4.4.68. **Voltmeter – 11kV**

The Instrument shall have the following features: -

i. Indicating Range, 0 – 11kV for voltage input of 0 – 110V AC
ii. Full Scale Deflection, 12kV
iii. Red Line at 11kV
iv. Black Scale on white background
v. Dimensions, 96 X 96 mm
vi. Suitable for Flush Mounting on the panel
vii. The instrument shall have screw type terminals large enough to accommodate 4mm2 cable

4.4.69. **Voltmeter Selector Switch**

For use on Protection and Control Panels, for measurement of all phase-earth and phase-phase voltages, using one voltmeter.

i. Suitable for flush mounting on the Panel
ii. Seven position selections, R, Y, B, R-Y, Y-B, B-R & OFF, indelibly labelled on an escutcheon plate fixed on the switch.
iii. The voltage measured on the voltmeter, corresponds to the selected position of the switch, while other phases will be open circuit.
iv. Contact Rating 10Amps
v. Screw type terminals suitable for connection of 2 x 2.5 mm^2 cable

4.4.70. **Check Synchronising Relays**

i. The relay shall be of numerical design
ii. The relay shall be suitable for panel flush mounting
iii. The relay shall measure voltage and shall be used to connect two separate networks together.
iv. The relay shall be used for both synchro-check functions and voltage-check functions.

v. The synchro-check function is used when two separate networks or two electrically interconnected network sections are to be connected together. The relay to issue circuit breaker command when conditions across the breaker are matching as per settings.

vi. Synchronism check- The circuit breaker close command will be issued only when all the conditions listed below are met:

a) Live line and live bus.
b) Voltage level difference.
c) Frequency difference (slip). The bus and line frequency must also be within a range of ±5 Hz from rated frequency.
d) Phase angle difference.
e) A time delay is available to ensure that the conditions are fulfilled for a minimum period of time. Adjustable settings shall be provided for all these functions

vii. The voltage-check function is used when a disconnected bus/line is to be connected to an energized section of a network. The Live and dead voltage thresholds shall be settable. The following functions shall be individually and collectively selectable

(a) Live Bus and Dead Line (LBDL)
(b) Dead Bus and Live Line (LBDL)
(c) Dead Bus and Dead Line (DBDL)

viii. The relay shall indicate whether synchronism status is met either via text on the LCD screen or via LED

ix. The relay shall indicate on the LCD screen the following parameters:

(d) Voltage on each side of the circuit breaker in primary or secondary values
(e) Voltage magnitude difference
(f) Voltage phase difference
(g) Frequency difference

x. The relay shall have self-supervision and incorporate watchdog function and green LED for healthy status and red LED for relay faulty status.

xi. Relay Terminals-shall be screw type terminals large enough to accommodate at least 2 x2.5mm^2 cable and shall be located at the back of the relay

xii. Front Serial RS232 or USB or Optical or Ethernet Port shall be provided for relay configuration and parameter setting and download of Data using a Laptop Computer.

xiii. Software for Programming the configuration and Relay Settings and also downloading and analysing the Relay Data

xiv. A provision shall be made via a software key to select the Check Synchronising function on or off.

xv. Relay to Laptop connection cable

4.4.71. **Voltage and Frequency Protection Relay**

i. The relay shall be of numerical design

ii. The relay shall be suitable for panel flush mounting

iii. The relay terminals will be at the rear

iv. The relay rated AC input is 110V AC and rated frequency is 50HZ

v. The relay shall have at least three stages of Voltage protection and each stage will be independently set. Each stage shall be set as either overvoltage or under voltage protection function. The voltage protection will have a settable definite time delay of at least 0-60 seconds in steps of not more than 0.1 seconds.

vi. The frequency function shall have at least three stages, each of which will be independently set. It shall be possible to set each stage as over frequency or under frequency. The frequency setting range shall cover the range 40-60 HZ. The frequency function will have a settable definite time delay, of at least 0-60 seconds in steps of not more than 0.03 seconds. It shall be possible to enable/block the frequency function using the voltage function

vii. The relay shall have a rate of change of frequency function. At least three stages of rate of change of frequency functions shall be provided. Each stage shall be separately set. The frequency function will have a settable definite time delay, of at least 0-60 seconds in steps of not more than 0.03 seconds. It shall be possible to enable/block the rate of change of frequency function with either the under frequency or over frequency function.

viii. The relay shall have self-supervision and incorporate watchdog output contact and green LED for healthy status and red LED for relay faulty status. Relay operation shall be indicated by a red LED.

ix. The relay shall have at least two binary input relays, four binary output relays and four programmable LEDs.

x. Relay terminals-shall be screw type terminals large enough to accommodate at least 2 x2.5mm^2 cable and shall be located at the back of the relay

xi. Front Serial RS232 or USB or Optical or Ethernet Port shall be provided for relay configuration and parameter setting and download of Data using a Laptop Computer.

xii. Software for Programming the configuration and Relay Settings and also downloading and analysing the Relay Data.

xiii. Relay to Laptop connection cable shall be provided.

4.4.72. **Additional Specifications for Relays**

All measurement relays must be of Numeric design.
Relays of Electromechanical design are acceptable only for use as auxiliary relays and contactors, not for measuring relays.

4.4.73. **Relay Programming Software and Connection Cables**

i. Software must be provided for programming and downloading data for all numerical relays supplied and also for any numerical instruments such as transducers provided.

ii. It shall be possible to install the Software to twenty different computers without any additional License Cost. Two or more memory devices shall be supplied for each different type of Software.

iii. Four (4) copies the software Users Guide shall also be supplied. The numerical relays will be equipped with an RS232 communication port or other suitable port to facilitate connection to a Laptop.

iv. The relevant communication cable, between the relay and the laptop shall also be provided. Four (4) cables shall be provided for each set of Relays using the same cable. Four (4) communication cables shall be provided for each set of transducers and also for the power measurement unit.

v. Communication facilities shall be provided on each numerical relay for remote interrogation and programming of the numerical relays.

vi. The relays will also have an MMI consisting of a keypad and an LCD screen to facilitate manual relay programming and data access.

vii. Relay operation due to system fault, shall be indicated by a red L.E.D. and the fault details (flags) shall be displayed on the LCD screen. Both the relay fault flags and red L.E.D will be reset without opening the relay cover, except where the relay contacts are latched.

4.5. Laptop Specifications

4.5.1. Technical Specifications for Laptop Computer

Description	Mandatory Minimum Requirements
Processor	Intel Core i7-5500 (2.60GHz 1600MHz 3MB, 2 Cores)
RAM	8GB 1600 MHz DDR3L
Operating System	Windows 10 pro 64 bit
Optical Drive	Super-Multi DVD burner
Hard Disk	750GB 7200 rpm Hard Drive
Display Panel	15.6" FHD LED Glossy (1920x1080) with integrated Webcam 720p camera
Graphics	Intel HD Graphics 5500
Internal Audio	Integrated HD audio internal speaker(standard), 1 x Mic / headphone combo
Communications	56K Modem, Integrated Intel Gigabit Network Connection (10/100/1000 NIC),
Wireless	Intel 802.11ac WLAN and Bluetooth
Security	Security Lock Slot plus steel cable with a combination lock
Interfaces	Memory Stick (MS), Memory Stick Pro (MS-Pro), Multi-Media Card (MMC) compatible.1 USB 2.0 port, 2 USB 3.0 ports, 1 Ethernet port, 1 HDMI port, Bluetooth, Wi-Fi enabled.
Pointing Devices	Touchpad with scroll zone, two pick buttons or Point stick, two pick buttons
Keyboard	Standard Keyboard
Mouse	External USB Mouse
Warranty	1 Year or More Warranty
Power	4-cell 41WHr Lithium-ion Battery; External AC adapter
Power Supply	240V AC, 50 Hz, British plugs
Carrying Case	Genuine Leather Carrying Case
Manufacturer' Authorization	a) Manufacturers Authorization Certificate/ Letter and for the models quoted, the principal (Manufacturer) MUST have an established regional office in Kenya.

APPENDIX A: TESTING

A.1. The manufacturers shall carry out all the routine tests of the protective relays, control devices and accessories and measuring instruments at the factory.

A.2. Copies of test reports shall be packaged together with the respective relays and measuring instruments before delivery to KPLC.

A.3. The tests shall be in accordance with the requirements of IEC 60255 and IEC 60051.

A.4 On receipt of the Protective Relays, Controls devices and Instruments, KPLC will inspect them and may perform or have performed any of the relevant tests in order to verify compliance with the specification. The supplier shall replace without charge to KPLC the Protective Relays, Controls devices and Instruments which, upon examination, test or use fail to meet any or all of the requirements in the specification.

APPENDIX B: WARRANTY

B.1 The supplier/manufacturer warrants the purchaser that all goods supplied under this tender shall have no defect arising from design, materials or workmanship.

B.2. A warranty of 48 months from the date of delivery of the measuring protection relays to Kenya Power store shall be offered by the manufacturer for the protection measurement relays, including annunciator relays.

B.3. The Warranty for other auxiliary relays and control devices shall be 36 months from the date of delivery of the devices to Kenya Power store. Any protection relays and control and measurement devices found to have failed at commissioning or while the device is in service or store during the stated warranty periods shall be replaced free of charge by the manufacturer/Supplier.

APPENDIX C: QUALITY MANAGEMENT SYSTEM (NORMATIVE)

C.1. The supplier shall submit a quality assurance plan (QAP) that will be used to ensure that the Protective Relays, Control devices and Accessories properties, tests and documentation, will fulfil the requirements stated in the contract documents, standards, specifications and regulations. The QAP shall be based on and include relevant parts to fulfil the requirements of ISO 9001:2015

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

C.3. The manufacturer shall indicate the delivery time of the equipment; manufacturer's monthly and annual production capacity and experience in the production of the type and size of items being offered. A detailed list and contact addresses (including e-mail) of the manufacturer's previous customers for similar type of Protective Relays, Control devices and Accessories sold in the last five years as well as reference letters from at least four of the customers shall be submitted with the tender for evaluation.

APPENDIX D: TECHNICAL DOCUMENTATION (NORMATIVE)

D.1. The bidder shall submit its tender complete with technical documents required 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 (GTPs) - Appendix N - stamped and signed by the manufacturer.

b) Copies of the Manufacturer's catalogues, brochures, drawings and technical data for the equipment;

c) Details of the manufacturer's experience; Sales records for the last five years and at least four customer reference letters.

d) Copies of previous test certificates and test reports by the relevant International or National Testing/Standards Authority of the country of manufacture (or ISO/IEC 17025 accredited independent laboratory) shall be submitted with the offer for evaluation. A copy of accreditation certificate for the laboratory shall also be submitted (all in English Language);

e) Marking & Packaging details (including packaging materials).

D.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 (GTPs) stamped and signed by the manufacturer **(these are not the ones submitted with the tender)**;

b) Technical details and drawings with details of Protective Relays, Control devices and Accessories to be manufactured for KPLC.

c) Quality assurance plan (QAP) that will be used to ensure that the design, material, workmanship, tests, service capability, maintenance and documentation will fulfil the requirements stated in the contract documents, standards, specifications and regulations.

D.3. Routine and sample test reports for the equipment to be supplied shall be submitted to Kenya Power for approval before shipment/delivery of the goods.

D.4. Each equipment package shall be supplied with detailed user's manual printed in English language that includes the following among other information written in English language to Kenya Power stores. All information shall be unambiguous. All documentation necessary for safety of the equipment as specified in IEC 61010-1 clause 5.4 shall be provided with the equipment.

APPENDIX E: TECHNICAL MANUALS/GUIDE AND OPERATION AND MAINTENANCE MANUALS

Technical manuals and operation and maintenance manuals shall be supplied with the goods as follows: -

E.1. Eleven (11) copies of hard copy technical manual/guides shall be furnished to KPLC for each type of relay, transducer, and instrument and control device. Soft copy of the manuals shall also be supplied with the goods.

The technical manual shall describe in detail the handling, installation, application, technical data and operating curves, test and commissioning, servicing/maintenance and calibration of the protection relays, measuring devices, transducers and control accessories,

E.2 These shall also include user/operator guide for protection relays, transducers, instruments and measuring devices for programming of the settings and configuration, and accessing the settings and data. Application drawings for the relay/device shall be included

APPENDIX F: FACTORY ACCEPTANCE TESTS, INSPECTION AND TRAINING (OPTIONAL)

F.1. The protective relays shall be subjected to factory acceptance testing and inspection by two KPLC engineers at place of manufacture where all routine tests as per IEC 60255 shall be carried out on two relays of each type for each specific (unique) configuration.

F.2. All the Relays, Instruments and Control devices shall be inspected to ensure they fully comply with the specifications.

F.3. In addition, training shall be conducted in the factory for the two KPLC engineers attending FATs, for the durations indicated below. Approval for shipment of goods by KPLC shall dependent on a satisfactory FAT report by the Engineers.

F.4. The full cost of the visit, including air tickets and accommodation shall be borne by KPLC. The manufacturer/bidder shall however take care of the local transport.

F.5. Factory Training shall be carried out for the following relays: -

(i) Distance Protection Relay - 3 days

(ii) Line Current Differential Protection Relay – 3 days

(iii) Biased Differential Protection Relay - 2 days

(iv) Three Phase Over current and Earth fault Relay - 2 days

(v) Three Phase Directional Over current and Earth Fault Relay - 2 days

(vi) Feeder Protection & Control Relay – 2 days

(vii) Transducer – 1 days

(viii) Power Measurement Unit – 1 day

F.6. The purpose of the training is to ensure that the KPLC engineers have adequate knowledge so that the relays are correctly installed, configured and parameters correctly set and finally the relays are successfully tested and put into service on the Kenyan Power system. The

manufacturer/supplier shall conduct an assessment to ensure that the KPLC Engineers have acquired the necessary knowledge and skills to be able to successfully apply the relays on the power system.

F.7. Where the number of days required for training on any of the above relays is more than what is indicated above, the manufacturer/bidder shall indicate the required number of days in their bid. The number of days indicated above is however the minimum requirement.

F.8. Each supplier/manufacturer shall conduct training for the protection relays they shall be offered to supply after tender evaluation.

APPENDIX G: LOCAL TRAINING IN NAIROBI

G.1. Local Training shall be conducted for KPLC Engineers and Technicians in Nairobi. This training shall cover the following relays: -

(a) Distance Protection Relay - 2 days

(b) Line Current Differential Protection Relay – 3 Days

(c) Transformer Differential Protection Relay - 3 days

(d) Three Phase Directional overcurrent and Earth Fault Relay - 2 days

(e) Three Phase Overcurrent and Earth Fault Relay – 2 days

(f) Feeder Protection & Control Relay – 2 days

(g) Transducer – 1 day

(h) Power Measurement Unit – 1 day

G.2. The Training shall be for a maximum of 15 working days and will involve training of up to15 Engineers/ Technicians.

G.3. The manufacturer shall meet the total cost of the factory as well as Local Training in Nairobi Kenya.

G.4. The supplier shall also meet all the other costs for conducting the local training, including local accommodation and transport for the training staff. The supplier shall provide all the training materials including notes.

G.5. The purpose of the training is to ensure that the KPLC Engineers/Technicians have adequate knowledge so that the relays are correctly installed, configured and parameters correctly set and finally the relays are successfully tested and put into service on the Kenyan power system. The manufacturer/supplier shall conduct an assessment to ensure that the KPLC Engineers

have acquired the necessary knowledge and skills to be able to successfully apply the relays on the power system.

APPENDIX H: REQUIREMENT FOR TENDER EVALUATION

H.1. Two copies each of product catalogue and technical publications for the specific protection relays, transducers, instruments and control devices offered shall accompany the bid.

H.2. The product catalogue and technical publications provided shall provide all the technical details of the offered relays/devices, including all the technical data and protection and control functions included in the device.

H.3. Application drawings for the relay/device shall also be submitted with the bid. The product catalogue and technical publication shall be used to verify information entered in the technical schedules completed by the bidder.

H.4 Failure to submit the product catalogue and the technical publication for each relay/device included in the bid may lead to rejection of the bid.

APPENDIX I: SOFTWARE

I.1. The software for each relay, transducer and measurement device shall be supplied for: -

(i) Configuration of the protection, measurement and transducer device.

(ii) Setting and programming of all parameters for the relay, measurement and transducer device/

(iii) Download and analysis of relay disturbance and fault record data.

I.2. Four CDs (or other appropriate memory device) for each type of software shall be supplied.

I.3. It shall be possible to install each software in at least twenty (20) desktop/laptop computers without requirement for additional licenses. Where additional licenses are required, the cost shall be considered to have been included in the bid.

I.4 The latest version of each software at the time of shipment of the goods shall be supplied.

APPENDIX J: PC TO DEVICE CONNECTION CABLE

Twelve (12) sets of each different type of PC to relay/measurement/transducer device connection cable and all other integral accessories/tools to ensure successful communication between the Laptop and the relay/device shall be supplied.

APPENDIX K: PACKING AND DELIVERY

K.1. PACKING

(i) Each item shall be packed properly or protected for shipment from the place of manufacture to the KPLC store.

(ii) (ii) Each crate of package shall contain a packing list in a waterproof envelope and a copy in triplicate shall be forwarded to KPLC prior to dispatch. All items of material shall be clearly marked for easy identification against the packing list.

(iii) All cases, packages, etc., shall be clearly marked on the outside to indicate the total weight, to show where the weight is bearing and the correct position of the slings and shall bear an identification mark relating them to the appropriate shipping documents.

(iv) All Accessories necessary for mounting the Relays, Instruments and Control Devices on to the panels, for terminations of cables or for labelling of LED indications shall be provided with the Relays, Instruments and Control Devices.

K.2. MARKING

The packaging shall be marked as detailed below.

(a) Consignee: THE KENYA POWER & LIGHTING CO. LTD.

(b) Name of Project: PROTECTIVE RELAYS AND CONTROL DEVICES AND INSTRUMENTS FOR PROJECTS

(c) Contract No.: .....

(d) Port of destination: .....

e) Item Number, Package number and quantity per package: ----------

f) Description of Contents: .....

Net and gross weight, cubic measure: .....

APPENDIX L: DELIVERY

L.1. The Supplier shall deliver all the Protection and Control items to KPLC bulk Stores at Isiolo Road, Nairobi.

L.2. Before acceptance of the devices, all the relays, Instruments and Control accessories shall be checked for any physical damage, for completeness and correctness.

L.3. The Supplier shall notify KPLC at least one week in advance on his/her date of delivery of the goods to the store.

L.4. Together with KPLC's representative the supplier will remove the seals on the packages and together inspect the goods for adherence to specifications, for completeness and to ensure that the goods have no physical damage.

L.5. Incorrect, damaged or incomplete Relays, Instruments and Control Accessories as per the Technical Specifications and the accepted offer and the delivery shall not be accepted and the supplier will take away such goods.

L.6 All goods must be supplied within the stipulated time as per the contract.

APPENDIX M: TENDER AWARD

The tender shall be awarded on the basis of the lowest evaluated bidder for each item; i.e., the Relays, Control devices, Transducers and Measurement Instruments and Measurement Unit.

Protection relays and control devices offered and which has shown poor performance service in the system shall be rejected.

For purposes of reliability of the Power System Protection Systems, Distance Relays Type I and Line Current Differential Relay Type I may be awarded to two different manufacturers each. The same case applies to Distance Protection type II and Line Current Differential Type II. This is however subject to the relays meeting all the requirements of the specifications.

Warranty for all protection relay devices shall be 3 years from the date of delivery to the stores.

Note 1: The cost for hard cover Technical Manuals, Guide and Operation and Maintenance manuals shall be deemed to be included in the unit cost of the respective Protection relay, Transducer,

Measurement device and control device. Twelve (12) hard copy original manuals for each relay/device type shall be supplied together with the relay/device.

Note 2: Each supplier/manufacturer shall supply Twelve (12) Laptop to Protection relay/Transducer/Measurement device, serial communication cables for the relays/devices that the supplier/manufacturer is offered to supply. The cost of the serial communication cables shall be deemed to be included in the bid price.

Note 3: Software for the Protection relays, Transducers and Power measurement units shall be supplied as indicated elsewhere in these specifications. This software shall be supplied by the supplier/manufacturer for the items they are offered to supply. The cost of the software shall be deemed to be included in the bid price.

APPENDIX N: TECHNICAL GUARANTEE PARTICULARS (GTPS) FOR RELAYS, TRANSDUCERS

CLAUSE	KPLC REQUIREMENTS	MANUFACTURER/ SUPPLIER'S OFFER
1	Manufacturers Name and address	
2	**Scope**	
3	Applicable standard(s)	
4.1	Service conditions(state)	
4.2	**General requirements**	
4.2.1	Compliance to climatic aging conditions as per IEC 60932 class 2	
4.2.2-4.2.4	Galvanizing /plating of all indoor parts to prevent rusting	
4.2.5-4.2.7	Material used for instrument and relay screws and springs	
4.2.8	Material used for gaskets	
4.2.9	Rated supply voltage of relays and measuring devices	
4.3.1	**Materials**	
4.3.1.1-4.3.1.4	Specify all compliance requirements in these clauses	
4.3.2	**Instruments**	
4.3.2.1	Instruments to be flush mounted, back connected and dust roof as per IEC 60051	
4.3.2.2	Size of analogue meters, scales and maximum errors.	
4.3.3.	**Protective Relays**	
4.3.3.1	Relays to be flush mounted and Numeric design as per IEC 60255	
4.3.3.2	Communication port type, HMI, and key pad	
4.3.3.3	Relay making and breaking contacts rating	
4.3.3.4	Relay DC voltage rating and switching capacity	
4.3.3.6-4.3.3.7	No use of dropping resistors/diodes	
4.4.3.8	Relay thermal ratings and multiplier Settings	
4.4.3.10	DIN rail mounting for plug in auxiliary relays	
4.4.1	**Ratings for Protection Relays and Control Devices:**	
(i)	Secondary rating of relay CTs	

CLAUSE	KPLC REQUIREMENTS	MANUFACTURER/ SUPPLIER'S OFFER
(ii)	Secondary Voltage Rating of VT	
(iii)	DC auxiliary rating	
(iv)	Relay trip indication	
4.4.2	**Distance Protection Relay Type I**	
i.	Manufacturer's Name	
	Type or Designation name of Relay	
	Complete order number for offered Relay	
	Numerical Design	
	Flush mounting design.	
	Relay suitable for use on a feeder in a 1&1/2 Breaker substation arrangement.	
ii.	High speed output relays for circuit breaker opening.	
	Full Scheme Distance relay	
	Number of similar Relay sold to date to the export market: Requirement; 1000	
	Experience in the manufacture of distance relay	
	Minimum operating voltage and current for impedance measurement/directional sensitivity	
	Operating time for fast operating output relays	
	Operating time for other output trip relays	
iii.	Tripping logic	
iv.	Number of Zones of protection	
v.	Zone Impedance Comparator Characteristics	
vi.	Impedance setting range for each Zone	
vii.	Communication Aided Schemes for Distance Protection	
viii.	Communication Aided schemes for Directional Earth Fault(DEF) Protection	
	Pick up setting range for the DEF element	
	Load Encroachment Discrimination Feature	
ix.	Fuse Failure Supervision	
x.	Weak end in feed & Echo feature	

CLAUSE	KPLC REQUIREMENTS	MANUFACTURER/ SUPPLIER'S OFFER
xi.	Current reversal guard Feature	
xii.	Power Swing Tripping & Blocking function	
xiii.	Voltage Memory Function	
xiv.	SOTF Function	
	Settings range for the SOTF Function	
xv.	Back-up Overcurrent and Earth fault protection function	
xvi.	Under-Frequency and rate of frequency change Protection function	
	Settings range for the Under-frequency and rate of change Protection	
xvii.	Settings range for the Backup Overcurrent and Earth Fault Protection	
xviii.	Circuit Breaker contact wear feature	
xix.	Broken Conductor detection	
xx.	Auto-reclose Function that is able to operate as per the specifications	
xxi.	Accuracy for Distance to Fault Location	
	Automatic display of fault details on the Relay. List the fault data displayed	
xxii.	Storage capacity for disturbance records, trip/fault records and events records	
xxiii.	Synchro-check Function for use with three phase auto-reclose	
xxiv.	Fault Locator with automatic Distance to Fault indication on the LCD screen in km. The last distance to fault Location will always be displayed on the screen.	
xxv.	Relay configuration & parameter settings, Event & Fault records and LED status are retained upon loss of relay DC power supply	
xxvi.	Metering provided	
xxvii.	Number of Binary Inputs	

CLAUSE	KPLC REQUIREMENTS	MANUFACTURER/ SUPPLIER'S OFFER
xxviii.	Number of Binary outputs	
xxix.	Ratings for output relay contacts	
xxx.	Number of LEDs	
xxxi.	Communication protocols	
xxxii.	Communication ports provided	
xxxiii.	Type and size of connection terminals for cable termination	
xxxiv.	Relay to Laptop connection cables offered	
xxxv.	Software for relay configuration and parameter setting and fault data Analysis offered for use with the relay. Software to be offered in CD form	
4.4.3	**Distance Protection Relay Type II**	
i.	Manufacturer's Name	
ii.	Type or Designation name of Relay	
iii.	Complete order number for offered Relay	
iv.	Number of similar Relay sold to date to the export market: Requirement; 1000	
v.	Experience in manufacture of distance relay	
vi.	Minimum operating voltage and current for impedance measurement/directional sensitivity	
vii.	No of analogue inputs	
viii.	Flush mounting design	
ix.	Numerical Design	
x.	Relay Starting Criteria	
xi.	Minimum operating time	
	Tripping logic	

CLAUSE	KPLC REQUIREMENTS	MANUFACTURER/ SUPPLIER'S OFFER
xii.	Number of Zones of Protection	
xiii.	Zone Impedance Comparator Characteristics	
	Impedance setting range for each Zone	
xiv.	Communication Aided Schemes for Distance	
xv.	Communication Aided schemes for Directional Earth Fault (DEF)	
	Pick up settings range for the DEF element	
	Load Encroachment Discrimination	
xvi.	Fuse Failure Supervision	
	Weak end In feed & Echo	
	Current reversal guard	
xvii.	Voltage Memory function	
xviii.	SOTF	
	Settings range for the SOTF element	
xix.	Back-up protection	
	Settings range for the Backup Overcurrent and Earth Fault Protection Element	
	Voltage protection; settings range	
	Under frequency and Rate of Change of Frequency Protection	
	Settings range for the under-frequency and rate of change of frequency Protection	
	Autoreclose Function	
xx.	Broken Conductor detection	
	Circuit Breaker contact wear feature	
xxi.	Fault Locator with automatic Distance to Fault indication on the LCD screen in km	
xxii.	Accuracy for Distance to Fault Location	
xxiii.	Automatic display of fault details on the screen. List the Fault data displayed.	
	Ability to display selected load measurements on the LCD screen all the time.	
	Availability of maximum demand values	
	Storage capacity for disturbance records, trip records and events record	

CLAUSE	KPLC REQUIREMENTS	MANUFACTURER/ SUPPLIER'S OFFER
xxiv.	Metering provided	
xxv.	Number of Binary Inputs	
xxvi.	Number of Binary outputs	
	Ratings of output relay contacts	
xxvii.	Number of LEDs	
xxviii.	Communication protocols	
xxix.	Communication ports provided	
xxx.	Type and size of connection terminals for cable termination	
xxxi.	Relay to Laptop connection cables offered	
xxxii.	Relay self-diagnostic with watchdog contact, relay healthy LED(green) and red LED for relay failure	
	Software for relay configuration and parameter setting and fault data Analysis offered for use with the relay. Software to be offered in CD form	
4.4.4	**Line Current Differential Relay Type I**	
i.	Manufacturer's Name	
ii.	Type or Designation name of Relay	
iii.	Complete order number for offered Relay	
iv.	Flush mounting design	
v.	Numerical Design	
vi.	Number of similar Relay sold to date to the export market: Requirement; 1000	
vii.	Experience in manufacture of Line Current Differential relay	
viii.	Minimum operating voltage and current for impedance measurement/directional sensitivity	
ix.	Minimum operating current /relay sensitivity	

CLAUSE	KPLC REQUIREMENTS	MANUFACTURER/ SUPPLIER'S OFFER
x.	Minimum operating time	
xi.	Tripping logic	
xii.	Simultaneous Tripping at both ends of the line even with no in feed at one end.	
xiii.	Phase segregated measurement of current magnitude and phase angle	
xiv.	High Speed relay operation suitable for protection of Transmission line	
xv.	Transformer Inrush restraint and ratio and phase angle compensation	
xvi.	Direct Transfer of Trip Function between the relays via fiber optical cable	
xvii.	Operates with directly connected fibre cables	
xviii.	Differential Protection blocks upon loss of communication to prevent mal-operation	
xix.	Auto-reclose Function: Available modes of Auto-reclose	
xx.	Integrated Distance Protection	
xxi.	Number of Zones for integrated distance Protection	
xxii.	Zone Impedance Comparator Characteristics	
xxiii.	Impedance Settings range for each Zone	
xxiv.	Automatic Display on the LCD screen of Distance to Fault in km	
xxv.	Back up Overcurrent and Earth Fault Protection	
xxvi.	Settings range for Back up Overcurrent and Earth fault Protection Elements	
xxvii.	Storage capacity for disturbance records, trip records and events record	
xxviii.	Metering capability	
xxix.	Number of Binary Inputs	

CLAUSE	KPLC REQUIREMENTS	MANUFACTURER/ SUPPLIER'S OFFER
xxx.	Number of Binary outputs	
xxxi.	Ratings for relay output contacts	
xxxii.	Ratings for relay output contacts	
xxxiii.	Number of LEDs	
xxxiv.	Relay self-diagnostic with watchdog contact, relay healthy LED(green) and red LED for relay failure	
xxxv.	Communication protocols	
xxxvi.	Communication ports provided	
xxxvii.	Type and size of connection terminals for cable termination	
xxxviii.	Relay to Laptop connection cables offered	
xxxix.	Software for relay configuration and parameter setting and fault data Analysis offered for use with the relay. Software to be offered in CD form	
4.4.5	**Line Current Differential Relay Type II**	
i.	Manufacturer's Name	
ii.	Type or Designation name of Relay	
iii.	Complete order number for offered Relay	
iv.	Flush mounting design	
v.	Number of similar Relay sold to date to the export market: Requirement; 500	
vi.	Experience in manufacture of Line Current Differential relay	
vii.	Minimum operating current /relay sensitivity	
viii.	Minimum operating time	
ix.	Tripping logic	

CLAUSE	KPLC REQUIREMENTS	MANUFACTURER/ SUPPLIER'S OFFER
x.	Simultaneous Tripping at both ends of the line even with no in feed at one end.	
xi.	Phase segregated measurement of current magnitude and phase angle	
xii.	Transformer Inrush restraint and ratio and phase angle compensation	
xiii.	Direct Transfer of Trip Function between the relays via fiber optical cable	
xiv.	The differential relays will block upon loss of communication between them, to prevent mal-operation.	
xv.	Status indications of all input, output and internal functions.	
xvi.	Display of Remote end currents on the local relay.	
xvii.	Display on the LCD screen of Bias and Differential currents	
xviii.	Ability of the Differential relays to send Direct inter-trips via the fiber optic cable.	
xix.	Transformer inrush restraint feature	
xx.	CT ratio mismatch and phase angle compensation	
xxi.	Auto-reclose Function: Available modes of Auto-reclose	
xxii.	Integrated Distance Protection	
xxiii.	Number of Zones for integrated distance Protection	
xxiv.	Zone Impedance Comparator Characteristics	
xxv.	Impedance Settings range for each Zone	
xxvi.	Automatic Display on the LCD screen of Distance to Fault in km.	
xxvii.	Back up Overcurrent and Earth Fault Protection	
xxviii.	Settings range for Back up Overcurrent and Earth Fault Protection Elements	

CLAUSE	KPLC REQUIREMENTS	MANUFACTURER/ SUPPLIER'S OFFER
xxix.	Storage capacity for disturbance records, trip records and events record	
xxx.	Metering capability	
xxxi.	Number of Binary Inputs	
xxxii.	Number of Binary outputs	
xxxiii.	Ratings for Relay output Contacts	
xxxiv.	Ability to latch output relays	
xxxv.	Number of LEDs	
xxxvi.	Communication protocols	
xxxvii.	Communication ports provided	
xxxviii.	Type and size of connection terminals for cable termination	
xxxix.	Relay to Laptop connection cables offered	
xl.	Relay self-diagnostic with watchdog contact, relay healthy LED(green) and red LED for relay failure	
xli.	Software for relay configuration and parameter setting and fault data Analysis offered for use with the relay. Software to be offered in CD form	
4.4.6	**Biased Differential Protection for a Two Winding Transformer**	
i.	Relay Manufacturer's name	
ii.	Type or designation name of the relay offered	
iii.	Complete order number of offered relay	
iv.	Numerical Design	
v.	Flush Mounting design	

CLAUSE	KPLC REQUIREMENTS	MANUFACTURER/ SUPPLIER'S OFFER
vi.	Number of similar Relay sold to date to the export market: Requirement; 1000	
vii.	Experience in manufacture of Biased Differential Protection relay	
viii.	Minimum operating current for biased differential /relay sensitivity and setting range	
ix.	Minimum operating time at 2 x setting	
x.	Provision of unrestrained High-set differential element and setting range	
xi.	Magnetizing Inrush detection method(s) and settings range	
xii.	Provision of Integral CT correction ratio feature and setting range	
xiii.	Integral Vector Group compensation feature	
xiv.	Display of HV & LV differential and bias currents on the LCD screen	
xv.	Storage capacity for Disturbance, Event and Trip/Fault records	
xvi.	Display of Fault currents on the LCD	
xvii.	Provision of over-fluxing Alarm and Trip functions	
xviii.	5th Harmonic restraint feature and settings range	
xix.	Dual- Bias characteristics	
xx.	Relay trip Indication by Red LED	
xxi.	No of Binary Inputs	
xxii.	No. of Binary Outputs	
xxiii.	Ratings of relay output contacts	
xxiv.	Number of LEDs	
xxv.	Ability to latch output contacts	

CLAUSE	KPLC REQUIREMENTS	MANUFACTURER/ SUPPLIER'S OFFER
xxvi.	Relay self-diagnostic with watchdog contact, relay healthy LED(green) and red LED for relay failure	
xxvii.	LCD screen and Keypad for programming relay parameter settings and data access	
xxviii.	Communication protocols	
xxix.	Communication ports provided	
xxx.	Type and size of terminals for cable connection	
xxxi.	Software offered for relay configuration and programming	
xxxii.	Laptop to relay connection cable	
xxxiii.	Metering capability	
4.4.7	**Restricted Earth Fault**	
i.	Relay Manufacturer's name	
ii.	Number of similar Relay sold to date to the export market: Requirement; 1000	
iii.	Experience in manufacture of Restricted Earth Fault Relay	
iv.	Type or Designation name of Relay	
v.	Complete order number for offered Relay	
vi.	Suitable for High Impedance operating principle application	
vii.	Minimum pick up & setting range	
viii.	Relay Operating time at 5 x setting current	
ix.	Number of LEDs	
x.	Number of Binary inputs	
xi.	Number of Binary outputs	

CLAUSE	KPLC REQUIREMENTS	MANUFACTURER/ SUPPLIER'S OFFER
xii.	Ratings of output relay contacts	
xiii.	Keypad for relay parameter settings and data access	
xiv.	Relay self-diagnostic with watchdog contact, relay healthy LED(green) and red LED for relay failure	
xv.	Software for relay configuration and parameter setting. Software to be offered in CD form	
xvi.	Connection cable from Laptop to Relay offered	
4.4.8	**Stabilizing Resistor**	
i.	Type and reference number of Stabilizing Resistor Offered.	
ii.	Setting Range of Offered resistor in Ohms.	
iii.	Maximum through fault for the REF scheme	
4.4.9	**Voltage Dependent Resistor (Metrosil)**	
i.	Type and reference number of Voltage Dependent Resistor (VDR) Metrosil offered. Rated voltage of VDR based on maximum fault current of 25kA.	
ii.	Both Stabilising Resistor and Voltage dependent resistor are housed in a single box with external connection terminals suitable panel mounting.	
iii.	Type and size of Relay terminals for cable connection	
iv.	Software for relay configuration and parameter setting. Software to be offered in CD form	
v.	Connection cable from Laptop to Relay offered	
4.4.10	**Feeder Protection and Bay Control Relay**	
i.	Relay Manufacturer's name	
ii.	Type or Designation name of Relay offered	
iii.	Complete order number for offered Relay	

CLAUSE	KPLC REQUIREMENTS	MANUFACTURER/ SUPPLIER'S OFFER
iv.	Number of similar Relay sold to date to the export market: Requirement; 1000	
v.	Experience in manufacture of Feeder Protection & Control Relay	
vi.	Numerical design	
vii.	Flush Mounting design	
viii.	Number of CT inputs	
ix.	Number of VT inputs	
x.	Protection and control Functions included in the relay available in relay and parameter setting range for each function: O/C, E/F, SEF, etc., including highest elements	
xi.	Settings range for protection and control elements included in the relay, including time-current characteristics that are available for assignment to each protection element	
4.4.11.	**Auto Reclose Relay Function in the Feeder Protection Relay.**	
i.	Auto reclose function and number of autoreclose shots possible	
ii.	Independent settings for each autoreclose shot, including selectable protection functions to initiate autoreclose for each shot	
iii.	Start and trip signals of Protection functions are freely assignable to the various output relays	
iv.	Broken Conductor Function and settings range	
v.	Circuit Breaker contact wear feature	
vi.	Relay self-diagnostic with watchdog contact, relay healthy LED(green) and red LED for relay failure	
vii.	Relay has circuit breaker close and open push buttons	
viii.	Relay LCD screen size	

CLAUSE	KPLC REQUIREMENTS	MANUFACTURER/ SUPPLIER'S OFFER
ix.	Free selection of measurements to be displayed on the relay screen.	
x.	Bay MIMIC to be included on the LCD display	
xi.	Ability to control circuit breaker, disconnectors and earth switch on the mimic on relay LCD using the open and close push buttons on the relay front face	
xii.	Metering/Measurement capability	
xiii.	Number of LEDS	
xiv.	Number of Binary inputs	
xv.	Number of Binary outputs	
xvi.	Ratings of relay output contacts	
xvii.	Communication ports	
xviii.	Communication protocols	
xix.	Type and size of relay terminals for cable connection	
xx.	Software for relay configuration and parameter setting. Software to be offered in CD form	
xxi.	Keypad for relay parameter settings and data access	
xxii.	Connection cable from Laptop to Relay offered	
4.4.12	**Feeder Protection Relay**	
i.	Relay Manufacturer's name	
ii.	Type or Designation name of Relay offered	
iii.	Complete order number for offered Relay	
iv.	Number of similar Relay sold to date to the export market: Requirement; 1000	

CLAUSE	KPLC REQUIREMENTS	MANUFACTURER/ SUPPLIER'S OFFER
v.	Experience in manufacture of Feeder Protection Relay: Requirement	
vi.	Relay is of Numerical design	
vii.	Flush mounting design	
viii.	Number of CT inputs Provided	
ix.	Number of VT inputs provided	
x.	Protection Functions included in the relay	
xi.	Setting range for the various protection elements.	
xii.	Auto-reclose function and number of autoreclose shots possible	
xiii.	Independent settings for each auto-reclose shot and free selection of protection functions to initiate autoreclose for each shot	
xiv.	Broken Conductor Function and settings range	
xv.	Relay has circuit breaker close and open push buttons	
xvi.	Relay LCD screen size	
xvii.	Free selection of measurements to be displayed on the relay screen	
xviii.	Metering/Measurement capability	
xix.	Number of LEDS	
xx.	Number of Binary inputs	
xxi.	Number of Binary outputs	
xxii.	Ratings of output relays contacts	
xxiii.	Start and Trip Contacts of the protection elements shall be freely configurable.	
xxiv.	Communication ports	

CLAUSE	KPLC REQUIREMENTS	MANUFACTURER/ SUPPLIER'S OFFER
xxv.	Communication protocols	
xxvi.	Circuit Breaker contact wear feature	
xxvii.	Relay self-diagnostic with watchdog contact, relay healthy LED(green) and red LED for relay failure	
xxviii.	Storage capacity for disturbance, event and fault records	
xxix.	Metering/Measurement capability	
xxx.	Software for relay configuration and parameter setting. Software to be offered in CD form	
xxxi.	Connection cable from Laptop to Relay offered	
xxxii.	Type and size of relay terminals for cable connection	
4.4.13	**Three Phase Directional Overcurrent and Earth Fault Relay**	
i.	Manufacturer's Name	
ii.	Type or Designation name of Relay	
iii.	Complete order number for offered Relay	
iv.	Number of similar Relay sold to date to the export market: Requirement; 1000	
v.	Experience in manufacture of Three Phase Directional Overcurrent & Earth Fault Relay	
vi.	Numerical/digital design	
vii.	Flush mounting	
viii.	Software for relay configuration and parameter setting and fault data Analysis offered for use with the relay. Software to be offered in CD form	
ix.	Protection Functions offered and the parameters setting range : DO/C, DE/F, for both low set and high set elements	

CLAUSE	KPLC REQUIREMENTS	MANUFACTURER/ SUPPLIER'S OFFER
x.	Time-Current characteristics available for all protection elements or stages	
xi.	Quadrature connection of polarizing voltage	
xii.	Free assignment of the directional feature to all phase and earth fault protection elements	
xiii.	Operating range: maximum relay torque angle	
xiv.	Other protection Functions included in the relay	
xv.	Setting range for Relay Characteristic Angle	
xvi.	Circuit Breaker contact wear feature	
xvii.	Sensitivity of the directional element: minimum operating values for voltage and current	
xviii.	Connection cable from Laptop to Relay offered	
xix.	Number of similar Relay sold to date to the export market: minimum - 1000	
xx.	Experience in manufacture of Directional Overcurrent and Earth Fault Relay in years	
xxi.	Number of LEDs	
xxii.	Number of Binary Inputs	
xxiii.	Number of Binary outputs	
xxiv.	Ratings for output relays contacts	
xxv.	Free assignment to output relays of start and trip signal of Protection functions	
xxvi.	Communication ports	
xxvii.	Communication protocols	
xxviii.	Relay self-diagnostic with watchdog contact, relay healthy LED(green) and red LED for relay failure	
xxix.	LCD screen size	

CLAUSE	KPLC REQUIREMENTS	MANUFACTURER/ SUPPLIER'S OFFER
xxx.	Storage capacity for disturbance, event and trip/fault records	
xxxi.	Metering/Measurement capability	
xxxii.	Software for relay configuration and parameter setting. Software to be offered in CD form	
xxxiii.	Connection cable from Laptop to Relay offered	
xxxiv.	Type and size of relay terminals for cable connection	
4.4.14	**Three Phase Overcurrent and Earth Fault Relay**	
i.	Manufacturer's Name	
ii.	Type or Designation name of Relay	
iii.	Complete order number for offered Relay	
iv.	Number of similar Relay sold to date to the export market: Requirement; 1000	
v.	Experience in manufacture of Three Phase Overcurrent and Earth Fault Relay	
vi.	Numerical/Digital design	
vii.	Flush mounting	
viii.	Protection Functions offered and the parameters setting range for all protection elements	
ix.	Time-current characteristics available for various Overcurrent, Earth fault elements and other protection elements	
x.	Broken Conductor Function	
xi.	Under frequency Protection	
xii.	Circuit Breaker contact wear feature	
xiii.	Number of LEDs	

CLAUSE	KPLC REQUIREMENTS	MANUFACTURER/ SUPPLIER'S OFFER
xiv.	Number of Binary Inputs	
xv.	Number of Binary outputs	
xvi.	Ratings of output relays contacts	
xvii.	Communication ports	
xviii.	Communication protocols	
xix.	Circuit Breaker maintenance	
xx.	Relay self-diagnostic with watchdog contact, relay healthy LED(green) and red LED for relay failure	
xxi.	Configuration of Start and trip contacts	
xxii.	Storage capacity for disturbance, event and trip/fault records	
xxiii.	Metering/Measurement capability	
xxiv.	Size of LCD screen	
xxv.	Relay Keypad for relay parameter setting and data access	
xxvi.	Software for relay configuration and parameter setting. Software to be offered in CD form	
xxvii.	Connection cable from Laptop to Relay offered	
xxviii.	Type and size of relay terminals for cable connection	
xxix.	Software for relay configuration and parameter setting and fault data Analysis offered for use with the relay. Software to be offered in CD form	
4.4.15	**Earth Fault Relay**	
i.	Manufacturer's Name	
ii.	Type or Designation name of Relay	

CLAUSE	KPLC REQUIREMENTS	MANUFACTURER/ SUPPLIER'S OFFER
iii.	Complete order number for offered Relay	
iv.	Number of similar Relay sold to date to the export market: Requirement; 1000	
v.	Experience in manufacture of Earth Fault Relay	
vi.	Numeric/Digital design	
vii.	Panel mounting design	
viii.	Software for relay configuration and parameter setting and fault data Analysis offered for use with the relay. Software to be offered in CD form	
ix.	Parameter settings range for low set and high set elements	
x.	Time-Current Characteristics available in the relay	
xi.	Circuit Breaker Contact wear feature	
xii.	Relay self-diagnostic with watchdog contact, relay healthy LED(green) and red LED for relay failure	
xiii.	Relay Drop off/Pick up Ratio	
xiv.	Size of LCD screen	
xv.	Relay Keypad for programming of relay settings and data access	
xvi.	Number of LEDs	
xvii.	Number of Binary Inputs	
xviii.	Number of Binary outputs	
xix.	Ratings of output relays contacts	
xx.	Communication ports	
xxi.	Communication protocols	
xxii.	Circuit Breaker maintenance	

CLAUSE	KPLC REQUIREMENTS	MANUFACTURER/ SUPPLIER'S OFFER
xxiii.	Storage capacity for disturbance, event and trip/fault records	
xxiv.	Metering/Measurement capability	
xxv.	Software for relay configuration and parameter setting. Software to be offered in CD form	
xxvi.	Connection cable from Laptop to Relay offered	
xxvii.	Communication ports	
xxviii.	Communication protocols	
xxix.	Type and size of relay terminals for cable connection	
4.4.16	**Sensitive Earth Fault Relay.**	
i.	Manufacturer's Name	
ii.	Type or Designation name of Relay	
iii.	Complete order number for offered Relay	
iv.	Number of similar Relay sold to date to the export market: Requirement; 1000	
v.	Experience in manufacture of Sensitive Earth Fault Relay	
vi.	Numerical/digital design	
vii.	Flush mounting	
viii.	Software for relay configuration and parameter setting and fault data Analysis offered for use with the relay. Software to be offered in CD form	
ix.	Pick up Current setting range	
x.	Definite Time delay setting range	
xi.	Drop off/Pick up ratio	
xii.	Relay self-diagnostic with watchdog contact, relay healthy LED(green) and red LED for relay failure	

CLAUSE	KPLC REQUIREMENTS	MANUFACTURER/ SUPPLIER'S OFFER
xiii.	Number of LEDs	
xiv.	Number of Binary Inputs	
xv.	Number of Binary outputs	
xvi.	Ratings of output relays contacts	
xvii.	Communication ports	
xviii.	Communication protocols	
xix.	Keypad for manual programming of relay settings	
xx.	Circuit Breaker contact wear feature	
xxi.	Storage capacity for disturbance, event and trip/fault records	
xxii.	Metering/Measurement capability	
xxiii.	Connection cable from Laptop to Relay offered	
xxiv.	Type and size of relay terminals for cable connection	
xxv.	Software for relay configuration and parameter setting and fault data Analysis offered for use with the relay. Software to be offered in CD form	
4.4.17	**Electrical Reset-Trip Relay**	
i.	Manufacturer's Name	
ii.	Type or Designation name of Trip Relay	
iii.	Complete order number for offered Trip Relay	
iv.	Number of similar Trip Relay sold to date to the export market: Requirement; 1000	
v.	Experience in manufacture of Trip Relay:	
vi.	Flush Design	

CLAUSE	KPLC REQUIREMENTS	MANUFACTURER/ SUPPLIER'S OFFER
vii.	High Burden trip relay; immune to capacitance discharge and leakage currents	
viii.	Shall be electrically resettable	
ix.	Number and configuration of output contacts	
x.	Output contact rating	
xi.	Relay flag on operation	
xii.	Type and size of relay terminals for cable connection	
xiii.	Size : lxhxb	
xiv.	Relay terminals are indelibly marked	
4.4.18	**Self-Reset Trip Relay**	
i.	Manufacturer's Name	
ii.	Type or Designation name of Trip Relay	
iii.	Complete order number for offered Trip Relay	
iv.	Number of similar Trip Relay sold to date to the export market: Requirement; 1000	
v.	Experience in manufacture of Trip Relay:	
vi.	Flush Design	
vii.	High Burden trip relay; immune to capacitance discharge and leakage currents	
viii.	Shall be electrically resettable	
ix.	Number and configuration of output contacts	
x.	Output contact rating	
xi.	Relay flag on operation	

CLAUSE	KPLC REQUIREMENTS	MANUFACTURER/ SUPPLIER'S OFFER
xii.	Type and size of relay terminals for cable connection	
xiii.	Size: lxhxb	
xiv.	Relay terminals are indelibly marked	
4.4.19	**Low Power Overcurrent and Earth Fault Protective relays**	
	General Requirements	
4.1, 4.2, 4.3	To meet specified requirements	State
4.4.19.1	Point of application of the relay	Specify
4.4.19.2-3	State how the relay initiates Changeover and discriminates between overcurrent and earth faults	state
4.4.19.4.1	**Performance Characteristics of Low Power Overcurrent and Earth Fault Relays**	
	Relay contact ratings VDC, (A)/s and switching capacity	
	System frequency,	State
	CT inputs and connection Type(A)	Specify
	Standard of manufacture of LPCT	State
	Current setting range (A)	State
	Rated VT secondary voltage (V)	State
	DC auxiliary rating, VDC	State
	Relay trip operation indication for measurement relays	State
4.4.19.4.2	Protection Functions	
	State protection functions provided	State
4.4.19.5	Dedicated CT for Sensitive Earth	Specify
4.4.19.6	Current Settings range for overcurrent	specify
4.4.19.7	Current Settings range for earth fault	specify
4.4.19.8	Stages for High Set element ,setting ranges and time delay	Specify
4.4.19.9	IDMT characteristics and standards	Specify
4.4.19.10	Time Setting Multiplier	state
4.4.19.11	Current Setting for Earth Fault function	state
4.4.19.12	Definite Time delay Characteristics for Sensitive earth Fault function settings	State
4.4.19.13	Measurement done by the relay	state

CLAUSE	KPLC REQUIREMENTS	MANUFACTURER/ SUPPLIER'S OFFER
4.4.19.14	Under Voltage settings range	State
4.4.19.15	Over Voltage settings range	State
4.4.19.16	Time for under voltage and overvoltage(minimum)	State
4.4.19.17	Auto reclose function requirements	State
4.4.19.18	Data storage records(Fault/trip, events, disturbance)	State
4.4.19.19	Relay configurable outputs	state
4.4.19.20	Indication of protection operation	state
4.4.19.21	Feeder protection auto reclose function in the relay	specify
4.4.19.22	Additional Features	
(i)	Relay self-diagnostic indications	specify
(ii)	Number of LED alarm annunciators	state
(iii)	Binary Inputs and ratings	State
(iv)	Binary Outputs and ratings	State
(v)	LCD screen	State
(vi)	Keypad	State
(vii)	Relay Terminals - screw type, at least 4mm^2 cable, located at the back of the relay (except for phase CT inputs which are LPCT terminals).	State
(viii)	The relay applicable protocol	
(ix)	Software for configuration, relay parameter settings, downloading and analysing the relay fault data	state
(x)	Broken conductor protection function	Provide
(xi)	Circuit Breaker contact wear function	Provide
(xii)	Permanency of events and fault records	specify
(xiii)	Means of identifying fault type and stage of protection	state
(xiv)	Trip and start contacts configurability	State
4.4.19.23	**Relay Communication**	
(i)	Ports for Communication	State
(ii)	Laptop connection cable	State
4.4.20	**Trip Circuit Supervision Relay Type I**	
i.	Manufacturer's Name	
ii.	Type or Designation name of TCS Relay	

CLAUSE	KPLC REQUIREMENTS	MANUFACTURER/ SUPPLIER'S OFFER
iii.	Complete order number for offered TCS Relay	
iv.	Number of similar TCS Relay sold to date to the export market: Requirement; 1000	
v.	Experience in manufacture of Trip Circuit Supervision Relay	
vi.	Trip Coil supervision for both Circuit Breaker in closed and open positions	
vii.	TCS healthy indication	
viii.	TCS faulty indication	
ix.	Inherent operation time delay	
x.	Number, rating and configuration of contacts	
xi.	Flush mounting	
xii.	Type and size of relay terminals for cable connection	
xiii.	Relay terminals are indelibly marked	
xiv.	Size : lxhxb	
4.4.21	**Trip Circuit Supervision Relay Type II**	
i.	Manufacturer's Name	
ii.	Type or Designation name of TCS Relay	
iii.	Complete order number for offered TCS Relay	
iv.	Number of similar TCS Relay sold to date to the export market: Requirement; 1000	
v.	Experience in manufacture of Trip Circuit Supervision Relay	
vi.	Trip Coil supervision for both CB in closed and open positions	
vii.	TCS healthy flag indication	

CLAUSE	KPLC REQUIREMENTS	MANUFACTURER/ SUPPLIER'S OFFER
viii.	Inherent operation time delay	
ix.	TCS faulty flag/indication	
x.	Number, rating and configuration of contacts	
xi.	Relay Terminals are inherently marked	
xii.	35mm DIN rail mounting	
xiii.	Type and size of relay terminals for cable connection	
4.4.22	**Auxiliary Relays for Transformer Mechanical Protection Trip Function Type I**	
i.	Manufacturer's Name	
ii.	Type or Designation name of Auxiliary Relay	
iii.	Complete order number for offered Auxiliary Relay	
iv.	Number of similar Auxiliary Relay sold to date to the export market: Requirement; 2000	
v.	Manufacturer's Experience in manufacture of Auxiliary Relay type I	
vi.	Relay operating time	
vii.	Number of relay elements per casing	
viii.	Draw out design	
ix.	Hand reset contacts and red flag	
x.	Suitable for DIN Rail mounting	
xi.	Number of NO contacts and rating	
xii.	Type and size of relay terminals for cable termination	

CLAUSE	KPLC REQUIREMENTS	MANUFACTURER/ SUPPLIER'S OFFER
xiii.	Relay terminals indelibly marked	
xiv.	Size : lxhxb	
4.4.23	**Auxiliary Relays for Transformer Mechanical Protection Trip Functions Type II**	
i.	Manufacturer's Name	
ii.	Type or Designation name of Auxiliary Relay	
iii.	Complete order number for offered Auxiliary Relay	
iv.	Number of similar Auxiliary Relay sold to date to the export market: Requirement; 2000	
v.	Manufacturer's Experience in manufacture of Auxiliary Relay type II:	
vi.	Relay operating time	
vii.	Self-reset contacts with red operation flag	
viii.	Relay supplied complete with mounting base	
ix.	35 mm DIN Rail mounting	
x.	Number of NO contacts and rating	
xi.	Type and size of relay terminals for cable termination	
xii.	Relay terminals indelibly marked	
xiii.	Size : lxhxb	
4.4.24	**Auxiliary Relays for Transformer Mechanical Protection Alarm Functions Type III**	
i.	Manufacturer's Name	
ii.	Type or Designation name of Auxiliary Relay	

CLAUSE	KPLC REQUIREMENTS	MANUFACTURER/ SUPPLIER'S OFFER
iii.	Complete order number for offered Auxiliary Relay	
iv.	Number of similar Auxiliary Relay sold to date to the export market: Requirement; 2000	
v.	Manufacturer's Experience in manufacture of Auxiliary Relay type III	
vi.	Relay operating time	
vii.	Self-reset contacts and red operational indicator	
viii.	Relay operating speed	
ix.	One element per casing	
x.	Relay supplied completed with mounting base	
xi.	35 mm DIN Rail mounting	
xii.	Number of NO contacts and rating	
xiii.	Type and size of relay terminals for cable termination	
xiv.	Relay terminals indelibly marked	
xv.	Size : lxhxb	
4.4.25	**Bistable Auxiliary relays**	
i.	Manufacturer's Name	
ii.	Type or Designation name of Bistable auxiliary Relay	
iii.	Complete order number for offered Bistable auxiliary Relay	
iv.	Number of similar Bistable auxiliary Relay sold to date to the export market: Requirement; 2000	
v.	Experience in manufacture of Bistable auxiliary relay	
vi.	The relay has two operating coils	

CLAUSE	KPLC REQUIREMENTS	MANUFACTURER/ SUPPLIER'S OFFER
vii.	Relay operating time	
viii.	35 mm DIN Rail mounting	
ix.	Number of NO contacts and rating	
x.	Type and size of relay terminals for cable termination	
xi.	Number of similar Relay sold to date to the export market: Requirement; 1000	
4.4.26	**DC Supply Under Voltage Relay**	
i.	Manufacturer's Name	
ii.	Type or Designation name of DC supply under voltage Relay	
iii.	Complete order number for offered DC supply under voltage Relay	
iv.	Number of similar DC supply under voltage Relay sold to date to the export market: Requirement; 1000	
v.	Experience in manufacture of DC Supply Under-voltage relays	
vi.	Relays pick up and drop off value. NB: nominal rating is 110 V DC	
vii.	Accuracy	
viii.	Number and rating of relay contacts	
ix.	Panel mounting design	
x.	Relay flag for under-voltage indication	
xi.	Self-reset flag	
xii.	Type and size of relay terminals for cable connection	
4.4.27	**Annunciator Relay Type I**	
i.	Manufacturer's Name	
ii.	Type or Designation name of Annunciator Relay	

CLAUSE	KPLC REQUIREMENTS	MANUFACTURER/ SUPPLIER'S OFFER
iii.	Complete order number for offered Annunciator Relay	
iv.	Number of similar Annunciator Relay sold to date to the export market: Requirement; 1000	
v.	Years of Experience in the manufacture of Annunciator relays	
vi.	Numeric/Digital design	
vii.	Panel flush mounting design	
viii.	Alarm management buttons	
ix.	Number of alarm elements/windows	
x.	Method of programming the Alarms	
xi.	Behaviour of alarms upon loss of auxiliary DC supply	
xii.	LED colour for each alarm ON Indication	
xiii.	Years of Service in Kenya Power	
xiv.	Field configurable labels	
xv.	Alarm elements freely assigned to URGENT or NON-URGENT alarm bus and to output relays	
xvi.	URGENT & NON-URGENT alarms shall be assigned to separate output relays	
xvii.	Number of contacts for output relays	
xviii.	Type and size of relay terminals for cable connection	
4.4.28	**Annunciator Relay Type II**	
i.	Manufacturer's Name	
ii.	Type or Designation name of Annunciator Relay	
iii.	Complete order number for offered Annunciator Relay	

CLAUSE	KPLC REQUIREMENTS	MANUFACTURER/ SUPPLIER'S OFFER
iv.	Number of similar Annunciator Relay sold to date to the export market: Requirement; 1000	
v.	Years of Experience in the manufacture of Annunciator relays	
vi.	Numerical/Digital design	
vii.	Panel flush mounting design	
viii.	Alarm management buttons	
ix.	Number of alarm elements/windows	
x.	Method of programming the alarms	
xi.	Behaviour of alarms upon loss of auxiliary DC supply	
xii.	LED colour for alarm ON Indication	
xiii.	Years of service in Kenya Power	
xiv.	Field configurable labels	
xv.	Alarm elements freely configurable to URGENT or NON-URGENT alarm bus and to output relays	
xvi.	Number of contacts for output relays	
xvii.	Type and size of relay terminals for cable connection	
4.4.29	**Annunciator Relay Type III**	
i.	Manufacturer's Name	
ii.	Type or Designation name of Annunciator Relay	
iii.	Service experience in KPLC	
iv.	Complete order number for offered Annunciator Relay	
v.	Number of similar Annunciator Relays sold to date to the export market: Requirement; 1000	

CLAUSE	KPLC REQUIREMENTS	MANUFACTURER/ SUPPLIER'S OFFER
vi.	Years of Experience in the manufacture of Annunciator relays	
vii.	Numeric/Digital design	
viii.	Panel flush mounting design	
ix.	Alarm management buttons	
x.	Number of alarm elements/windows	
xi.	Method of programming the Alarms	
xii.	Behaviour of alarms upon loss of auxiliary DC supply	
xiii.	Years of Service in Kenya Power	
xiv.	Field configurable labels	
xv.	LED colour for alarm ON Indication	
xvi.	Alarm elements freely configurable to URGENT or NON-URGENT alarm bus and to output relays	
xvii.	Number of contacts for output relays	
xviii.	Type and size of relay terminals for cable connection	
4.4.30	**Electronic Hooter**	
i.	Manufacturer's Name	
ii.	Type or Designation name of Electronic Hooter	
iii.	Complete order number for offered Electronic Hooter	
iv.	Number of similar Electronic Hooters sold to date to the export market: Requirement; 500	
v.	Years of Experience in the manufacture of Electronic Hooters	
vi.	Panel mounting design	

CLAUSE	KPLC REQUIREMENTS	MANUFACTURER/ SUPPLIER'S OFFER
vii.	Maximum output in dB(A)	
viii.	Physical size of hooter	
ix.	Type of Tone	
x.	Continuous operating mode	
xi.	Type and size of relay terminals for cable connection	
4.4.31	**Anti-condensation Heater**	
i.	Manufacturer's Name	
ii.	Manufacturer's Experience	
iii.	Type or Designation name of Heater	
iv.	Complete order number for offered Heater	
v.	Number of similar Heaters sold to date to the export market: Requirement; 1000	
vi.	Rated voltage and power	
vii.	Make/finish of heater body	
viii.	Suitable for mounting on DIN rail	
ix.	Type and size of heater terminals for cable connection	
4.4.32	**Hygrostat**	
i.	Manufacturer's Name	
ii.	Manufacturer's experience	
iii.	Type or Designation name of Hygrostat	
iv.	Complete order number for offered Hygrostat	

CLAUSE	KPLC REQUIREMENTS	MANUFACTURER/ SUPPLIER'S OFFER
v.	Number of similar Hygrostat sold to date to the export market: Requirement; 1000	
vi.	Temperature and Humidity setting range	
vii.	Suitable for mounting on DIN rail	
viii.	Rated power supply	
ix.	Contacts configuration	
4.4.33	**Discrepancy Switch for Circuit Breaker Control**	
i.	Manufacturer's Name	
ii.	Type or Designation name of Discrepancy switch	
iii.	Complete order number for offered Discrepancy switch	
iv.	Number of similar Discrepancy switches sold to date to the export market: Requirement; 1000	
v.	Experience in manufacture of Discrepancy Switch	
vi.	Panel mounting design	
vii.	Number and configuration of contacts for close and open operations	
viii.	Indelibly marked rectangular escutcheon plate with closing and opening positions clearly marked	
ix.	Rating of discrepancy white illumination bulb	
x.	Type and size of switch contacts for cable termination	
xi.	Contacts indelibly marked	
4.4.34	**Circuit Breaker Close/Open Control Switch**	
i.	Manufacturer's Name	
ii.	Manufacturer's experience	

CLAUSE	KPLC REQUIREMENTS	MANUFACTURER/ SUPPLIER'S OFFER
iii.	Type or Designation name of Circuit Breaker close/open control switch	
iv.	Complete order number for offered Circuit breaker close/open control switch	
v.	Years of experience in the manufacture of the Circuit Breaker close/open control switch	
vi.	Mechanical interlock	
vii.	Contacts rating and configuration	
viii.	Type and size of switch terminals for cable connection	
4.4.35	**Push Button Switches for Circuit Breaker Close/Open Operation Type I**	
i.	Manufacturer's Name	
ii.	Type or Designation name of Circuit Breaker close/open push button switch	
iii.	Complete order number for offered Circuit Breaker close/open push button switch	
iv.	Years of experience in the manufacture of push button switches	
v.	Shrouded and well recessed	
vi.	Panel mounting design	
vii.	Contacts rating	
viii.	Switch colour for open and label	
ix.	Switch Colour for Close and label	
x.	Type and Size of switch terminals for cable connection	
4.4.36	**Push Button Switch for Alarm/Trip Relay Reset - Type II**	
i.	Manufacturer's Name	

CLAUSE	KPLC REQUIREMENTS	MANUFACTURER/ SUPPLIER'S OFFER
ii.	Manufacturer's experience	
iii.	Type or Designation name of Push button switch	
iv.	Complete order number for offered push button switch	
v.	Complete order number for offered Push Button switch	
vi.	Years of Experience in the manufacture of push button switches	
vii.	Shrouded and well recessed	
viii.	Flush mounting design	
ix.	Contacts rating	
x.	Switch colour	
xi.	Type and Size of switch terminals for cable connection	
4.4.37	**Local/Remote Selector Switch**	
i.	Manufacturer's Name	
ii.	Type or Designation name of the Local/Remote switch	
iii.	Complete order number for offered Local/Remote switch	
iv.	Years of experience in the manufacture of the switch	
v.	Flush mounting	
vi.	Contacts Rating and configuration	
vii.	Indelible labelling on escutcheon plate	
viii.	Type and size of switch terminals for cable connection	
4.4.38	**OFF/Local/Remote Selector Switch**	

CLAUSE	KPLC REQUIREMENTS	MANUFACTURER/ SUPPLIER'S OFFER
i.	Manufacturer's Name	
ii.	Manufacturer's experience	
iii.	Type or Designation name of Discrepancy switch	
iv.	Complete order number for offered Discrepancy switch	
v.	Panel mounting design	
vi.	Contacts Rating and configuration	
vii.	Indelible labelling on escutcheon plate	
viii.	Type and size of switch terminals for cable connection	
4.4.39	**ON/OFF Selector Switch**	
i.	Manufacturer's Name	
ii.	Manufacturer's experience	
iii.	Type or Designation name of Discrepancy switch	
iv.	Complete order number for offered On/off switch	
v.	Panel mounting design	
vi.	Contacts Rating and configuration	
vii.	Indelible labelling on escutcheon plate	
viii.	Type and size of switch terminals for cable connection	
4.4.40	**Semaphore for Isolator and Earth Switch Position Indication**	
i.	Manufacturer's Name	
ii.	Manufacturer's experience	

CLAUSE	KPLC REQUIREMENTS	MANUFACTURER/ SUPPLIER'S OFFER
iii.	Type or Designation name of semaphore	
iv.	Complete order number for offered Semaphore	
v.	Panel mounting design	
vi.	Red LED Indications for Closed and Green LED Indication Open status	
vii.	Shall be of circular or rectangular front appearance	
viii.	Type and size on semaphore terminals for cable connection	
ix.	Number of similar Semaphore sold to date to the export market: Requirement; 500	
4.4.41	**LED Indicating Lamps**	
i.	Manufacturer's Name	
ii.	Manufacturer's experience	
iii.	Type or Designation name of LED Indicating Lamps	
iv.	Complete order number for offered LED Indicating Lamps	
v.	Panel mounting design	
vi.	LED lamp rating in watts	
	Duration for continuous operation	
4.4.42	**Miniature Circuit Breaker Type I**	
i.	Manufacturer's Name	
ii.	Manufacturer's Experience	
iii.	Type or Designation name of Miniature Circuit Breaker	
iv.	Complete order number for offered Miniature Circuit breaker	
v.	Number of poles	

CLAUSE	KPLC REQUIREMENTS	MANUFACTURER/ SUPPLIER'S OFFER
vi.	One(1) Normally Closed(NC) auxiliary contact	
vii.	Rated operating & insulating voltage	
viii.	Overload setting in Amps	
ix.	Overcurrent release rating in Amps	
x.	Electrical & mechanical endurance	
xi.	Number of Contacts	
xii.	ON/OFF status indication	
xiii.	DIN rail mounting	
xiv.	Type and size of terminals	
4.4.43	**Miniature Circuit Breaker Type II**	
i.	Manufacturer's Name	
ii.	Manufacturer's Experience	
iii.	Type or Designation name of Miniature Circuit Breaker	
iv.	Complete order number for offered Miniature Circuit breaker	
v.	Three pole configuration	
vi.	Rated operating & insulating voltage	
vii.	Rated short-circuit current	
viii.	Rated current	
ix.	Electrical & mechanical endurance	
x.	Tripping characteristic	
xi.	One(1) Normally Closed(NC) auxiliary contact	

CLAUSE	KPLC REQUIREMENTS	MANUFACTURER/ SUPPLIER'S OFFER
xii.	ON/OFF status indication	
xiii.	DIN rail mounting	
xiv.	Type and size of terminals	
4.4.44	**Miniature Circuit Breaker Type III**	
i.	Manufacturer's Name	
ii.	Manufacturer's experience	
iii.	Type or Designation name of Miniature Circuit Breaker	
iv.	Complete order number for offered Miniature Circuit breaker	
v.	One Pole Configuration	
vi.	Rated operating & insulating voltage	
vii.	Rated short-circuit current	
viii.	Rated current	
ix.	Electrical & mechanical endurance	
x.	Tripping Characteristic	
xi.	One(1) Normally Closed(NC) auxiliary contact	
xii.	ON/OFF status indication	
xiii.	DIN rail mounting	
xiv.	Type and size of terminals	
4.4.45	**Miniature Circuit Breaker Type IV**	
i.	Manufacturer's Name	

CLAUSE	KPLC REQUIREMENTS	MANUFACTURER/ SUPPLIER'S OFFER
ii.	Manufacturer's Experience	
iii.	Type or Designation name of Miniature Circuit Breaker	
iv.	Complete order number for offered Miniature Circuit breaker	
v.	Two Pole Configuration	
vi.	Rated operating & insulating voltage	
vii.	Rated short-circuit current	
viii.	Rated current	
ix.	Electrical & mechanical endurance	
x.	Tripping Characteristic	
xi.	One(1) Normally Closed(NC) auxiliary contact	
xii.	ON/OFF status indication	
xiii.	DIN rail mounting	
xiv.	Type and size of terminals	
4.4.46	**Miniature Circuit Breaker Type V**	
i.	Manufacturer's Name	
ii.	Manufacturer's Experience	
iii.	Type or Designation name of Miniature Circuit Breaker	
iv.	Complete order number for offered Miniature Circuit breaker	
v.	Two Pole Configuration	
vi.	Rated operating & insulating voltage	

CLAUSE	KPLC REQUIREMENTS	MANUFACTURER/ SUPPLIER'S OFFER
vii.	Rated short-circuit current	
viii.	Rated current	
ix.	Electrical & mechanical endurance	
x.	Tripping Characteristic	
xi.	One(1) Normally Closed(NC) auxiliary contact	
xii.	ON/OFF status indication	
xiii.	DIN rail mounting	
xiv.	Type and size of terminals	
4.4.47	**Miniature Circuit Breaker Type VI**	
i.	Manufacturer's Name	
ii.	Manufacturer's experience	
iii.	Type or Designation name of Miniature Circuit Breaker	
iv.	Complete order number for offered Miniature Circuit breaker	
v.	Two Pole Configuration	
vi.	Rated operating & insulating voltage	
vii.	Rated short-circuit current	
viii.	Rated current	
ix.	Electrical & mechanical endurance	
x.	Tripping Characteristic	
xi.	One(1) Normally Closed(NC) auxiliary contact	
xii.	ON/OFF status indication	

CLAUSE	KPLC REQUIREMENTS	MANUFACTURER/ SUPPLIER'S OFFER
xiii.	DIN rail mounting	
xiv.	Type and size of terminals	
xv.	Connection type 3 phase, 4 wire	
xvi.	Measurands	
4.4.48	**Multi-Functional Power Meter**	
i.	Manufacturer's Name	
ii.	Type or Designation name	
iii.	Flush mounting	
iv.	Numerical design	
v.	Manufacturer's experience	
vi.	Size of LCD display	
vii.	Measured parameters	
viii.	Measurement of THD & TDD	
ix.	Rated current and Voltage	
x.	CT and VT ratio programmable	
xi.	3 phase, 4-wire connection	
xii.	Accuracy class	
xiii.	Measurement range for MVA	
xiv.	Communication ports	
xv.	Communication protocols	

CLAUSE	KPLC REQUIREMENTS	MANUFACTURER/ SUPPLIER'S OFFER
xvi.	Software provided	
xvii.	PC to Measurement Unit connection cable provided	
xviii.	Type & size of terminals	
4.4.49	**Tap Position Indication Transducer**	
i.	Supply voltage	
ii.	Outputs in mA	
iii.	Tap position measuring range	
iv.	Mounting	
v.	Resistor per step – configurable range	
vi.	Accuracy	
vii.	Response time	
viii.	Temperature class	
ix.	Applicable standard	
x.	Construction type	
4.4.50	**Tap Position Indicator**	
i.	Indication of Tap Position	
ii.	Input mA	
iii.	Number of tap steps (1-17)/configurable	
iv.	Mounting style	

CLAUSE	KPLC REQUIREMENTS	MANUFACTURER/ SUPPLIER'S OFFER
4.4.51	**Transducers**	
	Manufacturer minimum experience	State
4.4.52	**MW Transducer**	
i.	Manufacturer's Name	
ii.	Type or Designation name of Transducer offered	
iii.	Complete order number for offered Transducer	
iv.	Years of Experience in the manufacture of Transducers	
v.	Connection configuration of Transducer	
vi.	Rated voltage & current	
vii.	Rated output in mA	
viii.	Programmable output characteristic and CT & VT ratio	
ix.	Auxiliary supply shall be 110V DC/110V AC	
x.	Type & size of terminals	
xi.	Software for relay configuration and parameter setting and fault data Analysis offered for use with the relay. Software to be offered in CD form	
xii.	Connection cable from Laptop to Transducer offered	
xiii.	Number of similar Transducers sold to date to the export market: Requirement; 500	
4.4.53	**MVAr Transducer**	
i.	Manufacturer's Name	
ii.	Type or Designation name of Transducer offered	

CLAUSE	KPLC REQUIREMENTS	MANUFACTURER/ SUPPLIER'S OFFER
iii.	Complete order number for offered Transducer	
iv.	Years of Experience in the manufacture of Transducer	
v.	Connection configuration for the Transducer	
vi.	Rated voltage & current	
vii.	Rated output in mA	
viii.	Programmable output characteristics and CT & VT ratio	
ix.	DIN rail mounting	
x.	Auxiliary Power supply 110V DC/110V AC	
xi.	Type & size of terminals	
xii.	Software for relay configuration and parameter setting and fault data Analysis offered for use with the relay. Software to be offered in CD form	
xiii.	Connection cable from Laptop to Transducer offered	
xiv.	Number of similar Transducers sold to date to the export market: Requirement; 500	
4.4.54	**Current Transducer**	
i.	Manufacturer's Name	
ii.	Type or Designation name of offered Transducer	
iii.	Complete order number for offered Transducer	
iv.	Years of Experience in the manufacture of Transducer	
v.	Rated input, in Amps	
vi.	Rated output, in mA	
vii.	Auxiliary power supply 110V DC/110V AC	

CLAUSE	KPLC REQUIREMENTS	MANUFACTURER/ SUPPLIER'S OFFER
viii.	DIN Rail mounting	
ix.	Type and size of terminals	
x.	Software for relay configuration and parameter setting and fault data Analysis offered for use with the relay. Software to be offered in CD form	
xi.	Connection cable from Laptop to Transducer offered	
xii.	Number of similar Transducer sold to date to the export market: Requirement; 500	
4.4.55	**_Voltage Transducer**	
i.	Manufacturer's Name	
ii.	Type or Designation name of Transducer	
iii.	Complete order number for offered Transducer	
iv.	Years of Experience in the manufacture of Transducer	
v.	Rated input, in Volts	
vi.	Rated output in kV	
vii.	DIN rail mounting	
viii.	Auxiliary power supply 110V DC/110V AC	
ix.	Type & size of terminals	
x.	Software for relay configuration and parameter setting and fault data Analysis offered for use with the relay. Software to be offered in CD form	
xi.	Connection cable from Laptop to Transducer offered	
xii.	Number of similar Transducer sold to date to the export market: Requirement; 500	
4.4.56	**INDICATING INSTRUMENTS DRIVEN BY TRANSDUCER OUTPUT**	
	Manufacturer minimum experience	state

CLAUSE	KPLC REQUIREMENTS	MANUFACTURER/ SUPPLIER'S OFFER
4.4.57	**MW Instrument**	
i.	Manufacturer's Name	
ii.	Type or Designation name of Instrument	
iii.	Complete order number for offered Instrument	
iv.	Years of Experience in the manufacture of Instrument	
v.	Rated input in mA	
vi.	Rated output in MW	
vii.	FSD of instrument	
viii.	Black scale on white background	
ix.	Panel mounting design	
x.	Dimensions of Instrument	
xi.	Type & size of terminals	
xii.	Number of similar Instruments sold to the export market: Requirement 400	
4.4.58	**MVAR Instrument**	
i.	Manufacturer's Name	
ii.	Type or Designation name of Instrument	
iii.	Complete order number for offered Instrument	
iv.	Years of Experience in the manufacture of Instrument	
v.	Rated input in mA	
vi.	Rated output in MVAr	

CLAUSE	KPLC REQUIREMENTS	MANUFACTURER/ SUPPLIER'S OFFER
vii.	FSD of instrument	
viii.	Black scale on white background	
ix.	Panel mounting design	
x.	Dimensions of Instrument	
xi.	Type & size of terminals	
xii.	Number of similar Instruments sold to the export market: Requirement 500	
4.4.59	**INDICATING INSTRUMENTS DIRECTLY CONNECTED**	
4.4.59	Manufacturer minimum experience	state
4.4.59.1	Instruments type IP Protection Class	State state
4.4.59.2	Accuracy class Maximum tolerated error Overload withstand	State State state
4.4.59.3	Suitability for Tropical Climatic conditions	State
4.4.59.4	Insulation withstand standard	State
4.4.59.5	Manufacturer's experience	State
4.4.60	**Ammeter with MDI– 200 A**	
i.	Manufacturer's Name	
ii.	Type or Designation name of Ammeter	
iii.	Complete order number for offered Ammeter	
iv.	Years of Experience in the manufacture of Ammeter	

CLAUSE	KPLC REQUIREMENTS	MANUFACTURER/ SUPPLIER'S OFFER
v.	Flush mounting	
vi.	Rated input in Amps	
vii.	Rated output in Amps	
viii.	FSD of Instrument	
ix.	Black scale on white background	
x.	Dimensions of Ammeter	
xi.	Maximum demand Indicator	
	Type & size of terminals	
	Number of similar Ammeter sold to date to the export market: Requirement; 500	
4.4.61	**Ammeter with MDI – 400 A**	
i.	Manufacturer's Name	
ii.	Type or Designation name of Ammeter	
iii.	Complete order number for offered Ammeter	
iv.	Years of Experience in the manufacture of the Ammeter	
v.	Flush mounting	
vi.	Rated input in Amps	
vii.	Rated output in Amps	
viii.	FSD of Instrument	
ix.	Black scale on white background	
x.	Dimensions of Ammeter	
xi.	Maximum demand Indicator	

CLAUSE	KPLC REQUIREMENTS	MANUFACTURER/ SUPPLIER'S OFFER
xii.	Type & size of terminals	
xiii.	Number of similar Ammeter sold to date to the export market: Requirement; 500	
4.4.62	**_Ammeter with MDI – 800 A**	
i.	Manufacturer's Name	
ii.	Type or Designation name of Ammeter	
iii.	Complete order number for offered Ammeter	
iv.	Years of Experience in the Manufacture of Ammeter	
v.	Flush mounting	
vi.	Rated input in Amps	
vii.	Rated output in Amps	
viii.	FSD of Instrument	
ix.	Black scale on white background	
x.	Dimensions of Ammeter	
xi.	Maximum demand Indicator	
xii.	Type & size of terminals	
xiii.	Number of similar Ammeter sold to date to the export market: Requirement; 500	
4.4.63	**Ammeter Selector Switch**	
i.	Manufacturer's Name	
ii.	Type or Designation name of Ammeter Selector Switch	
iii.	Complete order number for offered Ammeter Selector Switch	
iv.	Years of Experience in the Manufacture of Ammeter Selector Switch	
v.	Flush mounting	

CLAUSE	KPLC REQUIREMENTS	MANUFACTURER/ SUPPLIER'S OFFER
vi.	Independent measurement of all three phase current when used with one Ammeter	
vii.	Contact Rating in Amps	
viii.	Type & size of Terminals	
ix.	Manufacturer's experience on similar equipment	
4.4.64	**Voltmeter - 220KV**	
i.	Manufacturer's Name	
ii.	Type or Designation name of Voltmeter	
iii.	Complete order number for offered Voltmeter	
iv.	Years of Experience in the manufacture of Voltmeter	
v.	Flush mounting	
vi.	Rated input in volts	
vii.	Rated output in Kilovolts (kV)	
viii.	FSD of Instrument	
ix.	Black scale on white background	
x.	Dimensions of Voltmeter	
xi.	Type & size of terminals	
xii.	Number of similar Voltmeter sold to date to the export market: Requirement; 500	
4.4.65	**Voltmeter - 132KV**	
i.	Manufacturer's Name	
ii.	Type or Designation name of Voltmeter	
iii.	Complete order number for offered Voltmeter	
iv.	Years of Experience in the manufacture of Voltmeter	
v.	Flush mounting	
vi.	Rated input in volts	

CLAUSE	KPLC REQUIREMENTS	MANUFACTURER/ SUPPLIER'S OFFER
vii.	Rated output in Kilovolts (kV)	
viii.	FSD of Instrument	
ix.	Black scale on white background	
x.	Dimensions of Voltmeter	
xi.	Type & size of terminals	
xii.	Number of similar Voltmeter sold to date to the export market: Requirement; 500	
4.4.66	**Voltmeter - 66KV**	
i.	Manufacturer's Name	
ii.	Type or Designation name of Voltmeter	
iii.	Complete order number for offered Voltmeter	
iv.	Years of Experience in the manufacture of Voltmeter	
v.	Flush mounting	
vi.	Rated input in volts	
vii.	Rated output in Kilovolts (kV)	
viii.	FSD of instrument	
ix.	Black scale on white background	
x.	Dimensions of Voltmeter	
xi.	Type & size of terminals	
xii.	Number of similar Voltmeter sold to date to the export market: Requirement; 500	
4.4.67	**Voltmeter – 33 KV**	
i.	Manufacturer's Name	
ii.	Type or Designation name of Voltmeter	
iii.	Complete order number for offered Voltmeter	
iv.	Years of Experience in the manufacture of Voltmeter	
v.	Flush mounting	

CLAUSE	KPLC REQUIREMENTS	MANUFACTURER/ SUPPLIER'S OFFER
vi.	Rated input in volts	
vii.	Rated output in Kilovolts (kV)	
viii.	FSD of instrument	
ix.	Black scale on white background	
x.	Dimensions of Voltmeter	
xi.	Type & size of terminals	
xii.	Number of similar Voltmeter sold to date to the export market: Requirement; 500	
4.4.68	**Voltmeter – 11 KV**	
i.	Manufacturer's Name	
ii.	Type or Designation name of Voltmeter	
iii.	Complete order number for offered Voltmeter	
iv.	Years of Experience in the manufacture of Voltmeter	
v.	Flush mounting	
vi.	Rated input in volts	
vii.	Rated output in Kilovolts (kV)	
viii.	FSD of instrument	
ix.	Black scale on white background	
x.	Dimensions of Voltmeter	
xi.	Type & size of terminals	
xii.	Number of similar Voltmeter sold to date to the export market: Requirement; 1000	
4.4.69	**Voltmeter Selector Switch**	
i.	Manufacturer's Name	
ii.	Type or Designation name of Voltmeter Selector Switch	
iii.	Complete order number for offered Voltmeter Selector Switch	
iv.	Years of Experience in the Manufacture of Voltmeter Selector Switch	
v.	Flush mounting	
vi.	Independent measurement of all phase – earth and phase – phase voltages when used with one Voltmeter	
vii.	Contact Rating in Amps	
viii.	Type & size of Terminals	
4.4.70	**Check Synchronising Relays**	

CLAUSE	KPLC REQUIREMENTS	MANUFACTURER/ SUPPLIER'S OFFER
ix.	Manufacturer's Name	
x.	Type or Designation name of check synchronising relays	
xi.	Complete order number for offered check synchronising relays	
xii.	Years of Experience in the manufacture of check synchronising relays	
xiii.	Flush mounting	
xiv.	Application on synchro-check functions and voltage-check functions.	
xv.	Conditions for closing the circuit breaker	
xvi.	Indications status/parameters to be displayed	
xvii.	Self -Supervision facility of the synchro check relay	
xviii.	Terminals type and size of the relay	
xix.	Communication protocol	
xx.	Connection to the lap top	
4.4.71	**Voltage and Frequency Protection Relay**	
i.	Manufacturer's Name	
ii.	Type or Designation name of voltage and frequency protection relay	
iii.	Complete order number for offered Voltage and Frequency Protection Relay	
iv.	Number of similar voltage and frequency protection relay sold to date to the export market: Requirement; 2000	
v.	Manufacturer's Experience in manufacture of voltage and frequency protection relay	
vi.	Relay design	
vii.	Flush Mounting	
viii.	Stages of voltage protection and time settings	
ix.	Stages of frequency protection and time settings	
x.	Rate of change of frequency for the relay and time settings	
xi.	Type and size of relay terminals for cable termination	
xii.	Self -supervision and time stamping	

CLAUSE	KPLC REQUIREMENTS	MANUFACTURER/ SUPPLIER'S OFFER
xiii.	No of outputs and indications	
xiv.	Type and size of terminals	
xv.	Communication protocol	
xvi.	Connection to the laptop	
4.4.72	**Additional Specifications for Relays**	
	All measurement relays to be Numeric design.	
4.4.73	**Relay Programming Software and Connection Cables**	
	Software for programming and downloading data	Provide
	Installation of Software in > 20 different computers without any additional License Cost	State
	Two or more memory devices to be provided for each different type of Software.	state
	4 copies the software Users Guide	Provide
	RS232 or other communication port for relays	Provide
	Appropriate communication cables: • Four (4) cables for each set of Relays using the same cable. • Four (4) cables for each set of transducers and also for the power measurement unit.	Provide
	Communication facilities on each numerical relay for remote interrogation and programming of the numerical relays.	Provide
	MMI	Provide
	Relay fault indication	Provide
4.5	**Laptop specification**	
	State detailed specifications of the laptop offered	Specify
A.1	Responsibility of carrying out tests	Specify
A.2	Copies of Type Test Reports submitted with tender	Provide
A.3	Acceptance tests to be witnessed by KPLC at factory before shipment	Specify
A.4	Inspection at the stores and replacement of rejected items	Specify
B.1	The supplier/manufacturer warranty that all goods shall have no defect arising from design, materials or workmanship	Specify

CLAUSE	KPLC REQUIREMENTS	MANUFACTURER/ SUPPLIER'S OFFER
B.2	Warranty period 48 months for measuring protection relays, including annunciator relays.	Specify
B.3	Warranty period 36 months for other auxiliary relays and control devices	Specify
	Replacement replaced free of charge by the manufacturer/Supplier	Specify
C.1	Quality Assurance Plan	Provide
C.2	Copy of ISO 9001:2008 Certificate	Attach copy
C.3	Manufacturer's experience	Provide
	Manufacturing Capacity (units per month)	State
	List of previous customers	Provide
	Customer reference letters	Provide
D.1	Documents submitted with tender	List
D.2	Documents to be submitted by supplier to KPLC for approval before manufacture	List
E.	**Technical Manuals**	
E1& E2	No of copies of technical manuals to be provided.	state
F& G	Factory Acceptance Tests, Inspection and Training	specify
FI-G5	Factory Testing and training to be conducted as per specification	state
I	**Software**	
	Software and means to use to deliver and Test the software.	specify
K	Packaging	specify
	mode of packaging and markings to be used	specify
	Delivery and Inspection at KPLC stores	
	Sealing methods and acceptance of the products	specify
	Replacement of any noncompliance unit(s) without extra charge to KPLC	state
	Statement of compliance to specification	Provide

Note: *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