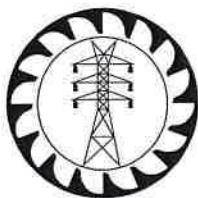


072: 2017

CEB  
SPECIFICATION

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**FAULT PASSAGE INDICATOR SYSTEM  
WITH REMOTE COMMUNICATION  
FACILITY FOR MEDIUM VOLTAGE  
OVERHEAD LINES**



**CEYLON ELECTRICITY BOARD  
SRI LANKA**



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Telephone: +94 11 232 8051

Fax: +94 11 232 5387

**CONTENTS**

	<b>Page</b>
1.0 Scope	3
2.0 System Parameters	3
3.0 Service Conditions	3
4.0 Applicable Standards	3
5.0 Basic Features	3
6.0 Quality Assurance	5
7.0 Additional Requirements	5
8.0 Inspection and Testing	6
9.0 Information to be Furnished with the Offer	7
10.0 Annex	7
Annex- A: Schedule of Technical Requirements and Guaranteed Technical Particulars	8
Annex - B: Non-Compliance Schedule	10



## SPECIFICATION FOR FAULT PASSAGE INDICATOR SYSTEM WITH REMOTE COMMUNICATION FACILITY FOR MEDIUM VOLTAGE OVERHEAD LINES

### 1.0 SCOPE

This specification covers the general requirements of design, manufacture and testing of Fault Passage Indicator with remote communication facility for locating short circuit and earth faults in the 11kV and 33kV overhead lines.

### 2.0 SYSTEM PARAMETERS

(a)	Nominal voltage (U)	11 kV	33 kV
(b)	System highest voltage (Um)	12 kV	36 kV
(c)	System frequency	50 Hz	50 Hz
(d)	Method of earthing	Effectively earthed	Non-effectively earthed
(e)	System fault level	25 kA	25 kA

### 3.0 SERVICE CONDITIONS

(a)	Annual average ambient temperature	30 °C
(b)	Maximum ambient temperature	40 °C
(c)	Maximum relative humidity	90%
(d)	Environmental conditions	Humid tropical climate with heavily polluted atmosphere
(e)	Operational altitude	From M.S.L. to 1900 m above M.S.L.
(f)	Isokeraunic (Thunder days) level	100 days
(g)	Solar Radiation	4.5 kWh/m <sup>2</sup> /day

### 4.0 APPLICABLE STANDARDS

The equipment and components supplied shall be in accordance with the latest editions of the standards specified below and amendments thereof.

(a)	IEC 61000-6-2:2005	Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity standard for industrial environments.
(b)	IEC 60870-5-101:2003	Transmission protocols- Companion standard for basic telecontrol tasks

**However in the event of discrepancy, details given in this CEB specification supersede above standards.**

### 5.0 BASIC FEATURES

#### 5.1. General

- (a) The medium voltage overhead line Fault Passage Indicator shall be of the outdoor type suitable for working in the tropical climate condition stipulated in clause 3.0 above.
- (b) The indicator shall be suitable for mounting on conductors of diameter 5mm - 24mm range of radial 11kV/33kV live lines with a suitable clamp. Line mounting and removing shall be easily and rapidly done with a hot-stick.
- (c) The Fault Passage indicator system shall comprise following modules;
  - i. Three Fault Indicator modules mounted on three phases
  - ii. Communication module (As a separate module or built in to the one of the fault



indicators. If provided separately, it shall be suitable for mounting on line supports such as wood poles / reinforced concrete poles / lattice steel towers etc.)

- (d) The components used in the Indicator shall be suitably protected from direct sunlight to prevent malfunctioning due to solar radiation. The maximum operating temperature shall not be less than 70°C.
- (e) Communication module shall act as a communication gateway between Fault Passage Indicators(at least within 50m) using short-range radio and control centre located remotely using GPRS and GSM communication, and it should support IP based communication using TCP/IP protocol.

The Communication module should support DNP3 and IEC 60870-5-101 protocol standards and it should provide critical information via DNP3 and IEC 60870-5-101 protocols which can be transmitted through the GPRS/GSM modem provided. It shall be able to make all other related configurations over http or SMS technology.

- (f) The Indicator shall be of the programmable type suitable for sensing short circuit faults, earth faults and loss of voltage.
- (g) The Indicators which are detecting the variation of the electromagnetic field due to fault current (Indicators installed between the circuit breaker and fault point shall only sense the fault current) shall only provide intermittent flash indication for a permanent fault. The duration of flash indication shall be adjustable from 2 to 24 hours.
- (h) A secondary flash indication shall also be provided to indicate a transient fault and the duration shall be able to set up to 12 hours.
- (i) Facilities shall be provided to program the sequence of operation of flash lamp indication as required by the purchaser. The Flash indication shall be suitable to provide the following operations.
  - (i) Phase to earth faults and phase to phase/three phase short circuit.
  - (ii) Transient faults.
  - (iii) Loss of voltage.
- (j) The Indicator shall have the following Flash indication resetting facilities;
  - (i) To reset automatically after restoration of supply.
  - (ii) To reset after Programmed duration after occurring of fault.
  - (iii) To reset manually.



- (k) The communication module shall be able to send following messages using http and SMS technology ;
  - (i) Low battery warning
  - (ii) Boot messages
  - (iii) Messages sent to verify the working condition of the equipment in configurable intervals.
  - (iv) Response /Receipt messages sent to the unit
  - (v) Permanent/Transient Faults & Loss of Voltage Alarms
- (l) The Indicator shall be operated as indicated below;
  - (i) It shall not respond to any sudden variations (increase/decrease) in typical load currents.
  - (ii) It shall not respond to inrush currents associated with typical switching operations.
  - (iii) Transient fault detector and indicator shall have enable/disable facilities.
  - (iv) Loss of voltage detection shall have enable/disable facilities.
- (m) Real Time Clock shall be available in the Communication Module in order to have a time stamp in alarms and status messages. There should be a method to ensure the accuracy of the real time clock.

## 5.2. Equipment Housing

The Fault Passage Indicator and communication module (if provided separately) housing shall be made of suitable high strength material and shall be of UV stabilized and flame retarding type. The housing shall be of Ingress Protection (IP) rating 54 (IP 54).

## 5.3. Clamping Mechanism

There shall be a suitable clamping mechanism in such a way that fault indicator can be easily mounted and removed from the live conductors.

## 5.4. Flash Indication

The flash indicator shall be of the neon/xenon/LED type and the flash indication shall be visible for at least 50m in day time and 300m in night time. The flash indicator shall be so designed to allow a uniform 360° monitoring.

## 5.5. Power Supply

The power supply for the operation of the Fault Indicator shall be from a replaceable battery suitable for at least three years trouble free service. Self-supplied power source shall be provided for the communication module if communication module provided separately, enabling it to operate for at least three years.

In addition, it is preferred to have an auxiliary power supply as a backup power source for the communication module.

## 6.0 QUALITY ASSURANCE

The manufacturer shall possess ISO 9001:2008 or latest Quality Assurance Certification for the design, manufacture and testing of Fault Passage Indicators for medium voltage lines. The Bidder shall furnish a copy of the ISO certificate certified as true copy of the original by the manufacturer, along with the offer.

## 7.0 ADDITIONAL REQUIREMENTS

### 7.1. Manufacturing Experience

The manufacturer shall have minimum of ten (10) years experience in Fault Passage Indicators for medium voltage lines. In addition, minimum of five (5) years experience shall be in manufacturing for orders from outside the country of the manufacturer. The product offered has to be in same voltage range of offered item and shall have been used in service utilities over past five (5) years.

Manufacturer shall furnish a list of purchasers with year and quantity of the product offered with the offer to prove his manufacturing experience.

### 7.2. Packing

Fault Indicator modules shall be suitably packed in a bio-degradable packing material to withstand rough handling and carry a label indicating the name of item, model/type No. etc.

If communication module provided separately it shall be separately packed in a bio-degradable packing material to withstand rough handling and carry a label indicating the name of item, model/type No. etc.

### 7.3. Rating Plates or Labeling

Each Fault Passage Indicator shall carry a weather and corrosion proof Rating Plate indicating the following particulars.

- (a) Country of manufacture, manufacturing year and manufacturer's identification.



- (b) Model or type number (as per catalogue)
- (c) Serial no.
- (d) Warranty period
- (e) Battery type, voltage and capacity.
- (f) Voltage level applicable and frequency
- (g) Number and Year of Standard adopted.



#### 7.4. Service and Tools

There should be a reputed and established local service provider who will coordinate with CEB for any technical issues arising after the goods are being procured. The bidder shall furnish an assurance that the necessary spare parts and after sales service will be provided by this local agent to the fullest satisfaction of the CEB, for at least next ten (10) years. A list of free spare parts and tools supplied shall be furnished with the offer.

Software and necessary hardware accessories (if required) shall be provided free of charge for configuration, testing and operation of Fault Passage Indicators.

Suitable installation tool shall be supplied to mount (or unmount) the fault indicator in the live line. One tool for every 30 Fault Passage Indicator systems and part thereof shall be provided. Installation tool shall be easily attached to an Operating Rod with a universal head.

#### 7.5. Warranty

A comprehensive warranty of 2 years shall be provided for the Fault Passage Indicator system.

#### 7.6. Technical Literature and Drawings

The selected bidder shall supply along with the Indicator relevant drawings and technical literature including method of installation, operation instruction and maintenance details.

### 8.0 INSPECTION AND TESTING

#### 8.1. Test Certificates

Following test certificates shall be furnished with the offer;

- (a) To confirm the operational performance of the Fault Passage Indicator as per Clauses 5.1 (e) to (m) and 5.2.
- (b) Electromagnetic compatibility (EMC) tests as per IEC 61000-6-2. The EMC test certificates shall clearly identify the equipment concerned showing the Manufacturer's identity, type number and basic technical parameters.

Test certificates referred to shall be from an **accredited independent testing laboratory acceptable to the CEB**. Proof of accreditation by a national/ international authority shall be forwarded with the offer. Test reports shall be complete including all the pages as issued by the testing authority and shall be in English language. Parts of test reports shall not be acceptable.

#### 8.2. Inspection

The Successful bidder shall make necessary arrangements for inspection by an Engineer appointed by the CEB and also to carry out in his presence necessary performance tests to confirm the operation of the Fault Passage Indicator as per Clauses 5.1 (e) to (j). CEB may waive off the inspection with the condition of witnessing the aforesaid performance tests by an independent testing authority acceptable to CEB. In such a situation a notice of waive off will be

issued in advance to the supplier.

## 9.0 SAMPLE

One complete sample of fault passage indicator with configuration software offered shall accompany the Bid to facilitate analysis and evaluation. The samples of the unsuccessful bidders will be returned once the award is made. The sample of the successful bidder would be retained and set off from the total quantity to be supplied.

## 10.0 INFORMATION TO BE FURNISHED WITH THE OFFER

The following shall be furnished with the offer.

- (a) Comprehensive catalogues describing the technical features, operating instructions of the equipment and indicating the Model Number.
- (b) Device profiles of DNP3 and IEC 60870-5-101 protocols.
- (c) Test Certificates in accordance with the clause 8.1.
- (d) Duly filled and signed 'Annex - B: Schedule of Technical Requirements and Guaranteed Technical Particulars'.
- (e) Documents to prove manufacturer's experience in accordance with clause 7.1.
- (f) Documentary evidence in accordance with clause 7.4 and 7.5
- (g) ISO 9001:2008 or latest Quality Assurance Certificate in accordance with clause 6.

## 11.0 ANNEX

Annex – A: Schedule of Technical Requirements and Guaranteed Technical Particulars

Annex – B: Non-Compliance Schedule







**SCHEDULE OF TECHNICAL REQUIREMENTS AND GUARANTEED TECHNICAL PARTICULARS**  
 (CEB Requirements shall be filled by the procurement entity and information of the offer shall be filled by the manufacturer)

		CEB Requirement	Offered
1.	Name of the Manufacturer		
2.	Country of Origin		
3.	Applicable voltage level	kV	
4.	Operating frequency	Hz	
	<b>Fault Indicator</b>		
5.	Model No.		
6.	Housing material and whether the housing material treated to prevent deterioration due to ultraviolet radiation of sun	Yes/No	Yes
7.	IP rating of the housing	IP 54	
8.	Operating temperature (max.).	°C	70
9.	Type of main flash indicator		
	(i) Visibility distance of flash indicator day/night	m	50/300
	(ii) Duration.	hours	As per clause 5.1 (g)
	(iii) Whether all direction visibility available.	Yes/No	Yes
10.	Whether resetting facilities provided as per clause 5.1 (i)	Yes/No	
11.	Whether the Indicator can be programmed to provide the following operations;		
	(a) Phase to earth faults and phase to phase/three phase short circuit.	Yes/No	Yes
	(b) Transient faults.	Yes/No	Yes
	(c) Loss of voltage.	Yes/No	Yes
12.	Type of secondary indication provided to monitor the transient faults.		
	(i) Whether the secondary indication is visible from the ground underneath.	Yes/No	Yes
	(ii) Duration.	hours	As per clause 5.1 (h)
13.	Type of sensors and/or the methods used in fault detection		
14.	Whether the equipment will not respond to typical sudden variation (increase/decrease) in load current.	Yes/No	Yes
15.	Whether the equipment will not respond to high magnetizing inrush current.	Yes/No	Yes
16.	Whether the equipment is non-directional type.	Yes/No	Yes
17.	Type and model of Battery provided.		
18.	Lifetime of the battery.	Years	Minimum 3
19.	Capacity of the battery	Ah	
	<b>Communication Module</b>		
20.	Model No.		
21.	Housing material and whether the housing material treated to prevent deterioration due to ultraviolet radiation of sun		
22.	IP rating of the housing		
23.	Operating temperature (max.).		
24.	Mounting mechanism if communication module provided separately		
25.	Whether resetting facilities provided as per clause 5.1 (i)	Yes/No	Yes
26.	Maximum communication distance with Fault Passage Indicator if provided separately	m	
27.	Whether the Real Time Clock is available?	Yes/No	Yes



28.	Whether the inbuilt GPRS modem available?	Yes/No	Yes	
29.	Whether the SMS alarm forwarding facility available?	Yes/No	Yes	
30.	Whether the alarm and status messages are time stamped?	Yes/No	Yes	
31.	Method of time synchronizing			
32.	Whether messages as per clause 5.1 (k) can be sent?	Yes/No	Yes	
33.	Communication protocols supported			
	(a) DNP3	Yes/No	Yes	
	(b) IEC 60870-5-101	Yes/No	Yes	
	(c) Other	Specify		
34.	Type and model of Battery provided.			
35.	Lifetime of the battery for continuous operation of the communication module	Years	Minimum 3	
36.	Capacity of the battery	Ah		
37.	Whether complete sample as per clause 9.0 provided?	Yes/No	Yes	
38.	Whether tools as per clause 7.4 provided with the offer?	Yes/No	Yes	
39.	Whether the Test Certificates as per Clause 8.1 furnished	Yes/No	Yes	
40.	Whether the ISO 9001:2008 or latest Quality Assurance Certification furnished?	Yes/No	Yes	
41.	Whether information provided with the offer as per clause 10.0?	Yes/No	Yes	

.....  
Signature and seal of the Manufacturer

.....  
Date

I/We certify that the above data are true and correct

.....  
Signature and seal of the Bidder

.....  
Date



**Non-Compliance Schedule**

On this schedule the bidder shall provide a list of non-compliances with this specification, documenting the effects that such non-compliance is likely to have on the equipment life and operating characteristics. Each non-compliance shall be referred to the relevant specification clause.

Clause No.	Non-Compliance

.....  
**Signature and seal of the Manufacturer**

.....  
**Date**

**I/We certify that the above data are true and correct**

.....  
**Signature and seal of the Bidder**

.....  
**Date**

