KASHEF 101

Operation Manual

EECC Smart Fault Indicator

Model: EECC-SFI

20241024 V1.0

Version	Date	Formulation / Revision	Make	Verify
V1.0	2024.12.03	First Published	Fatema	Saleem

Contents

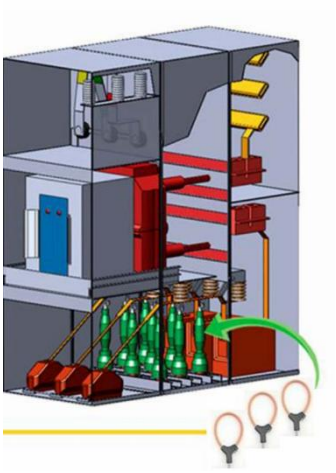
Part 1: General Description

EECC-SFI, is a Smart Fault Indicator developed by EECC, widely used in various ring main unit (RMU) equipment for underground power cables. Underground fault indicator devices are essential tools used in electrical power systems to detect and locate earth faults (ground faults) and short circuit 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-SFI technology uses electromagnetic induction signal processed using an intelligent MCU. 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 5 years); external structure designed with external bracket for easier mounting.

Outlook:

Front Side View



Current Sensors

Part 2: Technical Description

1. Functional Characteristics

- Intelligent indication of ground faults through the corresponding RED colored LED on the display unit to indicate the fault.
- AC power loss detection and indication with a YELLOW colored LED.
- Low battery indication with a Blue colored LED.
- Display unit designed with button for convenient reset or testing.
- The pulse width time of fault current can be configured to prevent incorrect fault indication caused by surge current.
- WIFI Web Server configuration interface provide simple & easy parameters configuration.
- Earth fault & Short-Circuit alarm trigger current, settable as desired from the Web Server interface.
- Battery can be replaced conveniently without soldering or tool.
- Zero-Sequence & Phases current measurement.

2. Functional Description

Earth Fault Alarm Indication: When an earth fault current is detected, where the zero-sequence current is higher than equal to or equal to the tripping current threshold, the display unit will indicate the event using Earth Fault LED blinking.

Short Circuit Fault Alarm Indication: When a short circuit fault current is detected, the display unit will indicate the event using the corresponding Phase RED LED blinking.

Power Loss Alarm Indication: When the AC supply is lost, the Fault Indicator activates a YELLOW colored blinking LED to indicate the Power Loss Alarm.

Low battery Alarm Indication: When the battery voltage is low, while the AC supply is available, the Fault Indicator activates a BLUE colored blinking LED to indicate the Low Battery Alarm.

Test Mode: If no fault is active, press the "Test/Reset" button and hold for at least 2 seconds, to check the LED indicators, and relay output.

Reset Mode: If any fault is active, press the " Test/Reset " button and hold for at least 2 seconds, to clear the active faults and release the flip the relay pins.

Phases Current Measurements: Phases Current Measurements reported through IEC104 Protocol.

3. Technical Specifications

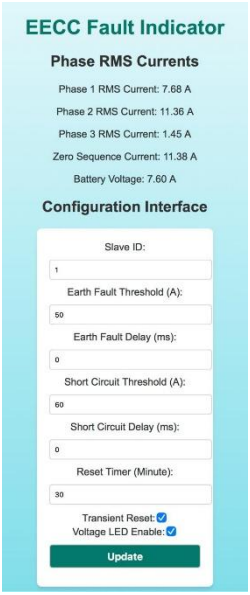
Parameters	Specifications
Types of recorded Faults	- Earth Fault. - Double & triple phase short-circuit.
Earth Fault Detection Range	10 – 2000 A
Short Circuit Detection Range	10 – 2000 A
Current Measurement Range	1 ~ 6000 A
Current Measurement Accuracy	Calibrated: +/- 0.5% Uncalibrated: +/- 5%
Voltage Ratings	0.11-70 kV
Visual indication	– High Intensity LED
Main Power supply	– 100~270 VAC. – 9~14VDC (Power Supply / 20W Solar Panel).
Power Consumption	Idle: 3mA@12V / TX/RX: 20mA@12V
Battery Type	– 2 PCS 3.7V 3000mAh 18650 Size
Indication Backup Supply	> 900 hours of Indication

Resetting the fault indication options	– Remotely From SCADA – Timer Reset. (Configurable time). – Automatic Voltage Restoration Reset. – Automatic Transient Reset (Can be switched off). – Manual Test/Reset Button.
Trigger control	– Visual. – Relay output.
Connection	IEC104
Trip Current Delay	60 - 300 ms
Installation Location	At the side of switchgear, Ring Main Unit (RMU), and Substation (Distribution Transformer)
Sensors Type	– Rogowski coil 85mV/kA 50Hz.
Temperature range	Standard from –40 °C to +85 °C
Device protection degrees	IP 65 by GOST14254-2015 (IEC 60529:2013)
Impact of mechanical factors	M7 version according to GOST 17516.1 version group N2 with GOST 52931-2008

4. Parameters Configuration Interface

The web server can be accessed after connecting to EECC-FI WIFI, the Access Point is activated by passing a magnet on the top of the device, AP remains active for 5 minutes and automatically shut down.

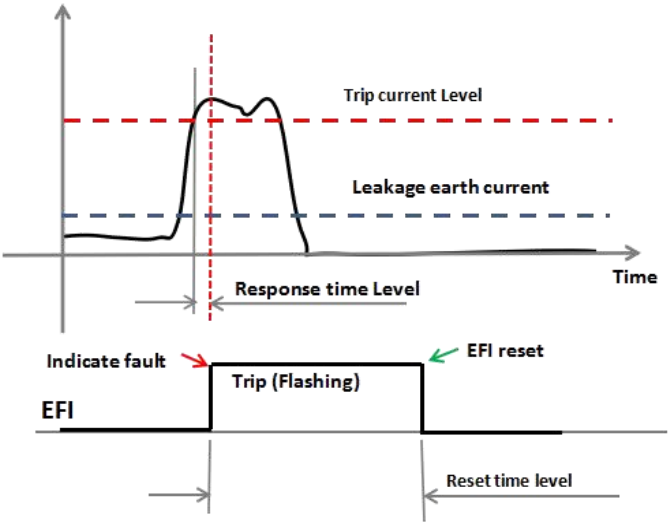
Parameter	Default
SSID	EECC-FI
Password	12345678
WEB Server IP	192.168.4.1



Note: Threshold Current and Delay must be selected correctly to prevent false alarms due to an inrush current when circuit breakers are closed.

5. Working characteristics

EECC-FI can sense Short Circuit & Earth Fault currents in power lines by monitoring the waveform of the 3 phase currents and zero sequence current simultaneously resulting in real time detection when the fault current exceeds the settable accepted tripping current.



Part 3: Communication Description

3.1 Wide Area Network (WAN):

The system accurately identifies faults and communicates fault details via Cellular network using IEC104 to maintenance teams.

3.2 Access point Activation:

- **WIFI Access Point Activation**: The system uses a magnet to turn the WIFI access point for 5 minutes, conserving energy during storage and delivery.

3.3 Communication Standards:

- **WIFI**: Operates on **2.4Ghz** frequency for wireless Parameters Configuration.
- **Network Compatibility**: GPRS/GSM, 2G, and 4G networks.
- **Cellular Bands**:
  - GSM/EDGE:850,900,1800MHz.
  - WCDMA:B1,B2,B5,B8.
  - FDD-LTE:B1,B3,B4,B5,B7,B8,B28.
  - TDD-LTE:B40.

- **Protocol**: Uses **IEC60870-5-104**, where the indicator serves as the **Master** and the SCADA system as the **Slave**.

3.4 SIM Card:

- When inserting/removing a SIM card, make sure the device is turned off.
- Make sure the device is placed flatly like the above picture when inserting or removing SIM card.

3.5 LED Indicator:

LED Indicator Introduction			
		Status	Description
PWR	Power Supply	Always ON	Power on
		OFF	Failure
RUN	Running	Flickering	Device is running
		OFF	Failure
LINK	Ethernet, 4G, WiFi	Flickering	Ethernet communication
		Always ON	4G or WiFi is working
		OFF	Failure

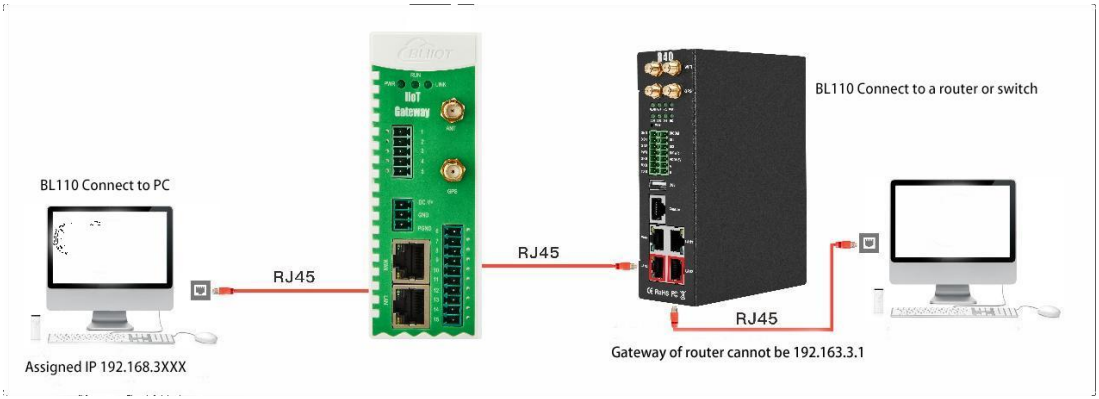
3.6 WAN Port and LAN Port:

Ethernet Port			
Indicator	Color	Status	Description
Speed	Green	Always ON	100Mbps mode
		OFF	10Mbps mode
LINK	Yellow	Always ON	Connected
		Flickering	Transmitting data
		OFF	Connection disconnected

3.7 Configuration Software:

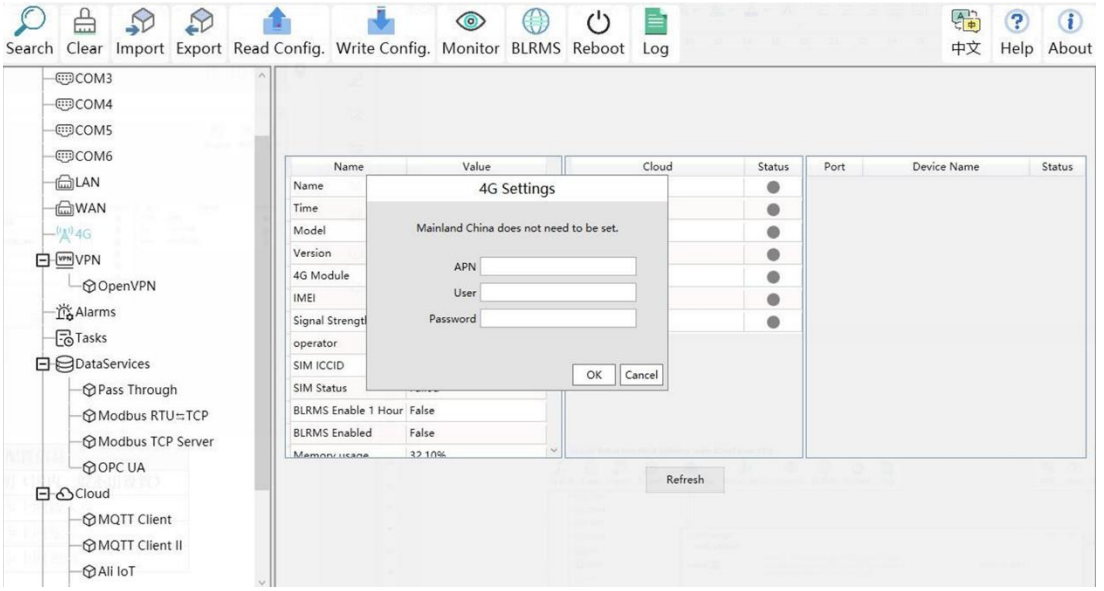
WAN port IP is retrieved automatically, LAN port IP is 192.168.3.1

Connect directly to PC or connect to a router or switch as follows:



3.8 Cellular Network Registration:

Set the APN of the SIM card, you don't need to set this if the device doesn't come with a 4G module. It’s not necessary to set up an APN for some 4G network operators.



4G Settings	
Function	**Description**
APN	SIM card Internet access point
User	SIM card username
Password	SIM card password

3.9 IEC104 SIGNALS LIST.:

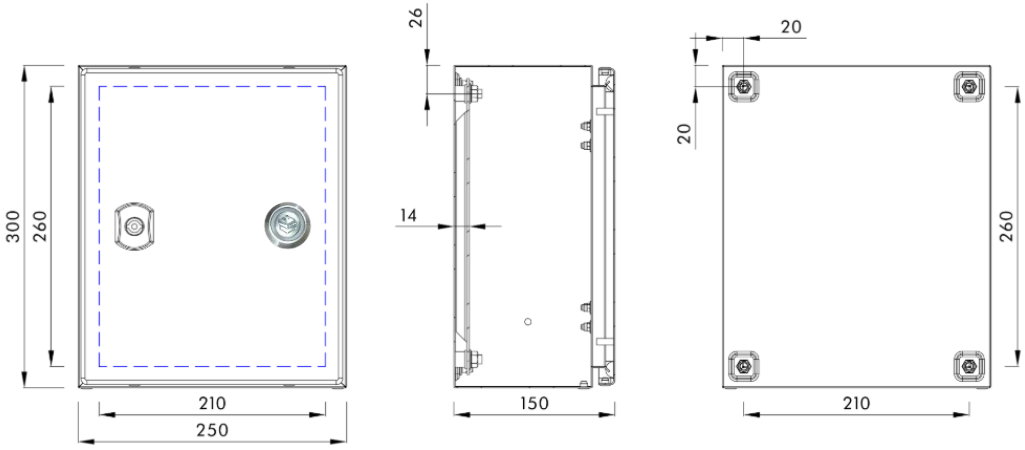
IEC104	Index	Define	Type	Data Type	Remark
Single Point Information	T01 1.100	TEST/RESET	R	Uint16	
Single Point Information	T01 1.101	Voltage Status	R	Uint16	1=Lost, 0=Available
Single Point Information	T01 1.102	Battery Status	R	Uint16	1=Low, 0=Normal
Single Point Information	T01 1.103	Phase A Current	R	Uint16	
Single Point Information	T01 1.104	Phase B Current	R	Uint16	
Single Point Information	T01 1.105	Phase C Current	R	Uint16	
Single Point Information	T01 1.106	Zero Sequence Current	R	Uint17	
Single Point Information	T01 1.107	Earth Fault Status	R	Uint18	1= Detected, 0=Normal
Single Point Information	T01 1.108	Phase A Short Circuit Status	R	Uint19	1= Detected, 0=Normal
Single Point Information	T01 1.109	Phase B Short Circuit Status	R	Uint20	1= Detected, 0=Normal
Single Point Information	T01 1.110	Phase C Short Circuit Status	R	Uint21	1= Detected, 0=Normal
Single Point Information	T01 1.111	Phase A Trip Current	R	Uint22	
Single Point Information	T01 1.112	Phase B Trip Current	R	Uint23	
Single Point Information	T01 1.113	Phase C Trip Current	R	Uint24	
Single Point Information	T01 1.114	Zero Sequence Trip Current	R	Uint25	

Part 4: Dimensions & Installation

1. Dimensions:

- Display Unit

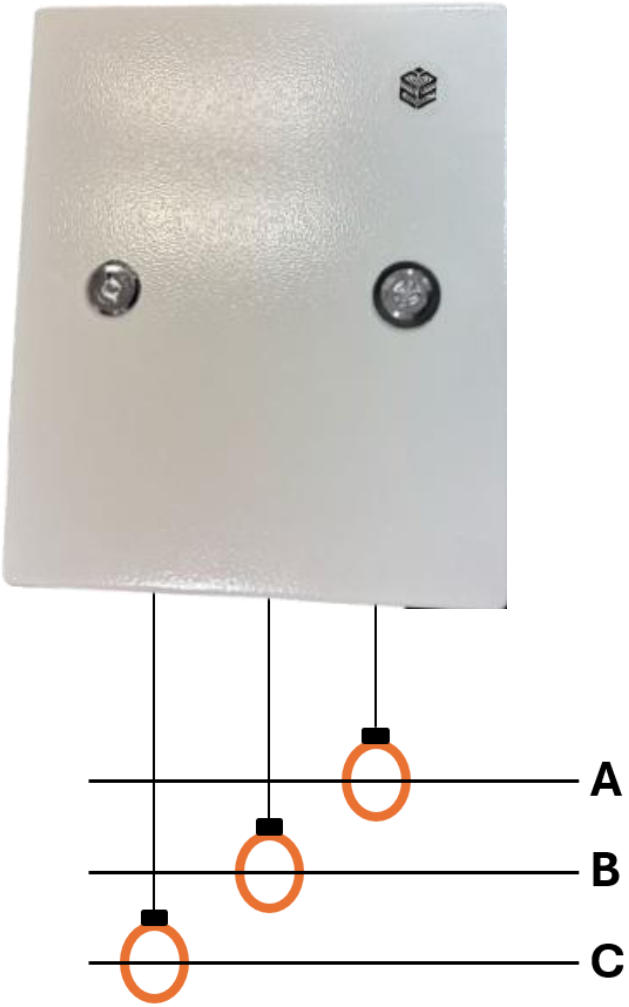
Name	Overall dimensions, mm		
	Length	Width	Depth
Fault Indicator	115	90	55



- Rogowski CT

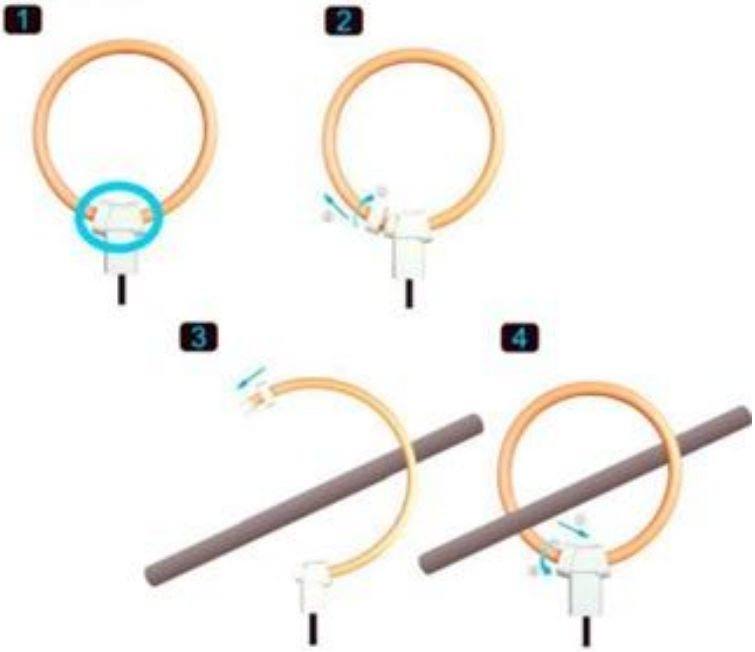
Name	Overall dimensions, mm
	Diameter
A	80
B	80
C	80

2- System Wiring diagram:

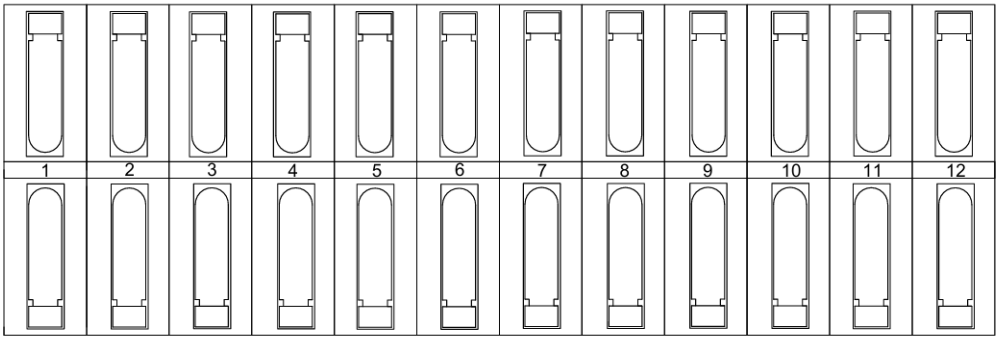


3- Current Sensor Installation Steps:

Each Current sensor needs to be mounted around the corresponding phase in the of power cable conductors and tightened with the tie belt.



4- Terminal Block Connection:



Point number	Point name	Point function	Point type	Remarks
1	PE	Potential Earthing input	Voltage input	100~250VAC
2	Vn	AC Supply voltage input		
3	VL	AC Supply voltage input		
4	V+	Power Supply/ Solar Input Positive	Voltage input	9~14VDC1A or 20W Solar Panel.
5	GND	Power Supply/ Solar Input Negative		
6	I1+	Phase L1 current input positive	Current input	Current Channel
7	I1-	Phase L1 current input negative		
8	I2+	Phase L2 current input positive		
9	I3-	Phase L2 current input negative		
10	I3+	Phase L3 current input positive		
11	I3-	Phase L3 current input negative		
12	NC	Normally Closed	Relay Output	Trip Relay Contact
13	COM	Common		
14	NO	Normally Open		

Part 5: Order Information

1. Package List

Standard Package Includes,

Fault Indicator	1Pcs
Current Sensor	3Pcs
Battery	2Pcs
Installation Kit (**INFX-KIT**).	1Pcs
Datasheet	1Pcs

2. Order Placement Tips

For orders, additional information or technical support, reach us on email,

info@eecl.sa