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Kenya Power

Single-Phase Post-payment Watt-hour Meter for Active Energy- Specification

A Document of the Kenya Power & Lighting Company Plc.

November 2019

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

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.

0.2 Amendment Record

Rev No.	Date (YYYY-MM-DD)	Description of Change	Prepared by (Name & Signature)	Approved by (Name & Signature)
0	2019-10-10	New Issue	Peter Wanyonyi Patricia Ngaanga Eng. Raphael Ndolo	Dr. Eng. Peter Kimemia

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FOREWORD

This Specification has been prepared by the Customer Service Division in collaboration with Standards Department, all of The Kenya Power & Lighting Company Plc (abbreviated as KPLC). It lays down requirements for single-phase post-paid static watt-hour meters for active energy measurement.

The Specification establishes uniform requirements for Single-Phase Post-payment Meters for active energy.

The Specification is intended for use by KPLC in procurement of single phase post-payment meters and does not purport to include provisions of a contract.

1. SCOPE

This Specification applies to newly manufactured, Single-Phase Static Watt-Hour Post-Payment Meters for direct connection in measurement of alternating current electrical energy consumption at a nominal voltage of 230V and nominal frequency of 50 Hz.

The Specification also covers inspections and tests of the meters as well as schedule of Guaranteed Technical Particulars to be filled, signed by the manufacturer and submitted for tender evaluation.

The Specification stipulates the minimum requirements for Single-Phase Static Watt-Hour Post-Payment Meters acceptable for use in the Company (KPLC) and it shall be the responsibility of manufacturer to ensure adequacy of the design, good workmanship, good engineering practice and adherence to standards, specifications and applicable regulations in the manufacture of the meters for KPLC.

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2. NORMATIVE REFERENCES

The following Standards contain provisions, which through reference in text constitute provisions of this Specification. Unless otherwise stated, the latest Editions (including amendments) apply. In case of conflict, the requirements of this Specification take precedence.

IEC 60695-2-11:2014	Fire Hazards Testing-Part 2-Test Methods-Section 1/sheet: Glow-wire end-product test and guidance.
IEC 61000-4-5:2014	Electromagnetic Capability, Testing and measurement Techniques, Surge immunity test.
IEC 61010-1:2010	Safety requirements for electrical equipment for measurement, control, and laboratory use-Part 1: General requirements
IEC 61140:2016	Protection against electric shock-common aspects for installation and equipment
IEC 61358-31:2008	Electricity metering equipment (AC)-Acceptance inspection Part 31: Particular requirements for static meters for active energy
IEC 61557	Electrical safety in low voltage distribution systems up to 1000V a.c. and 1,500V d.c. – Equipment for Testing, measuring or monitoring of protective measures-Part 1: General Requirements
IEC 60529	Degrees of protection provided by Enclosures (IP Code)
IEC 62052-11:2003	Electricity Metering equipment (a.c) – General Requirements, Tests and Test Conditions- PART 11: Metering equipment.
BS EN/IEC 62053-21:2003	Electricity metering equipment (a.c) – Particular Requirements - Part 21: Static meters for active energy (classes 1 and 2).

3. DEFINITIONS AND ABBREVIATIONS

For the purposes of this Specification, the Terms, Definitions and Abbreviations given in the Reference Standards apply, and shall include the following:

DC	Direct Current
Hz	Hertz
KPLC	Kenya Power & Lighting Company Limited
kV	Kilovolt
KWH	Kilowatt-hour
LCD	Liquid crystal display
LED	Light emitting diode
SRE	Significant Reverse Energy

4. REQUIREMENTS

4.1 Operating Conditions

4.1.1 Operating Environmental Conditions

The meters shall be suitable for continuous outdoor operation in tropical climate with the following conditions:

a) Altitude: Up to 2,200m above sea level (ASL)
b) Temperature: Average of 30° C with a minimum of -1° C and maximum of +55° C
c) Humidity: Up to 95%
d) Pollution: Pollution level III ('Heavy')

4.1.2 System Characteristics

4.1.2.1. The meter will be connected to an overhead or underground earthed system.
4.1.2.2 The nominal voltage (U_n) is 230 volts, 50Hz.

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4.2 Design and Construction Requirements

4.2.1 General Requirements

4.2.1.1 The meters shall be constructed as 1-phase, 2-wire meter with a permanent connection diagram (drawing) which shall be printed on the meter cover.

4.2.1.2 The meters shall be of BS EN/IEC 62053-21:2003 footprint and the terminals arrangement shall be **L: N: N: L (Live In: Neutral In: Neutral Out: Live out** respectively).

4.2.1.3 The front cover may be of translucent material but shall have a window (clear glass or polycarbonate) for reading the display and for observation.

4.2.1.4 The meters shall conform to the degree of protection of at least IP 54 as per IEC 60529.

4.2.1.5 The meters shall be for front projection mounting.

4.2.1.6 The meter shall be ultrasonically sealed for life and there shall be no screws on the body except for the termination of cables.

4.2.1.7 The potential link of the meters shall be internal (inside the meter body).

4.2.1.8 The meters shall have a sealing provision for terminal cover that is sealable with utility wire seals.

4.2.1.9 The meter terminal holes and screws shall be of moving-cage type made of brass or nickel-plated brass for high conductivity and corrosion resistance. The terminals shall be of suitable rating to carry continuously 125% Imax.

4.2.1.10 The Live and Neutral shall be DC immune complying with requirements of IEC 61036.

4.2.1.11 The meter terminal cover shall be of the long type with cable entry knock-offs.

4.2.1.12 The meter terminal holes shall be of sufficient size to accommodate the cables of at least 10mm diameter and depth of 15mm.

4.2.1.13 The meter body dimensions shall not exceed: Height = 170mm; Width = 130mm; and Depth = 60mm.

4.2.1.14 The meter shall have its Printed Circuit Boards conformal coated in a manner so as not to allow malfunction due to ingress of moisture, vermin, dust, chemicals and temperature extremes.

4.2.1.15 The meters' protection class shall be Class II (Double insulated) as per IEC 61140:2016 standard.

4.2.1.16 The meter enclosure shall be made of UV-stable unbreakable high-grade flame retardant polycarbonate that complies with IEC 60695-2-11:2014 glow wire test. The material shall be of good dielectric and mechanical strength with minimum thickness of 2.0mm.

4.2.2 Functionality Requirements

4.2.2.1 The meters shall have a back-up power supply to support display reading of data when there are no mains supply. The back-up supply shall have a shelf life of at least ten (10) years.

4.2.2.2 The Meter shall support two elements double circuit measurement both in active and neutral circuits. In case there is an imbalance between the live circuit and the Neutral circuit and the meter shall measure accurately on the higher current.

4.2.2.3 The meters shall continue to register energy in forward register during reverse connection condition.

4.2.2.4 The meters shall have an optical communication port, compliant to IEC62056-21 for accessing information stored inside the meter through optical probe and shall be fitted with an SCSSCAAA9 (MC171) compliant data port for retrieving register data when the meter is not powered on (1 each for optical and SCSSCAAA9 ports) shall be provided with the meter sample for evaluation

4.2.2.5 The meters shall have a backlight seven-segment Liquid Crystal Display **(LCD)** for displaying parameters and measured values.

4.2.2.6 The meter LCD shall have at least 7 digits and no decimals.

4.2.2.7 The meters LCD shall be capable of displaying various status and tampering conditions of the meter.

4.2.2.8 The meters shall have provision for scrolling through the display parameters. The following parameters shall be displayed: Date & time, Current Total Energy, Total Energy as at close of the previous Month, Voltage, Current, Meter Malfunction Errors.

4.2.2.9 The meters shall be capable of recording and displaying on the LCD, error status when the meter malfunctions.

4.2.2.10 The meters shall have an LED indicator for testing and for indication of kWh consumption.

4.2.2.11 The principal unit for the measured values shall be the kilowatt-hour (kWh).

4.2.2.12 The meters shall have a non-volatile memory capable of data storage and with long-term data retention for the certified life of the meter or fifteen (15) years, whichever is greater without an electrical supply being supplied to the meter

4.2.2.13 The meter shall have at least twelve (12) billing historical data stored in memory and retrievable by software action

4.3 Electrical Requirements

4.3.1 The meters shall be operated from mains with reference values of 230V, 50 Hz ± 5%, with operating voltage range from $0.4U_n$ to $1.3U_n$.

4.3.2 The meter shall have reference standard currents of I_b = 5 A, Imax ≥ 80 A

4.3.3 The meter shall have Reference Standard Electrical Design Parameters as in Table 1.

Table 1: Summary of Electrical Parameters

Electrical Parameters	
Accuracy	kWh Class 1 (IEC 62053-21)
Rated Nominal Voltage (U_n), Frequency (Hz)	230V, 50Hz ± 5%
Base Reference current, I_b	5A
Max. Voltage circuit burden	2W and 10 VA @230V, 50Hz, 30^0 C
Max. Current circuit burden	4VA @ 5A, 50Hz, 30^0 C
Maximum Current I_{max} (A)	80 A.
Protective class	Class II (double insulated)
Accurate metering range	0.05 I_b to 1.2 I_{max}
Starting current	0.2% I_b
Running with no-load	No more than one pulse on application of 0.4 U_n - 1.3 U_n
Short circuit current	30 I_{max}

Meter Constant	1000 imp/kwh
Insulation; Over voltage and Surge Protection	
Insulation classification Insulation level	Protective Class II At least 4 kV rms for 1 minute
Over voltage withstand	400 VAC for 48 hours
Voltage Impulse withstand Current Impulse withstand Lightning Surge Withstand	At least 6 kV, 1.2/50µs (IEC 62052-11) with 2Ω source impedance At least 5kA, 8/20 µs At least 30kA, 4/10 µs
Electromagnetic Compatibility	
Electrostatic discharge Immunity to HF fields Immunity to Fast Transient Bursts Radio interference	15 kV air discharge 80 MHz to 2 GHz @ 10V/m with load; 80 MHz to 2 GHz @ 30V/m no load- Accuracy not affected by magnetic fields from all sides- front, sides, top and bottom of the meter. 4 kV Complies with requirements for CISPR 22, IEC 61000-4-2,3,4,6

4.4 Quality Management Systems

4.4.1 The supplier shall submit a Quality Assurance Plan (QAP) that will be used to ensure that the meter design, 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.

4.4.2 Copies of quality management certifications including copy of valid ISO 9001: 2015 Certificate for international manufacturers and/or KEBS Standardization Certificate for local manufacturers shall be submitted with the tender for evaluation.

5. TESTS AND INSPECTIONS

5.1 The meters shall be tested in accordance with the requirements of IEC 62053-21:2003 and provisions of this specification. It shall be the responsibility of the supplier to perform or to have performed the tests specified.

5.2 The bidder shall submit copies of Type Tests Reports for each type of meter offered with the tender for technical evaluation. The Type Test Reports shall have been issued by a third-party testing laboratory, accredited to ISO/IEC 17025. The accreditation certificate to ISO/IEC 17025 for the same third-party testing laboratory used shall also be submitted with the tender document (all in English Language).

5.3 Routine and Sample Test Reports for the meter to be supplied shall be submitted to KPLC for approval before shipment/delivery of the goods.

5.4 All acceptance tests as stipulated in the relevant standards shall be carried out by the supplier and shall be witnessed by KPLC Engineers before shipment.

5.5 On receipt of the goods KPLC will perform any of the tests specified in order to verify compliance with this specification.

5.6 The meters shall be supplied together with a laptop loaded with software for interrogating the meter data through optical and the SCSSCAAA9 ports.

5.7 The supplier shall contact training in Nairobi for 20 No personnel on the use of optical and the SCSSCAAA9 ports.

5.8 The supplier shall replace without charge to KPLC the meters, which upon examination, test or use; fail to meet any of the requirements in the specification.

5.9 The following tests shall be conducted on the meter as per IEC 62053-21: 2003 and other relevant standards: -

5.9.1 Tests of Insulation Properties

5.9.1.1 Impulse Voltage Test

5.9.1.2 AC High Voltage Test

5.9.1.3 Insulation Test

5.9.2 Test of Accuracy Requirements

5.9.2.1 Tests on Limits of Error
5.9.2.2 Interpretation of Test Results
5.9.2.3 Test of Meter Constant
5.9.2.4 Test of Starting Conditions
5.9.2.5 Test of No-load Condition
5.9.2.6 Test of Ambient Temperature Influence
5.9.2.7 Test of Repeatability Error
5.9.2.8 Test of Influence Quantities

5.9.3 Test of Electrical Requirements

5.9.3.1 Test of Power Consumption
5.9.3.2 Test of Influence of Supply Voltage
5.9.3.3 Test of influence of Short-term Over-currents
5.9.3.4 Test of Influence of Self-heating
5.9.3.5 Test of Influence of Heating
5.9.3.6 Test of Influence of Immunity to Earth Faults

5.9.4 Test for Electromagnetic Compatibility

5.9.4.1 Radio Interference Measurement
5.9.4.2 Fast Transient Burst Test
5.9.4.3 Test of Immunity to Electrostatic Discharges
5.9.4.4 Test of Immunity to electromagnetic HF Fields

5.9.5 Test for Climatic Influences

5.9.5.1 Dry Heat Test
5.9.5.2 Cold Test
5.9.5.3 Damp Heat Cyclic Test

5.9.6 Test for Mechanical Requirements

5.9.6.1 Vibration Test
5.9.6.2 Shock Test
5.9.6.3 Spring Hammer Test
5.9.6.4 Protection Against Penetration of Dust and Water
5.9.6.5 Test of Resistance to Heat and Fire

5.9.7 Additional Tests

5.9.7.1 Glow wire testing for polycarbonate material
5.9.7.2 Accuracy tests in the presence of harmonics
5.9.7.3 Influence of d.c. and even harmonics
5.9.7.4 Measurement of Total energy – Effect of Harmonics
5.9.7.5 Magnetic induction of external origin (AC & DC)

5.10 Minimum Testing Facilities

The manufacturer shall have the necessary minimum testing facilities for carrying out the following Routine Tests:

(a) AC high voltage test
(b) Insulation resistance test
(c) Test of limits of errors
(d) Test of meter constant
(e) Test of starting condition
(f) Test of no load condition
(g) Repeatability of error test
(h) Test of power consumption
(i) Tamper conditions - as per this specification
(j) Transportation Test.

NB: The manufacturer shall have duly calibrated Equivalent Series Resistance (ERS) meter of Class 0.5 accuracy or better.

6 MARKING AND PACKING

6.1 Marking

Markings shall comply with IEC 61010-1 unless otherwise specified in other parts of IEC 61557.The measuring equipment shall carry the following marking which shall be clearly readable and indelible (in English Language) on the meter and of at least 4mm figure height.

The following information shall be marked on each meter.

(a) The inscription "**Property of KPLC.**",

(b) Name or trade mark of the manufacturer;

(c) Wiring Connection diagram.

(d) Country of Origin

(e) Type/model

(f) Meter number

(g) Barcode comprising of meter serial number without blank spaces

(h) Standard(s) to which the meter complies

(i) Year of Manufacture

(j) Guarantee – 5 Years

(k) KEBS Mark

6.2 Packing

6.2.1. The meters shall be packaged in such a manner as to minimize damage and entry of moisture during transportation and handling.

6.2.2. The meters shall be packed in suitable groups and / or batches with consecutive serial numbers. Packaging shall be done only after KPLC approval.

6.2.3. The meters shall be packaged in multiples of ten unless where the number of meters in a group/batch does not make a multiple of ten (10).

6.2.4. The number of meters packaged in a group and/or batch for handling/lifting/carrying by an operator manually shall be such that their weight does not exceed 15 kg.

7 DOCUMENTATION

7.1 The bidder shall submit its tender complete with technical documents required by Annex A (Guaranteed Technical Particulars) 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) Meter drawing giving all the relevant dimensions;

c) Wiring diagrams;

d) Users and operational manuals.

e) Copies of the Manufacturer's catalogues, brochures, drawings and technical data;

f) Sales records for the last five years and at least four customer reference letters;

g) Details of manufacturing capacity and the manufacturer's experience;
h) Copies of required type test reports by an Independent Third-Party Testing Laboratory accredited to ISO/IEC 17025; The test certificates shall bear the product serial number of meter on offer. KPLC reserves the right to demand repetition of some or all the type tests in presence of KPLC's representative, which acceptance should be submitted together with the offer. The retest results of the 3rd Party Laboratory binding and not be disputed. All type test reports of the meters shall be approved by Head of Standards, KPLC, before commencement of supply. Type test reports of offered meter carried out during last three years shall be valid. Type tests conducted in manufacturer's own laboratory and certified by testing bodies shall not be acceptable.

i) Copy of Accreditation Certificate to ISO/IEC 17025 for the third-party testing laboratory;
j) Valid copies of ISO 9001:2015 certificate for international manufacturers and/or KEBS standardization quality mark certificate for local manufacturers.
k) Evidence of the manufacturer having supplied a minimum of 200,000 pieces of the meter type offered to similar utilities in the past two years.
l) Current e-mail addresses, fax and telephone numbers of the National / International Testing / Calibration Laboratories and Meter Certification bodies used to test the meter on offer.

NOTE: The bidder shall complete, clearly, all the clauses in of the Schedule of Guaranteed Technical Particulars in the Annex. This shall form the basis of evaluation of the submitted tender. Failure to complete this Appendix shall render the tender non-responsive. The tenderers shall indicate the details of their offer where it is different from these requirements. Where the requirement is the same, they shall indicate what is offered. Insertions such as "noted", "agreed", "comply" etc. shall be considered as non-responsive where a specific response is called for.

7.2 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) signed by the manufacturer;
b) Design Drawings with details of low voltage measurement instruments to be manufactured for KPLC. 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 9001:2015.

c) The QAP Statement shall include a matrix of important raw materials and components (including the measurement and computing chips, memory chips, display modules, key electronic components and the battery) names of sub-suppliers for the raw materials, list of standards according to which the raw materials are tested and copies of test certificates in respect of bought out accessories.
d) An outline of the proposed work and program sequence.
e) List of areas in manufacturing process, where stage inspections are normally carried out for quality control and details of such tests and inspections.
f) The successful bidder shall within 30 days of placement of order, submit a matrix/list of raw materials and test certificates of the selected accessories and the names of sub-suppliers whether same or different from those furnished alongside the bids.
g) Detailed test program to be used during factory acceptance testing;
h) All documentation necessary for safety of the equipment as specified in IEC 61010-1 clause 5.4 shall be provided with the instrument.

7.3 The supplier shall submit recommendations for use, care, storage and routine inspection/testing procedures, all in the English Language, during delivery of the meters to KPLC stores.

8 INFORMATION AND WARRANTY (IN CASE OF TENDER AWARD)

8.1 Warranty

8.1.1 The supplied meters, and associated software/hardware shall be guaranteed by Warranty against any defects, which may develop due to faulty material, calibration, transportation or workmanship for a period of fifty-four (54) months from the date of successful commissioning certificate for KPLC or sixty (60) months from dispatch, whichever is later. All defective meters shall be replaced at the supplier's cost within one (1) month of receipt of intimation.

8.1.2 All software supplied shall be updated by the supplier at no extra cost while any required changes, e.g. tariff changes, statutory changes, etc. shall be implemented free of cost during the warranty period and beyond.

8.1.3 The successful bidder/supplier shall observe performance of their meter on site for a period of at least one (1) year and monitor accuracy of the same independently and submit a performance evaluation report of the same.

8.2 **Samples**

8.2.1 The tenderer shall submit three (3) meter samples together with the tender documents. Samples shall not be returned to the tenderers.

8.2.2 The submitted meter samples shall be subjected to accuracy tests at KPLC's Meter Central Laboratory and independent third-party accredited laboratory of KPLC's choice to verify compliance with all the requirements of IEC 62053-21:2003 other requirements of this specification.

8.2.3 Bidders are advised that the Laws of Kenya require that the Kenya Bureau of Standards must approve any new meter being introduced in the country. To this end, Bidders shall furnish the Bureau with 4 (four) samples of each meter type to be supplied. Bids submitted without the meter type approval from the Bureau will NOT be considered non-responsive. However, the winning Bidder must submit this approval before the signing of the supply contract.

8.2.4 Bidders may communicate directly with the Kenya Bureau of Standards on this matter through the following address:

The Managing Director
Kenya Bureau of Standards,
P.O. Box 54974, 00200,
Nairobi, Kenya.

Tel: (+254 020) 605490, 602350

Fax: (+254 020) 604031
Email: info@kebs.org
Web: http://www.kebs.org

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ANNEX A (Normative): Guaranteed Technical Particulars for Single-Phase Post-payment Static Meters for Active Energy Measurement (*To be filled and signed by the Manufacturer and submitted together with a sample meter, relevant copies of the Manufacturer's catalogues, brochures, drawings, technical data, sales records for previous five years, four customer reference letters, details of manufacturing capacity, the manufacturer's experience and copies of complete type test certificates and type test reports for tender evaluation, all in English Language*)

Clause number	**KPLC requirement**		**Bidder's offer** (indicate full details of the offered for the postpayment meter)
Manufacturer's Name and address			Specify
Brand name or designation			Specify
Country of Manufacture			Specify
Bidder's Name and address			Specify
1.	Scope		Specify
2.	Normative References		Specify
3.	Terms, Definitions and Abbreviations		Specify
4.	**REQUIREMENTS**		
4.1	**OPERATING CONDITIONS**		
4.1.1	Operating environmental conditions	Altitude	State
		Operating temperature	State
		Storage temperature	State
		Humidity range - Rel. humidity	State
		Pollution category	State
4.1.2	System Characteristics	Compatible electrical system	State
		Nominal voltage and frequency	State
4.2	**DESIGN AND CONSTRUCTION REQUIREMENTS**		
4.2.1	**General Requirements**-Standards applicable		State
4.2.1.1	Type of meter shall be 1-phase, 2-wire		Specify
4.2.1.2	Terminal arrangement		Specify
4.2.1.3	Front cover material and display window		Specify
4.2.1.4	Degree of IP protection of at least IP 54		Specify
4.2.1.5	Front projection mounting		Specify

Clause number	KPLC requirement	**Bidder's offer** (indicate full details of the offered for the postpayment meter)
4.2.1.6	The meter body ultrasonically sealed for life without screws on the body except for the termination of cables.	Specify
4.2.1.7	Internal potential link	Specify
4.2.1.8	The meter's terminal cover shall have screw inserts sealable with utility wire seals.	Specify
4.2.1.9	(a) Meters terminal holes and screws of Moving-cage type made of brass or nickel-plated brass for high conductivity and corrosion resistance	Specify type and class of brass and reference standard
	(b) Meter terminals with continuous current rating of at least 125%Imax	Specify
4.2.1.10	Live and Neutral shall be DC Immune	Specify
4.2.1.11	Meter terminal cover with cable entry knock offs	Specify
4.2.1.12	Terminal holes of at least 10-mm diameter and 15mm in depth.	Specify
4.2.1.13	Meter body dimensions (Not exceeding 170mmx130mmx60mm)	Specify
4.2.1.14	Printed circuit boards conformal coated to deter malfunction due to water ingress, dust, vermin, chemicals and temperature extremes	Specify
4.2.1.15	The meter protection class II (Double insulated)	Specify class and standard
4.2.1.16	Meter enclosure shall be made of UV-Stable unbreakable high-grade flame retardant polycarbonate.	Specify
4.2.2	**Functionality Requirements**	
4.2.2.1	Meter shall have a back-up power supply of a shelf life of at least 10 years.	Specify
4.2.2.2	Two elements double circuit measurement both in active and neutral circuits.	Specify
4.2.2.3	Meter shall register energy in forward register during reverse connection condition	Specify
4.2.2.4	(a) Meter shall be fitted with an SCSSCAAA9 (MC171) compliant data port for programming and interrogating the meter.	Specify
	(b) Two (2) sets of data interrogating and programming probes and software (1 each for optical and SCSSCAAA9 ports) shall be provided with the meter sample for evaluation	To Comply

Clause number	KPLC requirement	Bidder's offer (indicate full details of the offered for the postpayment meter)
4.2.2.5	Back-light seven-segment Liquid Crystal Display (LCD) for displaying parameters and measured values	Specify
4.2.2.6	LCD shall have at least 7 digits and no decimals	Specify
4.2.2.7	LCD Capable of displaying various status and tampering conditions of the meter	Specify
4.2.2.8	Provision for scrolling through the display parameters	Specify the parameters
4.2.2.9	Recording and display of error status on the LCD when the meter malfunctions	Specify all info to be displayed
4.2.2.10	LED indicator for testing and indication of kWh consumption	Specify
4.2.2.11	Principal unit of measurement shall be the kilo-watt hour (kWh)	Specify
4.2.2.12	Non-volatile memory with long term data retention for at least 15 years or certified life of the meter whichever is greater without an electrical supply being supplied to the meter	Specify
4.2.2.13	At least twelve (12) billing historical data stored in the memory and retrievable by software action	Specify
4.3	**Electrical requirements**	Specify
4.3.1	The meter is operated from mains with reference values of 230V, 50 Hz, with operating voltage range from 0.4Un to 1.3Un.	Specify
4.3.2	Reference standard currents Ib=5A, Imax≥80A	Specify
4.3.3	**Summary of electrical parameters as per table 1 of specification**	
(a)	Meter accuracy class	Specify class and reference standard
(b)	Rated Nominal Voltage (Un) and Frequency (Hz)	Specify
(c)	Base Reference Current, Ib	Specify
(d)	Maximum Voltage Circuit burden (W and VA)	Specify
(e)	Maximum Current circuit burden (VA)	Specify
(f)	Maximum Current Imax (A)	Specify
(g)	Protective class	Specify class and reference standard
(h)	Accurate Metering Range	Specify
(i)	Starting Current (as a percentage of Ib)	Specify
(j)	Running with no-load	Specify

Clause number	KPLC requirement	**Bidder's offer** (indicate full details of the offered for the postpayment meter)
(k)	Short Circuit current (as a function of Imax)	Specify
(l)	Meter constant	Specify
(m)	Insulation class	Specify and reference standard
(n)	Insulation Level (kV)	Specify and reference standard
(o)	Overvoltage withstand (VAC for 48 hours)	Specify and reference standard
(p)	Voltage Impulse Withstand (KV)	Specify withstand value and reference standard
(q)	Current Impulse withstand (kA/microsecs)	Specify withstand value and reference standard
(r)	Lightning Surge Withstand	Specify withstand value and reference standard
(s)	EMC-Electrostatic discharge (kV air discharge)	Specify rating and reference standard
(t)	Immunity to HF Fields	Specify rating and reference standard
(u)	Immunity to Fast Transient Bursts	Specify rating and reference standard
(v)	Immunity to Radio interference	Specify rating and reference standard
4.4	**Quality Management System**	
4.4.1	Quality Assurance Plan	Provide
4.4.2	Copy of valid ISO 9001:2015 Certificate for international manufacturers and/or KEBS standardization certificate for local manufacturers	Provide
5.	**TESTS AND INSPECTIONS**	
5.1	Test standards and responsibility of carrying out tests	Provide
5.2	Copies of valid Type Test Reports and 3rd Party testing lab accreditation certificate submitted with tender	Provide
5.3	Routine and sample test reports to be submitted by supplier to KPLC for approval before shipment	Provide
5.4	Acceptance tests to be witnessed by KPLC Engineers at factory before shipment	Provide

Clause number	KPLC requirement	**Bidder's offer** (indicate full details of the offered for the postpayment meter)
5.5	KPLC to perform any of the tests independently in order to verify compliance with this specification	Comply
5.6	Laptop loaded with software for interrogating then meter data through optical and the SCSSCAAA9 ports	Specify
5.7	Training of 20No. KPLC staff on the use of optical and the SCSSCAAA9 ports.	
5.8	Supplier to replace without charge to KPLC meters which upon examination, test, or use, fail to meet any requirements in the specification	Comply
5.9	Required Type Tests and Routine Acceptance Tests	Specify
5.10	Minimum testing facilities	Specify
6	**MARKING AND PACKING**	
6.1	Marking as per specifications	Specify
6.2	Packing as per specifications	Specify
7	**DOCUMENTATION**	
7.1	Documents to be submitted with GTPs for tender evaluation	Provide
7.2	Documents to be submitted to KPLC for approval before manufacture (if tender awarded)	Provide
7.2	Recommendations for use, care, storage and routine inspection/testing procedures	Provide
8	**INFORMATION AND WARRANTY**	
8.1	Warranty	
8.1.1	Warranty of Fifty four (54) months from date of successful commissioning certificate for KPLC or Sixty (60) months warranty from the date of dispatch whichever is later	Specify
8.1.2	Software supplied shall be updated by the supplier at no extra cost while any required changes, e.g. tariff changes, statutory changes, etc. shall be implemented free of cost during the warranty period and beyond.	Specify
8.1.3	The successful bidder/supplier shall observe performance of their meter on site for a period of at least one (1) year and monitor accuracy of the same independently and submit a performance evaluation report of the same.	Specify

Clause number	KPLC requirement	**Bidder's offer** (indicate full details of the offered for the postpayment meter)
8.2	**Samples**	Specify
8.2.1	The tenderer shall submit Three (3) meter samples together with the tender documents (N.B. Samples shall not be returned to the tenderers).	Provide
8.2.2	The submitted meter samples shall be subjected to accuracy tests at KPLC's Meter Central Laboratory and also a third-party accredited laboratory to verify the requirements of IEC 62053-21:2003 and to verify responsiveness to other requirements of this specification.	Comply
8.2.3	Meter type approval by KEBS	Comply

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Manufacturer's Name, Signature, Stamp and Date