



KASHEF 201

Operation Manual

EECC Smart Earth Fault Indicator



Model: EECC-SEFI



Version	Date	Formulation / Revision	Make	Verify
V1.0	2024.06.19	First Published	Fatema	Saleem



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Safety Requirements

1. This Operation Manual serves as a guide for personnel to ensure the correct operation, maintenance, transportation, and storage of the EECC-SEFI.
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.

General Instructions

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



Part 1: General Description

EECC-SEFI, is a Smart Earth Fault Indicator developed by EECC, 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-SEFI 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:



Internal Layout



Display Unit

Earth Fault Sensor



Part 2: Technical Description

1. Functional Characteristics

- ❖ Intelligent detection of ground fault and through the corresponding RED colored LED on the display unit to indicate fault.
- ❖ AC power loss detection and indication with a YELLOW colored LED.
- ❖ Low battery test function using the Test/Reset button to indicate the status of the battery using BLUE colored LED.
- ❖ Display unit designed with button, it is convenient for reset or testing.
- ❖ The pulse width time of fault current can be set to prevent incorrect fault indication caused by surge current.
- ❖ Automatic reset time can be selected and adjusted using DIP switches.
- ❖ Earth fault alarm current, multi-level can be settable through a DIP switch inside of the display unit.
- ❖ Battery can be replaced conveniently.
- ❖ Innovative Maintenance-Free backup power supply technology.



2. 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.



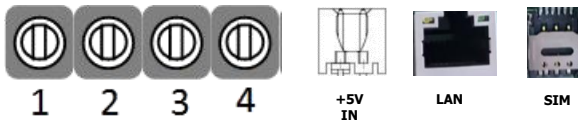
3. Technical Specifications

Voltage Range		AC110V-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 Cable Length		5m, 10m, 15m.
Alarm current accuracy		±10%	Response Time	20-40-70-80-100 ms.	
Rated Frequency withstand Voltage		2KV/1min			
Reset Time		1-2-4-8-12H	Work Environment	Temperature	-40°C~ +75°C
				Humidity	≤95%RH
Backup Supply Technology		Super Capacitors	Ratings		2*2.7V82F
Battery Type	ER14505	(LiSOC12) 3.6V/2700mAh	Earth Fault Sensor (Cable, Diameter)	CT100 (Special Order)	
Power Consumption	Standby	≤300mA@5V		CT150 Standard	
	Working	≤700mA@5V		CT300 (Special Order)	
Protection Level	Display Unit	IP 65			
	Sensor CT	IP 67			

CT Over Current Protection	800A Over Current 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	Opto-Coupler isolation between Display Unit and CT for 45KV
CT Voltage	45KV Max.		



4. Terminals Definition



- ❖ **Pin 1-2:** Current Sensor (CT).
- ❖ **Pin 3-4:** Power Supply Input (AC110-240V).
- ❖ **+5V IN:** EECC-SLR-KIT Input Connector.
- ❖ **LAN:** Local Area Network Port.
- ❖ **SIM:** NANO SIM Card Port.



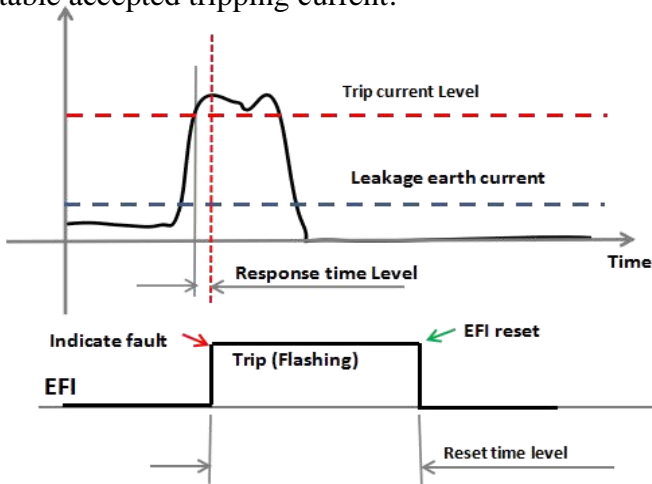
5. DIP Switches Setting

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		

Note: Trip Current & Response Time must be selected carefully to prevent false alarms due to inrush current when circuit breakers are closed.

6. Working characteristics

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





Part 3: Communication Description

1. Introduction

EECC-SEFI is a Smart Earth Fault Indicator in which it is Communication-Enabled, the device can be reached securely from two types of networks, Local Area Network and Wide Area Network. In this document, a detailed interference with KASHEF 201 will be handled.

2. Local Area Network (LAN)

EECC-SEFI devices can be reached and configured from local area network through a wired channel using the LAN port located under the cover of the device, and wirelessly using Static-IP SIM card with private APN.

2.1 Local Area Network Port

A local communication channel is created by plugging an RJ46 terminal to the ETHERNET LAN port connector on the interface of the device, in this method the device can be accessed using a Pre-Defined IP address (192.168.1.1), the IP address be changed from the web server interface.

2.2 Static-IP SIM Card Cellular Connection

Another way to create a local communication channel is achieved by using a Static-IP address SIM card with a private APN. In this method the device can be reached using the IP address of the Static-IP SIM card. In this method, the installed SIM card should support data package.



2.3 SNMPv1 (TCP/IP) Communication Protocol Characteristics

After creating a successful Local Network with KASHEF 201, a TCP/IP connection is created with the device using the following characteristics,

Protocol	SNMP
Version	V1
Read-Only Community	public
Write-Only Community	private
Commands	Get-Next

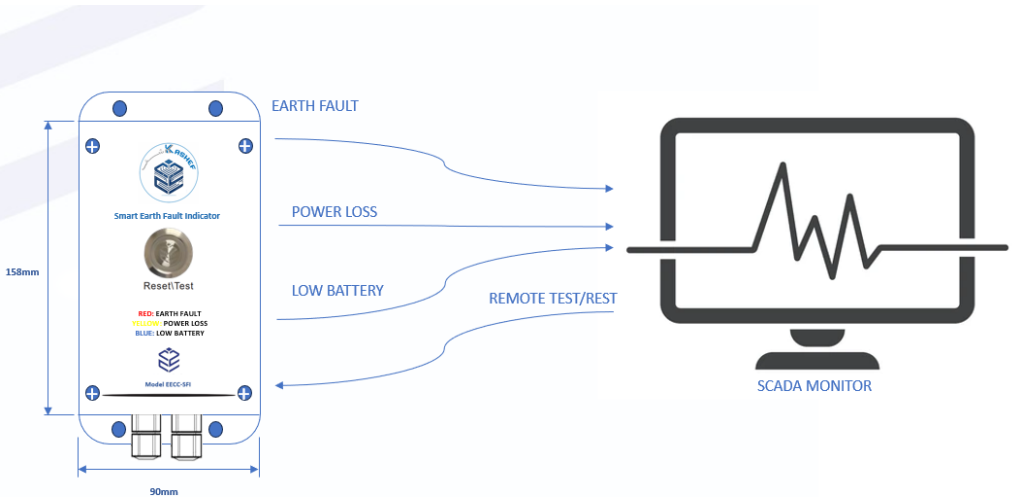
2.4 List of SCADA Signals

Using SNMPv1 Communication Protocol, the following signals can be obtained,

Signal Description	OID Address	Signal Translation	Type	Community
Earth Fault Signal	.1.3.6.1.4.1.30140.2.3.1.0	Normally (0) Fault Status (1)	u32	Read
Power Loss Signal	.1.3.6.1.4.1.30140.2.3.2.0	Normally (0) Power Loss Status (1)	u32	Read
Indicator Low Battery Signal	.1.3.6.1.4.1.30140.2.3.3.0	Normally (0) Low Battery Status (1)	u32	Read
Test/Reset Signal	.1.3.6.1.4.1.30140.2.3.4.0	Normally (0) Test/Reset Status (1) Hold for 5s	u32	Write
Temperature Signal	.1.3.6.1.4.1.30140.3.3.0	Temperature Value in Celsius	i32	Read
Power Supply Voltage Signal	.1.3.6.1.4.1.30140.3.4.0	Power Supply Voltage (mV)	i32	Read



2.5 SCADA SIGNAL Flow Diagram



3. Wide Area Network (WAN)

EECC-SEFI devices can be reached and configured securely from a wide area network through Short Messages Service (SMS).

3.1 Short Messages Service (SMS)

Up to 5 operators' mobile numbers can be registered on the web server of EECC-SEFI, enabling them to receive the status signals, and sending AT commands to configure and Test/Reset the device. In this method, the installed SIM card should support SMS package.

3.2 List of AT Commands

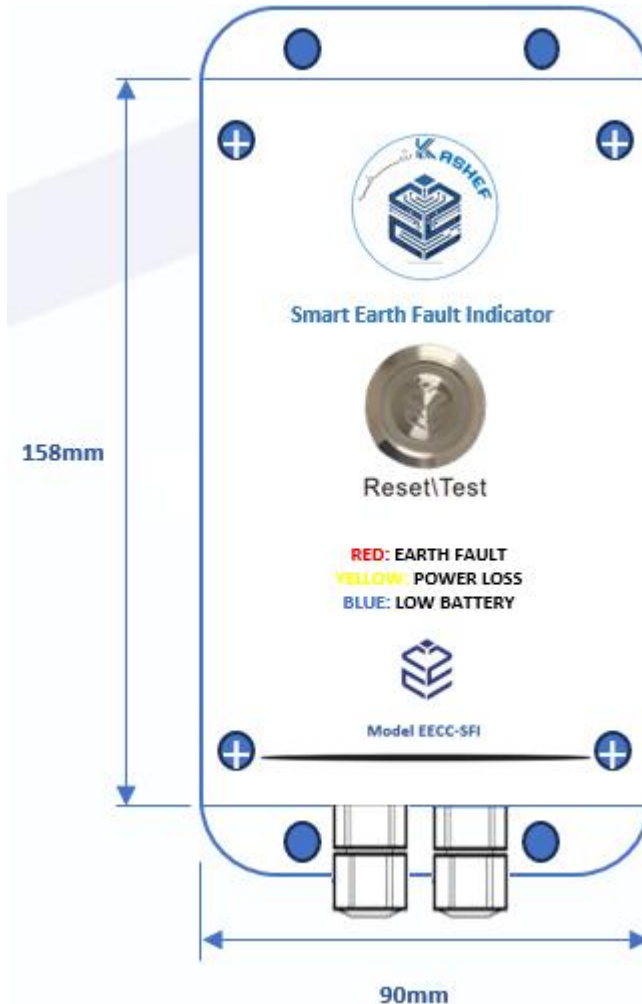
Signal Description	SMS Contents	TYPE
Earth Fault	EARTH FAULT	Reception
Power Loss	POWER LOSS	Reception
Low Battery	LOW BATTERY	Reception
Test/Reset	Reset	Sending



Part 4: Dimensions & Installation

1. Display Unit Dimensions & Installation.

Outside Dimensions: 195x90x60mm. Surface mounted on the wall or cabinet.

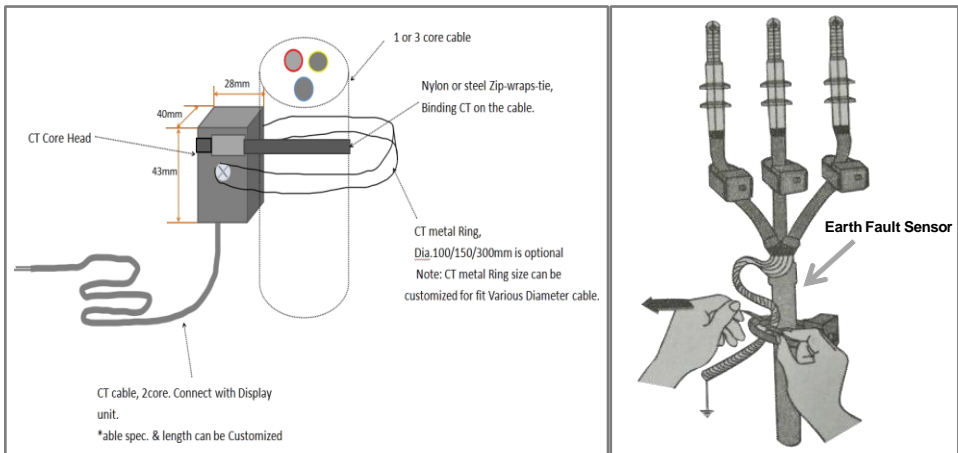




2. Earth Fault Sensor (CT) Dimensions & Installation

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,

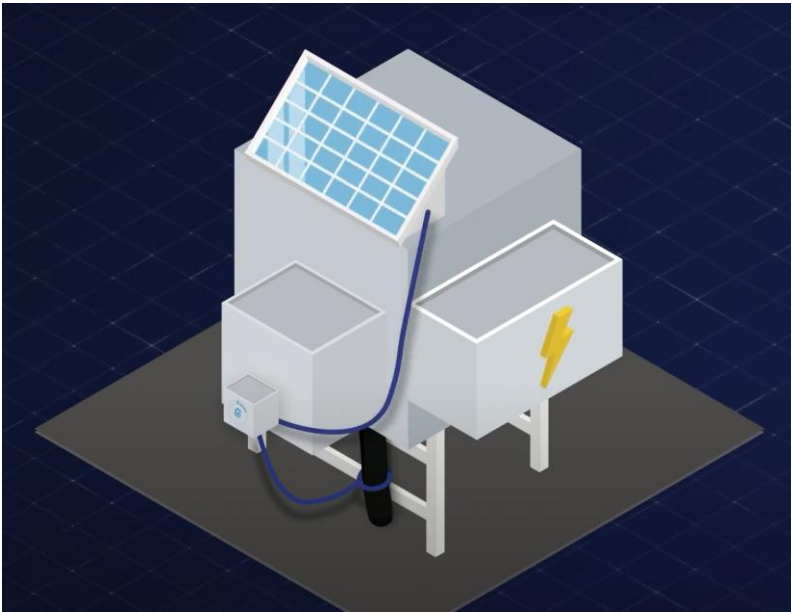




PART 5: EECC Solar Power Supply Kit (Optional)

1. Introduction

EECC provides an optional Solar Power Supply Kit (EECC-SLR-KIT) to provide the necessary power to the Smart Earth Fault Indicator for installation locations where an auxiliary power supply is not available such as RMU units with the absence of power transformers.





2. Technical Specifications

Solar Panel Voltage	9V
Solar Panel Maximum Output Power	27W
Solar Panel Short Circuit Current	3.3A
Solar Panel Open Circuit Voltage	10.8V
Solar Panel Maximum System Voltage	1KV
STC Conditions	1000W/m ² , AM1.5, 5.25 Celsius
Battery Type	18650
Number of Batteries	6 PCS
Battery Operating Voltage	3.7V
Battery Capacity	3000mAh
System Output Voltage	5V
System Maximum Output Current	3A
System Maximum Output Power	15W



Part 6: Order Information

1. Package List

Standard Package Includes,

Display Unit	1Pcs
Earth Fault Sensor	1Pcs
Battery	1Pcs
Installation Kit (INFX-KIT).	1Pcs
Datasheet	1Pcs

2. Optional Peripherals

Solar Power Supply Kit (EECC-SLR-KIT)	1Pcs
Smart Earth Fault Indicator Battery (ER14505)	1Pcs

3. 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.

Earth fault Tripping Current: 10/25/50/75/100/125/250A	Default: 80A.
Automatically reset time: 1/2/4/8/12H	Default: 1H.
Response Time: 20/40/60/80/100ms	Default: 70ms.
Current Sensor Belt Size: 100/150/200mm	Default: 150mm.
Current Sensor Cable Length: 5/10/15m	Default: 5m.