

DOCUMENT NO.: KP1/13D/4/1/TSP/09/123



Kenya Power

HAND HELD TRANSFORMER TURNS RATIO TESTER- SPECIFICATION

Document of the Kenya Power & Lighting Co. Plc

January 2023



TITLE:
**HAND HELD TRANSFORMER
TURNS RATIO TESTER -
SPECIFICATION**

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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?fFolderId=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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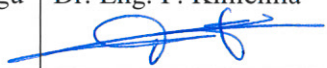
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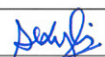



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0.2 AMENDMENT RECORD

Rev No.	Date (YYYY-MM-DD)	Description of Change	Prepared by (Name & Signature)	Approved by (Name & Signature)
0	2023-01-17	New issue	Eng. Faith M. Gicugu	Dr. Eng. P. 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 Plc (KPLC) and it lays down requirements for Hand Held Transformer Turns Ratio Tester.

The Hand Held Transformer Turns Ratio is intended for use by the Technical Services Department for determining the transformer turns ratio.

This specification was prepared to establish and promote uniform requirements for Hand Held Transformer Turns Ratio Tester to be used at Kenya Power and Lighting Company Plc.



There are no other specifications in this series.

This specification stipulates the minimum requirements for Hand Held Transformer Turns Ratio Tester 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, good workmanship and good engineering practice in the manufacture of the Hand Held Transformer Turns Ratio Tester for KPLC.

Users of Kenya Power this Specifications are responsible for its correct interpretation and application.

1. SCOPE

- 1.1. This specification is for Hand Held Transformer Turns Ratio Tester for use by company's Technical Services Department.
- 1.2. The specification covers requirements, design, inspection, tests and schedule of Guaranteed Technical Particulars of Hand Held Transformer Turns Ratio Tester.

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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: Electrical safety in low voltage distribution systems up to 1000VAC. and 1500VAC - 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
- IEC 61000: Electromagnetic Compatibility (EMC) – Part 4-2: Testing and measurement techniques – Electrostatic discharge immunity test; – Part 6-2: Generic standards – Immunity for Industrial environment.
- 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

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.

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3.1. ABBREVIATIONS

KPLC- Kenya Power and Lighting Company Limited

ISO – International Organization for Standardization.

LED –Light Emitting Diode

Kg –Kilogram

KV - Kilovolt

IP – Ingress Protection

LV – Low Voltage

EMC – Electromagnetic Compatibility

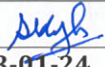

EU – European Union

4. REQUIREMENTS

4.1. SERVICE CONDITIONS

4.1.1 The Hand Held Transformer Turns Ratio Tester shall be suitable for outdoor and indoor use in tropical areas and harsh climatic conditions including areas exposed to:

- a) Altitudes of up to 2200m above sea level;
- b) Humidity of up to 95%;
- c) Average ambient temperature of +30°C with a minimum of -1 °C and a maximum of +40°C
- d) 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.

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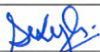



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4.2. DESIGN AND CONSTRUCTION

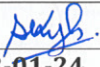
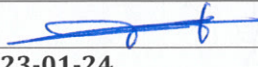
- 4.2.1. The Hand Held Transformer Turns Ratio Tester shall be designed, manufactured and tested according to IEC 61557.
- 4.2.2. The Hand Held Transformer Turns Ratio Test Set shall be capable of determining turns ratio in various power equipment, including:
- a) Distribution Transformers,
 - b) Power Transformers,
 - c) Reactors,
 - d) Current Transformer (CT),
 - e) Voltage Transformer (PT)
 - f) Z-type connected transformers
- 4.2.3. It shall be hand held, light weight, compact and rugged.
- 4.2.4. It shall have direct digital readings (no conversion scales required).
- 4.2.5. It shall have built-in lithium/alkaline battery (12V/5.2AH, charging time is about 3 hours using special charger (DC4.2V/2A*3 sets)), no AC power supply. The instrument shall be suitable for field use.
- 4.2.6. It shall be equipped with the function of monitoring and protecting the Battery.
- 4.2.7. It shall have a mechanical key for "run/stop".
- 4.2.8. The Hand Held Transformer Turns Ratio tester shall have the functions of high and low voltage reverse connection protection, short circuit protection of transformer and inter-turn short circuit protection.
- 4.2.9. The Hand Held Transformer Turns Ratio tester shall have a function of automatic shutdown: When it remains ON without operation for a period exceeding 5 minutes, automatic shutdown shall be activated.
- 4.2.10. It shall be suitable for use in an energized switchyard condition.
- 4.2.11. It shall be equipped with Common Flash Memory Interface (CFI) required for exporting data.
- 4.2.12. It shall be equipped with Bluetooth communication function.

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4.2.13. It shall have the technical particulars as shown in table 1 below:

Table 1: Technical particulars of Hand Held Transformer Turns Ratio Tester

Parameter	Requirement
Test range (ratio)	0.8-10000
Minimum resolution	0.0001
Accuracy	$\pm 0.2\%$ (turns ratio<1000), $\pm 0.3\%$ (turns ratio 1000~10000)
Output voltage	Max 35V/50Hz
Testing times	≥ 800 times (quick mode)
Storage data	Not less than 100 sets
Temperature in operation	-20°C ~40°C
Relative humidity	$\leq 90\%$, No dew
Volume	Not more than L210mm x W150mm x H70mm
Net weight	Less than 2kg Max
Display Full Graphics	LCD module, adjustable back-lighting, wide temperature range, 128 x 64 dots (21 characters by 8 lines)
Measurement Method	ANSI/IEEE C57.12.90 and IEC 600076.1 (2013)
Excitation Current Range	0 to 100 mA, 4-digit resolution

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5. DOCUMENTATION AND SUPPORT

5.1. WARRANTY AND TECHNICAL SUPPORT

- 5.1.1. The Hand Held Turns Ratio and Winding Resistance Tester shall be backed by a minimum of 12-months factory warranty.
- 5.1.2. Technical support and software upgrade, where applicable shall be provided free of charge to Kenya Power for a period of not less than 36 months.
- 5.1.3. The successful bidder shall demonstrate to KPLC Staff (in Nairobi) the use of the Hand Held Turns Ratio and Winding Resistance Tester.

5.2. TESTS REQUIREMENTS



The Hand Held Transformer Turns Ratio Tester shall be inspected and tested in accordance with the requirements of relevant standards and provision of this specification.

6. MARKING AND PACKING

6.1. MARKING

The following information shall be marked legibly and Permanently on the Hand Held Transformer Turns Ratio Tester:

- a) The manufacturer's name or trade mark;
- b) The type reference number / model number;
- c) Units of the measured quantity;
- d) Ranges of measurement;
- e) Type of battery and polarity of connection in the battery compartment;
- f) Standard of manufacture;
- g) The serial number;
- h) The instructions for handling and use (in the English Language).

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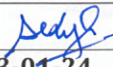
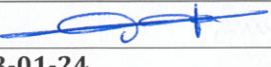
6.2. PACKING

- 6.2.1. The Hand Held Transformer Turns Ratio Tester shall be packaged 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 be shock proof and impact resistant and shall be able to withstand a fall of one meter without damage to the Hand Held Transformer Turns Ratio Tester.

APPENDICIES

A: TESTS AND INSPECTION (Normative)

- A.1. It shall be the responsibility of the manufacturer to perform or to have performed all the relevant tests as per the applicable standards.
- 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 Hand Held Transformer Turns Ratio Tester to be supplied shall be submitted to KPLC for approval before shipment/delivery of the equipment. Copies of test/calibration reports for the Hand Held Transformer Turns Ratio Tester offered to be submitted for tender evaluation shall include the following: -
1. Measured values of the standard equipment
 2. Indicated values of the unit under test (Winding Resistance Tester offered)
 3. Expanded Relative uncertainty
 4. Details of standard and reference equipment used in calibration tests.

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A.4. The Hand Held Transformer Turns Ratio Tester shall be subjected to acceptance tests at the manufacturer's premises before dispatch. Two Engineers appointed by KPLC shall witness the acceptance tests.

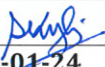

A.5. On receipt of the Hand Held transformer turns ratio tester Kenya Power will inspect them and may perform or have performed any of the relevant tests in order to verify compliance with the specification. The supplier shall replace without charge to Kenya Power, any Transformer Turns Ratio Tester 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 Hand Held Transformer Turns Ratio Tester 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, manufacturer's monthly & annual production capacity and experience in the production of the Hand Held Transformer Turns Ratio Tester being offered. A detailed list & contact addresses (including e-mail) of the manufacturer's previous customers for similar type of the Hand Held Transformer Turns Ratio Tester 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.

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
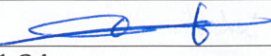
C: DOCUMENTATION (Normative)

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;
- 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;
- b) Design Drawings with details of the Hand Held Transformer Turns Ratio Tester to be manufactured for KPLC.
- c) Product manuals, operation manuals and brochures,

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

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- 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 Hand Held Transformer Turns Ratio Tester;
- 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 Hand Held Transformer Turns Ratio Tester to KPLC stores.

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
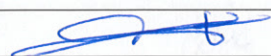
D: GUARANTEED TECHNICAL PARTICULARS (Normative)

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	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
4.	Requirements	
4.1	Service Conditions	State
4.2	Design and Construction	
4.2.1	Design, manufacture and test standard	State
4.2.2	Capable of testing various equipment	State
4.2.3	Light Weight, Hand held, Compact and Rugged	State
	Maximum weight(kg)	State
4.2.4	Direct digital Readings (No conversion scales)	State
4.2.5	Suitable for site testing	State

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4.2.6	Built-in battery Requirements		
		Built-in lithium/alkaline battery	Specify
		Voltage/Capacity	Specify
		Charging time	State
		Special charger (DC4.2V/2A*3 set)	Provide
4.2.7	Function for monitoring and protecting the Battery		Provide
4.2.8	Mechanical key for "run/stop"		Provide
4.2.9	Protection Functions		State
		High and low voltage reverse connection protection	Provide
		Short circuit protection of transformer	Provide
		Inter-turn short circuit protection	Provide
4.2.10	Automatic shutdown function		Specify
4.2.11	Suitable for use in an energized switchyard condition		State
4.2.12	Equipped with Common Flash Memory Interface (CFI)		Provide
4.2.13	Equipped with Bluetooth communication function		Provide
4.2.14	Technical particulars	Test range (ratio)	State
		Minimum resolution	State
		Accuracy	State
		Output voltage	State
		Testing times	State
		Storage data	state
		Temperature in operation	State
		Relative humidity	State
		Volume	State
		Net weight	State

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Clause number	Requirement	Bidder's offer
	Display Full Graphics	State
	Measurement Method	State
	Excitation Current Range	State
5.1.	WARRANTY AND TECHNICAL SUPPORT	
5.1.1.	Shall be backed by a minimum of 12-months factory warranty.	State
5.1.2.	Shall provide free Technical support and software upgrade to Kenya Power for a period of not less than 36 months.	State
5.1.3.	Shall demonstrate to KPLC Staff (in Nairobi) the use of the Hand Held Turns Ratio and Winding Resistance Tester.	State
5.2.	TEST REQUIREMENT	
5	Test Requirements	State Compliance
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
A.3.	Test certificates and calibration certificates to be submitted by supplier to KPLC for approval before supply/delivery	Provide
A.4.	Factory Acceptance tests to be witnessed by 2 KPLC Engineers	State compliance
A.5.	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 9001:2015 Certificate	Provide
B.3.	Delivery time of the equipment	Provide
	Manufacturer's experience	Provide
	Manufacturing Capacity (units per month)	Provide

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Date: 2023-01-24	Date: 2023-01-24



TITLE:
**HAND HELD TRANSFORMER
TURNS RATIO TESTER -
SPECIFICATION**

Doc. No.	KP1/13D/4/1/TSP/09/123
Issue No.	1
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Clause number	Requirement	Bidder's offer
	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	Provide
	Statement of compliance to specification (indicate deviations if any & supporting documents)	State compliance

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Manufacturer's Name, Signature, Stamp and Date

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Signed: 

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