



KASHEF 601

Operation Manual

EECC Smart Fault Passage Indicator



Model: EECC-SFPI



Version	Date	Formulation / Revision	Make	Verify
V1.0	2024.12.04	First Published	Fatema	Saleem



Contents

1. Part 1: Safety Requirements.....	2
2. Part 2: General Instructions.....	3
Part 3: General Description	4
Part 4: Technical Description.....	5
1. Functional Characteristics	5
2. Functional Description.....	5
3. Technical Specifications	6
Part 5: Communication Description	9
1. LED Signals	9
.....	9
3. Wide Area Network (WAN)	10
2. Fault Type Identification:	10
3.1 Reset Functions:	10
3.2 Power Supply Design:	10
3.3 Energy-Saving Features:	11
3.4 Communication Standards:	11
.4 Short Messages Service (SMS)	13
Part 6: Dimensions & Installation	14
1. Unit Dimensions & Installation.....	14
2. Smart Fault Passage Indicator Installation diagram.....	15
.....	15
Part 7: Order Placement Tips	17



1. Part 1: Safety Requirements

- **Live Line Safety:** Maintain a safe distance from live lines during installation. Only trained personnel should handle the installation.
- **Proper Insulation:** Ensure that installation tools, like the insulating rod and adaptor, are in good condition to prevent electrical hazards.
- **No Power Shutdown:** The device can be installed without turning off the grid power. Installers should remain on the ground and use the correct safety equipment.
- **Personal Protective Equipment (PPE):** Wear insulated gloves, boots, helmets, and other safety gear during installation.
- **Authorized Personnel:** Only qualified personnel should perform installation and maintenance.
- **Safe Distance:** Always maintain a safe working distance from live electrical components.
- **Site Safety:** Verify that the installation site is clear of hazards to ensure a safe installation.
- **Follow Local Regulations:** Comply with local electrical safety standards and guidelines during installation.



2. Part 2: General Instructions

1. Installation:

- Install safely using the **installation adaptor** and **insulating hot stick** on live lines, following safety guidelines.

2. Battery Installation:

- Ensure correct polarity connection of **batteries**.

3. Maintenance:

- Regularly check battery levels and replace if not being recharged. Use the **Test/Reset button** for system checks.

4. Communication Setup:

- Ensure **SMS alerts** are set up and operators **mobile numbers** are registered. Verify network compatibility (GPRS/GSM, 2G, or 4G).

5. Fault Indication:

- The system will alert through **LED indicators** and **SMS** when a fault is detected, IEC104 signals accessed through the installed SIM IP address.

6. Reset Functions:

- The system resets automatically or can be manually reset via **Android App, SCADA**, or the **Test/Reset button**.



Part 3: General Description

The EECC-FPI series overhead Fault Indicator system utilizes advanced sensor technology to monitor current signals ($<70\text{kV}$) on power lines through CTs (Current Transformers). A smart MCU processes these signals by calculating, analyzing, and identifying short circuits or earth faults. When a fault is detected, the Fault Indicator alerts maintenance personnel by blinking different LED lights.

Additionally, it communicates the fault status to the SCADA system or sends SMS notifications to registered mobile numbers. This system is highly beneficial for power management users, enabling them to quickly locate and diagnose faults, resolve issues efficiently, and restore power promptly.

Device Outlook:



- ○ Load current
- ○ EMF Power Harvesting CT
○ High Accuracy Measurement CT
- ○ PV Panels
- ○ 3 colors Fault Status LEDs
○ 2 Colors Bluetooth & GPRS Status LEDs



Part 4: Technical Description

1. Functional Characteristics

- Real-time Monitoring: Simultaneous Waveform tracking enabling sharp fault detecting.
- Visible Fault Indication: High illumination 360° LEDs efficient indication visibility from all directions during day & night.
- Group installation: The indicators are typically installed in a set composed of 3 PCS; one device has 4G communication capability.
- Bluetooth Communication: Local communication between master/slaves, and between operator mobile/all devices for data exchange and configuration.
- The smart fault indicator enhances power distribution safety by reducing downtime, improving maintenance efficiency, and minimizing manpower costs.

2. Functional Description

The Smart overhead line fault indicator is an advanced device used in smart grids to detect and communicate faults in overhead power distribution networks ranging from 220V to 70kV. It integrates sensing technology, Bluetooth & GPRS communication to monitor the power lines in real time. When a fault is detected, the indicator LED lights flashing immediately & visible in all directions. This allows maintenance personnel to locate the fault both during the day and at night.



3. Technical Specifications

Contents	Specification
OEM	EECC
Country	Saudi Arabia
Products name	Smart OHL Fault indicator integrated with communication Module
Model	EECC-SFPI
Installation	1)Outdoor installation. 2)Bare/Isolated conductor.
Conductor cable diameter	10mm up to 27mm
Operation voltage	<70KV
Operation frequency	50HZ/60hz
Product dimesnions	Length:200xwidth:92mm
Product Weight	<1kg
Indicator group	- 3 PCS per set. 1- Master, installed with Static IP SIM card. 2- Slave. 3- Slave.
SIM card size	Standard size
Communication model Frequency Bands	LTE-FDD B1/B2/B3/B4/B5/B7/B8/B28/B66 GSM/GPRS/EDGE 850/900/1800/1900MHz
Max. measured current	1500A
Effective measure current	Min. 1A, Max.1000A
Min load requirement	Zero load
Trip current setting	1~1000A configurable, 1A step
Short circuit fault current delta setting	1~1000A configurable, 1A step
Grounding fault current increment delta setting	1~1000A configurable, 1A step
Response (delay) time	40~1000ms, configurable, 20ms steps.
Re-closing time (Breaker waiting time)	1~900s, configurable, 1s steps.
Faults detection types	Phase to phase
	Phase to ground
Fault Indication Method	High Lamination 360° LED blinking. 1- Permanent Short Circuit:



EECC Smart Fault Passage Indicator Datasheet

	RED Color LED. 2- Transient Short Circuit: RED + YELLOW Color LEDs. 3- Earth Fault: RED + YELLOW Color LEDs.
Indication Visibility Distance	- During Night > 1000m. - During Day > 100m.
Reset Types	1) Voltage & Current restoration Automatic reset. 2) Timer Automatic reset. 3) Local Manual reset via Android App. 4) Remote Reset via SCADA.
Automatic Reset Timer	1 ~2880 min (1 min to 48hr) Configurable, steps of 1 minute.
Power Supply	1) Design with 3.7V, 1200mAh, 16500/17500 rechargeable battery, 2pcs, total: 2400mAh. 2) Design with 4pcs, 5V, total 75x4=300mAh solar panel to charge the batteries, make sure the battery can supply uninterrupted power. 3) Design with a CT-recharge resource for FPI at same time.
Battery	Model: 16500/17500. Capacity: 3.7V*1200mAh Quantity: 2 PCS
Smart power on/Off switching	Cellular Communication can be switched on/off easily by passing magnet near the device in order to save battery during the device being stored.
Network communication	GPRS/GSM, 2G/4G network
Radio Communication	2.4G, Bluetooth
Protocol	IEC60870-5-104. Indicator as a Master, SCADA Side as a Slave.
SMS function	*Max. 10 phone number registered *Periodically transmit an SMS "heartbeat" * Transmit indicating message when fault create
Android App	Available, 2.4G Bluetooth
Current withstands	25KV/160ms
Battery life	>10years
Indicating time	>1500 hours
Working temperature	-10 °C to +75 °C



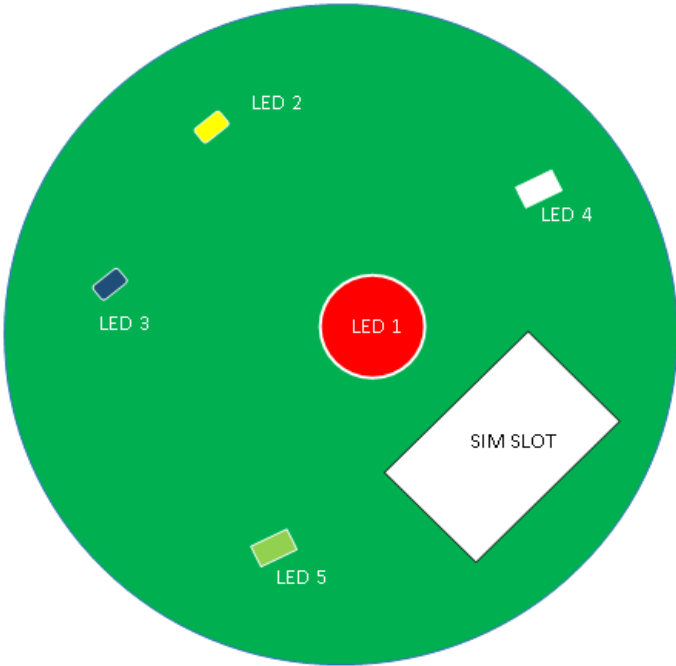
Protection grade	IP68
STANDARDS/TESTS	01-SDMS-01 / 38-SDMS-05 IEEE 495 IEC 60068-2-11 IEC 61000-4-2 IEC 61000-6-2 IEC 62689 IEC 60870-5 IEC 61850



Part 5: Communication Description

1. LED Signals

Signal Description	Signal Translation
Permanent Fault	LED 1 (Blinking)
Temporary Fault	LED 1 + LED 2 (Blinking sequentially)
Earth Fault	LED 1 + LED 3 (Blinking sequentially)
2.4G Bluetooth Cycle	LED 5
GPRS Cycle	LED 4





3. Wide Area Network (WAN)

2. Fault Type Identification:

The system accurately identifies faults and communicates fault details via SMS and IEC104 to maintenance teams.

3.1 Reset Functions:

1. **Voltage and Current Restore:** Automatic reset once voltage and current return to normal.
2. **Timing Interval:** The system automatically resets after a defined interval.
3. **Remote Reset via Android App:** Maintenance personnel can reset the system remotely using a mobile app.
4. **Remote Reset via SCADA:** Remote reset functionality integrated with the SCADA system.

3.2 Power Supply Design:

1. **Battery:** Uses two 3.7V, 1200mAh 16500/17500 rechargeable batteries (total capacity: 2400mAh).
2. **Solar Panels:** Four 5V solar panels (75mAh each, total: 300mAh) ensure uninterrupted battery charging.
3. **CT-Recharge:** Additional power recharge using a current transformer (CT) for continuous power.



3.3 Energy-Saving Features:

- **Bluetooth and 4G Module Activation:** The system uses a magnet to turn the Bluetooth and 4G modules on/off, conserving energy during storage and delivery. The modules activate automatically when grid power is detected.

3.4 Communication Standards:

- **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.
- **Bluetooth:** Operates on **2.4G** frequency for wireless communication.
- **Protocol:** Uses **IEC60870-5-104**, where the indicator serves as the **Master** and the SCADA system as the **Slave**.



3.5 IEC104 point list:

Type: Single Point Information	
Index	Define
101	FPI 1 permanent fault
102	FPI 1 temporary fault
103	FPI 1 earth fault
104	FPI 1 line on
105	FPI 1 battery voltage low
106	FPI 2 permanent fault
107	FPI 2 temporary fault
108	FPI 2 earth fault
109	FPI 2 line on
110	FPI 2 battery voltage low
111	FPI 3 permanent fault
112	FPI 3 temporary fault
113	FPI 3 earth fault
114	FPI 3 line on
115	FPI 3 battery voltage low
Type: Measured Value Short	
201	FPI 1 current value
202	FPI 1 fault current
203	FPI 1 temperature
204	FPI 1 battery voltage
205	FPI 1 electric field
206	FPI 2 current value
207	FPI 2 fault current
208	FPI 2 temperature
209	FPI 2 battery voltage
210	FPI 2 electric field
211	FPI 3 current value
212	FPI 3 fault current
213	FPI 3 temperature
214	FPI 3 battery voltage
215	FPI 3 electric field



4. Short Messages Service (SMS)

1. SMS Operator Registration:

- Up to **10 mobile numbers** can be registered web server to receive status updates and control the device.

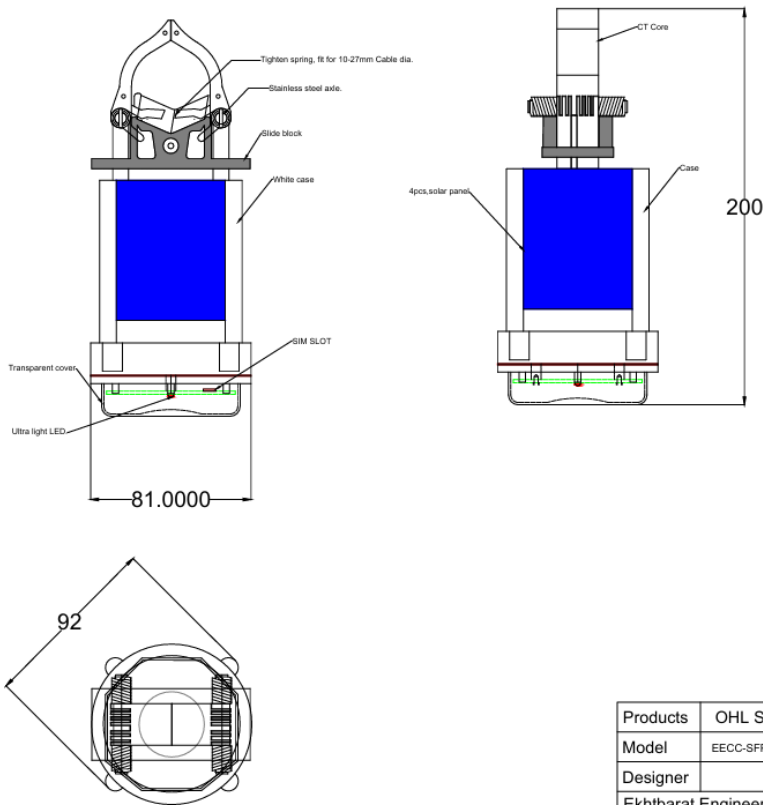
2. SMS Communication Features:

- **Heartbeat Message:** Periodically sends an SMS to verify that the system is operational.
- **Fault Notification:** Sends an SMS alert when a fault occurs, allowing quick response.
- **AT Commands:** Operators can send commands via SMS to configure, test, or reset the device remotely.



Part 6: Dimensions & Installation

1. Unit Dimensions & Installation.



Products	OHL Smart Fault Indicator		
Model	EECC-SFPI	Version	V2024.1
Designer		Date	2024.07.18
Ekhtbarat Engineering Ltd., Co			



2. Smart Fault Passage Indicator Installation diagram



EECC-SFPI OHL Fault indicator designed with a simple and convenient installation method.

It's designed to be instated with an installation adaptor, and an insulating hot stick.

3. Composition

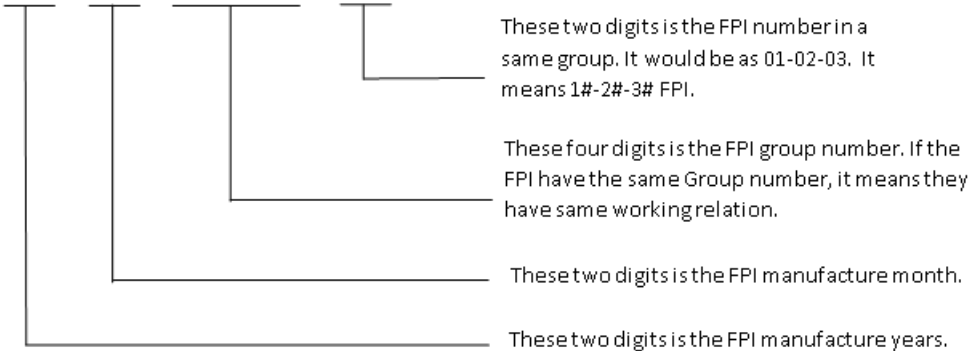
- Each group fault indicator was made up of three-piece indicator. They are corresponding to install for phase A-B-C.
- It includes 1pcs FPI as master, and 2 pcs FPI as Slave during the working and communication relation. Normally, the No#1 FPI as the Master, No#2 and No3# as the slave.



4. Serial Number

- Each SFPI device has its own 10 digits Serial Number, the Serial number is used as a connection address.

□□ □□ □□ □□ □□ □□



Example:

1) Serial No. 24 07 0001 01

- This means the FPI is 2024 year, July manufactured. It is the No.1 FPI, and its group is 0001.

2) Serial No. 24 07 0001 02

- This means the FPI is 2024 year, July manufactured. It is the No.2 FPI, and its group is 0001.

3) Serial No. 24 07 0001 03

- This means the FPI is 2024 year, July manufactured. It is the No.3 FPI, and its group is 0001.

Therefore, this three FPI should install on the same grid line location for phases A-B-C, FPI No.1 should be installed on phase A.



Part 7: Order Placement Tips

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

info@eecl.sa