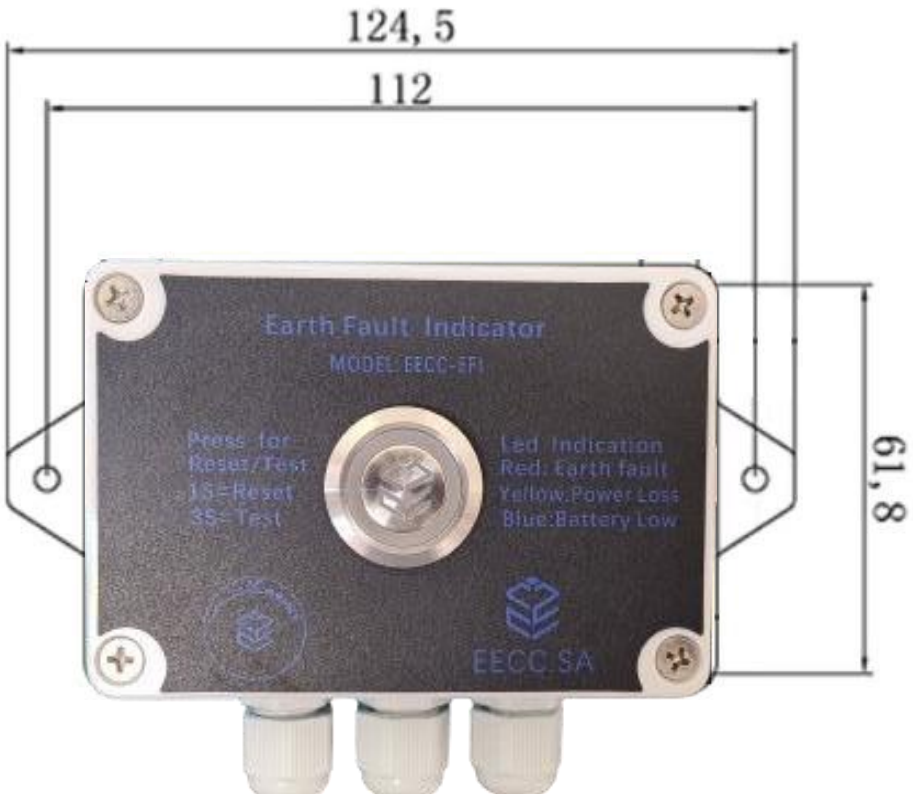




9. Installation

1) Display unit dimensions and installation.

outside size: 124.5x68x40mm. Surface mounted on the wall or cabinet.

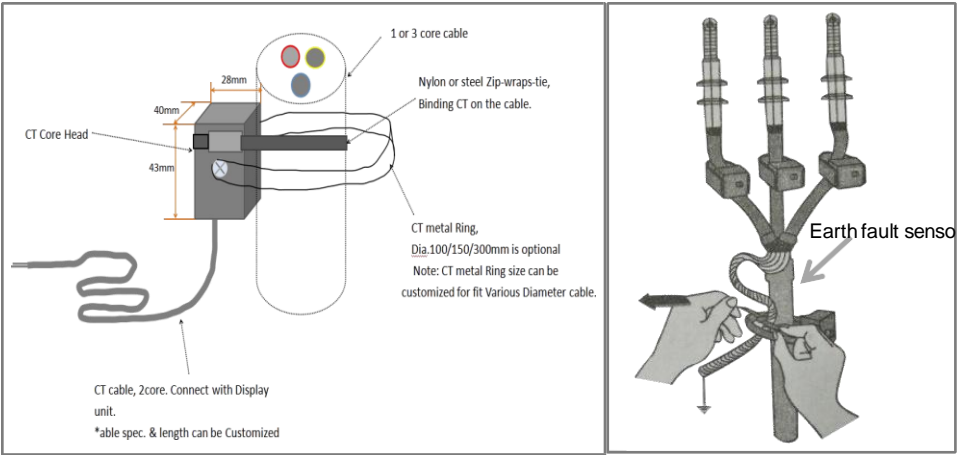




2) Earth Fault Sensor (CT) installation and dimension

Earth fault sensor needs to be mounted around the 3 phases power cable conductor and tightened with belt (if Neutral is available, then it can be directly connected around Neutral only).

Note: the grounding cable must be inserted out of the sensor and fixed tight as shown below,





10. Package List

- | | |
|-------------------------|------|
| 1. EFI | 1Pcs |
| 2. Earth Current Sensor | 1Pcs |
| 3. Battery | 1Pcs |

11. Order Placement Tips

For orders, additional information or technical support, reach us on email,
info@eecl.sa

Note: Upon Order, please specify the following parameters, otherwise we will supply the standard version.

- | | |
|------------------------------------------------------------|---------------------|
| 1) Earth fault Tripping Current: 10/25/50/80/100/125 /250A | Default: 80A |
| 2) Automatically reset time: Automatic/2H/4H/10H, | Default: Automatic. |
| 3) Response Time: 20ms/40ms/70ms/80ms/100ms | Default: 70ms. |
| 4) CT Belt Size: 100/150/200mm | Default: 150mm |