

DOCUMENT NO.: KP1/6C/4/1/TSP/09/107



Kenya Power

**PARTIAL DISCHARGE DETECTOR
PART 1: HANDHELD PARTIAL DISCHARGE DETECTOR - SPECIFICATION**

A Document of the Kenya Power & Lighting Co. Ltd
June 2018

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0.1 CIRCULATION LIST

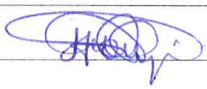

COPY NO.	COPY HOLDER
1	Manager, Standards
2	Electronic copy (pdf) on Kenya Power server (http://172.16.1.40/dms/browse.php?ffFolderId=23)

REVISION OF KPLC STANDARDS

In order 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.

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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	2018-06-13	New issue	Nancy Wairimu	Dr. Eng. Peter Kimemia

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FOREWORD

This specification has been prepared by the Standards Department in collaboration with Technical Services Department both of The Kenya Power and Lighting Company Limited (KPLC) and it lays down requirements for Handheld Partial Discharge Detector.

The Handheld Partial Discharge Detector is intended for use by the Technical Services Department for measuring partial discharge.

This specification was prepared to establish and promote uniform requirements for Handheld Partial Discharge Detector to be used at Kenya Power and Lighting Company Ltd.

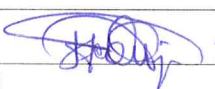
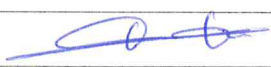
There are no other specifications in this series.

This specification stipulates the minimum requirements for Handheld Partial Discharge Detector acceptable for use in the company and it shall be the responsibility of the suppliers and manufacturer to ensure that the offered design is of the highest quality and guarantees excellent service to KPLC, and exhibits good workmanship and good engineering practice in the manufacture.

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	Division
Adriano Sagwe	Technical services
Nancy Wairimu	Infrastructure Development

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1. SCOPE

- 1.1. This specification is for Handheld Partial Discharge Detector for use by company's Technical Services Department.
- 1.2. The specification covers requirements, design, inspection and tests and schedule of Guaranteed Technical Particulars of Handheld Partial Discharge Detector.

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 60270 High voltage test techniques – Partial discharge measurements
- IEC 60529: Degrees of protection provided by enclosures (IP code)
- IEC 60815: Selection and dimensioning of high voltage insulators intended for use in polluted conditions –Part 1: Definitions, information and general principles
- LV Directive 2014/35/EU: Directive 2014/35/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of electrical equipment designed for use within certain voltage limits
- EMC directive 2014/35/EU: Directive 2014/30/EU of 26 February 2014 on the harmonisation of the laws of the Member States relating to electromagnetic compatibility
- ISO 9001: Quality Management systems – Requirements
- ISO/IEC 17025: General Requirements for the competence of testing and calibration laboratories

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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:

3.1. ABBREVIATIONS

KPLC- Kenya Power and Lighting Company Limited

ISO – International Organization for Standardization.

PD – Partial Discharge

TEV –Transient Earth Voltages

Kg –Kilogram

kV - Kilovolt

PT – Potential Transformers

CT – Current Transformer

IP – Ingress Protection

EC – European Commission

LV – Low Voltage

EMC – Electromagnetic Compatibility

EU – European Union

3.2. DEFINITIONS

Partial Discharge- localized dielectric breakdown of a small portion of a solid or fluid electrical insulation system under high voltage stress, which does not bridge the space between two conductors.

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4. REQUIREMENTS

4.1. SERVICE CONDITIONS

- 4.1.1 The Handheld Partial Discharge Detector shall be suitable for use outdoors in tropical areas and harsh climatic conditions including areas exposed to:
- Altitudes of up to 2200m above sea level;
 - Humidity of up to 95%;
 - Average ambient temperature of +30°C with a minimum of -1°C and a maximum of +40°C
 - Pollution: Design pollution level to be taken as "Heavy" (Pollution level III) for inland and "Very Heavy" (Pollution level IV) for coastal applications in accordance with IEC 60815.

4.2. DESIGN AND CONSTRUCTION

- The Handheld Partial Discharge Detector shall be handheld, rugged, compact, shock proof and impact resistant. It shall comply with IEC 60270.
- The Handheld Partial Discharge Detector shall have an IP rating of 54 as per IEC 60529.
- The Handheld Partial Discharge Detector shall be fully automated, intelligent and of high accuracy.
- The Handheld Partial Discharge Detector shall be equipped with the most recent software for easy operation and data analysis.
- The Handheld Partial Discharge Detector shall have an inbuilt system for automatic suppression of electrostatic and electromagnetic interference in power substations.
- The Handheld Partial Discharge Detector shall be EC compliant to LV Directive 2014/35/EU and EMC directive 2014/35/EU.
- The power supply of the Handheld Partial Discharge Detector shall have the following characteristics:
 - Rechargeable Lithium ion 3.75V, 2.2 AH battery
 - Battery charger supply of 230 ±10% V, 50Hz nominal frequency
 - Operating time for full charge of not less than 10 hours.

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d) Indication of the battery condition on the display as a bar-graph or any other appropriate indicator, and as a percentage.

4.2.8. The Handheld Partial Discharge Detector shall be supplied complete with the following accessories but not limited to :

- a) Carrying case
- b) Connectors for power
- c) Headphones and external acoustic sensor
- d) Battery charger
- e) Instruction manual

4.2.9. The weight of the Handheld Partial Discharge Detector shall not exceed 0.5 kg.

4.3. FUNCTIONS

4.3.1. The Handheld Partial Discharge Detector shall be self-calibrating and diagonalizing.

4.3.2. The Handheld Partial Discharge Detector shall be able to measure partial discharge activity taking place in live cable termination or busbars of low and medium voltage electrical plant and equipment (11kV boards and transformers) at power utility substations from a safe distance and without making physical contact.

4.3.3. The Handheld partial discharge detector shall be capable of accurately locating a partial discharge source within a live switchgear in 11kV medium voltage distribution boards or other equipment such as PT's, CT's and cables within and outside the substation in power utilities.

4.3.4. The Handheld Partial Discharge Detector shall be capable of capturing audible ultrasonic and Transient Earth Voltages (TEV) of PD activity and shall be able to distinguish between active PD and Noise.

4.3.5. The Handheld Partial Discharge Detector shall capable of:

- a) Ultrasonic PD detection on insulation surface.
- b) Transient Earth Voltage (TEV) detection inside the insulation.
- c) Rapid substation survey.

4.3.6. The Handheld Partial Discharge Detector measurement characteristic shall be as shown in table 1:


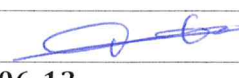
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Table 1: Measurement characteristic of Handheld Partial Discharge Detector

No	Parameter	Requirements	
1	TEV measurements	Sensor	Capacitive
		Measurement range	0 -80 dB
		Resolution	1dB
		Accuracy	± 1dB
2	Ultrasonic Measurement	Measurement range	-6 dBμV – 70 dBμV
		Resolution	1dBμV
		Accuracy	± 1dB

4.3.7. The Handheld Partial Discharge Detector shall have a minimum of 24 months factory warranty.

4.3.8. Technical support and software for upgrades where applicable shall be provided free of charge to KPLC for a period of not less than 24 months.

5. TESTS REQUIREMENTS



The Handheld Partial Discharge Detector shall be inspected and tested in accordance with the requirements of the requisite standards and provisions of this specification.

6. MARKING AND PACKING

6.1. MARKING

The following information shall be marked legibly and in a permanent manner on the Handheld Partial Discharge Detector:

- The manufacturer's name and trade mark;
- The type reference number / model number;
- Units of the measured quantity;
- Ranges of measurement;
- Type of battery/accumulator and polarity of connection in the battery compartment
- Standard of manufacture;
- The serial number;

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h) The words “Property of The Kenya Power & Lighting Co. Ltd.”

6.2. PACKING

- 6.2.1. The Handheld Partial Discharge Detector 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 one meter without damage to the detector.

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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.
- A.2 Copies of Type Test Certificates and Type Test Reports issued by a third party testing laboratory that is accredited to ISO/IEC 17025 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.3 Test certificates and calibration certificates for the Handheld Partial Discharge Detector to be supplied shall be submitted to KPLC for approval before shipment/delivery of the equipment.
- A.4 On receipt of the Handheld Partial Discharge Detector, Kenya Power will inspect them and may perform or have performed any of the relevant tests in order to verify compliance with the specification. The supplier shall replace without charge to Kenya Power, any Handheld Partial Discharge Detector which upon examination, 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 Handheld Partial Discharge Detector 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 9001:2008 or 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 9001:2008 or 2015 certificate shall be submitted with the tender for evaluation.
- B.3 The bidder shall indicate the delivery time of the equipment, manufacturer's monthly & annual production capacity and experience in the production of the Handheld Partial Discharge Detector being offered. A detailed list & contact addresses (including e-mail) of the manufacturer's previous customers for similar type of the Handheld Partial

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Discharge Detector sold in the last five years as well as reference letters from at least four of the customers shall be submitted with the tender for evaluation.


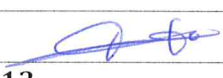
C: DOCUMENTATION AND DEMONSTRATION (Normative)

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;
- b) Copies of the Manufacturer's catalogues, brochures, drawings giving all relevant dimensions, Wiring diagram / Schematic Diagram and technical data;
- c) Sales records for the last five years and at least four customer reference letters;
- d) Details of manufacturing capacity and the manufacturer's experience;
- e) Copies of required type test reports by a third party testing laboratory accredited to ISO/IEC 17025;
- f) Copy of accreditation certificate to ISO/IEC 17025 for the third party testing 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 to KPLC stores
- i) Operational manual.
- j) Service manual.

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;

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- b) Design Drawings with details of the Handheld Partial Discharge Detector to be manufactured for KPLC.
- c) Product manuals, operation manuals and brochures,
- d) Quality assurance plan (QAP) that will be 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.
- e) Marking details and method to be used in marking the Handheld Partial Discharge Detector;
- f) All documentation necessary for safety of the equipment.
- g) Packaging details (including packaging materials).

- C.3. The Handheld Partial Discharge Detector shall be supplied with a full set of user operation and maintenance manuals all in the English language that guide use, care, storage and routine inspection/testing, during delivery to KPLC stores.
- C.4. The successful bidder shall demonstrate to KPLC Staff (in Nairobi) the use of the Handheld Partial Discharge Detector.

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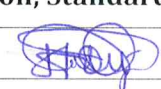
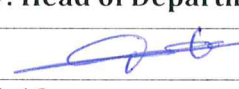
D: GUARANTEED TECHNICAL PARTICULARS (Normative)

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	Requirements	Bidder's offer
	Manufacturer's Name and address	Specify
	Country of Manufacture	Specify
	Name and model Number	Specify
1.	Scope	State
2.	Normative References	State
3.	Definitions and Abbreviations	
3.1.	Abbreviations	State
3.2.	Definitions	State
4.	Requirements	
4.1	Service Conditions	State
4.2	Design and construction	
	Dimensions	Specify
4.2.1	Shall be handheld, rugged, compact, shock proof and impact resistant. It shall comply to IEC 60270	Specify State
4.2.2	IP rating	State
4.2.3	Fully automated, intelligent and of high accuracy	State
4.2.4	Software	State
4.2.5	Inbuilt automatic suppression of electrostatic and electromagnetic interference system	State
4.2.6	EC compliance	State
4.2.7	Power supply characteristics Type of battery Battery charger supply Operating time for full charge Indication of battery condition	Specify
4.2.8	Accessories	List

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4.2.9	Weight		Specify
4.3	Functions		
4.3.1	Shall be self-calibrating and diagnosing		Specify
4.3.2	Shall be able to measure partial discharge activity taking place in live cable termination or busbars of low and medium voltage electrical plant and equipment (11kV boards and transformers) at power utility substations		Specify
	Shall be able to measure from a safe distance and without making physical contact.		Specify
4.3.3	Shall be capable of accurately locating a partial discharge source		Specify
4.3.4	Shall be capable of capturing audible ultrasonic and Transient Earth Voltages (TEV) of PD activity		Specify
	Shall be able to distinguish between active PD and Noise.		Specify
4.3.5	Capability of	Detection of Ultrasonic PD detection on insulation surface	Specify
		Detection of TEV inside the insulation	Specify
		Rapid substation survey	Specify
4.3.6	Measurement Characteristics		
	TEV measurements	Sensor	State
		Measurement range	State
		Resolution	State
		Accuracy	State
	Ultrasonic Measurement	Measurement range	State
		Resolution	State
		Accuracy	State
4.3.7	Warranty period		Specify
4.3.8	Technical support and software upgrade		Specify
5	Test Requirements		Specify
6	Marking and Packing		
6.1	Marking		Specify
6.2	Packing		Specify
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

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A.4	Inspection at the stores and replacement of rejected items	State compliance
B	Quality Management System	
B.1	Quality Assurance Plan	Provide
B.2	Copy of ISO 9001:2008 Certificate	Provide
B.3	Delivery time of the equipment	Provide
	Manufacturer's experience	Provide
	Manufacturing Capacity (units per month)	Provide
	List of previous customers	Provide
	Customer reference letters	Provide
C	Documentation and Demonstration	
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	State
C.4	Demonstration	
	Statement of compliance to specification (indicate deviations if any & supporting documents)	State compliance

.....

Manufacturer's Name, Signature, Stamp and Date

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