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Kenya Power

SPECIFICATION FOR OVERHEAD LINE FAULT INDICATORS

A Document of the Kenya Power & Lighting Plc

January 2024

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Head of Section, Standards Development	Head of Department, Standards
Signed:	Signed:
Date: 2024-01-15	Date: 2024-01-15

0.1 CIRCULATION LIST

COPY NO.	COPY HOLDER
1	Manager, Standards
2	Electronic copy (pdf) on Kenya Power server (http://172.16.1.40/dms/browse.php?FolderId=23)

REVISION OF KPLC STANDARDS

To keep abreast of progress in the industry, KPLC Standards shall be regularly reviewed. Suggestions for improvements to approved Standards, addressed to the Manager, Standards Department, are welcome.

Head of Section, Standards Development	Head of Department, Standards
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0.2 AMENDMENT RECORD

Rev No.	Date (YYYY-MM-DD)	Description of Change	Prepared by (Name & Signature)	Approved by (Name & Signature)
0	2023-12-14	New issue	Eng B. Dianga	Dr. Eng. Peter Kimemia

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0.3 FOREWORD

This specification has been prepared by the Standards Department in collaboration with Distribution Network, both of The Kenya Power and Lighting Company Limited. The specification lays down requirements for Overhead Line Fault Indicator. This specification is intended for use by KPLC to procure the Overhead Fault indicator.

A key performance indicator in any distribution network is the time taken to restore supply after a supply interruption. One of the management tools used to measure the network performance is SAIDI- System Average Interruption Duration Index. It measures how long it takes before an outage is resolved and customers are restored back to supply.

Restoration of supply after an interruption however, only happens after the source of fault has been found. Its therefore important that the methodology used to trace and find faults should shorten the search time. This is exactly what the remotely monitored Overhead Line Fault Indicator has been designed for; to quicken the locating the section of the line which has a fault. This specification stipulates the minimum requirements for Overhead Fault indicators acceptable for use in KPLC power network.

There are no other specifications in this series.

It shall be the responsibility of the suppliers and manufacturers to ensure that the offered design is of the highest quality and guarantees excellent service to KPLC, good workmanship and good engineering practice in the manufacture of the overhead line fault indicator.

Users of Kenya Power specifications are responsible for their correct interpretation and application.

The following are members of the team that developed this specification:

Name	Department
Benson Dianga	Standards
Zadock Rotich	Distribution Network
Bernard King'esi	Distribution Network

Head of Section, Standards Development	Head of Department, Standards
Signed:	Signed:
Date: 2024-01-15	Date: 2024-01-15

1. SCOPE

1.1. This specification covers technical requirements for overhead line fault indicator, that shall be used by KPLC's Distribution Network Department.

1.2. The specification covers requirements for Design, Inspection and Tests , Installation and Training of Overhead Fault Indicator.

2. NORMATIVE REFERENCES

The following standards contain provision which, through reference in this text, constitute provisions of this specification. For dated editions the cited edition will apply; for undated editions the latest edition of the referenced document shall apply.

IEC 61557-1: Electrical safety in low voltage distribution systems up to 1,000Vac and 1,500Vdc - Equipment for testing, measuring or monitoring of protective measures. Part 1- General requirements

IEC 60815: Selection and dimensioning of high voltage insulators intended for use in polluted conditions –Part 1: Definitions, information and general principles

OIML D 11: General Requirements for Measuring Instruments - Environmental Conditions

CISPR 22 Electromagnetic Compatibility (EMC) – Part 4-2:,Part 6-2

IEEE 495 4.4.8 Testing guides, conditions procedures, and test for faulted circuit indicators

IEC 60529: Degrees of protection provided by enclosures (IP code)

ISO 9001: Quality Management Systems – Requirements

ISO/IEC 17025: General Requirements for the competence of testing and calibration laboratories.

IEC 61000 Measurement methods, equipment, and interpretation of applicability of limit lines

IEC 60060 High voltage test technics

ISO 16508 Recommendations of the CIE for the colours of signal lighting and illuminations.

IS 9708(1993) Stockbridge Vibration damping properties for overhead power lines

3. DEFINITIONS AND ABBREVIATIONS

For the purpose of this specification, the definitions and abbreviations given in the reference standards shall apply together with the following abbreviations.

3.1. Abbreviations

KPLC- Kenya Power and Lighting Company Plc

ISO – International Organization for Standardization.

LED –Light Emitting Diode

Kg –Kilogram

kV - Kilovolt

IP – Ingress Protection

LV – Low Voltage

EMC – Electromagnetic Compatibility

EU – European Union

SCADA-Supervisory Control and Data Acquisition

DCU- Data concentrator Unit

IEC-International Electrotechnical Commission

SAIDI- System Average Interruption Duration Index

EMC Electromagnetic Compatibility

SFI Slave Fault Indicator

MFI Master Fault Indicator

FIDMS Fault Indicator Data Management System

4. REQUIREMENTS

4.1. Service Conditions

4.1.1 The overhead line fault indicator shall be suitable for continuous outdoors use in tropical areas and in harsh climatic conditions including areas exposed to:

a) Altitudes of up to 2200m above sea level;

b) Humidity of up to 90%;

c) Average ambient temperature of +30°C with a minimum of -1°C and a maximum of +40°C

d) Isokeraunic levels of up to 180 thunderstorm days per year.

e) Pollution (IEC 60815) Very Heavy: Class IV

4.2. Design and Construction

4.2.1 The overhead line fault indicator shall be designed, manufactured and tested according to IEC 61557.

4.2.2 The Overhead Line Fault Indicator shall be electronic and shall be designed for application on specific voltage class of 11kV,33kV,66kV and 132kV overhead lines operating at 50Hz. The network voltage that the fault indicator will monitor shall be specified for each tender.

4.2.3 A fault indicator set shall be able to monitor line sections and chainage of 10km on either side of its mounting position.

4.2.4 The fault indicator shall detect phase to phase faults, three phase to ground fault, earth faults, transient faults and voltage losses on any of the network phases it is installed .

4.2.5 The measurement accuracy of the fault indicator shall be 98% or better over the range rated minimum to rated maximum voltages and shall operate between 97% and 103% of the nominal operating frequency of 50Hz.

4.2.6 The fault indicator shall be able to withstand without damage, transient voltages that may appear on the distribution system up to the line rated voltage power frequency values. The transient voltages shall not affect its operational functionality.

4.3 Fault Indicator Module

4.3.1 The fault indicator shall be supplied in sets that consist of three(3) unit modules. For each set, two(2) modules shall be the Slave Fault Indicator(SFI) modules, and one(1) unit shall be Master Fault Indicator(MFI) module.

4.3.2 During general operation and service, each of the three modules shall be mounted on each of the three phases of medium voltage (MV) or high voltage(HV) lines.

4.3.3 The function of the Slave Fault indicator module shall be to monitor and record data of the line phase on which it's mounted. The Slave module shall be configured to send data to the Master Fault indicator.

4.3.4 The function of the Master Fault indicator module shall be to monitor and record data of the line phase on which it's mounted. The Master Fault Indicator module shall also receive data

sent by the Slave Fault Indicators mounted on other two line phases. The Master Fault indicator shall send all the three phase line monitoring data to Fault Indicator Data Management System(FIDMS).

4.3.5 The fault indicators shall be designed to be mounted on the conductors using standard voltage rated insulated hot/link sticks. The mounting shall be through a screw-in-place clamping on conductors whose overall diameter shall be between 18.3mm and 32mm(suitable for 300mmsq). The indicator shall have an adapter that connects to the link stick's mounting rod socketing ends.

4.3.6 The fault indicator shall detect low level faults, and within minimum operating time of 50ms.The operating time and other signal processing settings shall be configurable depending on the network and voltage class on which it shall be installed.

4.3.7 The operating settings and calibration for the fault indicator shall be configured during commissioning. However, the design shall also allow for remote configurations by the operator pilot at the Fault Indicator Data Management System (FIDMS) terminal desk.

4.3.8 The fault indicator's electronics shall have protection against abnormal surges, switching transients and over voltages as experienced during faults conditions.

4.3.9 The overhead fault indicator shall draw its power from the phase circuit on which it is mounted. The units shall not be powered by an external power source.

4.3.10 The fault indicator shall be equipped with batteries of adequate rating resources to support the equipment power demands for at least 10hours of main line outage. The fault indicator shall have its own battery charging circuitry.

4.3.11 The fault indicator standby battery shall be a long-life lithium based, with a minimum of 10years of service life before replacement.

4.3.12 The fault indicator shall be equipped with an illuminating strobes that visually guide to a fault location. The strobe shall be a low power consuming, coloured lighting that are visible from up to 50m in daylight and up to 200m at night in compliance with ISO 16508-1999.

4.3.13 The fault indicator outer casing shall be resistant to weather elements, high voltage corona effects, ultra violet radiation degradation and shall be of minimum IP67 minimum protection index, in accordance with IEC 60529.

4.3.14 The fault indicator shall be compatible to radio interference requirements and shall comply to CISPR 22 requirements.

4.3.15 The fault indicator current pick-up shall be configurable depending on the network voltage class and fault current thresholds according to IEC 61000-4-2,3,4,6

4.3.16 The fault indicator shall have a minimum of 400Amp current metering band with an average accuracy and precision of 99.5%

4.3.17 The master fault indicator shall have a maximum weight of 4.0kg designed with vibration damper properties in compliance with IS 9708

4.4 Communications

4.4.1 The communication architecture of fault indicators units shall be in two(2) levels;

i. Between Slave Fault Indicator(SFI) unit and the Master Fault Indicator(MFI) unit and
ii. Between Master Fault Indicator(MFI) and the Fault Indicator Data Management System(FIDMS)

4.4.2 The Slave Fault Indicator (SFI) unit and the Master Fault Indicator (MFI) shall communicate via a suitably configured radio link. The manufacturer shall indicate scalability by stating how many Slave Fault Indicator (SFI)s modules can connect to one Master Fault Indicator(MFI).

4.4.3 The local radio communication between the fault indicators shall be protected by AE128 encryption standard

4.4.4 The communication between the Master Fault Indicator (MFI) and the online Fault Indicator Data Management System(FIDMS) shall be bi-directional and shall be via any of the following: GSM/GPRS/2G/3G/4G/EDGE/ NB-IoT .

4.4.5 The Master Fault Indicator(MFI) shall send data to Fault Indicator Data Management System(FIDMS) via the in-built gateway shield on the Master Fault Indicator(MFI)

4.4.6 The Fault indicators and its data management systems communication shall be on a VPN framework with required security provisions.

4.5 The Fault Indicator Data Management System(FIDMS)

4.5.1 The Fault detection solution shall have a back-end program that runs either on the vendor's online(and therefore web accessible) resources or installable on KPLC servers.

4.5.2 The programs shall process, record and store grid data, grid analytics reports on power flow, fault location and other network management transcripts.

4.5.3 The programs shall allow access to required reports and parameters such as power quality, power factor, phase angle, sequence harmonics and faults data. Data shall have time footings.

4.5.4 The program shall also provide online instantaneous grid visibility, when queried. Status refreshing frequency shall be configurable and allow for setting by the operator.

4.5.5 The back-end fault indicator management system shall be protected by a robust and secure cyber firewall to deter interference, noise and interceptions.

4.5.6 The back-end management system shall be accessible from any client terminal front end on the corporate network resources through a web-based application.

4.5.7 The web based application shall be user friendly, with easier to navigate Graphics User Interfaces(GUI) modules for load mapping on a geo-location panel.

4.5.8 The program shall also have a mobile application version that runs on Android platform allowing users and network managers to access reports, receive alarms and other hot notifications on mobile devices.

4.5.9 The Fault Indicator Data Management System(FIDMS) shall have provisions for APIs for integration with existing KPLC network management and operating schemes.

4.5.10 Fault Indicator shall have the technical particulars as shown in Table 1 below.

Table 1: Technical particulars of Network Fault indicator

Parameter	Description
Operating temperature	- 5°C--- +55°C
Storage temperature	- 5 ... +60 °C
Humidity range - Rel. humidity	20% -- 96%, non-condensing
Voltages of Application (Selectable)	11kV, 33kV, 66kV & 132kV
Max. load(measuring) current	800A
Accuracy	95.5%
Short-circuit Current withstand	25kA 3s
Earth-fault Response Delay	3s
Strobe blinking	Colour: Configurable to alarm type Configurable: Default 15 Flashes per Minute
Protection Class	IP67
Indicator Battery	Lithium battery 3.6V / 2.7Ah, replaceable
Battery Life	10 years
Max Indicator weight	4.0 kg Max
Clamp Diameter Range	18.3mm and 32mm. (300mmsq conductor).
Communication	RF transceivers 433MHz GSM/GPRS/2G/3G/4G/EDGE/ NB-IoT
Protocols	IEC101, IEC104, DNP3.0, Modbus GPRS UDP,TCP, Modbus RTU,
Internal Type Test	According to IEEE495-2007

5. TESTS REQUIREMENTS

5.1 The overhead fault indicator shall be inspected and tested in accordance with IEC 61243, IEC 60832, IEC 61010-1, IEC 61481, IEC 60664- 1 & 3, IEC 61326, IEC 60112, IEC 60068, IEC 61000, IEC 60965 and IEC 60529 standards and this specification. It shall be the responsibility of the manufacturer to perform or to have performed all the tests specified. Tenderers shall confirm the manufacturer's capabilities in this regard when submitting tenders. Any limitations shall be clearly specified.

5.2 Copies of previous Test/calibration Reports issued by own or a third-party testing laboratory that is accredited to ISO/IEC 17025:2005 or 17025:2017 confirming accuracy and compliance of the overhead line fault indicator offered shall be submitted with the offer for evaluation (all in English Language).

5.3 Copies of test/calibration reports for the overhead line fault indicator offered to be submitted

a) Routine Tests

i. Visual and dimensional inspection
ii. Grip force and deflection
iii. Vibration resistance
iv. Torsion and tension of the adaptor.
v. Drop resistance
vi. Shock resistance
vii. Climatic dependence
viii. Degree of protection
ix. Durability of markings
x. Functional tests on the instruments

b) Type tests for equipment performance

i. Electromagnetic compatibility (EMC)
ii. Impulse overvoltage tests on the equipment -Clearances
iii. Dielectric voltage withstands tests on the equipment - Controlled overvoltage

c) Functional tests on the instruments that shall include:

i. Clear indication
ii. Clear perceptibility of visual indication
iii. Frequency dependence
iv. Response time
v. Power source dependability
vi. Check of testing element
vii. Non-response to d.c voltage
viii. Time rating

d) Type tests for printed circuit board coating performance

i. Environmental, humidity and thermal conditioning tests
ii. Dielectric voltage withstand tests
iii. Protection against bridging for indoor/outdoor type
iv. Protection against bridging for outdoor type
v. Spark resistance
vi. Comparative tracking index (CTI)
vii. Resistance to soldering heat test
viii. Flammability test
ix. Coating adhesion test
x. Insulation resistance between conducting parts

6.0 MARKING AND PACKING

6.1. MARKING

The following information shall be marked legibly and permanently on the overhead line fault indicator.

i. The Manufacturer's Name or Trade Mark;

ii. Voltage designation

iii. Model Number

iv. Serial Number;

v. Letters "Property Of Kenya Power & Lighting Plc "

6.2. PACKING

6.2.1. The overhead line fault indicator shall be packed in a carrying case so as to protect it from damage and entry of moisture during transportation, handling and storage.

6.2.2. The carrying case shall shock proof and impact resistant and shall be able to withstand a fall of overhead line fault indicator

7.0 WARRANTY

7.1 The overhead line fault indicator shall be backed by a minimum of 12-months warranty period.

7.2 Technical support and software upgrade, for the fault indicator where applicable shall be provided free of charge to KPLC for a period of not less than 36 months.

7.3 The Bidder shall submit a clause by clause statement of compliance with the specifications(GTP) together with copies of the manufacturer's catalogues. brochures, technical data and proven test reports. all in English for evaluation, according to Appendix C1 of this Specification The manufacturer's type reference/designation of the item offered shall be indicated

7.4 In the case of tender award, technical details for the overhead line fault indicators shall be submitted to the Kenya Power for approval before manufacture commences. according to Appendix C2 of this Specification.

8.0 TRAINING

8.1 Training at the manufacturer Premises

8.1.1 The successful bidder/manufacturer shall arrange to conduct a Factory Acceptance Test for the manufactured Overhead Fault Indicators. The Factory Acceptance Test shall include training for the overhead fault indicator for four (4) KPLC Engineers/Technicians. At least two (2) of the Engineers/Technicians shall be users.

8.1.2 The training shall include theory followed by practical demonstrations on how to install the fault indicators on a live network and a guide on correct use for achieving correct measurement results. All the operational procedures shall be exhaustively explained and demonstrated.

8.1.3 The manufacturer shall plan adequate time for the training which shall be conducted by the manufacturer's expert. The duration and location of the training shall be determined by the manufacturer.

8.1.4 The training shall be dimmed successful once the engineers/technicians are able to install, test and operate the equipment.

8.1.5 The manufacturer shall meet all the total cost of the factory training.

8.2 . Local Training

8.2.1 Following the delivery of the overhead fault indicator, the manufacturer shall conduct training for the equipment in Nairobi, Kenya. The training shall be conducted in one session of 20 KPLC engineers/technicians. The session shall last at least three (3) days

8.2.2 The training shall include theory on features and how the equipment works followed by practical demonstrations including parameter settings. All steps shall be exhaustively explained and demonstrated.

8.2.3 The Training shall be considered to have been successful once the engineers/ technicians are able to completely install, test and operate the equipment.

8.2.4 The supplier shall meet all the costs for conducting the local training, including local accommodation and transport for their training staff. The supplier shall provide all the training materials including notes.

APPENDICIES:

A: TESTS AND INSPECTION (Normative)

A.1 It shall be the responsibility of the supplier to test or to have all the relevant tests performed on the overhead line fault indicator.

A.2 Copies of previous Test/calibration Reports of overhead line fault indicator issued by own or a third party testing laboratory that is accredited to ISO/IEC 17025:2005 or 17025:2017 shall be submitted with the tender for the purpose of technical evaluation. A copy of the accreditation certificate for the testing laboratory shall also be submitted with the tender (all in English Language). Any translations of certificates and test reports into English language shall be signed and stamped by the Testing Authority.

A.4 On receipt of the Overhead Fault indicator, Kenya Power will inspect the items and may perform relevant tests in order to verify compliance with the specification. The supplier shall replace without charge to Kenya Power, any overhead line fault indicator unit which upon test or use fail to meet any or all of the requirements in the specification.

B: QUALITY MANAGEMENT SYSTEM (Normative)

B.1 The supplier shall submit a Quality Assurance Plan (QAP) that will be used to ensure that the overhead line fault indicator physical properties, tests and documentation, will fulfill the requirements stated in the contract documents, standards, specifications and regulations. The QAP shall be based on and include relevant parts to fulfill the requirements of ISO 9001: 2015.

B.2 The Manufacturer's Declaration of Conformity to applicable standards and copies of quality management certifications including copy of valid and relevant ISO 9001:2015 certificate shall be submitted with the tender for evaluation.

B.3 The bidder shall indicate the delivery time of the equipment. A detailed list & contact addresses (including e-mail) of the manufacturer's previous customers for similar type of the fault indicator sold shall be submitted with the tender for evaluation.

C: TECHNICAL DOCUMENTATION (Normative)

C.1 The bidder shall submit its tender complete with technical documents for tender evaluation. The technical documents to be submitted (all in English language) for tender evaluation shall include the following:

a) Fully filled clause by clause guaranteed technical particulars (GTP) signed by the manufacturer; as indicated in Appendix D of this Specification.

b) Copies of the Manufacturer's catalogues, brochures, drawings giving all relevant dimensions, Wiring diagram / Schematic Diagram and technical data;

c) Records for previous projects, local or foreign, for the items;

d) Details of manufacturing capacity and the manufacturer's experience;

e) Copies of required test/calibration reports of testing/calibrating laboratory accredited to ISO/IEC 17025;

f) Copy of accreditation certificate to ISO/IEC 17025 for the testing/calibrating laboratory;

g) Manufacturers letter of authorization, ISO 9001 certificate, and other technical documents required in the tender.

h) Manufacturer's warranty and guarantee; subject to 12 months from date of delivery of items to KPLC stores.

i) Operational and service manual for the items

C.2 The successful bidder (supplier) shall submit the following documents/details to The Kenya Power & Lighting Company for approval before manufacture:

a) Fully filled clause by clause guaranteed technical particulars (GTP) stamped and signed by the manufacturer; as indicated in Appendix D of this Specification

b) Drawings of the overhead line fault indicator to be manufactured for KPLC.

c) Product operation manuals and brochures,

d) Quality assurance plan (QAP) used to ensure that the design, material; workmanship, tests, service capability, maintenance and documentation will fulfill the requirements stated in the

contract documents, standards, specifications and regulations. The QAP shall be based on and include, relevant parts to fulfill the requirements of ISO 9001:2015

e) Marking details and method to be used in marking the Overhead Line Fault Indicator ;
f) All documentation necessary for safety of the equipment.
g) Packaging details (including packaging materials).

C.3. The supplier shall submit recommendations for use, care, storage and routine inspection/testing procedures, all in the English Language, during delivery of the overhead line fault indicatorto KPLC stores.

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D: GUARANTEED TECHNICAL PARTICULARS (Normative)

To be filled and signed by the Manufacturer and submitted together with relevant copies of the Manufacturer's catalogues, brochures, drawings, technical data, sales records for previous five years, four customer reference letters, details of suppliers' capacity and experience; and copies of complete type test certificates and test reports for tender evaluation, all in English Language)

Tender No. .....

Bidder's name and Address.....

Clause number	Requirement	KPLC Requirement	Bidder's offer
	Manufacturer's Name and address	State	
	Country of Manufacture	State	
	Name and model Number	State	
	Manufacturer's Name and address	State	
1.0	Scope	State	
2.0	Normative References	State	
3..0	Definitions and Abbreviations	State	
4.0	**Requirements**		
4.1	Service Conditions	State	
4.2	**Design and construction**		
4.2.1	Standard of design and manufacture	State	
4.2.2	Application Voltage, Frequency	Specify	
4.2.3	Monitoring range of one indicator unit	State	
4.2.4	Faults and line abnormalities detection types	State	
4.2.5	Monitoring and measurement accuracy and	State	

Clause number	Requirement	KPLC Requirement	Bidder's offer
4.2.6	Durability against line faults	State	
4.3	**The Overhead Line Fault Indicator**		
4.3.1	Module design and packaging	State	
4.3.2	Mounting type and conductor clamp sizes	State	
4.3.3	Module function elements 1	State	
4.3.4	Module function elements 2	State	
4.3.5	Mounting type and provisions	state	
4.3.6	Line fault protection schemes	state	
4.3.7	Settings and Calibration provisions	state	
4.3.8	Protection against line faults	state	
4.3.9	Power Supply Schemes	state	
4.3.10	Battery type and hold up time	State	
4.3.11	On board charging circuit and battery service life	State	
4.3.12	Physical indication facility and range of visibility	State	
4.3.13	Degree of casing protection and IP indices.	State	
4.3.14	Compatibility and compliance to EMC requirements	State	
4.3.15, - 4.3.16	Current pick up measurement ranges	State	
4.3.17	Weight of each Fault indicator Unit.	State	
4.4	**Communications**		
4.4.1	Communication architecture and design for the fault indicator	State	

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Clause number	Requirement		KPLC Requirement	Bidder's offer
4.4.2	The communication link and type between the fault detection and terminal units.		State	
4.4.3	Security provisions for communication modules/channels		Specify	
4.4.4-4.4.5	WAN Communication Gateway type/module		Specify	
4.5	**The Fault Indicator Data Management System(FIDMS)**			
4.5.1-4.5.3	Design architecture of back-end fault indicator management system		Specify	
4.5.4	The program facility resources and coverage		Specify	
4.5.5	Cyber security schemes on program.		Specify	
4.5.6	Accessibility application of the fault indicator management system		Specify	
4.5.7	Operating Panel of the fault indicator management system		Specify	
4.5.8	Mobile application of the fault indicator management system		Specify	
4.5.9	Integration and compatibility resources with other programs		Specify	
4.5.10	Table 1 Technical particulars of Network Fault indicator			
	Table 1Technical particulars			
	Parameter	**KPLC Requirements**		
	Application Voltage	11kV, 33kV, 66kV & 132kV	State	
	Max. load/fault current	800A	State	
	Accuracy	>95.5%	State	
	Short-circuit Current withstand,time	25kA, 3s	State	

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Clause number	Requirement		KPLC Requirement	Bidder's offer
	Earth-fault Response Delay time	3s		
	Strobe blinking	Colour: Configurable to alarm type	state	
		Configurable Default 15 Flashes per Minute	state	
		Illumination intensity: Automatic	state	
	Protection Class	IP67	State	
	Indicator Battery	Lithium battery 3.6V / 2.7Ah, replaceable	State	
	Battery Life	10 years	State	
	Max Indicator weight	4.0 kg Max	State	
	Clamp Diameter Range	6mm~32mm (300mmsq conductor)	State	
	Communication	RF tranceiving 433MHz GSM/GPRS/2G/3G/4G/EDGE/ NB-IoT	State	
	Protocols	IEC101, IEC104, DNP3.0, Modbus GPRS UDP,TCP, Modbus RTU,	State	
	Internal Type Test	According to IEEE495-2007	State	
5.0	**Test Requirement**			
5.1	Manufacturer's capabilities of inspections and testing		State	
5.2	Copies of previous Test/calibration Reports		Attach	

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Clause number	Requirement	KPLC Requirement	Bidder's offer
	A copy of the accreditation certificate and the scope of accreditation		
5.3	Copies of test/calibration reports	Attach	
	Tests to be carried out	Specify	
6.0	Marking and Packing		
6.1	Marking	Specify	
6.2	Packing	Specify	
7.0	Warranty: State duration.	State	
7.1	Shall be backed by a minimum of 12-months factory warranty.	State	
7.2	Shall provide free Technical support and software upgrade to KENYA POWER for a period of not less than 36 months.	State	
7.3	Shall submit a clause-by-clause statement of compliance with the specifications together with copies of the manufacturer's catalogues, brochures, technical data and proven test reports clearly marked to support each clause, all in English for evaluation. The manufacturer's type reference/designation of the item offered shall be indicated	State	
7.4	Shall submit technical details for the Overhead Fault indicator to the Kenya Power for approval before manufacture commences	State	
8.0	**Training**		
8.1	Training by the manufacturer's premises	State	
8.1.1-8.1.5	Training coverage and compliance with requirements on the number and costs	State compliance	
8.2	Local Training		

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Clause number	Requirement	KPLC Requirement	Bidder's offer
8.2.1-8.2.4	Training coverage and compliance with requirements on the number and costs	State compliance	
A	**Test and inspection**		
A.1	Responsibility of carrying out tests	State	
A.2	Copies of Type Test Reports submitted with tender	Provide	
A3	Test certificates and calibration certificates to be submitted by supplier to KPLC for approval before supply/delivery	Provide	
A.4	Inspection at the stores and replacement of rejected items	State	
B	**Quality Management System**		
B.1	Quality Assurance Plan	Provide	
B.2	Copy of ISO 9001:2015 Certificate	Provide	
B3	Manufacturer's experience	Provide	
	List of previous customers	Provide	
C	**Technical Documentation**		
C.1	Documents submitted with tender	Provide	
C.2	Documents to be submitted by supplier to KPLC for approval before manufacture	Provide	
C.3	Documents to be submitted during delivery at the store	Provide	
	Statement of deviations if any & supporting documents	State deviations	

NOTE:

1) *Bidders shall give full details of the items on offer as per the specification and applicable standards. The details provided shall conform to the test reports and their certificates, as well as labelled drawings complete with dimensions, catalogues and/or brochures for the purpose of tender evaluation.*

2) *Bidders should note that the above Guaranteed Technical Particulars Schedules must be fully completed and submitted with the bid. Wherever there is conflict between the GTPs and the clauses in the specification, the clauses in the specification take precedence. Failure to complete the schedules shall lead to rejection of the bid.*

*3) Guaranteed values shall be specified. * Words like 'agreed', 'confirmed', 'As per KPLC specifications', etc. shall not be accepted and shall be considered non-responsive.*

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Manufacturer's Name, Signature, Stamp and Date