

DOCUMENT NO.: KP1/6C/4/1/TSP/11/118



Kenya Power

**COMPLETE PROTECTION AND CONTROL PANELS FOR
POWER TRANSFORMERS AND TRANSMISSION /
SUBTRANSMISSION LINES - SPECIFICATION**

A Document of the Kenya Power & Lighting Company PLC
August 2020



TITLE:
COMPLETE PROTECTION AND CONTROL PANELS FOR POWER TRANSFORMERS AND TRANSMISSION / SUBTRANSMISSION LINES - SPECIFICATION

Doc. No.	KP1/6C/4/1/TSP/11/118
Issue No.	1
Revision No.	0
Date of Issue	2020-08-03
Page 2 of 51	

Table of Contents

0.1	CIRCULATION LIST	4
0.2	AMENDMENT RECORD.....	5
	FOREWORD	6
1.	SCOPE.....	7
2.	NORMATIVE REFERENCES	7
3.	DEFINITIONS AND ABBREVIATIONS	8
4.	REQUIREMENTS	9
4.1.	SERVICE CONDITIONS	9
4.2.	PROTECTION AND CONTROL PANELS GENERAL REQUIREMENTS	9
4.3.	PROTECTION RELAY AND CONTROL DEVICE GENERAL SPECIFICATIONS	14
4.4.	TYPES OF PROTECTION AND CONTROL PANELS	16
4.4.1.	Transformer Protection and Control panels for 7.5MVA, 23MVA, and 45MVA Transformers	16
4.4.2.	Transmission Range Transformer Protection panels.....	17
4.4.3.	Transmission Line Protection panels (220kV).....	18
4.4.4.	Transmission Line Protection panels (132kV).....	19
4.4.5.	Sub-Transmission Line Protection and Control panels (66kV and 33kV).....	19
4.4.6.	Metering Bay Protection and Control Panels (132kV, 66kV and 33kV).....	20
4.4.7.	220kV and 132kV Control panels.....	21
4.5.	DETAILED SPECIFICATIONS FOR PROTECTION RELAYS, INSTRUMENTS AND CONTROL DEVICES.....	22
4.6.	PROGRAMMABLE DIGITAL TRANSDUCER	22
4.7.	MULTIFUNCTIONAL POWER METER/ MEASUREMENT CENTERS, DIRECTLY CONNECTED	22
4.8.	TRIPLE POLE MINIATURE CIRCUIT BREAKERS FOR VT SECONDARY CIRCUIT	23
4.9.	DOUBLE POLE DC MINIATURE CIRCUIT BREAKERS	23
4.10.	SINGLE POLE AC MINIATURE CIRCUIT BREAKERS	23
4.11.	HOOTER.....	24

Issued by: Head of Section, Standards Development

Authorized by: Head of Department, Standards

Signed:

Signed:

Date: 2020-08-03

Date: 2020-08-03



TITLE:
COMPLETE PROTECTION AND CONTROL PANELS FOR POWER TRANSFORMERS AND TRANSMISSION / SUBTRANSMISSION LINES - SPECIFICATION

Doc. No.	KP1/6C/4/1/TSP/11/118
Issue No.	1
Revision No.	0
Date of Issue	2020-08-03
Page 3 of 51	

4.12.	ANTI-CONDENSATION HEATER	24
4.13.	DC SUPPLY UNDER VOLTAGE RELAY	24
4.14.	INDICATING LAMPS	24
4.15.	RELAY PROGRAMMING SOFTWARE AND CONNECTION CABLES.....	25
4.16.	ACCESSORIES	25
5.	TESTS REQUIREMENTS	25
6.	MARKING AND PACKING	26
APPENDICES.....		27
A.	TESTS AND INSPECTION (Normative)	27
B.	QUALITY MANAGEMENT SYSTEM (Normative).....	27
C.	DOCUMENTATION (Normative)	28
D.	GUARANTEED TECHNICAL PARTICULARS (Normative).....	30

Issued by: Head of Section, Standards Development

Authorized by: Head of Department, Standards

Signed:

Signed:

Date: 2020-08-03

Date: 2020-08-03



TITLE:
COMPLETE PROTECTION AND CONTROL PANELS FOR POWER TRANSFORMERS AND TRANSMISSION / SUBTRANSMISSION LINES - SPECIFICATION

Doc. No.	KP1/6C/4/1/TSP/11/118
Issue No.	1
Revision No.	0
Date of Issue	2020-08-03
Page 4 of 51	

0.1 CIRCULATION LIST

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

REVISION OF KPLC STANDARDS

In order to keep abreast of progress in the industry, KPLC Standards shall be regularly reviewed. Suggestions for improvements to approved Standards, addressed to the Manager, Standards Department, are welcome.

© Kenya Power & Lighting Co. PLC.

Users are reminded that by virtue of Section 25 of the Copyright Act, 2001 (Revised 2009) Cap 130 of the Laws of Kenya copyright subsists in all KPLC Standards and except as provided under Section 26 of this Act, no KPLC Standard produced by KPLC may be reproduced, stored in retrieval system by any means without prior permission from the Managing Director & CEO, KPLC.

Issued by: Head of Section, Standards Development

Authorized by: Head of Department, Standards

Signed:

Signed:

Date: 2020-08-03

Date: 2020-08-03



TITLE:
COMPLETE PROTECTION AND
CONTROL PANELS FOR POWER
TRANSFORMERS AND
TRANSMISSION /
SUBTRANSMISSION LINES -
SPECIFICATION

Doc. No.	KP1/6C/4/1/TSP/11/118
Issue No.	1
Revision No.	0
Date of Issue	2020-08-03
Page 5 of 51	

0.2 AMENDMENT RECORD

Rev No.	Date (YYYY-MM-DD)	Description of Change	Prepared by (Name & Signature)	Approved by (Name & Signature)
Issue 1 Rev 0	2020-08-03	New Issue	J. Ng'ang'a S. Nguli	Dr. Eng. Peter Kimemia

Issued by: Head of Section, Standards Development

Authorized by: Head of Department, Standards

Signed:

Signed:

Date: 2020-08-03

Date: 2020-08-03



TITLE:
COMPLETE PROTECTION AND CONTROL PANELS FOR POWER TRANSFORMERS AND TRANSMISSION / SUBTRANSMISSION LINES - SPECIFICATION

Doc. No.	KP1/6C/4/1/TSP/11/118
Issue No.	1
Revision No.	0
Date of Issue	2020-08-03
Page 6 of 51	

FOREWORD

This specification has been prepared by the Standards department in collaboration with Central Construction-E/Plant Projects and System Protection all of The Kenya Power and Lighting Company Plc (KPLC) and it lays down requirements for Complete Protection and Control Panel (Cubicles/Enclosures) for use in KPLC's indoor substations.

At present, the Company fabricates the panels and installs the requisite equipment depending on the particular need. However, due to the need to standardise the panels and procure them completely wired as necessary, this specification was developed.

At present, there are no other specifications in this series.

This specification stipulates the minimum requirements for the Complete Protection and Control Panels acceptable for use in the company and it shall be the responsibility of the supplier and manufacturer to ensure that the offered design is of the highest quality and guarantees excellent service to KPLC, and exhibits good workmanship and good engineering practice in the manufacture.

Users of KPLC specifications are responsible for their correct interpretation and application.

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

Name	Division
Paul Mwangi	Network Management
James Onsare	Network Management
Stephen Nguli	IESR
John Nganga	IESR
Abdalla Chanzu	Infrastructure Development

Issued by: Head of Section, Standards Development

Authorized by: Head of Department, Standards

Signed:

Signed:

Date: 2020-08-03

Date: 2020-08-03



TITLE:
COMPLETE PROTECTION AND CONTROL PANELS FOR POWER TRANSFORMERS AND TRANSMISSION / SUBTRANSMISSION LINES - SPECIFICATION

Doc. No.	KP1/6C/4/1/TSP/11/118
Issue No.	1
Revision No.	0
Date of Issue	2020-08-03
Page 7 of 51	

1. SCOPE

- 1.1.** This specification, Complete Protection and Control Panels for Power Transformers and Transmission/Sub-Transmission Lines, is intended to cover the design, manufacture, assembly, testing at manufacturer's factory, supply and delivery of the Complete Protection and Control Panels to KPLC stores. This will in turn provide the user (KPLC) trouble-free operation to achieve the intended purpose of efficient and cost-effective installation and commissioning of Power Transformers, Metering and Feeder Protection schemes.
- 1.2.** The Complete Protection and Control Panels shall conform in all respects to high standards of engineering, design and workmanship and shall be capable of performing in continuous operation as per the bidder's guarantee in a manner acceptable to KPLC.

2. NORMATIVE REFERENCES

The following Standards contain provisions which, through reference in this text, constitute provisions of this specification. For dated editions, the cited edition shall apply; for undated editions, the latest edition of the referenced document shall apply:

BS EN 10142:2000	Continuously hot-dip zinc coated low carbon steels strip and sheet for cold forming. Technical delivery conditions
DIN 1249-12	Glass for use in building construction; toughened glass; dimensions, working and requirements
IEC 61439-1:2011	Low-voltage switchgear and control gear assemblies - Part 1: General rules
IEC 60529	Degrees of protection provided by enclosures (IP Code)
IEC 62208:2011	Empty enclosures for low-voltage switchgear and control gear assemblies - General requirements
ISO 9001:2015	Quality management systems – Requirements
ISO/IEC 17025:2017	General requirements for the competence of testing and calibration laboratories
IEC 60815	Selection and dimensioning of high voltage insulators intended for use in polluted condition
KP1/6C/4/1/TSP/13/001	Protective Relays, Control Devices and Instruments – Specification
KP1/6C/4/1/TSP/14/020	Current and potential transformer connected meters – specification

Issued by: Head of Section, Standards Development	Authorized by: Head of Department, Standards
Signed:	Signed:
Date: 2020-08-03	Date: 2020-08-03



TITLE:
COMPLETE PROTECTION AND CONTROL PANELS FOR POWER TRANSFORMERS AND TRANSMISSION / SUBTRANSMISSION LINES - SPECIFICATION

Doc. No.	KP1/6C/4/1/TSP/11/118
Issue No.	1
Revision No.	0
Date of Issue	2020-08-03
Page 8 of 51	

3. DEFINITIONS AND ABBREVIATIONS

For the purpose of this specification, the terms and definitions given in the reference standards shall apply. The following abbreviations shall also apply:

- 3P4W: 3 phase 4 wire
- AC: Alternating Current
- BCU: Bay Control Unit
- BGA: Buchholz Gas Alarm
- BI: Binary Inputs
- BO: Binary Outputs
- BS: Buchholz Surge
- CT: Current Transformer
- CTR: Current Transformer Ratio
- DC: Direct Current
- Equipment: Complete Protection & Control panel
- GTP: Guaranteed Technical Particulars
- HMI: Human Machine Interface
- HV: High Voltage
- I: Current
- In: Nominal current
- kV: Kilo Volt
- kWh: kilowatt hour
- L.E.D: Light Emitting Diode
- LCD: Liquid Crystal Display
- mA: Milliamps
- MCB: Miniature Circuit Breaker
- NC: Normally Closed
- NO: Normally Open
- OLTC BS: On Load Tap Changer Buchholz Surge
- OLTC: On Load Tap Changer

Issued by: Head of Section, Standards Development	Authorized by: Head of Department, Standards
Signed:	Signed:
Date: 2020-08-03	Date: 2020-08-03



TITLE:
COMPLETE PROTECTION AND CONTROL PANELS FOR POWER TRANSFORMERS AND TRANSMISSION / SUBTRANSMISSION LINES - SPECIFICATION

Doc. No.	KP1/6C/4/1/TSP/11/118
Issue No.	1
Revision No.	0
Date of Issue	2020-08-03
Page 9 of 51	

- OTA: Oil Temperature Alarm
- OTT: Oil Temperature Trip
- P: Active Power
- pf: Power Factor
- PRD: Pressure Relief Device
- PVC: Poly Vinyl Chloride
- Q: Reactive Power
- RTU: Remote Terminal Unit
- SCADA: Supervisory Control and Data Acquisition
- V: Voltage
- VT: Voltage Transformer
- VTR: Voltage Transformer Ratio
- WTA: Winding Temperature Alarm
- WTT: Winding Temperature Trip

4. REQUIREMENTS

4.1. SERVICE CONDITIONS

The Complete Protection and Control Panels shall be suitable for use indoors in tropical areas and harsh climatic conditions including areas exposed to:

- a) Altitudes of up to 2200m above sea level and humidity of up to 95%,
- b) Average ambient temperature of +30°C with a minimum of -10°C and a maximum of +60°C, in direct sunlight,
- c) Pollution: Design pollution level to be taken as “Heavy” (Pollution level III) for inland and “Very Heavy” (Pollution level IV) for coastal applications in accordance with IEC 60815.
- d) Isokeraunic levels of up to 180 thunderstorm days per year.

4.2. PROTECTION AND CONTROL PANELS GENERAL REQUIREMENTS

4.2.1. All dimensions are in millimeters unless otherwise specified. In particular, the panels shall preferably have the following dimensions; 2100mm x 800mm x 650mm (H x W x D).

Issued by: Head of Section, Standards Development	Authorized by: Head of Department, Standards
Signed:	Signed:
Date: 2020-08-03	Date: 2020-08-03



TITLE:
COMPLETE PROTECTION AND CONTROL PANELS FOR POWER TRANSFORMERS AND TRANSMISSION / SUBTRANSMISSION LINES - SPECIFICATION

Doc. No.	KP1/6C/4/1/TSP/11/118
Issue No.	1
Revision No.	0
Date of Issue	2020-08-03
Page 10 of 51	

- 4.2.2. The panels when manufactured shall comply with or exceed Protection enclosure class IP42 in accordance with IEC 60529.
- 4.2.3. The panels shall be made from sheet steel of at least 2.0mm thickness and reinforced for strength. The steel sheet shall be Cold Rolled Cold Annealed (CRCA) steel.
- 4.2.4. The painting primer and second layer shall be of universal grey based on acrylic resin.
- 4.2.5. The Powder Painted finish coat shall be of RAL7032 shade based on polyurethane.
- 4.2.6. Painting thickness at any point on the panel shall be no less than 80 microns (μm).
- 4.2.7. The Protection and Control panels shall have a front door with 4mm transparent safety glass (Glazed Door) covering 80 to 90% of the face. The Safety glass shall be sealed properly on the door frame and conform to IP65 ingress protection. The front door shall have three or four (3 or 4) right hand hinges. The door lock shall be at the left-hand mid height level of the door and shall be locked/opened using a double bit key.
- 4.2.8. The Protection and Control panels shall also have an inner door with left hand hinges, which shall have 2 millimeter thick x 19-inch (482.6mm) Rack modular plates. The height of each of the modular plates shall be sufficient to accommodate the flush mounting of the respective Protection Relay or Instrument or Control device. This door shall have a lock at the right hand mid height level. This lock shall be opened or closed using a double bit closing/opening key. There shall be sufficient clearance between the front and inner doors to allow smooth opening of the two doors.
- 4.2.9. Another door shall be located at the rear and shall have left hand hinges. This rear door shall have a lock at the right-hand side mid height level of the door. The door shall be opened/closed using a double bit key.
- 4.2.10. The locking device shall lock both bottom and top when actuated and shall be made from strong brass. The double bit key shall be made from strong stainless steel.
- 4.2.11. The rear door shall be the same size as the front door with full plate, and with no transparent glass.
- 4.2.12. The rear door shall have two sets of vents at the bottom and at the top fitted with gauze wire to provide air circulation in the panel whilst ensuring that the panel is both vermin and dust proof.

Issued by: Head of Section, Standards Development

Authorized by: Head of Department, Standards

Signed:

Signed:

Date: 2020-08-03

Date: 2020-08-03



TITLE:
COMPLETE PROTECTION AND CONTROL PANELS FOR POWER TRANSFORMERS AND TRANSMISSION / SUBTRANSMISSION LINES - SPECIFICATION

Doc. No.	KP1/6C/4/1/TSP/11/118
Issue No.	1
Revision No.	0
Date of Issue	2020-08-03
Page 11 of 51	

- 4.2.13. The anti-condensation heater rated at 100W and controlled by hygostat, shall be mounted at the bottom near the gland plate.
- 4.2.14. The internal panel lighting holder and lamp shall be mounted inside the Protection and Control panel, at the interior panel ceiling top, and controlled through an appropriate durable door switch. The lamp shall be an 11-watt LED lamp with bayonet bottom.
- 4.2.15. A copper earthing bar shall be mounted at the bottom inside of the panel near the gland plate and shall run the full width of the panel. The Earth bar shall be fitted with earthing terminal blocks for bonding/connecting all the earthing connections for the protection and control devices mounted on the panel. The earthing terminal blocks shall be suitable for termination of 1.5 mm² up to 10 mm² stranded copper cables. Additionally, the panels shall be fitted with two 50 mm² high quality copper mechanical lugs suitable for connection of earthing - bonding cables/conductors connection to the substation earthing system. The mechanical lugs shall have shear off bolts.
- 4.2.16. Four lifting eye bolts/hooks made of brass, shall be provided at the diagonals on the panel top cover plate and shall be able to take the weight of the panel together with the accessories and devices mounted on the panel. The inner diameter of the eyebolt shall be 35 mm while the external shall be 65 mm.
- 4.2.17. Upon the front plate of the Control Panels, a mimic diagram describing the circuit protected and controlled, shall be drawn using good shade colours - 220kV - purple, 132kV- black, 66kV – dark brown, 33kV - green and 11kV - red. The mimic strips shall be 8 mm thick and 800mm length (the width of the panel). The adhesive shall be strong for durability throughout the life of the panels, which is expected to be at least 30 years. The mimic diagram and labels shall be professionally done to provide the best aesthetics.
- 4.2.18. Each panel shall have engraved labels fixed on both sides of the inner modular plate door to provide name of each Protection Relay/Instrument/Device. The labels shall be on the front atop the Protection Relay/Devices and also in the panel interior. The engraved labels for the Relays/Devices shall be of 15mm height by 60mm Length and written in capital Arial font. The labels shall be made by engraving white text on to black or grey background plastic fitted to the panel using suitable fixing material. The panel shall also have a header label (Black Label with clearly visible sized white text) with dimension of 30mm by 300mm denoting type of panel as per schedule of requirements.
- 4.2.19. PVC cable racks and terminal blocks shall be mounted conveniently on the panel sides or the panel back plate to allow wires to neatly terminate on protection devices/instrument from

Issued by: Head of Section, Standards Development

Authorized by: Head of Department, Standards

Signed: 

Signed: 

Date: 2020-08-03

Date: 2020-08-03



TITLE:
COMPLETE PROTECTION AND CONTROL PANELS FOR POWER TRANSFORMERS AND TRANSMISSION / SUBTRANSMISSION LINES - SPECIFICATION

Doc. No.	KP1/6C/4/1/TSP/11/118
Issue No.	1
Revision No.	0
Date of Issue	2020-08-03
Page 12 of 51	

terminal blocks. Bundles of cables should be secured in flex shroud to avoid damage on the control cables while opening/closing the internal modular plate panel door. There shall be one vertical cable rack on either side of the vertical terminal block rail. These PVC cable racks shall be suitable to accommodate all the control wiring going through them without bulging or hindering PVC cable rack cover from being fitted.

- 4.2.20. The Terminal Blocks (TB's) shall be PVC insulated and mounted on a DIN asymmetric rail, but DIN Symmetric rail is also acceptable. The terminal blocks shall take up to 6mm² stranded copper cables. Current Transformer (CT) and Voltage Transformer (VT) terminals blocks shall be of the sliding type. The terminal blocks for the CT's shall have appropriate shorting facility with isolating links and external cable CT shorting links to allow for separate secondary current injection to associated protection relay and also provide for modification inside the panel of CT circuits as may be required.
- 4.2.21. Terminal blocks shall be numbered indelibly with number labels (preferably black numbers on white labels) that cannot fall off from the terminal block.
- 4.2.22. A 230VAC supply two gang socket outlet shall be provided in every panel. This shall be of rectangular slots - British Standard.
- 4.2.23. Suitably sized/rated Miniature Circuit Breakers (MCBs) for both DC and AC control circuits shall be provided in every panel. These shall all have auxiliary contacts 1NO/NC for use in monitoring the status of the MCBs. One spare MCB of each type used for DC and AC controls circuits implemented shall be provided in each panel. DC control/power supply circuit MCBs shall be of DC type 'C' curve characteristic. The AC control/power supply circuit MCBs shall be of AC type 'C' curve characteristic. The MCB's used in each panel shall be well coordinated to provide reliable, selective, sensitive and high-speed operation in case of DC/AC control circuit faults. DC and AC MCB calculations and coordination analysis to be submitted for approval. Bidders are advised to utilize the standard Internal Components ratings of HV equipment used in KPLC substations to carry out MCB sizing calculations for selection purposes. Specifications for devices used in HV Electrical Equipment i.e. Disconnectors, Circuit Breakers, Power Transformers are available at the KPLC Standards Department. The MCB sizing calculations shall also be provided to KPLC for approval.
- 4.2.24. 2 Amp or 4 Amp triple pole AC type 'C' curve characteristic MCBs shall be provided for all VT secondary circuits in every panel. These MCBs shall also have auxiliary contacts 1NO/NC for use in status monitoring.

Issued by: Head of Section, Standards Development	Authorized by: Head of Department, Standards
Signed:	Signed:
Date: 2020-08-03	Date: 2020-08-03



Kenya Power

TITLE:
COMPLETE PROTECTION AND CONTROL PANELS FOR POWER TRANSFORMERS AND TRANSMISSION / SUBTRANSMISSION LINES - SPECIFICATION

Doc. No.	KP1/6C/4/1/TSP/11/118
Issue No.	1
Revision No.	0
Date of Issue	2020-08-03
Page 13 of 51	

- 4.2.25. Two detachable gland plates shall be provided for all panels. The gland plates shall be fitted at 150mm above the ground level at the end of the skirting frame. Each gland plate shall measure 600mm Length x 250mm Width x 3mm Thickness.
- 4.2.26. Each gland plate shall have at least 5 circular holes to receive 32mm² brass cable gland, at least 6 circular holes to receive 25mm² brass cable gland, at least 7 circular holes to receive 20mm² brass cable gland. The holes shall be fitted with plastic covers which can be removed when cables are being fitted onto the gland plate.
- 4.2.27. Synchro-check/override facility and features shall be provided for all 220kV, 132kV and 66kV circuit panels.
- 4.2.28. Most KPLC Substation auxiliary DC supplies are rated 110VDC nominal voltage. 24VDC to 250VDC range of power supply for the protection devices shall be provided by supplier.
- 4.2.29. All Protection and Control Panel wiring shall be in grey colour 2.5mm² stranded copper cable for CT circuits and DC/AC control wiring. Spare Protection Relay BI/BO, spare local/remote switch contacts, spare Discrepancy Control switch contacts and Semaphore switch contacts shall be wired to spare Protection panel Terminal Blocks. They shall be clearly captured in the design drawing to be provided for approval.
- 4.2.30. All control/protection wires shall be terminated with appropriate 2.5mm² pin, spade or ring type cable lugs where appropriate, and terminated firmly on all devices.
- 4.2.31. The Control/Protection wire ferruling shall adapt the British standard where VT secondary voltages start with 'E', Overcurrent CT circuits start with 'C', Metering CT circuits start with 'D', Differential and Distance protection CT circuits start with 'A', DC supplies 'J', DC Control circuits 'K', Indication and Alarm circuits 'L', 230VAC supplies 'H' etc. The prefix letters shall be followed by numbers e.g. D10- Red metering CT input, D30 -yellow phase metering CT input, D50- Blue phase metering CT input and D70 star point of the metering CT.
- 4.2.32. The successful bidder shall provide well labelled and referenced Hardcopy and Softcopy schematic design drawings for the protection and control circuits for each panel manufactured. The soft copies shall be in PDF and AUTOCAD format for each protection/metering/control panel manufactured. Each set of panel drawings shall be presented on A4 size paper and filed in a well labelled Hard Cover box file (3 copies).
- 4.2.33. The Manufacturer shall provide for approval the schematic design drawings and panel cutout designs for each category of Power Transformer/Metering/Feeder Protection and Control

Issued by: Head of Section, Standards Development

Authorized by: Head of Department, Standards

Signed: 

Signed: 

Date: 2020-08-03

Date: 2020-08-03



TITLE:
COMPLETE PROTECTION AND CONTROL PANELS FOR POWER TRANSFORMERS AND TRANSMISSION / SUBTRANSMISSION LINES - SPECIFICATION

Doc. No.	KP1/6C/4/1/TSP/11/118
Issue No.	1
Revision No.	0
Date of Issue	2020-08-03
Page 14 of 51	

panel before manufacturing kicks off, including the Protection Relays, control devices and instruments before manufacture. After KPLC approval, samples of each category of Transformer/Feeder/ Metering Protection and Control panel shall be manufactured and approved by KPLC prior to mass production.

- 4.2.34. The successful bidder shall provide Original software for all Numerical Relays/devices used and shall also provide Protection Relay manuals in English Language.
- 4.2.35. The successful bidder shall provide to KPLC serial communication cables or any other type of communication cables required to programme/configure the protection relays/devices for each panel Manufactured.
- 4.2.36. All relays supplied with the panels shall be having a working default configuration which can be edited or used without requiring special tools or skills. The Bay Control Unit (BCU) shall be configured with a default mimic diagram and the objects linked to Binary Inputs (BI's) and Binary Outputs (BO's). 66kV BCUs shall be preconfigured with a double busbar mimic diagram. 220kV and 132kV bay BCUs shall be preconfigured with a default mimic of 1 ½ breaker (breaker and a half) system. 33kV and 11kV bay BCUs shall be preconfigured with a default mimic of a single busbar, one Disconnecter on either side of the breaker and an earth switch towards the line or protected object. At least 7 no's each Spare Binary Inputs/Binary Outputs shall be provided for in the BCUs.
- 4.2.37. The mounting of Protection Relays, Instruments, Devices and Bay Control Units shall be on removable modular plates which shall make it easy to change or upgrade in future.

4.3. PROTECTION RELAY AND CONTROL DEVICE GENERAL SPECIFICATIONS

- 4.3.1. All Protective Relays, Control Devices and Instruments used shall be IEC 61850 compliant and shall further comply with Technical Specification: KP1/6C/4/1/TSP/13/001. The panels shall also be wired in such a way as to easily be integrated into the substation SCADA system which will be further integrated to the RTU.
- 4.3.2. The Main Scheme Protection e.g. Transformer/ Line Differential, Distance Protection shall not be embedded in the BCU.
- 4.3.3. All the BCUs shall incorporate 3 phase overcurrent and earth fault protection as well as Auto Reclosing and Synchro check protection functions. The BCU's shall be configured to send commands to selected objects in the preconfigured mimic diagrams. BCUs shall also provide information on the status of the substation Bay equipment and shall be IEC 61850 compliant.

Issued by: Head of Section, Standards Development

Authorized by: Head of Department, Standards

Signed:

Signed:

Date: 2020-08-03

Date: 2020-08-03



TITLE:
COMPLETE PROTECTION AND CONTROL PANELS FOR POWER TRANSFORMERS AND TRANSMISSION / SUBTRANSMISSION LINES - SPECIFICATION

Doc. No.	KP1/6C/4/1/TSP/11/118
Issue No.	1
Revision No.	0
Date of Issue	2020-08-03
Page 15 of 51	

- 4.3.4. The Protection devices shall operate over a wide range of auxiliary DC power supply voltage i.e. 24VDC to 250VDC.
- 4.3.5. Multi-Functional Power meters shall be able to display all the 3 phase and Neutral V, I, P, Q, CosΦ (pf), F, kWh. The CTR and VTR shall be programmable through HMI and communication cable with software (both to be provided to KPLC). The accuracy class of these instruments shall be 0.5. The units shall be powered using 110VDC power supplies only.
- 4.3.6. Digital Programmable Transducers shall be from reputable manufacturers with mA transducer outputs for P, Q, I, V at the least. They should be 3P4W connected. These Digital Programmable Transducers shall be fully wired to the terminal blocks to be integrated into the substation SCADA system.
- 4.3.7. Tariff class energy meters with an Automatic Meter Reading (AMR) feature shall be installed on all Feeder/Metering/Transformer Protection and Control panels for energy measurement. The meters shall be of class 0.5 and shall be interfaced with the LV side Instrument Transformers for the Transformer Protection/Control panels. The energy meters shall be of 3P4W configuration and the VTR and CTR shall be fully configurable/programmable. The detailed meters specific requirements are contained in the specification “Current and potential transformer connected meters – specification” reference KP1/6C/4/1/TSP/14/020 dated 2017-12-15. Bidders are required to fill in the Guaranteed Technical Particulars (GTPs) contained in the above specification (reference KP1/6C/4/1/TSP/14/020 dated 2017-12-15) together with the GTP contained in this specification for evaluation purposes.
- 4.3.8. Discrepancy Control switches, Semaphores, Remote/Supervisory selector switches, Test switches from reputable manufacturers shall be used to achieve excellent functional control and indication schemes. The functional control achieved by the control switches shall be in addition to the functional control offered from the BCUs.
- 4.3.9. DC supply supervision shall be provided for each category of the Transformer/Feeder/Metering Protection and Control panel listed below. A Hooter shall be wired and configured to provide audible alarm in case of DC loss/failure in panel for all categories of panels listed below.

Issued by: Head of Section, Standards Development	Authorized by: Head of Department, Standards
Signed:	Signed:
Date: 2020-08-03	Date: 2020-08-03



TITLE:
COMPLETE PROTECTION AND CONTROL PANELS FOR POWER TRANSFORMERS AND TRANSMISSION / SUBTRANSMISSION LINES - SPECIFICATION

Doc. No.	KP1/6C/4/1/TSP/11/118
Issue No.	1
Revision No.	0
Date of Issue	2020-08-03
Page 16 of 51	

4.4. TYPES OF PROTECTION AND CONTROL PANELS

4.4.1. Transformer Protection and Control panels for 7.5MVA, 23MVA, and 45MVA Transformers

These panels shall have the following Protection and Control devices:

- a) Two winding Power Transformer Differential Protection Relay (87T) with over fluxing function
- b) LV Restricted Earth Fault Protection Relay (64N).
- c) HV Three Phase Overcurrent and Earth Fault Relay (50/51HV, 50N/51N).
- d) Stand By Earth Fault Protection Relay (51G).
- e) Annunciator Relay (30) with 36 windows. Annunciator shall also have reset push buttons for resetting Lock Out Relay and Protection Relay.
- f) Multi-Functional Power meters for the HV and LV side of the Power Transformer.
- g) 3P4W Programmable Digital Transducer for the LV and HV side of the Power Transformer.
- h) 3P4W Energy Meter class 0.5 capable of being interfaced to the SCADA system.
- i) Bay Control Units to be provided and implemented in this panel as a Low Voltage side Three phase Overcurrent and Earth fault.
- j) Discrepancy Control Switches for all Circuit Breakers and Motorized Disconnectors controlling the Power Transformer.
- k) Semaphores for all Earth Switches and non-motorized switches.
- l) Suitable Auxiliary Relay with 4 no's Heavy-Duty Change Over contacts each/or equivalent Intelligent Relay for Power Transformer Protection functions like Main Tank Buchholz, Oil Temperature, HV Winding Temperature, LV Winding Temperature, Pressure Relief Device, OLTC Pressure Relief Device, OLTC Buchholz Surge, Oil Level Low etc. Output 1 of Auxiliary Relay will be for Trip, Output 2 for Annunciation, Output 3 wired to Terminal Block for SCADA system interfacing, output 4 will be a spare for future use. An Intelligent Repeater Relay which can achieve the signal multiplication as mentioned above may be used in lieu of the Auxiliary Relays.
- m) Lockout/ Latching Relay (86) with manual or remote reset with reset push button, which operates when critical protection functions operate. This relay shall have Heavy Duty NO/NC contacts.
- n) Indication LED and Reset Push Button for the Lockout relay. All relays except Lock Out Relay shall have common reset push button.
- o) Selector switches shall be provided for enabling Local/Remote/SCADA modes of operations.

Issued by: Head of Section, Standards Development

Authorized by: Head of Department, Standards

Signed:

Signed:

Date: 2020-08-03

Date: 2020-08-03



TITLE:
COMPLETE PROTECTION AND CONTROL PANELS FOR POWER TRANSFORMERS AND TRANSMISSION / SUBTRANSMISSION LINES - SPECIFICATION

Doc. No.	KP1/6C/4/1/TSP/11/118
Issue No.	1
Revision No.	0
Date of Issue	2020-08-03
Page 17 of 51	

- p) Trip Circuit Supervision Relay (95) for supervision of Circuit Breaker trip circuits controlling the Power Transformer. These can either be stand-alone or integrated on one of the protection relays.
- q) For the 33/11kV rated substations, the Transformer bay substation equipment layout shall be composed of a Busbar Disconnecter and a Circuit Breaker followed by the Power Transformer. The mimic diagram shall correspond to this layout with appropriate colours for the equipment controlling the Power Transformer as per clause 4.2.17.
- r) For the 66/11kV rated substations, the Transformer bay substation equipment layout shall be composed of a Disconnecter connected to each busbar and a Circuit Breaker followed by the Power Transformer. The mimic diagram shall correspond to this layout with appropriate colours for the equipment controlling the Power Transformer as per clause 4.2.17.

4.4.2. Transmission Range Transformer Protection panels

Shall have two Protection panels provided for each transformer. The protection functions shall be grouped in two groups; Protection A and Protection B, to avoid crowding all Protection and Control devices in one panel. Each Protection panel shall have the following Protection Relays and control devices:

- a) Lockout Relay with at least 8 Change Over contacts or 8NO+8NC contacts rated to carry circuit breaker tripping coil currents of up to 10 Amperes (F86/F94).
- b) HV Overcurrent and Earth Fault Relay (50/51HV)
- c) Three winding Transformer Differential Protection Relay (87T)
- d) HV side Restricted Earth Fault Protection Relay (REF) or Circulating Current Protection– 87HC
- e) HV side Stand By Earth Fault Protection Relay (SBEF) -51G
- f) Annunciator Relay with at least 16 windows -30T
- g) MV side Overcurrent and Earth Fault Protection – 50/51MV
- h) MV side Stand By Earth Fault Protection Relay (SBEF) -51G
- i) Transformer mechanical protection auxiliary relays for PRD, BS, OLTC BS, OTT, WTT, OTA, WTA, BGA, Oil Level Low, etc.
- j) Tertiary Voltage (TV) side Overcurrent and Earth Fault Protection – 50/51TV
- k) TV side Restricted Earth Fault Protection Relay (REF) – 50NET
- l) TV side StandBy Earth Fault Protection Relay (SBEF) -51NET
- m) Measurement Centre (Unit) for the MV side of the transformer

Issued by: Head of Section, Standards Development

Authorized by: Head of Department, Standards

Signed:

Signed:

Date: 2020-08-03

Date: 2020-08-03



TITLE:
COMPLETE PROTECTION AND CONTROL PANELS FOR POWER TRANSFORMERS AND TRANSMISSION / SUBTRANSMISSION LINES - SPECIFICATION

Doc. No.	KP1/6C/4/1/TSP/11/118
Issue No.	1
Revision No.	0
Date of Issue	2020-08-03
Page 18 of 51	

- n) Digital Programmable 3P4W Transducer for the MV, HV and TV side.
- o) Energy Meter 3P4W class 0.5 on the MV side
- p) Bay Control Unit (BCU) either stand alone or part of one of the protection devices preferably the Overcurrent and Earth fault Relay.
- q) Indication lamp and Reset Push Button for the Lockout relay.
- r) IEC61850 communication facility within the panel and out from the panel to RTU.
- s) DC supply supervision for the panel.

4.4.3. Transmission Line Protection Panels (220kV)

These panels shall have the following protection and control devices:

- a) Main 1 Protection: Line Current Differential Relay (87 L) with Distance/Auto Reclose Backup protection (21/79) on separate panel than the Main 2.
- b) Main 2 Protection: Distance/Auto Reclose Protection Relay (21/79).
- c) Back up Protection: Three Phase Overcurrent and Earth Fault Relay (50/51,50N/51N)
- d) 3P4W input Programmable Digital Transducer for the Line Bay.
- e) 3P4W Energy Meter class 0.5 capable of being interfaced to the SCADA system.
- f) Auto Reclose function to be embedded in Line Protection relays mentioned above.
- g) Main 1 and Main 2 Line Protection relays must be from different manufacturers to offer redundancy in Line Protection in case of Internal Relay Failure (IRF).
- h) Auto Reclose selector switches shall be provided for Single Phase, Two Phase, and Three phase Auto Reclose modes.
- i) Self-Resetting High Speed Tripping Relay (94), which operates when critical protection functions operate.
- j) Permissive Sends Receives (PSR), and Direct Transfer Trip (DTT) sends/receives shall be alarmed. This alarm signal shall have provision for acknowledge, mute and reset.
- k) Transmission Line equipment monitoring e.g. Circuit Breaker, Earth Switch, Line Disconnecter, shall be implemented in the Distance Protection Relay and BCU.
- l) For the 220kV rated Transmission Line bay substation equipment layout shall be composed of a Disconnecter each connected to main and reserve busbar followed by a Circuit Breaker and a

Issued by: Head of Section, Standards Development

Authorized by: Head of Department, Standards

Signed:

Signed:

Date: 2020-08-03

Date: 2020-08-03



TITLE:
COMPLETE PROTECTION AND CONTROL PANELS FOR POWER TRANSFORMERS AND TRANSMISSION / SUBTRANSMISSION LINES - SPECIFICATION

Doc. No.	KP1/6C/4/1/TSP/11/118
Issue No.	1
Revision No.	0
Date of Issue	2020-08-03
Page 19 of 51	

Line Disconnecter with Earth switch. The mimic diagram shall correspond to this layout with appropriate colours for the equipment controlling the Transmission Line bay as per clause 4.2.17.

4.4.4. Transmission Line Protection Panels (132kV)

These panels shall have the following protection and control devices:

- a) Main Protection: Line Current Differential Relay (87L).
- b) Back-up Protection: Distance/ Auto Reclose Relay (21/79).
- c) Back-up Protection: Three Phase Overcurrent and Earth Fault Relay (50/51/50N/51N)
- d) 3P4W input Programmable Digital Transducer for the Line Bay.
- e) 3P4W Energy Meter class 0.5 capable of being interfaced to the SCADA system.
- f) Permissive Send Receives (PSR), and Direct Transfer Trip (DTT) sends/receives shall be alarmed. This alarm signal shall have provision for acknowledge, mute and reset.
- g) Auto Reclose function to be embedded in main and backup Protection Relays above.
- h) Self-Resetting High Speed Tripping Relay (94), which operates when critical protection functions operate.
- i) Bay Control Unit (BCU) with Three Phase Overcurrent and Earth fault, Synchro check and Auto Reclose protection functions.
- j) Trip Circuit Supervision (95) for all Circuit Breakers controlling the Line. These can either be stand alone or integrated on one of the Protection Relays.
- k) Discrepancy Control Switches for all Circuit Breakers and Motorized Disconnectors controlling the Transmission Power Line.
- l) Selector Switches shall provide for enabling Auto-Reclosing and Local/Remote/SCADA modes of operations.
- m) Semaphores for all Earth Switches and non-motorized switches.
- n) Transmission Line equipment monitoring e.g. Circuit Breaker, Earth Switch, Line Disconnecter, shall be implemented in the Distance Protection Relay and BCU.
- o) Multi-Functional Power meters for the Line measurands.

4.4.5. Sub-Transmission Line Protection and Control Panels (66kV and 33kV)

These panels shall have the following Protection and Control devices:

- a) Main Protection: Distance Protection Relay with Auto Reclose function (21/79).
- b) Backup Protection: Three Phase Overcurrent and Earth Fault Relay (50/51/50N/51N).

Issued by: Head of Section, Standards Development	Authorized by: Head of Department, Standards
Signed:	Signed:
Date: 2020-08-03	Date: 2020-08-03



TITLE:
COMPLETE PROTECTION AND CONTROL PANELS FOR POWER TRANSFORMERS AND TRANSMISSION / SUBTRANSMISSION LINES - SPECIFICATION

Doc. No.	KP1/6C/4/1/TSP/11/118
Issue No.	1
Revision No.	0
Date of Issue	2020-08-03
Page 20 of 51	

- c) Annunciator Relay (30) with at least 16 windows. Annunciator shall also have reset push buttons for resetting Lock Out Relay and Protection Relays.
- d) 3P4W input Programmable Digital Transducer.
- e) 3P4W Energy Meter class 0.5 capable of being interfaced to the SCADA system.
- f) Bay Control Unit (BCU) with Three Phase Overcurrent and Earth fault Relay, Synchro check and Auto Reclose protection functions.
- g) Self-Resetting High Speed Tripping Relay (94), which operates when critical protection functions operate.
- h) Trip Circuit Supervision (95) for all Circuit Breakers controlling the Line. These can either be stand alone or integrated on one of the protection relays.
- i) Discrepancy Control Switches for all Circuit Breakers and Motorized Disconnectors controlling the Sub Transmission Power Line Bay.
- j) Transmission Line equipment monitoring e.g. Circuit Breaker, Earth Switch, Line Disconnector, shall be implemented in the Distance Protection Relay and BCU.
- k) Semaphores for all Earth Switches and non-motorized switches.
- l) The 66kV rated Sub Transmission Line bay substation equipment layout shall be composed of a Disconnector each connected to main and reserve Busbar followed by a Circuit Breaker and a Line Disconnector with Earth Switch. The mimic diagram shall correspond to this layout with appropriate colours for the equipment controlling the Sub-Transmission Line bay as per clause 4.2.17.
- m) The 33kV sub transmission line bay shall have a single busbar configuration; composed of a Disconnector connected to the single busbar followed by a Circuit Breaker and a Line Disconnector with Earth Switch.
- n) Multi-Functional Power meters for the Line measurands.
- o) Selector switches shall provide for enabling Auto Reclosing and Local/Remote/SCADA modes of operations.

4.4.6. Metering Bay Protection and Control Panels (132kV, 66kV and 33kV)

These panels shall have the following protection and control devices:

- a) Three Phase Overcurrent and Earth Fault Protection Relay with an integrated BCU. (50/51/50N/51N).
- b) Trip Circuit Supervision (TCS) Relay (95) for the Circuit Breaker Trip circuits controlling the metering bay. TCS can be either stand-alone or integrated on the Protection Relay.

Issued by: Head of Section, Standards Development	Authorized by: Head of Department, Standards
Signed:	Signed:
Date: 2020-08-03	Date: 2020-08-03



TITLE:
COMPLETE PROTECTION AND CONTROL PANELS FOR POWER TRANSFORMERS AND TRANSMISSION / SUBTRANSMISSION LINES - SPECIFICATION

Doc. No.	KP1/6C/4/1/TSP/11/118
Issue No.	1
Revision No.	0
Date of Issue	2020-08-03
Page 21 of 51	

- c) Annunciator Relay (30) with 16 windows. Annunciator shall also have reset push buttons for resetting Lock Out Relay and Protection Relay.
- d) High Speed Lockout Relay (86) with NO and NC output contacts.
- e) Discrepancy Control Switches for all Circuit Breakers and Motorized Disconnectors controlling the Line.
- f) Semaphores for all Earth Switches and non-motorized switches.
- g) 3P4W input Programmable Digital Transducer.
- h) 3P4W Energy Meter class 0.5 capable of being interfaced to the SCADA system.
- i) Selector Switches shall provide for enabling Local/Remote/SCADA modes of operations.
- j) Metering Bay equipment monitoring for the Circuit Breaker, Earth Switch, Line Disconnecter and Earth Switch to be implemented in the BCU.
- k) Multi-Functional Power meters for the Line measurands.
- l) The Metering bays shall have a single busbar configuration; composed of a Disconnecter connected to the single Busbar followed by a Circuit Breaker and a Load Disconnecter. The mimic diagram shall correspond to this layout with appropriate colours for the equipment controlling the Metering bay as per clause 4.2.17

4.4.7. 220kV and 132kV Control panels

These panels shall have the following protection and control devices:

- a) Annunciator Relay (30) with 36 windows. Annunciator shall also have reset push buttons for resetting Lock Out Relay and Protection Relay.
- b) Bay Control Unit (BCU) with Three Phase Overcurrent and Earth fault, Reclosing and Synchro check protection functions.
- c) Multi-Functional Power meters for the HV circuit.
- d) 3P4W input Programmable Digital Transducer.
- e) Discrepancy Control Switches for all Circuit Breakers and Motorized Disconnections controlling the transformer.
- f) Semaphores for all Earth Switches and non-motorized switches.
- g) Suitable Auxiliary Relay for SCADA interface and Circuit Breakers monitoring.
- h) Selector Switches shall provide for enabling auto reclosing and Local/SCADA modes of operations.
- i) The 220 and 132kV rated Transmission Line bay substation equipment layout shall be composed of a Disconnecter connected to main and reserve Busbar followed by a Circuit Breaker and a

Issued by: Head of Section, Standards Development	Authorized by: Head of Department, Standards
Signed:	Signed:
Date: 2020-08-03	Date: 2020-08-03



TITLE:
COMPLETE PROTECTION AND CONTROL PANELS FOR POWER TRANSFORMERS AND TRANSMISSION / SUBTRANSMISSION LINES - SPECIFICATION

Doc. No.	KP1/6C/4/1/TSP/11/118
Issue No.	1
Revision No.	0
Date of Issue	2020-08-03
Page 22 of 51	

Line Disconnecter with Earth Switch. The mimic diagram shall correspond to this layout with appropriate colours for the equipment controlling the Transmission Line as per clause 4.2.17.

4.5. DETAILED SPECIFICATIONS FOR PROTECTION RELAYS, INSTRUMENTS AND CONTROL DEVICES

The specific requirements for the Protection Relays, Instruments and Control Devices to be used in each category of Section 4.4 above are contained in the "Protective Relays, Control Devices and Instruments – Specification" reference KP1/6C/4/1/TSP/13/001. Bidders are required to fill in the Guaranteed Technical Particulars (GTPs) contained in the above specification together with the GTP contained in this specification for evaluation purposes.

4.6. PROGRAMMABLE DIGITAL TRANSDUCER

- 4.6.1. Accuracy: Class 0.2, Class 0.5
- 4.6.2. Frequency: 50Hz
- 4.6.3. Nominal Measuring Voltage (Secondary): 110VAC 3 phase 4wire
- 4.6.4. Nominal Measuring Current (Secondary): 1-5A
- 4.6.5. Transducer Supply Voltage: 40V - 250VDC
- 4.6.6. Communication Ports:
 - a) Serial USB: USB Mini B connector, Modbus RTU, 38400(Baud) or
 - b) Serial RS485 : 3 Terminal screws \leq 6mm², Modbus RTU, 1200-38400(Baud)
- 4.6.7. Number of Digital outputs: 2
- 4.6.8. Number of Analog Outputs (V, I, P, Q): 4
- 4.6.9. Type of Analog outputs: Current/Voltage Bi-Polar
- 4.6.10. Analog output Maximum Voltage (open output): +/- 20V
- 4.6.11. Analog output Load Current output: +/-20mA, +/-5mA, +/-2mA
- 4.6.12. Protection Housing: IP40
- 4.6.13. Terminals: IP 20
- 4.6.14. Suitable for DIN rail mounting
- 4.6.15. Programming kit consisting of software and communication cable.

4.7. MULTIFUNCTIONAL POWER METER/ MEASUREMENT CENTERS, DIRECTLY CONNECTED

Multifunctional Power Meter to be implemented in the schemes above shall meet requirements of clause 4.4.16 of Specification KP1/6C/4/1/TSP/13/001 dated 2019-06-07

Issued by: Head of Section, Standards Development	Authorized by: Head of Department, Standards
Signed:	Signed:
Date: 2020-08-03	Date: 2020-08-03



TITLE:
**COMPLETE PROTECTION AND
CONTROL PANELS FOR POWER
TRANSFORMERS AND
TRANSMISSION /
SUBTRANSMISSION LINES -
SPECIFICATION**

Doc. No.	KP1/6C/4/1/TSP/11/118
Issue No.	1
Revision No.	0
Date of Issue	2020-08-03
Page 23 of 51	

4.8. TRIPLE POLE MINIATURE CIRCUIT BREAKERS FOR VT SECONDARY CIRCUIT

- 4.8.1. Shall be Triple Pole with Auxiliary contacts.
- 4.8.2. Auxiliary contacts shall be 1 NC and 1 NO contact.
- 4.8.3. Shall have a rated operating voltage rating of 110V AC.
- 4.8.4. Rated Insulation voltage shall be 600V AC.
- 4.8.5. Rated Current shall be 4 A.
- 4.8.6. Characteristic Operating Curve shall be the type 'C' curve.
- 4.8.7. Rated frequency shall be 50 Hz.
- 4.8.8. Setting value of thermally delayed Overload release shall be 4 A.
- 4.8.9. Terminals suitable for connection of at least 2.5 mm² stranded copper conductor.

4.9. DOUBLE POLE DC MINIATURE CIRCUIT BREAKERS

- 4.9.1 Shall be Double Pole DC type MCB's with Auxiliary contacts.
- 4.9.2 Auxiliary contacts shall be 1 NC and 1 NO contact.
- 4.9.3 Shall have a rated operating voltage rating of 110VDC.
- 4.9.4 Characteristic Operating Curve shall be the 'C' curve.
- 4.9.5 Setting value of thermally delayed Overload release shall be 4A.
- 4.9.6 Terminals suitable for connection of at least 2.5 mm² stranded copper conductor.
- 4.9.7 Rated Insulation voltage shall be 600VAC

4.10. SINGLE POLE AC MINIATURE CIRCUIT BREAKERS

- 4.10.1 Shall be single Pole AC type MCB's with Auxiliary contacts.
- 4.10.2 Auxiliary contacts shall be 1 NC and 1 NO contact.
- 4.10.3 Shall have a rated operating voltage rating of 230VAC.
- 4.10.4 Characteristic Operating Curve shall be the 'C' curve.
- 4.10.5 Rated frequency shall be 50 Hz.
- 4.10.6 Setting value of thermally delayed Overload release shall be 4A.
- 4.10.7 Terminals suitable for connection of at least 2.5 mm² stranded copper conductor

Issued by: Head of Section, Standards Development

Authorized by: Head of Department, Standards

Signed:

Signed:

Date: 2020-08-03

Date: 2020-08-03



TITLE:
COMPLETE PROTECTION AND CONTROL PANELS FOR POWER TRANSFORMERS AND TRANSMISSION / SUBTRANSMISSION LINES - SPECIFICATION

Doc. No.	KP1/6C/4/1/TSP/11/118
Issue No.	1
Revision No.	0
Date of Issue	2020-08-03
Page 24 of 51	

4.11. HOOTER

- 4.11.1. The actuator system shall consist of a strong, non-polarized electromagnet with an impact resistant sturdy casing.
- 4.11.2. Rated voltage shall be 110VDC; +6/-10 %
- 4.11.3. Protection degree shall be IP 55.
- 4.11.4. Operating mode shall be continuous with a pushbutton facility for acknowledge, mute and reset.
- 4.11.5. Volume approximately 100 dB to 120dB.
- 4.11.6. Connection terminals for termination of 2.5 mm² stranded copper cable.

4.12. ANTI-CONDENSATION HEATER

- 4.12.1. The heater shall be suitable for mounting inside the protection or control panels with Protection Relays and other measuring and control devices.
- 4.12.2. The heater shall be of a type and mounted in such a way that it does not interfere with operation of the equipment and will not cause damage to the cables or any other item in the panel.
- 4.12.3. The heater shall be rated at 20W and 230V AC and shall be suitable for preventing condensation within the panels which have dimensions of (2200x800x650) mm (HxWxD).
- 4.12.4. The heater shall have terminals suitable for connection of 2.5 mm² conductor.
- 4.12.5. The heater shall be suitable for mounting on a DIN rail inside the panel.

4.13. DC SUPPLY UNDER VOLTAGE RELAY

- 4.13.1. Shall have a settable range for under voltage pick up, of 30-80% of the rated DC voltage
- 4.13.2. Shall be of electronic design
- 4.13.3. Shall have an accuracy of at least $\pm 4\%$
- 4.13.4. Shall be self-reset when the voltage returns to normal level
- 4.13.5. Shall have a built-in indication LED (green) and a built-in operation LED (red)
- 4.13.6. Shall have at least 2 NC auxiliary contacts (Contacts close for under voltage conditions)
- 4.13.7. The Relay shall be rated for continuous operation at the rated DC voltage.
- 4.13.8. Shall be suitable for mounting on DIN rail.

4.14. INDICATING LAMPS

LED Indicator Lamps utilized shall meet requirements of clause 4.4.15 of Specification reference KP1/6C/4/1/TSP/13/001 dated 2019-06-07

Issued by: Head of Section, Standards Development

Authorized by: Head of Department, Standards

Signed:

Signed:

Date: 2020-08-03

Date: 2020-08-03



TITLE:
COMPLETE PROTECTION AND CONTROL PANELS FOR POWER TRANSFORMERS AND TRANSMISSION / SUBTRANSMISSION LINES - SPECIFICATION

Doc. No.	KP1/6C/4/1/TSP/11/118
Issue No.	1
Revision No.	0
Date of Issue	2020-08-03
Page 25 of 51	

4.15. RELAY PROGRAMMING SOFTWARE AND CONNECTION CABLES

- 4.15.1. The software shall be provided, in English, for programming and downloading data for all numerical relays supplied and also for any numerical instruments such as transducers provided.
- 4.15.2. It shall be possible to install the software to 10 different Computers without any additional License Cost.
- 4.15.3. The software User Guide, in English, shall also be supplied. The Numerical Relays shall be equipped with an RS232/USB Communication port to facilitate connection to a Laptop.
- 4.15.4. The relevant communication cable, between the Relay and the Laptop shall also be provided. Eight (8) cables shall be provided for each set of Relays using the same cable.
- 4.15.5. Two (2) communication cables shall be provided for each set of Transducers using the same connection cable.
- 4.15.6. Also communication facilities shall be provided on each Numerical Relay for Remote Interrogation and Programming of the Numerical Relays.
- 4.15.7. The Relays shall also have a HMI to facilitate manual Relay programming and Data access. Relay Operation due to system fault, shall be indicated by a Red LED and the fault details (flags) shall be displayed on the HMI.
- 4.15.8. Both the Relay Fault flags and Red LED shall be reset without opening the Relay Cover.

4.16. ACCESSORIES

- 4.16.1. All necessary accessories shall be supplied with each modular protection and control cubicle. The cubicle shall be ready to be powered with auxiliary supplies i.e. 110VDC and 230VAC along with external secondary protection and control wiring from the High Voltage Disconnectors, Circuit Breakers, Current Transformers, Voltage Transformers and Power Transformer Protection Devices, RTUs as described above.
- 4.16.2. 5 no. spare removable modular plates of each size shall be provided with the final delivery of manufactured modular completely wired panels.

5. TESTS REQUIREMENTS

The Complete Protection and Control Panels shall be inspected and tested in accordance with the requirements of the applicable IEC standards and this specification. Testing requirements shall be as described in Appendix A of this specification.

Issued by: Head of Section, Standards Development

Authorized by: Head of Department, Standards

Signed:

Signed:

Date: 2020-08-03

Date: 2020-08-03



TITLE:
COMPLETE PROTECTION AND
CONTROL PANELS FOR POWER
TRANSFORMERS AND
TRANSMISSION /
SUBTRANSMISSION LINES -
SPECIFICATION

Doc. No.	KP1/6C/4/1/TSP/11/118
Issue No.	1
Revision No.	0
Date of Issue	2020-08-03
Page 26 of 51	

6. MARKING AND PACKING

6.1. Marking

The following information shall be marked legibly and indelibly on the panels and on packing material;

- a) The Manufacturer's name and identification mark.
- b) The Type and Rating of panel.
- c) The Year of manufacture.
- d) The Gross weight and net weight, in kilograms.
- e) The instructions for handling and use (in English language).
- f) Serial number.
- g) The words "**Property of The Kenya Power and Lighting Co. Plc.**"

6.2. Packaging

6.2.1 Each Complete Protection & Control panel shall be packed in single units properly preferably in wooden crates and protected from internal damage during transportation and at storage.

6.2.2 Packing lists and assembly instructions shall be provided for all deliveries.

7. WARRANTY

The manufacturer shall offer a warranty of 60 months from the date of delivery of the complete Protection and Control panels to KPLC store.

Issued by: Head of Section, Standards Development

Authorized by: Head of Department, Standards

Signed:

Signed:

Date: 2020-08-03

Date: 2020-08-03



TITLE:
COMPLETE PROTECTION AND CONTROL PANELS FOR POWER TRANSFORMERS AND TRANSMISSION / SUBTRANSMISSION LINES - SPECIFICATION

Doc. No.	KP1/6C/4/1/TSP/11/118
Issue No.	1
Revision No.	0
Date of Issue	2020-08-03
Page 27 of 51	

APPENDICES

A. TESTS AND INSPECTION (Normative)

- A.1 It shall be the responsibility of the manufacturer to perform or to have performed all the tests specified in the specification and in the manufacturing standards and other tests performed at the factory.
- A.2 Copies of previous Type Test Certificates and Type Test Reports issued by a third-party testing laboratory that is accredited to ISO/IEC 17025 shall be submitted with the tender for the purpose of technical evaluation. A copy of the accreditation certificate to ISO/IEC 17025 for the testing laboratory shall also be submitted. Any translations of certificates and test reports into English language shall be signed and stamped by the Testing Laboratory that carried out the tests.
- A.3 The panels shall be subject to acceptance tests at the manufacturer's premises/factory before dispatch. Acceptance tests shall be witnessed by two or more Engineers appointed by The Kenya Power and Lighting Company Plc (KPLC).
- A.4 Routine and sample test reports for the individual components and complete panels shall be submitted to KPLC for approval before shipment.
- A.5 On receipt of the tested complete panels, KPLC shall perform or have performed any of the tests specified in order to verify compliance with this specification. The supplier shall replace without charge to KPLC the panels, or parts thereof, which upon examination, test or use, fail to meet any of the requirements in the specification.

B. QUALITY MANAGEMENT SYSTEM (Normative)

- B.1 The bidder shall submit a quality assurance plan (QAP) that shall be used to ensure that the complete panel design, material, workmanship, tests, service capability, maintenance and documentation, shall 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
- B.2 The Manufacturer's Declaration of Conformity to applicable standards and copies of quality management certifications including copy of valid and relevant ISO 9001:2015 certificate shall be submitted with the tender for evaluation.
- B.3 The bidder shall indicate the delivery time of panels, manufacturer's monthly and annual production capacity and experience in the production of the type of panels being offered. A detailed list and contact addresses (including e-mail) of the manufacturer's previous customers outside the country of manufacture for exact or similar panels sold in the last five years shall be submitted with the tender for evaluation.

Issued by: Head of Section, Standards Development

Authorized by: Head of Department, Standards

Signed:

Signed:

Date: 2020-08-03

Date: 2020-08-03



TITLE:
COMPLETE PROTECTION AND CONTROL PANELS FOR POWER TRANSFORMERS AND TRANSMISSION / SUBTRANSMISSION LINES - SPECIFICATION

Doc. No.	KP1/6C/4/1/TSP/11/118
Issue No.	1
Revision No.	0
Date of Issue	2020-08-03
Page 28 of 51	

C. DOCUMENTATION (Normative)

- C.1 The bidder shall submit its tender complete with technical documents required by Appendix D (Guaranteed Technical Particulars) for tender evaluation. The documents to be submitted (all in English language) for tender evaluation shall include the following:
- a) Fully filled clause by clause Guaranteed Technical Particulars (GTP) signed by the manufacturer.
 - b) Copies of the manufacturer's catalogues, brochures, drawings, wiring diagrams and technical data sheets with programming details and manuals.
 - c) Sales records for the last five years and at least four customer reference letters.
 - d) Details of manufacturing capacity and the manufacturer's experience.
 - e) Copies of required type test certificates and type test reports by a third-party testing laboratory accredited to ISO/IEC 17025,
 - f) Copy of accreditation certificate to ISO/IEC 17025 for the third-party testing laboratory,
 - g) Manufacturer's warranty and guarantee. Manufacturer's letter of authorization.
 - h) Marking, packaging details (including packaging materials) and safe storage information.
- C.2 The successful bidder (supplier) shall submit the following documents/details to KPLC for approval before manufacture:
- a) Fully filled clause by clause Guaranteed Technical Particulars (GTP) signed by the manufacturer (not the ones used for tendering).
 - b) Design drawings, test reports and technical details.
 - c) Operation manuals and brochures shall be submitted.
 - d) Quality assurance plan (QAP) that shall be used to ensure that the design, material, workmanship, tests, service capability, maintenance and documentation shall 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.
 - e) Detailed test program to be used during factory testing.
 - f) Marking details and method to be used in marking the items.
 - g) Packaging details.
 - h) Manufacturer's undertaking to ensure adequacy of the design, good engineering practice, adherence to the specification and applicable standards and regulations as well as ensuring good workmanship in the manufacture of the panels for The Kenya Power & Lighting Company Plc.

Issued by: Head of Section, Standards Development

Authorized by: Head of Department, Standards

Signed: 

Signed: 

Date: 2020-08-03

Date: 2020-08-03



TITLE:
COMPLETE PROTECTION AND CONTROL PANELS FOR POWER TRANSFORMERS AND TRANSMISSION / SUBTRANSMISSION LINES - SPECIFICATION

Doc. No.	KP1/6C/4/1/TSP/11/118
Issue No.	1
Revision No.	0
Date of Issue	2020-08-03
Page 29 of 51	

C.3 The supplier shall submit recommendations for use, care, storage and routine inspection/ testing procedures, all in the English language, during delivery of the panels to KPLC stores.

----- SPACE LEFT BLANK -----

Issued by: Head of Section, Standards Development

Authorized by: Head of Department, Standards

Signed: 

Signed: 

Date: 2020-08-03

Date: 2020-08-03



TITLE:
COMPLETE PROTECTION AND CONTROL PANELS FOR POWER TRANSFORMERS AND TRANSMISSION / SUBTRANSMISSION LINES - SPECIFICATION

Doc. No.	KP1/6C/4/1/TSP/11/118
Issue No.	1
Revision No.	0
Date of Issue	2020-08-03
Page 30 of 51	

D. GUARANTEED TECHNICAL PARTICULARS (Normative)

(To be filled, stamped and signed by the Manufacturer and submitted together with relevant copies of the Manufacturer's catalogues, brochures, drawings, technical data, sales records for previous five years, four customer reference letters, details of suppliers' capacity and experience; and copies of complete type test certificates and test reports for tender evaluation or approval, all in English Language)

Tender No.

Bidder's name and Address.....

Clause	Description	KPLC Requirement	Manufacturer's/supplier offer
1	Manufacturer's name	State	
	Manufacturer's letter of Authorization.	Provide a copy	
	Description of item on offer	Specify	
	Type or designation	State	
2	Scope	State	
3	Reference standards	State	
4	Requirements		
4.1	Service conditions	Specify	
4.2	Protection and control panels general requirements		
4.2.1	Panel dimensions (HxWxD)	2100mmx800mmx650mm	
4.2.2	Protection class	IP 42	
4.2.3	Material of sheets	CRCA steel 2.0mm thick	
4.2.4	Paint primer and second layer	Universal grey based on acrylic resin	
4.2.5	Powder Paint finish coat	RAL 7032 based on polyurethane	
4.2.6	Paint thickness	At least 80 microns	
4.2.7	Front door	Has 4mm thick transparent safety glass which covers 80-90% of face	
	Glass type	Transparent glazed glass	
	IP class of door frame to safety glass	IP 65	
	Hinges	3 to 4 right hand hinges	
	Door lock position	Left hand mid position	
	Key type	Double bit key	
4.2.8	Inner door	Has hinges on the left	

Issued by: Head of Section, Standards Development

Authorized by: Head of Department, Standards

Signed:

Signed:

Date: 2020-08-03

Date: 2020-08-03



TITLE:
COMPLETE PROTECTION AND CONTROL PANELS FOR POWER TRANSFORMERS AND TRANSMISSION / SUBTRANSMISSION LINES - SPECIFICATION

Doc. No.	KP1/6C/4/1/TSP/11/118
Issue No.	1
Revision No.	0
Date of Issue	2020-08-03
Page 31 of 51	

Clause	Description	KPLC Requirement	Manufacturer's/ supplier offer
	Dimensions of rack modular plates	2 millimeter x 19 inch Height shall be sufficient to accommodate flush mounting of relays, instrument or control device	
	Door lock position	Right hand mid position	
	Key type	Double bit key	
	Clearance between the front and inner door	Allow sufficient clearance between the doors for smooth opening.	
4.2.9	Rear door	Has hinges on the left-hand side	
	Door lock position	Right hand mid position	
	Key type	Double bit key	
4.2.10	Locking devices locking position	Shall lock both top and bottom	
	Locking devices material of manufacture	Brass with strong mechanical strength	
	Double bit keys material of manufacture	Stainless steel with strong mechanical strength	
4.2.11	Rear door design and dimensions	Same size as front door with full plate and no transparent glass	
4.2.12	Ventilation on rear door	Shall have two vents at top and at bottom Vents fitted with gauze wire to provide air circulation and ensure panel is both vermin and dust proof	
4.2.13	Space heater/ anti condensation heater	Rated 100W Controlled by hygrostat Mounted at bottom near gland plate	
4.2.14	Internal lighting	Mounted inside at panel ceiling top Controlled by a durable door switch The lamp shall be an 11-watt LED lamp with bayonet bottom.	
4.2.15	Earthing bar	Mounted at bottom inside near gland plate Runs full width of panel Fitted with terminal blocks Terminal blocks suitable for 1.5mm ² up to 10mm ²	

Issued by: Head of Section, Standards Development

Authorized by: Head of Department, Standards

Signed:

Signed:

Date: 2020-08-03

Date: 2020-08-03



TITLE:
COMPLETE PROTECTION AND CONTROL PANELS FOR POWER TRANSFORMERS AND TRANSMISSION / SUBTRANSMISSION LINES - SPECIFICATION

Doc. No. KP1/6C/4/1/TSP/11/118
Issue No. 1
Revision No. 0
Date of Issue 2020-08-03
Page 32 of 51

Clause	Description	KPLC Requirement	Manufacturer's/supplier offer
		High quality copper mechanical lugs with shear off bolts for 50mm ²	
4.2.16	Lifting eye bolts or hooks	Made of brass	
		Mounted at diagonals of panel top	
		Can withstand weight of complete panel.	
		Inner diameter of eyebolt shall be 35mm, outer diameter 65mm	
4.2.17	Mimic diagram	Voltage level and Colour	
		Mounted on front plate	
		Dimensions - 8mm thick by 800mm length	
		Adhesive lifespan - 30 years	
4.2.18	Labels/ nameplates	Fixed on both sides of inner modular plate door	
		Each device shall have a nameplate	
		Nameplate shall be at front atop each relay/device and in panel interior	
		Dimensions - 15mm H x 60mm L	
		Font type - capital Arial font	
		Text engraved on black plastic background	
		Text colour - white	
	Panel header label	Dimensions - 30mm by 300mm	
4.2.19	PVC cable racks and Terminal blocks	Mounted on panel sides or back plate	
	Bundles of cable	Secured in flex shroud	
	Vertical cable racks	One placed either side of vertical terminal block rail	
	Mechanical strength and size	Shall accommodate all control wiring	
		Shall not bulge	
4.2.20	Terminal blocks design	Shall be PVC insulated	
		Mounted on DIN rails	
		Shall take upto 6mm ² stranded copper cables	
		CT and VT Terminal blocks of sliding type	

Issued by: Head of Section, Standards Development

Authorized by: Head of Department, Standards

Signed:

Signed:

Date: 2020-08-03

Date: 2020-08-03



TITLE:
COMPLETE PROTECTION AND CONTROL PANELS FOR POWER TRANSFORMERS AND TRANSMISSION / SUBTRANSMISSION LINES - SPECIFICATION

Doc. No. KP1/6C/4/1/TSP/11/118
Issue No. 1
Revision No. 0
Date of Issue 2020-08-03
Page 33 of 51

Clause	Description	KPLC Requirement	Manufacturer's/ supplier offer
		Terminal blocks of CTs to have shorting facility	
4.2.21	Terminal blocks labeling	Number labels that won't fall off Black numbers on white labels Numbers indelibly marked	
4.2.22	Socket outlet	A 230VAC two gang British standard socket outlet	
4.2.23	DC MCBs	Ratings for DC and AC MCBs	
		Have auxiliary contacts INO/NC	
		One spare MCB	
		Curve characteristic - type C	
4.2.23	AC MCBs	Ratings for AC MCBs	
		Have auxiliary contacts INO/NC	
		One spare MCB	
		Curve characteristic - type C	
4.2.24	VT secondary circuit protection	Type C MCB to be provided	
		MCB with auxiliary contacts INO/NC	
		Ratings - 2 or 4 Amps	
4.2.25	Gland plates	Two detachable ones for each panel	
		Fitted 150mm above ground level at end of skirting frame	
		Dimensions - 600mm length x 250mm width x 3mm thickness	
4.2.26	Circular Holes on gland plates	At least 5x32mm ²	
		At least 6x25mm ²	
		At least 7x20mm ²	
		Holes fitted with removable plastic covers	
4.2.27	Synchro-check/ Override facility	Provide for 66kV to 220kV	
4.2.28	DC supply rating for Protection devices	Rating – 24VDC to 250VDC	
4.2.29	Panel wiring	Grey 2.5mm ² stranded copper cable	
		Spare Protection Relay BI/BO, spare local/remote switch contacts, spare Discrepancy Control switch contacts and	

Issued by: Head of Section, Standards Development

Authorized by: Head of Department, Standards

Signed:

Signed:

Date: 2020-08-03

Date: 2020-08-03



TITLE:
COMPLETE PROTECTION AND CONTROL PANELS FOR POWER TRANSFORMERS AND TRANSMISSION / SUBTRANSMISSION LINES - SPECIFICATION

Doc. No. KP1/6C/4/1/TSP/11/118
Issue No. 1
Revision No. 0
Date of Issue 2020-08-03
Page 34 of 51

Clause	Description	KPLC Requirement	Manufacturer's/supplier offer	
		Semaphore switch contacts shall be wired to spare Protection panel Terminal Blocks		
4.2.30	Termination	2.5mm ² pin, spade or ring lugs where appropriate		
4.2.31	Ferruling	Adopts British standard		
		VT secondary voltage - 'E'		
		Overcurrent - 'C'		
		Metering - 'D'		
		Differential and distance protection - 'A'		
		DC supply - 'J'		
		DC control circuits - 'K'		
		Indication & alarm circuits - 'L'		
		230VAC supplies - 'H'		
			Prefix letters followed by numbers	D10 - Red metering D30 - Yellow phase metering D50 - Blue phase metering D70 - Star point metering
4.2.32	Copies of schematic design drawings	Hardcopy and softcopy -3 copies		
4.2.33	Drawing approvals	Provide design drawings for components, panel cut-out, wiring and whole assembly for approval		
4.2.34	Software for relays/devices	Provide original software with its license		
4.2.35	Communication cables	Provide eight (8) communication cables for programming		
4.2.36	Relay default configuration	Can be used or modified without special skills or tools		
		Bay control unit relays configuration	Configured with default mimic diagram	
			Objects linked to binary inputs and binary outputs	
			66kV- double bus bar mimic diagram	
			220kV and 132kV – breaker and a half mimic	
			33kV and 11kV- single bus bar mimic	
One disconnector on either side of a breaker and an earth switch towards line or protected device for each mimic				

Issued by: Head of Section, Standards Development

Authorized by: Head of Department, Standards

Signed:

Signed:

Date: 2020-08-03

Date: 2020-08-03



TITLE:
COMPLETE PROTECTION AND CONTROL PANELS FOR POWER TRANSFORMERS AND TRANSMISSION / SUBTRANSMISSION LINES - SPECIFICATION

Doc. No. KPI/6C/4/1/TSP/11/118
Issue No. 1
Revision No. 0
Date of Issue 2020-08-03
Page 35 of 51

Clause	Description	KPLC Requirement	Manufacturer's/ supplier offer
		Provide at least 7 no spare binary inputs/ binary outputs	
4.2.37	Mounting	Done on removable modular plates	
4.3	Protection relay and control device general specifications		
4.3.1	Compliance	All relays shall be IEC 61850 compliant and KPLC specification KPI/6C/4/1/TSP/13/001	
	Integration into SCADA system	Panel wiring shall allow easy integration to substation SCADA system and RTU	
4.3.2	Main scheme protection	Shall be standalone, not embedded in BCU	
4.3.3	Components/characteristics of BCU	3 phase overcurrent and earth fault protection	
		Auto reclose and synchro check protection	
		Configured to send commands to selected objects in the preconfigured mimic diagrams	
		Provide information on the status of the substation Bay equipment	
4.3.4	Protection devices power rating	24VDC to 240VDC	
4.3.5	Multi-functional Power Meter	Displays voltage, current, active power, reactive power, power factor, frequency, energy per phase	
		The CTR and VTR shall be programmable on HMI	
		Accuracy class shall be 0.5	
		Powered through 110VDC	
4.3.6	Digital Programmable Transducers	Have mA outputs for P, Q, I, V	
		Are 3P4W connected	
		Wired to terminal blocks to be SCADA ready	
4.3.7	Energy meters	Shall be ready for Automatic Meter Reading (AMR) infrastructure	
		Provide as per "Current and potential transformer connected meters – specification" reference KPI/6C/4/1/TSP/14/020 dated 2017-12-15.	
		Class 0.5	

Issued by: Head of Section, Standards Development

Authorized by: Head of Department, Standards

Signed:

Signed:

Date: 2020-08-03

Date: 2020-08-03



Kenya Power

TITLE:
COMPLETE PROTECTION AND CONTROL PANELS FOR POWER TRANSFORMERS AND TRANSMISSION / SUBTRANSMISSION LINES - SPECIFICATION

Doc. No.	KP1/6C/4/1/TSP/11/118
Issue No.	1
Revision No.	0
Date of Issue	2020-08-03
Page 36 of 51	

Clause	Description	KPLC Requirement	Manufacturer's/ supplier offer
		Configuration – 3P4W	
		VTR and CTR fully programmable	
4.3.8	Switches and semaphores	Used to achieve excellent functional control and indication schemes	
		DC Voltage Rating	
		The functional control achieved by the control switches shall be in addition to the functional control offered from the BCUs	
4.3.9	DC MCBs	DC supply supervision shall be provided for each category	
		A Hooter shall be wired and configured to provide audible alarm in case of DC loss/failure	
4.4	Types of protection and control panels		
4.4.1	7.5MVA, 23MVA and 45MVA, Power Transformer protection and control panel components	a) Two winding power transformer differential protection relay (87T) with over fluxing function	
		b) LV Restricted Earth fault protection relay (64N)	
		c) Three Phase Overcurrent and Earth Fault Relay (50/51HV, 50N/51N)	
		d) Stand By Earth Fault Protection Relay(51G)	
		e) Annunciator Relay (30) with 36 windows. Annunciator shall also have reset push buttons for resetting Lock Out Relay and Protection Relay	
		f) Multi-Functional Power meters for the HV and LV side of the Power Transformer	
		g) Digital Programmable Transducers for HV and LV side	
		h) 3P4W Energy Meter class 0.5 capable of being interfaced to the SCADA system.	
		i) Bay Control Units to be provided and implemented in this panel as a Low Voltage side Three phase Overcurrent and Earth fault.	

Issued by: Head of Section, Standards Development

Authorized by: Head of Department, Standards

Signed:

Signed:

Date: 2020-08-03

Date: 2020-08-03



TITLE:
COMPLETE PROTECTION AND CONTROL PANELS FOR POWER TRANSFORMERS AND TRANSMISSION / SUBTRANSMISSION LINES - SPECIFICATION

Doc. No. KP1/6C/4/1/TSP/11/118
Issue No. 1
Revision No. 0
Date of Issue 2020-08-03
Page 37 of 51

Clause	Description	KPLC Requirement	Manufacturer's/ supplier offer
		j) Discrepancy control switches and motorized disconnectors	
		k) Semaphores for all Earth Switches and non-motorized switches. Mimic diagram	
		l) Auxiliary relay	
		m) Lockout/latching relay (86) with electrical reset	
		n) Indication lamp/LED and Reset Push Button for the Lockout relay	
		o) Selector switches shall be provided for enabling Local/Remote/SCADA modes of operations IEC61850 communication facility DC supply supervision for the panel	
		p) Trip circuit supervision relay (95)	
		q) Guideline for 33/11kV substations Transformer bay substation equipment layout	
		r) Guideline for 66/11kV substations Transformer bay substation equipment layout	
4.4.2	Transmission range transformer protection panels	a) Lockout Relay with at least 8 Change Over contacts or 8NO+8NC contacts rated to carry circuit breaker tripping coil currents of up to 10 Amperes (F86/F94). b) HV Overcurrent and Earth Fault Relay (50/51HV) c) Three winding Transformer Differential Protection Relay (87T) d) HV side Restricted Earth Fault Protection Relay (REF) or Circulating Current Protection- 87HC e) HV side Stand By Earth Fault Protection Relay (SBEF) -51G f) Annunciator Relay with at least 16 windows -30T	

Issued by: Head of Section, Standards Development

Authorized by: Head of Department, Standards

Signed:

Signed:

Date: 2020-08-03

Date: 2020-08-03



Kenya Power

TITLE:
COMPLETE PROTECTION AND CONTROL PANELS FOR POWER TRANSFORMERS AND TRANSMISSION / SUBTRANSMISSION LINES - SPECIFICATION

Doc. No.	KP1/6C/4/1/TSP/11/118
Issue No.	1
Revision No.	0
Date of Issue	2020-08-03
Page 38 of 51	

Clause	Description	KPLC Requirement	Manufacturer's/supplier offer
		g) MV side Overcurrent and Earth Fault Protection – 50/51MV	
		h) MV side Stand By Earth Fault Protection Relay (SBEF) -51G	
		i) Transformer mechanical protection auxiliary relays for PRD, BS, OLTC BS, OTT, WTT, OTA, WTA, BGA, Oil Level Low, etc.	
		j) TV side Overcurrent and Earth Fault Protection – 50/51TV	
		k) TV side Restricted Earth Fault Protection Relay (REF) – 50NET	
		l) TV side StandBy Earth Fault Protection Relay (SBEF) -51NET	
		m) Measurement Centre (Unit) for the MV side of the transformer	
		n) Digital Programmable 3P4W Transducer for the MV, HV and TV side.	
		o) Energy Meter 3P4W class 0.50 on the MV side	
		p) Bay Control Unit (BCU) either stand alone or part of one of the protection devices preferably the Overcurrent and Earth fault Relay.	
		q) Indication lamp and Reset Push Button for the Lockout relay.	
		r) IEC61850 communication facility within the panel and out from the panel to RTU.	
		s) DC supply supervision for the panel.	
4.4.3	Transmission line protection panels – 220kV components	a) Line Current Differential Relay (87 L) with Distance/Auto Reclose Backup protection (21/79) on separate panel	
		b) Distance/Auto Reclose Protection Relay (21/79).	
		c) Three Phase Overcurrent and Earth Fault Relay (50/51,50N/51N)	

Issued by: Head of Section, Standards Development

Authorized by: Head of Department, Standards

Signed:

Signed:

Date: 2020-08-03

Date: 2020-08-03



TITLE:
COMPLETE PROTECTION AND CONTROL PANELS FOR POWER TRANSFORMERS AND TRANSMISSION / SUBTRANSMISSION LINES - SPECIFICATION

Doc. No. KP1/6C/4/1/TSP/11/118
Issue No. 1
Revision No. 0
Date of Issue 2020-08-03
Page 39 of 51

Clause	Description	KPLC Requirement	Manufacturer's/supplier offer
		d) 3P4W input Programmable Digital Transducer for the Line Bay.	
		e) 3P4W Energy Meter class 0.5 capable of being interfaced to the SCADA system.	
		f) Auto Reclose function to be embedded in Line Protection relays mentioned above.	
		g) Main 1 and Main 2 Line Protection relays must be from different manufacturers to offer redundancy in Line Protection in case of Internal Relay Failure (IRF).	
		h) Auto Reclose selector switches shall be provided for Single Phase, Two Phase, and 3 phase Auto Reclose modes.	
		i) Self-Resetting High Speed Tripping Relay (94), which operates when critical protection functions operate.	
		j) Permissive sends receive (PSR), and Direct Transfer Trip (DTT) sends/receives shall be alarmed. This alarm signal shall have provision for acknowledge, mute and reset.	
		k) Transmission Line equipment monitoring e.g. Circuit Breaker, Earth Switch, Line Disconnecter, to be implemented in the Distance Protection Relay and BCU.	
		l) Guideline for 220kV rated Transmission Line bay substation equipment layout	
		Mimic diagram	
		IEC61850 communication facility	

Issued by: Head of Section, Standards Development

Authorized by: Head of Department, Standards

Signed:

Signed:

Date: 2020-08-03

Date: 2020-08-03



Kenya Power

TITLE:
COMPLETE PROTECTION AND CONTROL PANELS FOR POWER TRANSFORMERS AND TRANSMISSION / SUBTRANSMISSION LINES - SPECIFICATION

Doc. No.	KP1/6C/4/1/TSP/11/118
Issue No.	1
Revision No.	0
Date of Issue	2020-08-03
Page 40 of 51	

Clause	Description	KPLC Requirement	Manufacturer's/ supplier offer
		DC supply supervision for the panel	
4.4.4	Transmission line protection panels -132Kv components	a) Main Protection: Line Current Differential Relay (87L).	
		b) Backup Protection: Distance/ Auto Reclose Relay (21/79).	
		c) Back up Protection: Three Phase Overcurrent and Earth Fault Relay (50/51/50N/51N)	
		d) 3P4W input Programmable Digital Transducer for the Line Bay.	
		e) 3P4W Energy Meter class 0.5 capable of being interfaced to the SCADA system.	
		f) Permissive sends receive (PSR), and Direct Transfer Trip (DTT) sends/receives shall be alarmed. This alarm signal shall have provision for acknowledge, mute and reset.	
		g) Auto Reclose function to be embedded in main and backup Protection relays above.	
		h) Self-Resetting High Speed Tripping Relay (94), which operates when critical protection functions operate	
		i) Bay Control Unit (BCU) with Three Phase Overcurrent and Earth fault, Synchro check and Auto Reclose protection functions.	
		j) Trip Circuit Supervision (95) for all Circuit Breakers controlling the Line. These can either be stand alone or integrated on one of the Protection relays	
		k) Discrepancy Control Switches for all Circuit Breakers and Motorized Disconnectors controlling the Transmission Power Line.	
		l) Selector switches shall provide for enabling Auto-Reclosing and	

Issued by: Head of Section, Standards Development

Authorized by: Head of Department, Standards

Signed:

Signed:

Date: 2020-08-03

Date: 2020-08-03



TITLE:
COMPLETE PROTECTION AND CONTROL PANELS FOR POWER TRANSFORMERS AND TRANSMISSION / SUBTRANSMISSION LINES - SPECIFICATION

Doc. No. KP1/6C/4/1/TSP/11/118
Issue No. 1
Revision No. 0
Date of Issue 2020-08-03
Page 41 of 51

Clause	Description	KPLC Requirement	Manufacturer's/ supplier offer
		Local/Remote/SCADA modes of operations.	
		m) Semaphores for all Earth Switches and non-motorized switches.	
		n) Transmission Line equipment monitoring e.g. Circuit Breaker, Earth Switch, Line Disconnecter, to be implemented in the Distance Protection Relay and BCU.	
		o) Multi-Functional Power meters for the Line measurands.	
4.4.5	66kV and 33kV line protection and control panels components	a) Distance Protection Relay with Auto Reclose function (21/79).	
		b) Backup Protection: Three Phase Overcurrent and Earth Fault Relay (50/51/50N/51N).	
		c) Annunciator Relay (30) with at least 16 windows. Annunciator shall also have reset push buttons for resetting Lock Out Relay and Protection Relays.	
		d) 3P4W input Programmable Digital Transducer.	
		e) 3P4W Energy Meter class 0.5 capable of being interfaced to the SCADA system.	
		f) Bay Control Unit (BCU) with Three Phase Overcurrent and Earth fault Relay, Synchro check and Auto Reclose protection functions.	
		g) Self-Resetting High Speed Tripping Relay (94), which operates when critical protection functions operate.	
		h) Trip Circuit Supervision (95) for all Circuit Breakers controlling the Line.	
		i) Discrepancy Control Switches for all Circuit Breakers and Motorized Disconnectors controlling the Sub Transmission Power Line Bay	

Issued by: Head of Section, Standards Development

Authorized by: Head of Department, Standards

Signed:

Signed:

Date: 2020-08-03

Date: 2020-08-03



Kenya Power

TITLE:
COMPLETE PROTECTION AND CONTROL PANELS FOR POWER TRANSFORMERS AND TRANSMISSION / SUBTRANSMISSION LINES - SPECIFICATION

Doc. No.	KP1/6C/4/1/TSP/11/118
Issue No.	1
Revision No.	0
Date of Issue	2020-08-03
Page 42 of 51	

Clause	Description	KPLC Requirement	Manufacturer's/ supplier offer
		j) Transmission Line equipment monitoring e.g. Circuit Breaker, Earth Switch, Line Disconnecter, to be implemented in the Distance Protection Relay and BCU.	
		k) Semaphores for all Earth Switches and non-motorized switches.	
		l) Mimic diagram	
		m) Multi-functional Power meter	
		n) Selector switches shall provide for enabling Auto Reclosing and Local/Remote/SCADA modes of operations.	
		o) IEC61850 communication facility	
4.4.6	Metering Bay protection and control panels- 132, 66kV and 33kV components	a) Three Phase Overcurrent and Earth Fault Protection Relay with an integrated BCU. (50/51/50N/51N).	
		b) Trip Circuit Supervision Relay (95) for the Circuit Breaker Trip circuits controlling the metering bay.	
		c) Annunciator Relay (30) with 16 windows.	
		d) High Speed Lockout Relay (86) with NO and NC output contacts.	
		e) Discrepancy control switches for CBs and motorized disconnections	
		f) Semaphores for earth switches and non-motorized switches	
		g) 3P4W input Programmable Digital Transducer.	
		h) 3P4W Energy Meter class 0.5 capable of being interfaced to the SCADA system	
		i) Selector switches shall provide for enabling Local/Remote/SCADA modes of operations.	
		j) Metering Bay equipment monitoring for the Circuit Breaker, Earth Switch, Line Disconnecter and Earth switch to be implemented in the BCU.	

Issued by: Head of Section, Standards Development

Authorized by: Head of Department, Standards

Signed:

Signed:

Date: 2020-08-03

Date: 2020-08-03



TITLE:
COMPLETE PROTECTION AND CONTROL PANELS FOR POWER TRANSFORMERS AND TRANSMISSION / SUBTRANSMISSION LINES - SPECIFICATION

Doc. No. KP1/6C/4/1/TSP/11/118
Issue No. 1
Revision No. 0
Date of Issue 2020-08-03
Page 43 of 51

Clause	Description	KPLC Requirement	Manufacturer's/ supplier offer
		k) Multi-Functional Power meters for the Line measurands. Mimic diagram	
		l) Metering bays busbar configuration	
4.4.7	220kV and 132kV control panels components	a) Annunciator Relay (30) with 36 windows. Annunciator shall also have reset push buttons for resetting Lock Out Relay and Protection Relay.	
		b) Bay Control Unit (BCU) with Three phase Overcurrent and Earth fault, Reclosing and Synchro check protection functions.	
		c) Multi-Functional Power meters for the HV circuit	
		d) 3P4W input Programmable Digital Transducer.	
		e) Discrepancy control switches for CBs and motorized disconnections	
		f) Semaphores for earth switches and non-motorized switches	
		g) Suitable Auxiliary Relay for SCADA interface and Circuit Breakers monitoring	
		h) Selector switches shall provide for enabling Auto reclosing and Local/SCADA modes of operations.	
		i) Guideline for 220 and 132kV rated Transmission Line bay substation equipment layout	
		IEC61850 communication facility	
		Mimic diagram	
4.5	Relay specifications	Provide as per "Protective relays, Control Devices and Instruments – Specification" reference KP1/6C/4/1/TSP/13/001 dated 2018-06-28.	
4.6	Programmable Digital Transducer		
4.6.1	Accuracy	Class 0.2, Class 0.5	
4.6.2	Frequency	50Hz	
Issued by: Head of Section, Standards Development		Authorized by: Head of Department, Standards	
Signed:		Signed:	
Date: 2020-08-03		Date: 2020-08-03	



Kenya Power

TITLE:
COMPLETE PROTECTION AND CONTROL PANELS FOR POWER TRANSFORMERS AND TRANSMISSION / SUBTRANSMISSION LINES - SPECIFICATION

Doc. No.	KP1/6C/4/1/TSP/11/118
Issue No.	1
Revision No.	0
Date of Issue	2020-08-03
Page 44 of 51	

Clause	Description	KPLC Requirement	Manufacturer's/ supplier offer
4.6.3	Nominal Measuring Voltage (Secondary):	110Vac 3 phase 4wire	
4.6.4	Nominal Measuring Current (Secondary):	1-5Amps	
4.6.5	Transducer Supply Voltage:	40V - 250VDC	
4.6.6	Communication Ports	Serial USB: USB Mini B connector, Modbus RTU, 38400(Baud) or	
		Serial RS485 : 3 Terminal screws<= 6mm2, Modbus RTU, 1200-38400(Baud)	
4.6.7	Number of Digital outputs:	2	
4.6.8	Number of Analog Outputs	4 (V, I, P, Q)	
4.6.9	Type of Analog outputs	: Current/Voltage Bi-Polar	
4.6.10	Analog output Maximum Voltage (open output):	+/- 20V	
4.6.11	Analog output Load Current output	+/-20mA, +/-5mA, +/-2mA	
4.6.12	Protection Housing:	IP40	
4.6.13	Terminals:	IP 20	
4.6.14	Mounting	Suitable for DIN rail mounting	
4.6.15	Programming kit consisting software and communication cable.	Provide	
4.7	Multifunctional power meter / measurement centers directly connected		
	Specification	Provide as per "Protective relays, Control Devices and Instruments – Specification" reference KP1/6C/4/1/TSP/13/001 dated 2019-06-07 clause 4.4.16	
4.8	Triple pole AC miniature circuit breakers for VT secondary circuit		
4.8.1	Make	Triple pole AC type MCB with auxiliary contacts	
4.8.2	Auxiliary contacts	1NC and 1NO contact	
4.8.3	Rated operating voltage	110VAC	
4.8.4	Rated insulation voltage	600VAC	
4.8.5	Rated current	4Amps	
4.8.6	Characteristic curve	Type C	
4.8.7	Rated Frequency	50Hz	

Issued by: Head of Section, Standards Development

Authorized by: Head of Department, Standards

Signed:

Signed:

Date: 2020-08-03

Date: 2020-08-03



Kenya Power

TITLE:

COMPLETE PROTECTION AND
CONTROL PANELS FOR POWER
TRANSFORMERS AND
TRANSMISSION /
SUBTRANSMISSION LINES -
SPECIFICATION

Doc. No.

KP1/6C/4/1/TSP/11/118

Issue No.

1



Revision No.

0

Date of Issue

2020-08-03

Page 45 of 51

Clause	Description	KPLC Requirement	Manufacturer's/ supplier offer
4.8.8	Setting value of thermally delayed overload release	4A	
4.8.9	Terminals size	Suitable for at least 2.5mm ² stranded copper cable	
4.9	Double pole DC miniature circuit breakers		
4.9.1	Make	Double pole DC type MCB with auxiliary contacts	
4.9.2	Auxiliary contacts	1NC and 1NO contact	
4.9.3	Rated operating voltage	110V AC	
4.9.4	Characteristic curve	Type C	
4.9.5	Setting value of thermally delayed overload release	4A	
4.9.6	Terminals size	Suitable for at least 2.5mm ² stranded copper cable	
4.9.7	Rated Insulation voltage	600VAC	
4.10	Single pole AC miniature circuit breakers		
4.10.1	Make	Single pole AC type MCB with auxiliary contacts	
4.10.2	Auxiliary contacts	1NC and 1NO contact	
4.10.3	Rated operating voltage	230VAC	
4.10.4	Characteristic curve	Type C	
4.10.5	Setting value of thermally delayed overload release	4A	
4.10.6	Terminals size	Suitable for at least 2.5mm ² stranded copper cable	
4.11	Hooter		
4.11.1	Actuator system	Strong non-polarized electromagnet with an impact resistant sturdy casing	
4.11.2	Rated frequency	50Hz	
4.11.3	Rated voltage	110V DC +6%/-10%	
4.11.4	Degree of protection	IP 55	
4.11.5	Operating mode	Continuous	
4.11.6	Volume	Approximately 100dB - 120dB	
4.11.7	Terminals	Suitable for at least 2.5mm ² cables	
4.12	Anti-condensation heater		
Issued by: Head of Section, Standards Development		Authorized by: Head of Department, Standards	
Signed: 		Signed: 	
Date: 2020-08-03		Date: 2020-08-03	



Kenya Power

TITLE:
COMPLETE PROTECTION AND CONTROL PANELS FOR POWER TRANSFORMERS AND TRANSMISSION / SUBTRANSMISSION LINES - SPECIFICATION

Doc. No.	KP1/6C/4/1/TSP/11/118
Issue No.	1
Revision No.	0
Date of Issue	2020-08-03
Page 46 of 51	

Clause	Description	KPLC Requirement	Manufacturer's/ supplier offer
4.12.1	Mounting	Suitable for mounting inside a protection or control panel	
4.12.2	Compatibility	It shall not interfere with operation of equipment or cause damage to cables or other components in panel	
4.12.3	Rating	20W and 240V AC	
4.12.4	Terminals	Suitable for at least 2.5mm ² cables	
4.12.5	Mounting	Suitable for DIN rail mounting	
4.13	DC supply under voltage relay		
4.13.1	Under voltage pick up	Settable range: - 30-80%	
4.13.2	Design	Electronic	
4.13.3	Accuracy	± 4%	
4.13.4	Reset	Self-reset	
4.13.5	Built in Indication LED (green) and Built in Operation LED (red)	Provide	
4.13.6	Auxiliary contacts	At least 2 NC contacts (contacts close for under voltage conditions)	
4.13.7	Rating	Rated for continuous operation at rated DC voltage	
4.13.8	Mounting	Suitable for DIN rail mounting	
4.14	Indicating lamps	Provide as per "Protective relays, Control Devices and Instruments – Specification" reference KP1/6C/4/1/TSP/13/001 dated 2019-06-07.	
4.15	Relay programming software and connection cables		
4.15.1	Software – for programming and downloading data	Provided in English for all numerical relays and numerical instruments like transducers	
4.15.2	Multiuser license	Possible to install on 5 machines at no additional cost	
4.15.3	User guide	Provide in English language	
	Communication port	RS232/USB	
4.15.4	Relay local communication cable	Provided 8 for each set of relays using similar cable	
4.15.5	Transducer communication cable	Provide two for each set of transducers using similar cable	

Issued by: Head of Section, Standards Development

Authorized by: Head of Department, Standards

Signed:

Signed:

Date: 2020-08-03

Date: 2020-08-03



TITLE:
COMPLETE PROTECTION AND CONTROL PANELS FOR POWER TRANSFORMERS AND TRANSMISSION / SUBTRANSMISSION LINES - SPECIFICATION

Doc. No.	KP1/6C/4/1/TSP/11/118
Issue No.	1
Revision No.	0
Date of Issue	2020-08-03
Page 47 of 51	


Clause	Description	KPLC Requirement	Manufacturer's/ supplier offer
4.15.6	Remote communication facilities	IEC 60850 compliant. Communication facilities provided on each relay for remote interrogation and programming of the numerical relays	
4.15.7	HMI on relay	Provide	
	Indication of operation by system fault	By Red LED and flagged on HMI	
4.15.8	Reset of fault flags and Red LED	Reset without opening relay cover	
4.16	Accessories		
	Necessary accessories for each protection and control panel	Provide	
	Power supply of panel	110V DC and 240V AC ready	
	Secondary protection and control wiring	Provide	
	Spare removable modular plates	5 no. supplied with final delivery of complete panels	
5	Test Requirements	state	
6	Marking and packing		
6.1	Marking	state	
6.2	Packaging		
6.2.1	Mode of protection against internal damage during transportation and storage	state	
6.2.2	Packing list	provide	
7	Warranty	60 months from the date of delivery	
APPENDICES			
A	Tests and Inspection		
A.1	Responsibility of carrying out tests	specify	
A.2	Copies of Type Test Reports submitted with tender	List/submit	
Issued by: Head of Section, Standards Development		Authorized by: Head of Department, Standards	
Signed:		Signed:	
Date: 2020-08-03		Date: 2020-08-03	

Clause	Description	KPLC Requirement	Manufacturer's/supplier offer
A.3	Acceptance tests to be witnessed by KPLC at factory before shipment	List tests to be carried out	
A.4	Submission of routine and sample test reports before shipment	State compliance	
A.5	Inspection at the stores and replacement of defective items	state compliance	
B	Quality Management System		
B.1	Quality Assurance Plan	provide	
B.2	Copy of ISO 9001:2015	provide	
B.3	Manufacturer's experience	provide	
	Manufacturing Capacity (units per month)	provide	
	List of previous customers	provide	
	Customer reference letters	State compliance	
C.	Documentation		
C.1	Technical documents to be submitted with tender documents	State	
	a) Fully-filled clause by clause Guaranteed Technical Particulars (GTPs) - Appendix D - stamped and signed by the manufacturer.	provide	
	b) Copies of the Manufacturer's catalogues, brochures, drawings, wiring diagrams and technical data for the equipment with programming details and manuals;	provide	

Issued by: Head of Section, Standards Development

Authorized by: Head of Department, Standards

Signed: 

Signed: 

Date: 2020-08-03

Date: 2020-08-03



TITLE:
COMPLETE PROTECTION AND CONTROL PANELS FOR POWER TRANSFORMERS AND TRANSMISSION / SUBTRANSMISSION LINES - SPECIFICATION

Doc. No.	KP1/6C/4/1/TSP/11/118
Issue No.	1
Revision No.	0
Date of Issue	2020-08-03
Page 49 of 51	

Clause	Description	KPLC Requirement	Manufacturer's/ supplier offer
	c) Sales records for the last five years and at least four customer reference letters.	provide	
	d) Manufacturing capacity and experience	state	
	e) Copies of previous test certificates and test reports (As given in Clause A.2) 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 (all in English Language).	provide	
	f) Copy of accreditation certificate for the laboratory (all in English Language)	provide	
	g) Manufacturer's warranty and guarantee. A warranty of 60 months from date of delivery shall be offered.	provide	
	h) Manufacturers letter of authorization	provide	
	i) Marking & Packaging details (including packaging materials) and safe storage information	state	

Issued by: Head of Section, Standards Development

Authorized by: Head of Department, Standards

Signed:

Signed:

Date: 2020-08-03

Date: 2020-08-03



TITLE:
COMPLETE PROTECTION AND CONTROL PANELS FOR POWER TRANSFORMERS AND TRANSMISSION / SUBTRANSMISSION LINES - SPECIFICATION

Doc. No.	KP1/6C/4/1/TSP/11/118
Issue No.	1
Revision No.	0
Date of Issue	2020-08-03
Page 50 of 51	

Clause	Description	KPLC Requirement	Manufacturer's/s/ supplier offer
C.2	Documents to be submitted Kenya Power for approval before manufacture/supply	State	
	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);	provide	
	b) Technical details and drawings	provide	
	c) Operation manuals and brochures	provide	
	d) Quality assurance plan (QAP)	provide	
	e) Detailed test program to be used during factory testing	provide	
	f) Marking details and method used in marking	provide	
	g) Packaging details (including packaging materials and marking and identification of batches)	provide	
	(i) Manufacturer's undertaking	provide	
C.3	Submit recommendations for use, detailed user's installation guide, etc. during delivery	State	

Issued by: Head of Section, Standards Development

Authorized by: Head of Department, Standards

Signed:

Signed:

Date: 2020-08-03

Date: 2020-08-03



TITLE:
COMPLETE PROTECTION AND CONTROL PANELS FOR POWER TRANSFORMERS AND TRANSMISSION / SUBTRANSMISSION LINES - SPECIFICATION

Doc. No.	KP1/6C/4/1/TSP/11/118
Issue No.	1
Revision No.	0
Date of Issue	2020-08-03
Page 51 of 51	

Clause	Description	KPLC Requirement	Manufacturer's/supplier offer
	Routine and sample test reports to be submitted to Kenya Power for approval before shipment/delivery of the goods	provide	
	Statement of compliance to Tender Specifications (indicate deviations if any & supporting documents)	provide	

.....
Manufacturer's Name, Signature, Stamp and Date

Issued by: Head of Section, Standards Development	Authorized by: Head of Department, Standards
Signed:	Signed:
Date: 2020-08-03	Date: 2020-08-03

