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Kenya Power

THREE-PHASE WATT-HOUR SMART METER WITH SELECTABLE PRE-PAID AND POST-PAID MODES- SPECIFICATION

A Document of The Kenya Power & Lighting Company PLC

February 2023

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 TABLE OF CONTENTS

0.2 AMENDMENT RECORD

Rev No.	Date (YYYY-MM-DD)	Description of Change	Prepared by (Name & Signature)	Approved by (Name & Signature)
2	08/02/2023	Cancels and replaces revision 1 and all previous issues	Peter Wanyonyi Benson Dianga Nancy Wairimu Cleophas Ogutu John Kenyanya John Kinyua	Dr. Eng. Peter Kimemia
2	08/02/2023	Removed part of clause 4.2.1.27 that requires IEC 62059-31-1 based Accelerated Reliability Test (ALT) and Dependability report on meters		
2	08/02/2023	Updated Clause 4.2.2.3 to require that the GPS module embedded on meters PCB should be pre-programmed with default communication protocol		
2	08/02/2023	Amended clause 4.2.2.10 to describe the number of channels of RS485 interface Modbus communication		
2	08/02/2023	Modified Clause 4.2.2.12 to specify that the communication module shall be powered by surge protected auxiliary power supply terminals of the meter.		
2	08/02/2023	Amended clause 4.4.1 and Table 2 on the Rated Voltage and Frequency tolerances to read- Rated nominal voltage (Un) 230vac ±10% & Frequency (Hz), 50 Hz±1.25Hz		
2	08/02/2023	Added specified characteristics of Disconnecting device on Table 2		

Rev No.	Date (YYYY-MM-DD)	Description of Change	Prepared by (Name & Signature)	Approved by (Name & Signature)
2	08/02/2023	Amended clause 5.1 to include testing procedures Annexes A, B, C and D at IEC 62055-31:2005		
2	08/02/2023	Added a section of Appendices which will now have Test and Inspection, QMS ,Technical Documentation and GTP		

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0.4 FOREWORD

This Specification has been prepared by the Commercial Service and Sales in collaboration with Standards Department, Meter Central Laboratory, Infrastructure Development, CT and Network Management, all of The Kenya Power & Lighting Company PLC (KPLC). It lays down requirements for Three-Phase Watt-hour Smart Meter for use in the KPLC Advanced Metering Infrastructure (AMI).

The specification establishes uniform requirements for Three-Phase Watt-hour Smart Meters

Specifications in this series are:

(i) TSP/14/011-02 - Single-Phase Split Din-rail Mounting Static Watt-hour Prepayment Meter for Active Energy- Using Power Line Carrier (PLC) as Medium of Communication Between Measurement and Control Unit (MCU) and User Interface Unit (UIU)

(ii) TSP/14/011 – 05 - Single-Phase Watt-Hour Smart Meter with Selectable Prepayment and Postpaid Modes- Specification

(iii) TSP/14/011 – 06 - Three-Phase Watt-Hour Meter with Selectable Prepayment and Postpaid Modes- Specification

The specification is intended for use by KPLC for procurement of Three-Phase Watt-hour Smart Meter and does not purport to include provisions of a contract.

Users of this KPLC specification are responsible for its correct interpretation and application.

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

Name	Division
Peter Wanyonyi	Commercial Service and Sales
Benson Dianga	Standards
Nancy Wairimu	Standards
Cleophas Ogutu	Infrastructure Projects
John Kenyanya	Meter Lab
John Kinyua	Procurement

1. SCOPE

1.1 This specification is for newly manufactured Three-Phase Watt-hour Smart Meter for measurement of alternating current active energy in 3 x 230/400 V, 50Hz networks.

1.2 Meters are for use in KPLC's Advanced Metering Infrastructure (AMI) system. The Meter shall communicate via either GSM/GPRS/3G/4G or NB-IoT and shall also support field/hot swappable/ replaceable plug-in type bi-directional communication modules with easy adaptability to network interfaces with other modes of communications;RS485, Modbus.

1.3 The modem shall support meter communication protocols as per DLMS/COSEM standards

1.4 The specification also describes the inspections and tests to be carried out on the meters as well as Schedule of Guaranteed Technical Particulars(GTP) to be filled and signed by the manufacturer and submitted with bids for tender evaluation.

1.5 The specification stipulates the minimum requirements for Three-Phase Watt-hour Smart Meter acceptable for use in KPLC's system and it shall be the responsibility of manufacturer to ensure adequacy of the design, good workmanship, good engineering practice and adherence to the Specifications and applicable Standards and regulations in the manufacture of the Meters.

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 61968-9:2013	Application integration at electric utilities - System interfaces for distribution management - Part 9: Interfaces for meter reading and control
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 Compatibility (EMC)-Part 4-5: 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 62056-6-2:2017	Electricity metering data exchange - The DLMS/COSEM suite - Part 6-2: COSEM interface classes.
IEC 62058-11:2008	Electricity Metering Equipment (AC) -Acceptance Inspection Part 11-General Acceptance Inspection methods
IEC 62058-31:2008	Electricity Metering Equipment (AC) -Acceptance Inspection Part 31-Particular requirements for static meters for active energy (classes 0.2S, 0.5S, 1 & 2)
IEC 62059-31-1	Electricity Metering Equipment - Dependability - Part 31-1: Accelerated Reliability Testing - Elevated Temperature And Humidity
IEC 61557-1: 2019	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 61810-1:2015	Electromechanical elementary relays - Part 1: General and safety requirements
IEC 60529:2013	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.
IEC 62053-21:2020	Electricity metering equipment - Particular requirements - Part 21: Static meters for AC active energy (classes 0,5, 1 and 2)
IEC 62055-31:2005	Electricity metering – Payment systems – Part 31: Particular requirements – Static payment meters for active energy (classes 1 and 2).
IEC 62055-41:2018	Electricity metering - Payment systems - Part 41: Standard transfer specification (STS) - Application layer protocol for one-way token carrier systems
IEC 62055-51:2007	Electricity metering - Payment systems - Part 51: Standard transfer specification (STS) - Physical layer protocol for one-way numeric and magnetic card token carriers
IEC 62056-21	Electricity metering - Data exchange for meter reading, tariff and load

control - Part 21: Direct local data exchange

IEEE 1901.2-2013	IEEE Standard for Low-Frequency (less than 500 kHz) Narrowband Power Line Communications for Smart Grid Applications.
SANS1524-1:2014	Electricity prepayment Systems, Part 1: Prepayment meters.
ISO 75-1:2020	Determination of temperature of deflection under load — Part 1: General test method.
ISO 9001:2015	Quality Management Systems — Requirements

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:

DLMS/COSEM	Device Language Message Specification/Companion Specification for Energy Metering
CIU	Customer Interface Unit
UIU:	User Interface Unit
EDIS:	Energy Data Identification System
EMC:	Electromagnetic Compatibility
GPRS:	General Packets Radio Service
GSM:	Global System for Mobile communications
I_b:	Basic current of an electric meter
I_{max}:	Maximum current of an electricity meter
I_n:	Nominal current of a transformer coupled electricity meter
IEC:	International Electro-Technical Commission.
ISO:	International Organization for Standardization

LCD:	Liquid Crystal Display
KPLC:	Kenya Power and Lighting Company PLC
RF:	Radio Frequency
TCP/IP:	Transmission Control Protocol/Internet Protocol
TMR:	Energy Tele-Meter Reading system
Hz	Hertz
kV	Kilovolt
KWH	Kilowatt-hour
LED	Light emitting diode
MCU	Measurement and Control Unit
PLC	Power Line Carrier
SRE	Significant Reverse Energy
STS	Standard Transfer Specification
BPL,	Broadband PLC
LoRa,	Long-Range WIFi
Nb-IOT	Narrowband Internet of Things
G3 PLC	Narrow band PLC based on ITU G.9903
Prime PLC	PoweRline Intelligent Metering Evolution PLC
SMS	Short Message Service
USSD	Unstructured Supplementary Service Data
CSD	Circuit Switched Data

4. REQUIREMENTS

4.1 Operating Conditions

4.1.1 Operating Environmental Conditions

The meters shall be suitable for continuous indoor and outdoor operation in tropical climate with the following

conditions:

a) Altitude of up to 2400m 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 +55°C and;
d) Pollution: Design pollution level to be taken as "Heavy" (Pollution level III) for inland and "Very Heavy" (Pollution level IV) for coastal applications.
e) Isokeraunic levels of up to 180 thunderstorm days per year.

4.1.2 System Characteristics

4.1.2.1. The meter shall be connected to an overhead or underground-earthed system.

4.1.2.2 The nominal voltage (U_n) is 3 x 230/400 volts, 50Hz.

4.2 Design and Construction Requirements

4.2.1 General Requirements

4.2.1.1 The meter shall be constructed as Three-phase Four-wire Direct-Connected Prepaid/Postpaid meters. The meter shall support both prepaid and postpaid modes.

4.2.1.2 The meter shall be of British Standard (BS) 5685-foot print for standardized mounting for asymmetrical (BS) wiring

4.2.1.3 The meter shall have terminals with bottom entry for cables and the arrangement shall be L1L1: L2L2: L3L3: NN for 3 phase 4-wire meters

4.2.1.4 The meter base and cover shall be of non-metallic, non-hygroscopic, flame retardant, polished material having high impact-resilience and low dirt absorption properties.

4.2.1.5 The meter front cover shall have a window (clear glass or polycarbonate) for reading the display and for observation and the terminal cover shall be transparent with sealable Nickel-plated steel

4.2.1.6 The nickel-plated steel screw shall be long enough for firm holding of the cover, and shall have a stopper/retaining mechanism to prevent falling off the cover when unscrewed.

4.2.1.7 The meter shall conform to the degree of protection of at least IP 54 as given in IEC 60529:2013.The terminals shall be designed to ensure protection from ingress of water and dust.

4.2.1.8 The meter shall have a real-time clock controlled by a quartz crystal oscillator. It shall be possible to reset the clock without loss of billing data that shall be synchronized with the AMI system.

4.2.1.9 The material of which the terminal block shall be capable of passing the tests given in ISO 75-1:2020.

4.2.1.10 The meter shall be for front projection mounting.

4.2.1.11 The meter shall have an internal back –up battery to support the LCD display, clock and calendar in the event of an AC power failure. The life expectancy of the battery shall last for a minimum of 10 years.

4.2.1.12 The meters shall be equipped with lockable/sealable push buttons where such buttons are used to program the meter parameters.

4.2.1.13 The potential link of the meters shall be internal (inside the sealed part of the meter).

4.2.1.14 The meter shall have a sealing provision for terminal cover. The meter terminal cover shall be of the long type with cable entry knock-offs which shall be at least 20mm from the terminal block.

4.2.1.15 The meter shall have terminal cover open detection. Once the terminal cover is opened, the load shall be disconnected.

4.2.1.16 The meters' terminal holes and screws shall be of moving-cage type made of nickel-plated brass for high strength and good conductivity.

4.2.1.17 The meter shall support double element circuit measurement (phase and neutral circuits).

4.2.1.18 The meter body dimensions shall not exceed: Height = 290mm; Width = 170mm; and Depth = 90 mm;

4.2.1.19 The MCU shall have a keypad on the body of the meter for keying in the tokens and other interrogations. They keypad shall be IP54 compliant.

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

4.2.1.21 The meter shall have terminal cover open detection mechanism. Once the terminal cover is opened, the load shall be disconnected. The mechanism shall be designed to operate as in sub-clauses (a) to (c) below:

(a) The MCU shall be supplied with loading switch in open mode and installer can open terminal cover when MCU is not activated by commissioning code (token).

(b) After installation of MCU, the installer will input a commission code (token) to close the loading switch and activate terminal cover open detection function. The commissioning code/token shall precede any token to be keyed into the meter to activate all functionalities of the meter. The meter shall reject any token (clear tamper token, credit token, etc.) input into the meter as long as the commissioning token has not been keyed into the meter.

(c) After commissioning token is put into the MCU and loading switch closes, opening of the terminal cover shall lead to tamper. When MCU has power and terminal cover is opened, MCU will disconnect immediately. When MCU has no power and terminal cover is opened, MCU will detect and record the event and disconnect immediately power resumes.

4.2.1.22 The MCU shall be sealed and 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.

4.2.1.23 The terminals shall be of suitable rating to carry continuously Imax current.

4.2.1.24 Terminal holes shall be of at least 10-mm diameter and 15mm in depth.

4.2.1.25 The meter terminal cover shall have screw inserts sealable with utility wire seals.

4.2.1.26 The meter protection class shall be Class II (Double insulated) as per IEC 61140:2016 standard.

4.2.1.27 The meter shall have a non-volatile memory capable of data storage and with long-term data retention period of not less than 10 years or for the certified life of the meter or whichever is greater without an electrical supply being supplied to the meter.

4.2.1.28 The meter shall have register codes as per the list of default OBIS codes.

4.2.1.29 The principal unit for the measured values shall be the kilowatt-hour (kWh) for active power and kilo volt-ampere for reactive power (kVAR) with a resolution of at least 0.01 for testing purposes.

4.2.1.30 The cumulative consumption register of the meter shall **NOT** be resettable to zero.

4.2.1.31 The meter shall detect Significant Reverse Energy (SRE) when the line and load wires are swapped and this shall be indicated on the LCD display of the meter.

4.2.1.32 The meters shall continue to operate correctly and decrement credit during SRE detection for prepaid meters and increment for postpaid meters.

4.2.1.33 The meters shall have LED indicators for testing and indication of Active power and Reactive power consumption.

4.2.1.34 The spacing between the LEDs shall be sufficient so as not to disrupt the testing of the meter during the verification of the accuracy of the energy meter.

4.2.1.35 The internal circuit of the meter shall be designed in a manner to delink the optical interface and the display to allow interrogation of the meter through the optical interface when the LCD display is not working.

4.2.1.36 The MCU enclosure material shall be of good dielectric and mechanical strength with minimum thickness of 2.0mm. The material shall comply with IEC 60695-2-11 glow wire test.

4.2.1.37 The bidders shall specify Original Equipment Manufacturers (OEM) and any Technical Partners in the design of their meters.

4.2.2 Communication:

4.2.2.1 The meter shall support bi-directional communication.

4.2.2.2 The meters shall be compliant with the DLMS/COSEM communication protocol. The bidder shall submit the Compliance Certificate together with the tender document for evaluation.

4.2.2.3 The meter shall have an integrated GPS module on the meter PCB for locating the meter. The offered meter should have a GPS module with function for real time location using longitude and latitude. The manufacturer to equip the meter with own GPS default protocol.

4.2.2.4 The meter shall be equipped with an infrared optical port compliant with the IEC 62056-21 standard for meter programming and data downloading.

4.2.2.5 The MCU shall come fitted with an SCSSCAAA9 (MC171) compliant data port for programming and interrogating the meter.

4.2.2.6 Meter shall have modular design and have a plug in GSM 4G communication modem/module and shall support other communication modules as per clause 4.2.2.9 and the point at which its plugged shall be sealable. The meter shall communicate with the remote central server system. The 4G modem shall support lower generation broadband technologies.

4.2.2.7 The communication module shall be hot swappable.

4.2.2.8 The communication Module Printed Circuit Boards shall be conformal coated to prevent malfunction due to ingress of moisture, vermin, dust, chemicals and temperature extremes.

4.2.2.9 The Meter shall communicate via GSM/GPRS/3G/4G/NB-IoT but shall also have a sealable slot to support field/hot swappable/ replaceable plug-in type bi-directional communication modules with easy adaptability to network interfaces with RS485, Modbus modes of communications. All the interfaces shall be DLSM/COSEM complaint

4.2.2.10 The Meters shall have isolated dual channel RS485 communication interface.

4.2.2.11 Meter's firmware shall be upgradable remotely and locally. Upgrading of firmware shall not stop or affect meter's metrology.

4.2.2.12 The communication module shall support GPRS modem and online and on-demand-online modes. The Communication module shall be powered by surge protected auxiliary power supply terminals of the meter.

4.2.2.13 Meter shall send a 'last gasp' power outage response when it loses power and a 'First Breath' restoration message when power is restored.

4.2.2.14 The meter shall support manual meter reading in case of loss of communication to the meter.

4.2.2.15 The meter shall work on either Postpaid Mode or Prepaid Mode. The switch of mode shall be done via meter-specific token or via optical communication or via the system signal.

4.2.2.16 The meters shall be supplied together with a scanner and laptop for scanning the meters at the KPLC warehouse and a laptop loaded with software for interrogating the meter data and loading commissioning and credit token during testing at our laboratory. The laptop specification shall include, the following or higher specifications as in Table 1

Table 1: Laptop Technical Specifications

Description	Mandatory Minimum Requirements
Processor	Intel Core i7-5500 (2.60GHz 1600MHz 3MB, 8 Cores)
RAM	16GB DDR4-2133MHz SODIMM
Operating System	Windows 10 pro 64 bit
Optical Drive	Super Multi DVD-RW or DVD Recordable Burner
Hard Disk	1TB 7200 rpm Hard Drive
Display Panel	15.6" FHD LED Glossy (1920x1080) with integrated Webcam 720p camera
Graphics	Integrated Intel HD Graphics 520
Internal Audio	Integrated HD audio internal speaker (standard) or Stereo with Dolby Audio TM, 1xMic Headphones Combo
Communications	GPRS/ HSDPA Modem, Integrated Intel Gigabit Network Connection (10/100/1000 NIC)
Wireless	Intel 802.12 AC WLAN and Bluetooth(R)
Interfaces	VGA, MDP, 4-in-1 Card Reader, Smart Card Reader. RJ-45, Headphone and Microphone Jack, Mechanical Docking, 2 x USB 3.0, W/WAN SIM, Express Card Slot, 1 HDMI port, Bluetooth, Wi-Fi enabled
Pointing Devices	Touchpad with scroll zone, Two Pick Buttons or Pick Stick, Two Pick Buttons
Keyboard	Keyboard with Number Pad – English (Standard)
Mouse	External USB Mouse
Warranty	1 Year
Power	4-cell 41WHr Lithium-ion Battery; External AC adapter
Power Supply	230V AC, 50 Hz, British plugs
Carrying Case	Genuine Leather Carrying Case
Manufacturer's Authorization	Manufacturers Authorization Certificate/ Letter and for the models quoted, the principal (Manufacturer) MUST have an established regional office in Kenya.

4.2.3 Meter Display

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

4.2.3.2 The meter LCD shall have at least seven (7)-numerical characters comprising of selectable integers and two decimals points for energy measurement. The minimum character height

shall be eight (8) mm.

4.2.3.3 The meters LCD shall be capable of displaying the current state of the relay via symbols.

4.2.3.4 The meters LCD shall be capable of displaying various tampering conditions of the meter.

4.2.3.5 The display parameters shall be configurable by software action.

4.2.3.6 The LCD display shall operate in at least two modes, namely, basic and extended data list display using push buttons on meter front.

4.2.3.7 Meters shall have provision for reading the meter at site even when mains power supply fails.

4.2.4 Functionality Requirements of Measuring and Control Unit (MCU)

4.2.4.1 The MCU shall measure and display the energy quantities of active power, reactive power and apparent power in both import and export modes.

4.2.4.2 The meters shall be capable of profiling multiple channels of energy, demand (KVA, KW, KVAr), voltage, current, power factor, harmonics, for a period of at least six (6) months for 60 minutes data intervals.

4.2.4.3 The meter shall be able to measure the units consumed in the event of an imbalanced load or the absence of one or two phases.

4.2.4.4 The meters shall measure Energy correctly even when the phase rotation/sequence is incorrect.

4.2.4.5 The meters shall be capable of recording of active and reactive energy in all four (4) quadrants with up to four (4) tariffs.

4.2.4.6 The meter shall have at least four (4) registers for energy

4.2.4.7 The meter shall be capable of measuring energy in security mode and also record reversed units.

4.2.4.8 The Meter shall indicate on the LCD display reverse energy consumption.

4.2.4.9 The meter shall have capability of closing end of billing period on any selected date of the month selectable by software.

4.2.4.10 The meter's billing registers shall NOT be re-settable to zero.

4.2.4.11 The meters shall have at least twelve (12) billing historical data stored in memory and

retrievable by software action.

4.2.4.12 The meter shall have a load switch to disconnect the load circuit on the expiry of credit balance in the case of prepayment meters.

4.2.4.13 The load switch shall automatically restore the load circuit after token top up for prepayment meters.

4.2.4.14 The meter load switch shall comply with the requirements given in IEC 62055-31:2005.

4.2.4.15 The meters shall have a programmable power limit setting that shall disconnect the load once exceeded and reconnect once the load falls below the set limit

4.2.4.16 The meters shall disconnect the load if power failure is detected and connect the load after normalization.

4.2.4.17 The meters shall be able to indicate absence or presence of continuous power by use of a Light Emitting Diode (LED).

4.2.4.18 The MCU shall have an LED indicator to show the rate of consumption. The pulse rate shall be proportional to current rate of consumption.

4.2.4.19 The MCU shall have an LED to indicate the presence of an alarm of any registered event on the meter.

4.2.4.20 The MCU shall have a self-diagnostic feature to diagnose the status of the functions of the meter.

4.2.4.21 The MCU shall have a Liquid Crystal Display (LCD) for numeric display and language independent pictograms to identify operational features. The LCD shall have a wide viewing angle of 45^0. to 60^0. with, up to one-meter distance.

4.2.4.22 The Live and Neutral shall be DC immune complying with requirements of IEC 62052-11:2003 and IEC 62055-31:2005.

4.2.4.23 The MCU shall come fitted with an SCSSCAAA9 (MC171) compliant data port for programming and interrogating the meter. 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. For the winning bidders, each delivery of 100,000 meters shall have 50 sets of probes and read only software for use with the optical

and the SCSSCAAA9 ports.

4.2.4.24 The MCU shall be supplied together with a plastic card of dimension 60mm x 40 mm (length x height) indicating the meter number. A tolerance of ±1mm will be acceptable. The meter serial number shall be engraved on the card together with its bar code version. No random redundant digits shall be added to the meter number.

4.2.4.25 The MCU shall be with Nil units pre-loaded (i.e. 0 (Zero) kWh for prepaid meters.

4.2.5 Time-of-use tariff measurements

4.2.5.1 The meters shall be capable of measuring and displaying time-of-day active and reactive energy consumption up to four tariff registers.

4.2.5.2 The meters shall be capable of measuring and displaying time-of-day demand (kW and kVA) consumption up to four tariff registers.

4.2.5.3 Each tariff register shall be set to operate over defined time periods during a 24-hour day.

4.2.5.4 The meters shall have at least two seasons and four day types namely weekday, Saturday, Sunday and Special/Holiday with switching times set independently.

4.2.5.5 The meters shall have at least forty (40) special days to take care of national holidays, world days and Easter holidays.

4.2.6 Demand measurements

4.2.6.1 The meters shall be capable of measuring and displaying active, reactive and apparent demand consumption in both import and export modes.

4.2.6.2 The meters shall display demand values and their time and date stamps.

4.2.6.3 The meters shall measure demand correctly even when the phase rotation/sequence is incorrect.

4.2.6.4 The meter shall have at least four (4) registers for demand.

4.2.6.5 The meters shall have a capability of closing end of billing period on any selected date of the month selectable by software.

4.2.6.6 The meters shall have at least twelve (12) billing historical data stored in memory and retrievable by software action. The current and billing/historical data shall be available on meter display for reading and billing purposes.

4.2.7 Instrumentation data measurements

4.2.7.1 The meters shall be capable of displaying instrumentation data namely instantaneous phase voltages and currents, phase angles, and power factor.

4.2.7.2 The meters shall be capable of measuring and displaying instantaneous power (active, reactive and apparent).

4.2.7.3 The meters shall be capable of measuring and displaying average power factor for the current and the previous billing months.

4.2.7.4 The meters shall be capable of continuous display of the presence or absence of individual phase voltages.

4.2.7.5 The meter shall have diagnostics to alert of any abnormal three phase power condition, such as: over/under voltage, missing voltage, missing current, improper meter vectors for service, reverse power flow, etc.

4.2.8 Load profiling

4.2.8.1 The meters shall be capable of profiling multiple channels of energy, demand (kVA, kW, kVAr), voltage, current, power factor, harmonics, for a period of at least six (6) months for 60 minute intervals.

4.2.8.2 The load profile integration period shall be programmable from one (1) minute up to a maximum of sixty (60) minutes.

4.2.9 Power Quality Analysis

4.2.9.1 The meter shall collect and record basic power quality information – overcurrent, total no. of alarms, power outages, voltage and current, average power factor and line frequency, etc.

4.2.9.2 The meter shall be able to provide voltage sag and swell detection.

4.2.9.3 The meters shall provide Total Harmonic Distortion (THD) event detection at least up to the 10th harmonic with analysis for unusual system conditions.

4.3 Security features

4.3.1 The meters shall be capable of event recording and communication, which shall include but not be limited to the following:

a) Power ups and power downs with date and time stamp;

b) Individual phase failure, with date and time stamps;

c) Over- and under-voltages based on a pre-set threshold with date & time stamp;
d) Battery voltage status (if applicable);
e) Memory status;
f) Meter errors,
g) Date and time of last programming/parameterization;
h) Date and time of the last end of billing period;
i) Firmware upgrades
j) Prepayment events
k) Terminal cover removal, even during a power failure
l) Main meter cover removal, even during a power failure
m) Communications removal
n) Magnetic detection, at least 0.5 mT
o) Bypassing neutral
p) Interchanging incoming and outgoing leads

4.3.2 The LCD shall display events that have occurred. The events displayed shall include but not be limited to the following:

a) Meter errors
b) Phase failures
c) Battery voltage status (if applicable)
d) Alarms
e) Warning messages
f) Prepayment mode
g) Terminal cover removal
h) Communications removal
i) Magnetic detection, at least 0.5 mT

4.4 Electrical Requirements

4.4.1 The meter shall be operated from mains with reference values of 3 x 230/400V, ± 10% 50Hz ± 1.25% with a load switching voltage range from 0.4Un to 1.3Un phase to neutral.

4.4.2 The load switch shall be of bi-stable type designed and manufactured in accordance with IEC 61810- 1, as well as meet the overload and short circuit requirement of IEC 62052-11 /

62055-31:2005. The load switch shall interrupt the supply when the voltage is below 0.4 Un and above 1.3Un phase to neutral.

4.4.3 The load switch shall automatically restore supply within a minute when the voltage falls within 0.4 Un – 1.3 Un phase to neutral.

4.4.4 The meters shall be connectable for 3 Phase 4-wire systems, a permanent connection drawing of which shall be printed on the meter body. Stickers of any kind shall not be accepted.

4.4.5 The meter shall have Reference Standard Electrical Design Parameters as in Table 2 below.

Table 2: Summary of Electrical Parameters

Measurement and Control Unit	
Electrical Parameters	
Accuracy Active power	kWh Class 1 (IEC 62055-31:2005)
Accuracy Reactive power	kVAr Class 2 (IEC 62055-31:2005)
Rated Nominal Voltage (U_n), Frequency (Hz)	3 x 230/400V, ± 10% 50Hz ± 1.25%
Load switching voltage range	0.4 U_n to 1.3 U_n (Phase to neutral)
Base Reference current, I_b	10A
Max. Voltage circuit burden	1W and 5 VA @3 x 230/400V, 50Hz, 30^0 C
Max. Current circuit burden	2VA @ 5A, 50Hz, 30^0 C per phase
Maximum Current I_{max} (A)	100 A.
Protective class	Class II (double insulated)
Accurate metering range	0.002 I_b to I_{max}
Starting current	0.002 I_b
Running with no-load	No more than one pulse on application
Short circuit current	30 I_{max}
Meter Constant	1000 imp/kwh
Meter Constant	1000 imp/kVAr
Disconnection Devices	
Type	Latching contactor, 100 A.
Mechanical life at maximum power, PF=1	At least 3,000 cycles
Maximum switching current per phase	At least 100 A
Maximum switching voltage per phase	At least 265 V AC

Maximum overload current per phase	120 A (30 min)
Insulation; Over voltage and Surge Protection	
Insulation classification	Protective Class II
Insulation level	At least 6 kV rms for 1 minute
Over voltage withstand	400 VAC for 48 hours
Voltage Impulse withstand	At least 6 kV, 1.2/50µs (IEC 62052-11) with 2Ω source
Current Impulse withstand	At least 5kA, 8/20 µs
Lightning Surge Withstand	At least 30kA, 4/10 µs
Electromagnetic compatibility	
Electrostatic discharge	15 kV air discharge
Immunity to HF fields	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
Immunity to Fast Transient Bursts	Complies with requirements for CISPR 22, IEC 61000-4-2,3,4,6
Radio interference	4 kV
Communication Circuitry	
Type	GPRS
Rated Impulse Voltage	Voltage 6 kV (1.2/50µs) waveform (IEC 62052-11) Protective Class II
Insulation level	6 kV_{rms} (1 Minute) - IEC 62052-11 Protective Class II
Communication Protocol	DLMS/COSEM (IEC 62056)

Note: The above electrical design parameters shall all form part of the Type Test Report:

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4.4.6 The meter shall have Default Factory Parameters settings as in Table 3 below:

Table 3: Default Factory Parameters Settings

CONFIGURATION ITEM	DATA VALUE
Basic Parameters	
Rated Voltage	3 x 230/400V
Basic Current (I_b)	10A
Maximum Current(Imax)	100A
Meter Constant for Active power	1000imp/kWh
Meter Constant for Reactive power	1000imp/kVAr
Accuracy class for active power	1
Accuracy class for reactive power	2
Frequency	50Hz
Time zone	GMT+3
Measurement configuration	
Active	|Ai| = |+A| + |-A|
	|Ac| = |-A|
Reactive	|Ri| = |+R| + |-R|
	|Re| = |-R|
Prepaid parameters	
Factory default payment mode	Prepaid/Postpaid
Pre-load credit	0KWh
Low credit warning(Alarm green LED-Permanent)	≤ 20KWh
Low credit warning(Alarm Red LED-Permanent)	≥10KWh to <20KWh
Low credit warning(Alarm Red LED-Flashing)	≥5KWh to <10KWh
Low credit warning(Alarm Red LED-Flashing and alarm buzzer)	<5KWh
Emergency recharge credit limit	0KWh

Maximum recharge credit limit	999999.99kWh
STS Key	
Supplier Group Code(SGC)	XXXXXXX (to be supplied by KPLC)
Tariff Index	1
Events Parameters	
Overvoltage threshold value	299V (Phase to Neutral)
Overvoltage estimate delay	10s
Under voltage threshold value	92V (Phase to Neutral)
Under voltage estimate delay	10s
Bypass define Threshold	10%
Bypass Enter Define Delay	30s
Overload trip threshold value	Un*Imax
Duration time of over load for disconnection	30s
Overload Exit(recovery) Define Delay	30s
Overload Recover Define Delay(after sustained overload)	30 mins
Over current trip threshold	120A
MCU Display	
MCU Auto -scroll interval	3s
MCU Auto -scroll sequence	-Remaining Credit balance - Total Units consumed -Date and Time -Flagged Alarms e.g. meter bypass, meter terminal cover open

4.5 Interoperability Requirements

4.5.1 The Manufacturer shall produce meters that fully meet the requirements of the IEC 62055-51:2007 on Standard Transfer Specification protocol and IEC 62056-6-2:2017 on communication protocol to be provided by KPLC:

(a) Facilitates interoperability amongst hardware, software and meters supplied by other manufacturers.

(b) Does not lock KPLC to only the bidder or any one supplier or manufacturer in its future procurement of prepayment meters, software or hardware.

(c) The smart meters shall be interoperable with the existing KPLC Advanced Metering Infrastructure (AMI). The bidder shall be able to demonstrate this before award.

4.5.2 The bidder awarded the contract to supply the smart meters as per this specification shall be provided with the communication protocol encryption/decryption security key by KPLC for the meters supplied.

5.0 TESTS AND INSPECTIONS

5.1 The meters shall be tested in accordance with the requirements of IEC 62053-21:2020, IEC 62055-31:2005, including Annex A, B, C and D and other relevant standards as well as provisions of this specification.

5.2 It shall be the responsibility of the supplier to perform or to have performed the tests specified in their premise or a third-party accredited laboratory.

5.3 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 cover all, but not limited to, those outlined in clauses 5.4.1, 5.4.2, 5.4.3, 5.4.4, 5.4.5, 5.4.6, 5.4.7 and 5.4.8 of this specification and 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 the English Language).

5.4 The following tests shall be conducted on the meter as per IEC 62052-11: 2003, IEC 62053-21: 2003, IEC 62055-31: 2005 including Annex A, B, C and D and other relevant standards:

5.4.1 Tests of Insulation Properties

a) Impulse Voltage Test
b) AC High Voltage Test
c) Insulation Test

5.4.2 Test of Accuracy Requirements

a) Tests on Limits of Error
b) Interpretation of Test Results
c) Test of Meter Constant
d) Test of Starting Conditions

e) Test of No-load Condition
f) Test of Ambient Temperature Influence
g) Test of Repeatability Error
h) Test of Influence Quantities

5.4.3 Test of Electrical Requirements

a) Test of Power Consumption
b) Test of Influence of Supply Voltage
c) Test of influence of Short-term Over-currents
d) Test of Influence of Self-heating
e) Test of Influence of Heating
f) Test of Influence of Immunity to Earth Faults

5.4.4 Test for Electromagnetic Compatibility

a) Radio Interference Measurement
b) Fast Transient Burst Test
c) Test of Immunity to Electrostatic Discharges
d) Test of Immunity to electromagnetic HF Fields

5.4.5 Test for Climatic Influences

a) Dry Heat Test
b) Cold Test
c) Damp Heat Cyclic Test

5.4.6 Test for Mechanical Requirements

a) Vibration Test
b) Shock Test
c) Spring Hammer Test
d) Protection Against Penetration of Dust and Water
e) Test of Resistance to Heat and Fire

5.4.7 Functional Tests

a) Open Cover tamper detection.
b) Token validation test
c) Decrementing of units when connected to Load.
d) Automatic interrupting of the load circuit on expiry of units
e) Test of credit balance and debit
f) Test of disconnect of supply when credit decrement to zero
g) Test of reconnecting supply on providing credit
h) Test to disconnect supply if load/current exceeds the preset value of the meter
i) Test to reconnect supply if load current falls within present value.

5.4.8 Additional Tests

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

5.5 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 for (a),(c),(g),(h). Stickers shall not be accepted

The following information shall be marked on each meter.

(a) The Standard Transfer Specification (STS) compliant serial number, in the preferred format known as a national meter number,
(b) The STS compliance logo,
(c) The inscription "**Property of KPLC**.",
(d) Name or trade mark of the manufacturer;

(e) Wiring Connection diagram.

(f) Country of Origin

(g) Type/model

(h) Meter number

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

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

(k) Year and Month of Manufacture

(l) Guarantee – 5 Years

(m) KEBS Standardization/Diamond Mark. This is exempt for international manufacturers

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 (a)The meters shall be packed in suitable groups and / or batches with consecutive serial numbers. The barcodes of the serial numbers shall be labelled on the outer part of the carton for easy scanning. Packaging shall be done only after KPLC approval

(b) For postpaid meters the serial numbers of the energy meters shall be provided by KPLC

6.2.3 The meters and UIU shall be packaged in multiples of ten unless where the number of meters in a group/batch does not make a multiple of ten and the number of meters should be packaged with an equal number of CIUs.

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.

6.2.5 The supplier shall indicate the delivery time versus quantities of each type of meter and his production capacity.

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7.0 INFORMATION AND WARRANTY

7.1 Warranty, Qualification and Capacity

7.1.1 The supplied meters, MCUs, UIUs, 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.

7.1.2 The successful bidder/supplier shall be in compliance with the manufacturers experience or relevant manufactures qualification requirement as defined in the tender documents under the relevant manufacturers qualification clauses and also the Appendix C,Part C1 xiv,xv,xvi of this Specification.

7.1.3 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.

7.1.4 The successful bidder/supplier shall observe the performance of their meters on site for a period of at least one (1) year. The bidder/ supplier shall independently verify accuracy and carry out functional tests to verify that the meters are working as expected for at least 0.5% of the meters supplied and submit a performance evaluation report to KPLC for review. The sampled meters shall be from at least 3 counties with the leading number of meters installed.

7.1.5 Energy meter models which have registered poor performance with failure rates above 1.5 % within the warranty period of 5yrs while in service in Kenya Power system shall not be accepted.

7.2 Samples

7.2.1 The tenderer shall submit three (3) MCUs and three (3) UIUs samples together with the tender documents. Samples shall not be returned to the tenderers.

7.2.2 The submitted meter samples shall be subjected to accuracy tests at KPLC's Meter Central Laboratory or 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.

7.2.3 The samples of the meters offered shall be submitted together with test tokens for; different Power Limit Settings and resets for the same, Credit and Clear Credit Tokens to aid in the testing of the meters. The manufacturer might be required to provide more tokens at no extra cost.

7.2.4 The samples provided during tendering shall be the same as the product being delivered and this shall be confirmed during approval of drawings to verify that there is no variation of the product.

7.2.5 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. Bidders therefore shall furnish the Bureau with 4 (four) samples of each meter type to be supplied. The winning bidders therefore must submit KEBS approval before signing of the supply contract.

APPENDIX A: TESTS AND INSPECTIONS

A.1 Routine and sample test reports for the meter to be supplied shall be submitted to KPLC for approval before shipment/delivery of the goods.

A.2 All acceptance tests as stipulated in the relevant standards shall be carried out by the supplier and shall be witnessed by KPLC Engineers at the Manufacturers factory before shipment.

A.3 On receipt of the goods KPLC will perform any of the tests specified in order to verify compliance with this specification.

A.4 The supplier shall conduct training in Nairobi for 25no. Personnel on the use of optical and the SCSSCAAA9 ports. The training shall also include installation, commissioning, and metering operation management.

A.5 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.

APPENDIX B: QUALITY MANAGEMENT SYSTEMS

B.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.

B.2 The supplier shall submit, with the tender for evaluation ,Copies of Quality Management Certifications including a copy of valid and relevant ISO 9001: 2015 Certificate for international manufacturers and/or KEBS Standardization Certificate for local manufacturers shall be submitted with the tender for evaluation as a declaration of Conformity to reference standards.

B.3 The bidder shall indicate the delivery time of the ordered meters, manufacturer's monthly & annual production capacity and experience in the production of the type and size of meter being offered versus quantities of each type of meter.

APPENDIX C: TECHNICAL DOCUMENTATION

C.1 The bidder shall submit its tender complete with technical documents required by Appendix D (Guaranteed Technical Particulars) for tender evaluation. The technical documents to be submitted (all in English language) for Tender Evaluation shall include the following:

(i) Fully filled clause by clause Guaranteed Technical Particulars (GTP) signed and stamped by the manufacturer;

(ii) Meter drawings, giving all the relevant dimensions.

(iii) Wiring diagrams;

(iv) Users and Operating Manuals.

(v) Copies of the Manufacturer's Catalogues, Brochures, Drawings and Technical Data;

(vi) 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 shall be 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 tests conducted in the manufacturer's own laboratory and certified by testing bodies shall not be acceptable.

(vii) Current e-mail addresses, and telephone numbers of the National / International Testing / Calibration Laboratories and Meter Certification bodies used to test the meter on offer.

(viii) Copy of Accreditation Certificate to ISO/IEC 17025 for the third-party testing laboratory

(ix) A copy of ISO 9001: 2015 Certificate

(x) KEBS standardization quality mark certificate for local manufacturers.

(xi) Manufacturer's letter of authorization.

(xii) Manufacturer's warranty and Guarantee.

(xiii) Copies of DLMS/COSEM certificates

(xiv) Evidence that the manufacturer has supplied a given number of pieces of the meters type offered – and having done so within a given duration, as stated in the tender document.

(xv) Sales records of the last 3 years. International (non-Kenyan) manufacturers to submit reference letters for sales over the same period from at least four different customers.

(xvi) Details of manufacturing capacity and the manufacturer's experience.

(xvii) The supplier shall provide the test results of all the meters supplied in soft copy in a format that shall enable a quick search of a particular meter number and its results.

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

(i) Fully filled clause by clause Guaranteed Technical Particulars (GTP) signed by the manufacturer;
(ii) Design Drawings with details of meters to be manufactured for KPLC.
(iii) Wiring diagrams
(iv) Detailed of Tests and Test Program to be used during Factory Acceptance Testing;
(v) A copy of ISO 9001: 2015 Certificate
(vi) Copy of Accreditation Certificate to ISO/IEC 17025 for the third-party testing laboratory
(vii) Copies of DLMS/COSEM certificates
(viii) Manufacturer's Warranty and Guarantee;
(ix) Manufacturer's letter of authorization,
(x) KEBS standardization quality mark certificate for local manufacturers.
(xi) 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 requirements of ISO 9001:2015.
(xii) An outline of the proposed manufacturing process and program sequence.
(xiii) List of areas in manufacturing process, where stage inspections are normally carried out for quality control and details of such tests and inspections.

C.3 All documentation necessary for Safety and Operation of the equipment after Installation as specified in IEC 61010-1:2010 clause 5.4 shall be provided with the meter during delivery to KPLC.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.

APPENDIX D: GUARANTEED TECHNICAL PARTICULARS

For Three Phase Smart Selectable Prepaid and Postpaid Active Energy Meter *(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 prepayment 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.	Definitions and Abbreviations		Specify
4.	**REQUIREMENTS**		
4.1	**Operating Conditions**		
4.1.1	Operating environmental conditions	Altitude	State
		Humidity range - Rel. humidity	State
		Operating temperature	State
		Pollution category	State
		Isokeraunic levels	
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	Meter shall be constructed as Three-phase Four-wire Direct-Connected Prepaid/Postpaid meters.		Specify
	Meter shall support both prepaid and postpaid modes.		Specify

Clause number	KPLC requirement	Bidder's offer (*indicate full details of the offered for the prepayment meter*)
4.2.1.2	Meter shall be of British Standard (BS) 5685-foot print for standardized mounting for asymmetrical (BS) wiring	
4.2.1.3	The meter shall have terminals with bottom entry for cables and the arrangement shall be L1L1: L2L2: L3L3: NN for 3 phase 4-wire meters	Specify
4.2.1.4	Meter base and cover shall be of non-metallic, non-hygroscopic, flame retardant, polished material having high impact-resilience and low dirt absorption properties.	Specify
4.2.1.5	Meter front cover shall have a window (clear glass or polycarbonate) for reading the display and for observation	Specify
	Meter terminals cover shall be transparent with sealable Nickel-plated steel screws with retainer/stopper for the screw.	Specify
4.2.1.6	The nickel plated steel screw shall be long enough for firm holding of the cover, and shall have a stopper/retaining mechanism to prevent falling off the cover when unscrewed.	Specify
4.2.1.7	The terminals shall be designed to ensure protection from ingress of water and dust. Meter shall conform to the degree of protection of at least IP 54 as given in IEC 60529:2013.	Specify
4.2.1.8	The meter shall have a real-time clock controlled by a quartz crystal oscillator.	Specify
	It shall be possible to reset the clock without loss of billing data that shall be synchronized with the AMI system.	
4.2.1.9	The material of which the terminal block shall be capable of passing the tests given in ISO 75-1:2020.	Specify
4.2.1.10	The meter shall be for front projection mounting.	Specify
4.2.1.11	Meter shall be provided with an internal back –up battery to support the LCD display with backlight, clock and calendar in the event of an AC power failure.	Specify
	The life expectancy of the battery shall last for a minimum of 10 years.	Specify

Clause number	KPLC requirement	Bidder's offer (*indicate full details of the offered for the prepayment meter*)
4.2.1.12	Meter shall be equipped with lockable/sealable push buttons where such buttons are used to program the meter parameters	Specify
4.2.1.13	The potential link of the meters shall be internal (inside the sealed part of the meter).	Specify
4.2.1.14	Meter shall have a sealing provision for terminal cover.	Specify
	The meter terminal cover shall be of the long type with cable entry knock-offs which shall be at least 20mm from the terminal block and shall ensure adequate coverage of all the terminals.	Specify
4.2.1.15	Meter shall have terminal cover open detection. Once the terminal cover is opened, the load shall be disconnected	Specify
4.2.1.16	Meters' terminal holes and screws shall be of moving-cage type.	Specify
	Made of brass or nickel-plated brass for high strength and good conductivity.	Specify
4.2.1.17	Meter shall support double element circuit measurement (phase and neutral circuits).	Specify
4.2.1.18	The meter body dimensions shall not exceed: Height = 290mm; Width = 170mm; and Depth = 90 mm;	Specify
4.2.1.19	Meter shall have a keypad on the body of the meter for keying in the tokens and shall be IP54 compliant.	Specify
4.2.1.20	Meter body shall be ultrasonically sealed for life.	Specify
	There shall be no screws on the MCU body except for the termination of cables.	Specify
4.2.1.21	Meter shall have terminal cover open detection mechanism. Once the terminal cover is opened, the load shall be disconnected. The mechanism shall be designed to operate as in sub-clauses (a) to (c) below:	Specify
(a)	The MCU shall be supplied with loading switch in open mode and installer can open terminal cover when MCU is not activated by commissioning code (token).	Specify

Clause number	KPLC requirement	Bidder's offer (*indicate full details of the offered for the prepayment meter*)
(b)	After installation of MCU, the installer will input a commission code (token) to close the loading switch and activate terminal cover open detection function. The commissioning code/token shall precede any token to be keyed into the meter to activate all functionalities of the meter. The meter shall reject any token (clear tamper token, credit token, etc.) input into the meter as long as the commissioning token has not been keyed into the meter.	Specify
(c)	After the commissioning token is put into the MCU and loading switch closes, opening of the terminal cover shall lead to tamper. When MCU has power and terminal cover is opened, MCU will disconnect immediately. When MCU has no power and terminal cover is opened, MCU will detect and record the event and disconnect immediately power resumes.	Specify
4.2.1.22	MCU shall be sealed and 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	Specify
4.2.1.23	The terminals shall be of suitable rating to carry continuously Imax current	Specify
4.2.1.24	Terminal holes shall be of at least 10-mm diameter and 15mm in depth.	Specify
4.2.1.25	Meter terminal cover shall have screw inserts sealable with utility wire seals.	Specify
4.2.1.26	Meter protection class shall be Class II (Double insulated) as per IEC 61140:2016 standard.	Specify
4.2.1.27	The meter shall have a non-volatile memory capable of data storage and with long term data retention period of not less than 10 years or for certified life of meter whichever is greater without an electrical supply being supplied to the meter.	Specify

Clause number	KPLC requirement	Bidder's offer (*indicate full details of the offered for the prepayment meter*)
4.2.1.28	Meter shall have register codes as per the list of the OBIS codes provided.	Specify
4.2.1.29	The principal unit for the measured values shall be the kilowatt-hour (kWh) for active power and kilo volt-ampere for reactive power (kVar) with a resolution of at least 0.01 for testing purposes.	Specify
4.2.1.30	The cumulative consumption register of the meter shall **NOT** be resettable to zero	Specify
4.2.1.31	Meter shall detect significant reverse energy (SRE) when the line and load wires are swapped.	Specify
	This shall be indicated on the LCD display of the meter	Specify
4.2.1.32	Meter shall continue to operate correctly and decrement credit during SRE detection for prepaid meters and increment for postpaid meters.	Specify
4.2.1.33	Meter shall have LED indicators for testing and indication of Active power and Reactive power consumption.	Specify
4.2.1.34	The spacing between the LEDs shall be sufficient so as not disrupt the testing of the meter during the verification of the accuracy of the energy meter	Specify
4.2.1.35	The internal circuit of the meter shall be designed in a manner to delink the optical interface and the display to allow interrogation of the meter through the optical interface when the LCD display is not working	Specify
4.2.1.36	The MCU enclosure material shall be of good dielectric and mechanical strength with minimum thickness of 2.0mm. The material shall comply with IEC 60695-2-11 grow wire test.	Specify
4.2.1.37	The bidders shall specify Original Equipment Manufacturers (OEM) and any Technical Partners in the design of their meters	Specify
4.2.2	**Communication**	
4.2.2.1	The meter shall support bi-directional communication.	Specify

Clause number	KPLC requirement	Bidder's offer (*indicate full details of the offered for the prepayment meter*)
4.2.2.2	The meters shall be compliant with the DLMS/COSEM to IEC 62056 standard communication protocol.	Specify and state reference standard
	The bidder shall submit the Compliance Certificate together with the tender document for evaluation.	Specify
4.2.2.3	The meter shall have an integrated GPS module on the meter PCB for locating the meter. Meter equipped with own GPS default protocol.	Specify
4.2.2.4	The meter shall be equipped with an infrared optical port compliant with the IEC 62056-21 standard for meter programming and data downloading.	Specify
4.2.2.5	The MCU shall come fitted with an SCSSCAAA9 (MC171) compliant data port for programming and interrogating the meter.	Specify
4.2.2.6	Meter shall have modular design and have a plug in GSM 4G communication modem/module and shall support other communication modules as per clause 4.2.2.9 and the point at which its plugged shall be sealable. The meter shall communicate with remote central server system. The 4G modem shall support all the GSM technologies.	Specify
4.2.2.7	The communication module shall be hot swappable.	Specify
4.2.2.8	The communication module shall be interchangeable by the different interfaces as described in clause 4.2.2.9	Specify
4.2.2.9	The Meter shall communicate via GSM/GPRS/3G/4G/NB-IoT but shall also have a sealable slot to support field/hot swappable/ replaceable plug-in type bi-directional communication modules with easy adaptability to network interfaces with RS485, Modbus modes of communications. All the interfaces shall be DLSM/COSEM complaint	Specify
4.2.2.10	The Meters shall have isolated dual channel RS485 communication interface	Specify

Clause number	KPLC requirement	Bidder's offer (*indicate full details of the offered for the prepayment meter*)
4.2.2.11	Meter's firmware shall be upgradable remotely and locally. Upgrading of firmware shall not stop or affect meter's metrology.	Specify
4.2.2.12	The communication module shall support GPRS modem and online and on-demand-online modes. The Communication module shall be powered by surge protected auxiliary power supply terminals of the meter.	Specify
4.2.2.13	Meter shall send a 'Last Gasp' power outage response when it loses power and a 'First Breath' restoration message when power is restored.	Specify
4.2.2.14	The meter shall support manual meter reading in case of loss of communication to the meter.	Specify
4.2.2.15	The meter shall work under Postpaid Mode or Prepaid Mode. The switch of mode shall be done via meter-specific token or optical communication or via the system.	Specify
4.2.2.16	The meters shall be supplied together with a scanner and laptop for scanning the meters at the KPLC warehouse and a laptop loaded with software for interrogating the meter data and loading commissioning and credit token during testing at our laboratory. The laptop specification shall include specifications as in Table 1	Specify
4.2.3	**Meter Display**	
4.2.3.1	The meters shall have a backlight seven-segment Liquid Crystal Display (LCD) for displaying parameters and measured values.	Specify
4.2.3.2	The meter LCD shall have at least seven (7)-numerical characters comprising of selectable integers and two decimals points for energy measurement. The minimum character height shall be eight (8) mm.	Specify
4.2.3.3	The meters LCD shall be capable of displaying the current state of the relay via symbols.	Specify

Clause number	KPLC requirement	Bidder's offer (*indicate full details of the offered for the prepayment meter*)
4.2.3.4	The meters LCD shall be capable of displaying various tampering conditions of the meter.	Specify
4.2.3.5	The display parameters shall be configurable by software action.	Specify
4.2.3.6	The LCD display shall operate in at least two modes, namely, basic and extended data list display using push buttons on meter front.	Specify
4.2.3.7	Meters shall have provision for reading the meter at site even when mains power supply fails.	Specify
4.2.4	**Functionality Requirements of MCU**	
4.2.4.1	The MCU shall measure and display the energy quantities of active power, reactive power and apparent power in both import and export modes.	Specify
4.2.4.2	The meters shall be capable of profiling multiple channels of energy, demand (KVA, KW, KVAr), voltage, current, power factor, harmonics, for a period of at least six (6) months for60 minutes data intervals.	Specify
4.2.4.3	The meter shall be able to measure the units consumed in the event of an imbalanced load or the absence of one or two phases.	Specify
4.2.4.4	The meters shall measure Energy correctly even when the phase rotation/sequence is incorrect.	Specify
4.2.4.5	The meters shall be capable of recording of active and reactive energy in all four (4) quadrants with up to four (4) tariffs.	Specify
4.2.4.6	The meter shall have at least four (4) registers for energy.	Specify
4.2.4.7	The meter shall be capable of measuring energy in security mode and also record reversed units.	Specify
4.2.4.8	The Meter shall indicate on the LCD display reverse energy consumption	Specify
4.2.4.9	The meter shall have capability of closing end of billing period on any selected date of the month selectable by software	Specify
4.2.4.10	The meter's billing registers shall NOT be re-settable to zero.	Specify

Clause number	KPLC requirement	Bidder's offer (*indicate full details of the offered for the prepayment meter*)
4.2.4.11	The meter shall have at least twelve (12) billing historical data stored in memory and retrievable by software action	Specify
4.2.4.12	The meter shall have a load switch to disconnect the load circuit on the expiry of credit balance in the case of prepayment meters.	Specify
4.2.4.13	The load switch shall automatically restore the load circuit after token top up for prepayment meters	Specify
4.2.4.14	The meter load switch shall comply with the requirements given in IEC 62055-31:2005	Specify
4.2.4.15	The meters shall have a programmable power limit setting that shall disconnect the load once exceeded and reconnect once the load falls below the set limit	Specify
4.2.4.16	The meters shall disconnect the load if power failure is detected and connect the load after normalization	Specify
4.2.4.17	The meters shall be able to indicate absence or presence of continuous power by use of a Light Emitting Diode (LED).	Specify
4.2.4.18	The MCU shall have an LED indicator to show the rate of consumption. The pulse rate shall be proportional to current rate of consumption.	Specify
4.2.4.19	The MCU shall have an LED to indicate the presence of an alarm of any registered event on the meter.	Specify
4.2.4.20	The MCU shall have a self-diagnostic feature to diagnose the status of the functions of the meter.	Specify
4.2.4.21	The MCU shall have a Liquid Crystal Display (LCD) for numeric display and language independent pictograms to identify operational features with backlight. The LCD shall have a wide viewing angle of 45 deg. to 60 deg. with, up to one-meter distance.	Specify
4.2.4.22	The Live and Neutral shall be DC immune complying with requirements of IEC 62052-11:2020 and IEC 62055-31:2005.	Specify

Clause number	KPLC requirement	Bidder's offer (*indicate full details of the offered for the prepayment meter*)
4.2.4.23	The MCU shall come fitted with an SCSSCAAA9 (MC171) compliant data port for programming and interrogating the meter. 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. For the winning bidders, each delivery of 100,000 meters shall have 50 sets of probes and read only software for use with the optical and the SCSSCAAA9 ports.	Specify
4.2.4.24	The MCU shall be supplied together with a plastic card of dimension 60mm x 40 mm (length x height) indicating the meter number. A tolerance of ±1mm will be acceptable. The meter serial number shall be engraved on the card together with its bar code version. No random redundant digits shall be added to the meter number.	Specify
4.2.4.25	The MCU shall be with Nil units pre-loaded (i.e. 0 (Zero) kWh.	Specify
4.2.5	**Time-of-use tariff measurements**	
4.2.5.1	The meters shall be capable of measuring and displaying time-of-day active and reactive energy consumption up to four tariff registers.	Specify
4.2.5.2	The meters shall be capable of measuring and displaying time-of-day demand (kW and kVA) consumption up to four tariff registers.	Specify
4.2.5.3	Each tariff register shall be set to operate over defined time periods during a 24-hour day.	Specify
4.2.5.4	The meters shall have at least two seasons and four day types namely weekday, Saturday, Sunday and Special/Holiday with switching times set independently.	Specify
4.2.5.5	The meters shall have at least forty (40) special days to take care of national holidays, world days and Easter holidays.	Specify
4.2.6	**Demand measurements**	

Clause number	KPLC requirement	Bidder's offer (*indicate full details of the offered for the prepayment meter*)
4.2.6.1	The meters shall be capable of measuring and displaying active, reactive and apparent demand consumption in both import and export modes.	Specify
4.2.6.2	The meters shall display demand values and their time and date stamps.	Specify
4.2.6.3	The meters shall measure demand correctly even when the phase rotation/sequence is incorrect.	Specify
4.2.6.4	The meter shall have at least four (4) registers for demand.	Specify
4.2.6.5	The meters shall have a capability of closing end of billing period on any selected date of the month selectable by software.	Specify
4.2.6.6	The meters shall have at least twelve (12) billing historical data stored in memory and retrievable by software action. The current and billing/historical data shall be available on meter display for reading and billing purposes.	Specify
4.2.7	**Instrumentation data measurements**	Specify
4.2.7.1	The meters shall be capable of displaying instrumentation data namely instantaneous phase voltages and currents, phase angles, and power factor.	Specify
4.2.7.2	The meters shall be capable of measuring and displaying instantaneous power (active, reactive and apparent).	Specify
4.2.7.3	The meters shall be capable of measuring and displaying average power factor for the current and the previous billing months.	Specify
4.2.7.4	The meters shall be capable of continuous display of the presence or absence of individual phase voltages.	Specify
4.2.7.5	The meter shall have diagnostics to alert of any abnormal three phase power condition, such as: over/under voltage, missing voltage, missing current, improper meter vectors for service, reverse power flow, etc.	Specify
4.2.8	**Load profiling**	

Clause number	KPLC requirement	Bidder's offer (*indicate full details of the offered for the prepayment meter*)
4.2.8.1	The meters shall be capable of profiling multiple channels of energy, demand (kVA, kW, kVAr), voltage, current, power factor, harmonics, for a period of at least six (6) months for 60 minute intervals.	Specify
4.2.8.2	The load profile integration period shall be programmable from one (1) minute up to a maximum of sixty (60) minutes.	Specify
4.2.9	**Power Quality Analysis**	
4.2.9.1	The meter shall collect and record basic power quality information – overcurrent, total no. of alarms, power outages, voltage and current, average power factor and line frequency, etc.	Specify
4.2.9.2	The meter shall be able to provide voltage sag and swell detection.	Specify
4.2.9.3	The meters shall provide Total Harmonic Distortion (THD) event detection at least up to the 10th harmonic with analysis for unusual system conditions.	Specify
4.3	**Security features**	
4.3.1	The meters shall be capable of event recording and communication, which shall include but not be limited to the following: 1. Power ups and power downs with date and time stamp; 2. Individual phase failure, with date and time stamps; 3. Over- and under-voltages based on a pre-set threshold with date & time stamp; 4. Battery voltage status (if applicable); 5. Memory status; 6. Date and time of the last end of billing period; 7. Firmware upgrades	

Clause number	KPLC requirement	Bidder's offer (*indicate full details of the offered for the prepayment meter*)
	8. Prepayment events 9. Terminal cover removal, even during a power failure 10. Main meter cover removal, even during a power failure 11. Communications removal 12. Magnetic detection, at least 0.5 mT 13. Bypassing neutral 14. Interchanging incoming and outgoing leads	
4.3.2	The LCD shall display events that have occurred. The events displayed shall include but not be limited to the following: a) Meter errors b) Phase failures c) Battery voltage status (if applicable) d) Alarms e) Warning messages f) Prepayment mode g) Terminal cover removal h) Communications removal i) Magnetic detection, at least 0.5 mT	
4.4	**Electrical Requirements**	Specify
4.4.1	The meter shall be operated from mains with reference values of 3 x 230/400V, ± 10% 50Hz ± 1.25% with a load switching voltage range from 0.4Un to 1.3Un phase to neutral	Specify
4.4.2	The load switch shall be of bi-stable type designed and manufactured in accordance with IEC 61810- 1, as well as meet the overload and short circuit requirement of IEC 62052-11 / 62055-31:2005. The load switch shall interrupt the supply when the voltage is below 0.4 Un and above 1.3Un phase to neutral	Specify
4.4.3	The load switch shall automatically restore supply within a minute when the voltage falls within 0.4 Un – 1.3 Un phase to neutral.	Specify

Clause number	KPLC requirement	Bidder's offer (*indicate full details of the offered for the prepayment meter*)
4.3.4	The meters shall be connectable for 2-wire systems, a permanent connection drawing of which shall be printed on the meter body. Stickers of any kind shall not be accepted.	Specify
4.4.5	The meter shall have Reference Standard Electrical Design Parameters as in Table 2 below.	Specify
4.4.5	**Summary of electrical parameters as per table 1 of specification**	Specify
(a)	Meter accuracy class	Specify class and reference standard
(b)	Rated Nominal Voltage (Un)	Specify
(c)	Load switching voltage range	Specify
(d)	Maximum Voltage Circuit burden (W and VA)	Specify
(c)	Base Reference Current, Ib	Specify
(f)	Maximum Current circuit burden (VA)	Specify
(g)	Maximum Current Imax (A)	Specify
(h)	Protective class	Specify class and reference standard
(i)	Accurate Metering Range	Specify
(j)	Starting Current (as a percentage of Ib)	Specify
(k)	Running with no-load	Specify
(l)	Short Circuit current (as a function of Imax)	Specify
(m)	Meter constant	Specify
(n)	Disconnection device	Specify type and current rating
(o)	Insulation class	Specify and reference standard
(p)	Insulation Level (kV)	Specify and reference standard
(q)	Overvoltage withstand (VAC for 48 hours)	Specify and reference standard

Clause number	KPLC requirement	Bidder's offer (*indicate full details of the offered for the prepayment meter*)
(r)	Voltage Impulse Withstand (KV)	Specify withstand value and reference standard
(s)	Current Impulse withstand (kA/microsecs)	Specify withstand value and reference standard
(t)	Lightning Surge Withstand	Specify withstand value and reference standard
(u)	EMC-Electrostatic discharge (kV air discharge)	Specify rating and reference standard
(v)	Immunity to HF Fields	Specify rating and reference standard
(w)	Immunity to Fast Transient Bursts	Specify rating and reference standard
(x)	Immunity to Radio interference	Specify rating and reference standard
(y)	Rated impulse withstand voltage of PLC (kV)	Specify withstand value and reference standard
(z)	Insulation level of PLC (kVrms)	Specify withstand value and reference standard
(aa)	Communication Protocol	Specify
(bb)	Communication Range of PLC	Specify
4.4.6	Default Factory Parameters settings	Specify
	Basic Parameters	
(a)	Rated Voltage	Specify
(b)	Basic Current (Ib)	Specify
(c)	Maximum Current(Imax)	Specify
(d)	Meter Constant	Specify
(e)	Frequency	Specify

Clause number	KPLC requirement	Bidder's offer (*indicate full details of the offered for the prepayment meter*)
(f)	Load Rating	Specify
(g)	Time zone	Specify
	Measurement Configuration	
(h)	Active	Specify
(i)	Reactive	Specify
	Prepayment Parameters	
(j)	Factory default payment mode	Specify
(k)	Pre-load credit	Specify
(l)	Low credit warning(Alarm green LED-Permanent)	Specify
(m)	Low credit warning(Alarm Red LED-Permanent)	Specify
(n)	Low credit warning(Alarm Red LED-Flashing)	Specify
(o)	Low credit warning(Alarm Red LED-Flashing and alarm buzzer)	Specify
(p)	Emergency recharge credit limit	Specify
(q)	Maximum recharge credit limit	Specify
	Event Parameters	
(r)	Overvoltage threshold value	Specify
(s)	Overvoltage estimate delay	Specify
(t)	Under voltage threshold value	Specify
(u)	Under voltage estimate delay	Specify
(v)	Bypass define Threshold	Specify
(w)	Bypass Enter Define Delay	Specify
(x)	Overload trip threshold value	Specify
(y)	Duration time of over load for disconnection	Specify
(z)	Overload Exit(recovery) Define Delay	Specify
(aa)	Overload Recover Define Delay(after sustained overload)	Specify
(bb)	Over current trip threshold	Specify
4.5	**Interoperability Requirements**	
4.5.1	The meter's applicable standards	Specify
(a)	Interoperability of the meter on offer among hardware, software and meters supplied by other manufacturers	Specify

Clause number	KPLC requirement	Bidder's offer (*indicate full details of the offered for the prepayment meter*)
(b)	Non-proprietary technology that does not lock KPLC to only one bidder or any one manufacturer in its future procurement of software, hardware or meters	Specify
(c)	Meter interoperable with the existing KPLC smart metering management system. The bidder shall be able to demonstrate this capability before award.	Specify
4.5.2	Provision of Communication protocol Encryption/decryption key	Provide
5. 0	**TESTS AND INSPECTIONS**	
5.1-5.2	Test standards and responsibility of carrying out tests	Provide
5.3	Copies of valid Type Test Reports and 3rd Party testing lab accreditation certificate submitted with tender	Provide
5.4	List of tests to be conducted on the meter as per IEC 62052-11: 2003, IEC 62053-21: 2003, IEC 62055-31: 2005 including Annex A, B, C and D and other relevant standards.	State
5.5	Minimum calibrated manufacturers testing facilities	State
6.0	**MARKING AND PACKING**	
6.1	Marking as per specification	Specify
	Markings Legibility, Language and Font dimension	Specify
	Markings with No stickers	State
	Markings to be indicated on meter	State
6.2	Packing requirements for safe freight	Specify
	Packing requirements for CIU and MCU batch numbers	State
	Packing requirements batch weight	State
7.0	**INFORMATION AND WARRANTY**	
7.1	Warranty, Qualification and Capacity	
7.1.1	Fifty four (54) months warranty from date of successful commissioning certificate for KPLC or Sixty (60) months warranty from the date of dispatch whichever is later	Specify
7.1.2	Compliance with the manufacturers experience or relevant manufactures qualification requirement as defined in the tender documents	State

Clause number	KPLC requirement	Bidder's offer (*indicate full details of the offered for the prepayment meter*)
7.1.3	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
7.1.4	Compliance with functional test of 0.5% of supplied meters to verify accuracy over a period of at least one (1) year and submission of a report to KPLC for review. The sampled meters shall be from at least 3 counties with the leading number of meters installed.	State
7.1.5	State if models offered has registered poor performance with failure rates above 1.5 % within the warranty period of 5yrs while in service in Kenya Power system	State
7.2	**Samples**	
7.2.1	Compliance with requirement to submit three (3) MCUs and three (3) UIUs samples together with the tender documents.	State
7.2.2	Authority to KPLC to subject the submitted meter to accuracy test and other compliances according to IEC 62053-21:2003	State
7.2.3	Compliance with requirement to provide token and other resources facilitation for testing at KPLC lab	State
7.2.4	Similarity in delivered meters and sample provided during tendering	State
7.2.5	Kenya Bureau of Standards approval on submitted samples	State
	APPENDICES	
	APPENDIX A: TEST AND INSPECTION	
A.1	Required Type Tests and Routine Acceptance Tests	Specify
A.2	Acceptance tests to be witnessed by KPLC Engineers at factory before shipment	Provide
A.3	KPLC to perform any of the tests independently in order to verify compliance with this specification	Comply
A.4	Training of 20No. KPLC staff on the use of optical, the SCSSCAAA9 ports, installation, commissioning and metering operation managements.	Comply

Clause number	KPLC requirement	Bidder's offer (*indicate full details of the offered for the prepayment meter*)
A.5	Supplier to replace without charge to KPLC meters which upon examination, test, or use, fail to meet any requirements in the specification	Comply
	APPENDIX B: QUALITY MANAGEMENT SYSTEMS	
B.1	Submission of Quality Assurance Plan to ensure fulfilment of the requirements	Provide
B.2	Copy of valid ISO 9001:2015 Certificate for international manufacturers and/or KEBS standardization certificate for local manufacturers	Provide
B.3	Delivery time of the meter, monthly & annual production capacity and experience in the production of the type and size of meter being offered.	Provide
	APPENDIX C: TECHNICAL DOCUMENTATION	
C1	Submission of tender complete with technical documents required by GTP for tender evaluation. List all technical documents to be submitted (all in English language) for Tender Evaluation	List
C2	Submission of Technical Documents required for Drawing and GTP approval Before Manufacture. List all technical documents to be submitted (all in English language) for Approval Before Manufacturing	List
C3	Submission of Technical Documents required for Safety and Operation of the meter after Installation as specified in IEC 61010-1:2010 clause 5.4 List all technical documents to be submitted (all in English language) with the meter during delivery to KPLC. The documents specify- in the English Language- the Recommendations for use, Care, Storage and Routine Inspection/Testing procedures of the meter during use.	List

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