



Kenya Power

**12kV VACUUM AUTORECLOSERS (POLE MOUNTED)
-SPECIFICATION**



TITLE:
**12kV VACUUM AUTORECLOSERS
 (POLE MOUNTED) – SPECIFICATION**

Doc. No.	KPLD/330/41/TSP/11/012
Issu. No.	0
Revision No.	1
Date of Issue	2024-09-11
Page 2 of 52	

Contents

0.1	Circulation List	3
0.2	Amendment Record	4
	FOREWORD	5
1	SCOPE	6
2	APPLICABLE STANDARDS	6
3	TERMS AND DEFINITIONS	7
4	REQUIREMENTS	7
4.1	Service Conditions	7
4.2	General Requirements	7
4.3	Operating Mechanism	10
4.4	Ratings	11
4.5	Autorecloser Control Cabinet	11
4.6	Energy and Power Measurements	20
4.7	Operation	21
4.8	Events and Fault Records Lists	21
4.9	Auxiliary Power Supply	21
4.10	DC Voltage	21
4.11	Technical Literature Drawings	21
5.0	APPENDICES	23
	APPENDIX A: TESTS AND INSPECTION (NORMATIVE)	23
	APPENDIX B: WARRANTY	25
	APPENDIX C: MARKINGS AND NAMEPLATE	25
	APPENDIX D: MANUFACTURERS' RECOMMENDED SPARES	26
	APPENDIX E: QUALIFICATION OF THE MANUFACTURER	26
	APPENDIX F: TRAINING (NORMATIVE)	27
	APPENDIX G: DOCUMENTATION (NORMATIVE)	28
	APPENDIX H: GUARANTEED TECHNICAL PARTICULARS	30

Issued by: Head of Section, Standards Development

Signed:

Date: 2024-09-11

Authorized by: Head of Department, Standards

Signed:

Date: 2024-09-11



TITLE:
12KV VACUUM AUTORECLOSERS
(POLE MOUNTED) – SPECIFICATION

Doc. No.	KPLC/SD/41/TSP/11/013
Issue No.	0
Revision No.	1
Date of Issue	2024-09-11
Page 3 of 42	

0.1 Circulation List

COPY NO.	COPY HOLDER
1	Manager, Standards
Electronic copy (pdf) on KPLC server currently: https://172.16.1.89/ams/amsweb.php?FolderId=23	

REVISION OF KPLC STANDARDS

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

© Kenya Power & Lighting Co. Ltd.

Users are reminded that by Section 25 of the Copyright Act, 2001 (Revised 2014) 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 may be reproduced, or stored in retrieval system by any means without prior permission from the Managing Director & CEO, KPLC.

Issued by: Head of Section, Standards
Development

Signed:

Date: 2024-09-11

Authorized by: Head of Department, Standards

Signed:

Date: 2024-09-11



TITLE:
**12kV VACUUM AUTORECLOSERS
 (POLE MOUNTED) – SPECIFICATION**

Doc. No.	KPLD/04/TSR/1/012
Issue No.	6
Revision No.	1
Date of Issue	2024-09-11
Page 4 of 42	

0.2 Amendment Record

Rev No.1	Date (YYYY-MM-DD)	Description of Change	Prepared by (Name & Signature)	Approved by (Name & Signature)
Issue 6 Rev 1	2018-07-24	<ol style="list-style-type: none"> This cancels and replaces issue 5 revision 0 of 2010/04/09 Clause 4.6.19. Independent VTs to provide auxiliary supply for Auto reclosers New format of specifications Change the title from "vacuum automatic reclosers" to "vacuum auto reclosers" 	S. Nguli	Dr. Eng. Peter Kinemba
Issue 6 Rev 2	2024-09-11	<p>Revised clause 4.2.12 for minimum rated short circuit current from 12.5 kA to 21 kA for 3secs</p> <p>Revised creepage distance in clause 4.2.19 to be 31mm/kV according to IEC/TR 60815 for pollution level IV</p> <p>Revised table 4.4 on phase-to-phase and phase-to-earth clearance values in line with IEC 60071-1</p> <p>Revised clause 4.5.1.15 to remove mobile phone as a communication gateway device for the auto reclosure</p> <p>Revised clause 4.5.8.1.3/2.3 on O/C highest set range from 20-1200Amps to 20-1500/2000Amps</p> <p>Revised clause 4.5.3 to specify portable storage devices as flash memory storage with USB plug-in provision.</p> <p>Revised clause 4.5.5.4 on the auxiliary DC supply to 24V DC in line with recommendations on Table 6 of IEC 62271-1:2017</p> <p>Revised clause 4.5.6.2 on battery hold-up time to 8 hours to match requirements on clause 4.10.1 on DC auxiliary DC supply.</p> <p>Revised clause A7.5 to include more tests to be carried out during FAT</p> <p>Revised clauses B2 & B3 to revise the warranty period to 5yrs, and that electronic cards are also covered in the 5yr warranty</p>	B. Dianga	Dr. Eng. Peter Kinemba

Issued by: Head of Section, Standards

Development
 Signed:

Date: 2024-09-11

Authorized by: Head of Department, Standards

Signed:

Date: 2024-09-11



TITLE:
**12kV VACUUM AUTORECLOSERS
(POLE MOUNTED) – SPECIFICATION**

Doc. No.	KPI/ID-01/TSP/11/011
Issue No.	01
Revision No.	1
Date of Issue	2024-09-11
Page 5 of 01	

FOREWORD

This Specification has been prepared by the Standards Department in collaboration with the Electrical Plant and System Protection all of Kenya Power & Lighting Co. Ltd. (KPLC). The specification lays down the requirements of pole-mounted 12kV Vacuum Autoclosers.

The Specification stipulates the minimum requirements for the 12kV Vacuum Autocloser Units acceptable for use in the company. It shall be the responsibility of the supplier and manufacturer to ensure the adequacy of the design, good engineering practice, adherence to the specification, applicable standards and regulations, as well as good workmanship in the manufacture of 12kV Vacuum Autoclosers.

Users of this specification shall be responsible for its correct interpretation and application and to be knowledgeable of the standards.

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

Name	Division
Benson Dianga	Standards
Vincent Achongu	System Protection
Julius Ndirangu	Standards
Samuel Gaihege	System Protection

Issued by: Head of Section, Standards Development

Signed:

Date: 2024-09-11

Authorized by: Head of Department, Standards

Signed:

Date: 2024-09-11



TITLE:
**12kV VACUUM AUTORECLOSERS
 (POLE MOUNTED) – SPECIFICATION**

Doc. No.	KP113Dr/6/1/TSP/11/032
Issue No.	0
Revision No.	1
Date of Issue	2024-09-11
Page 6 of 47	

1 SCOPE

This Specification is for 12kV Vacuum Autoclosers (Pole Mounted) together with controls and auxiliary equipment for use on distribution lines to provide switching and protection of the overhead power distribution lines. The equipment shall be used on overhead distribution lines where the nominal voltage is 12kV and the highest rated voltage is 12kV.

The equipment shall be complete with a control unit and all components and accessories necessary to realize the intended application.

The Specification also covers the inspection and test of the equipment as well as a schedule of Guaranteed Technical Particulars(GTP) to be filled, and signed by the manufacturer for submission for tender evaluation.

2 APPLICABLE STANDARDS

The following Standards contain provisions which, through reference in the text constitute provisions of this specification. Unless otherwise stated, the latest editions (including amendments) apply.

IEC 60529:	Degree of protection offered by enclosures (IP code)
IEC 62271-100	High voltage alternating current circuit breakers
IEC 62271-111:	High-voltage switchgear and control gear. Part 111: Automatic circuit Reclosers and fault interrupters for alternating current systems.
IEC 60812: 2008	Selection and dimensioning of high voltage insulators intended for use in polluted conditions.
IEC 262217: 2012	Polymeric HV Insulators for indoor and outdoor use – general definitions, tests methods and acceptance criteria
IEC 60071: 2014	Insulation co-ordination
IEC 60060-2: 2010	High Voltage Test Techniques – Part 2: Measuring systems
BS EN ISO 1461: 2009	Hot dip galvanized coatings on fabricated iron and steel articles. Specifications and Test Methods
89/116/EEC	Electromagnetic Compatibility (EMC) directive
IEC 60694	Common specifications for high-voltage switchgear and control gear standards

Issued by: Head of Section, Standards Development

Signed:

Date: 2024-09-11

Authorized by: Head of Department, Standards

Signed:

Date: 2024-09-11



TITLE:
**12kV VACUUM AUTORECLOSERS
(POLE MOUNTED) – SPECIFICATION**

Doc. No.	KPI/EDS/41/ISP/11/012
Item No.	8
Revision No.	1
Date of Issue	2024-09-11
Page 1 of 42	

3. TERMS AND DEFINITIONS

For this specification, the definitions given in the reference standards shall apply.

4. REQUIREMENTS

4.1 Service Conditions

- 4.1.1 The 12kV Vacuum Autoclosers shall be suitable for continuous operation outdoors in tropical areas exposed to:
- a) Altitudes of up to 2200m above sea level,
 - b) Average ambient temperature of -30°C with a minimum of -1°C and a maximum of $+40^{\circ}\text{C}$, in direct sunlight,
 - c) Humidity: upto 95%
 - d) Pollution: Design pollution level to be taken as "Heavy" (Pollution Level III) for inland and "Very Heavy" (Pollution Level IV) for coastal applications in accordance with IEC 60812.
 - e) Isokeraunic levels of up to 180 thunderstorm days per year.
 - f) Tropical sunshine conditions
- 4.1.2 Average solar radiation is up to 6Kwh/m^2 .
- 4.1.3 The level of galvanizing and painting for all ferrous parts and materials used for the Autoclosers tank, control box and all components shall be suitable for these conditions.
- 4.1.4 The Autocloser shall be connected to protect an 11kV 50Hz, 3-phase overhead line with a maximum system voltage of 12kV and the neutral point is solidly connected to the ground at the power transformer, i.e., an effectively earthed system. The Minimum rated short-time withstand current for symmetrical fault shall be assumed to be 21 kA for 3 seconds.

4.2 General Requirements

- 4.2.1 The Autocloser shall be outdoor type, designed for three-phase operation and suitable for H-pole mounting. Single pole mounting shall also be accepted. The Autocloser shall be manufactured in accordance with IEC 62271-100

Issued by: Head of Section, Standards Development

Signed:

Date: 2024-09-11

Authorized by: Head of Department, Standards

Signed:

Date: 2024-09-11



TITLE:
**12kV VACUUM AUTORECLOSERS
 (POLE MOUNTED) – SPECIFICATION**

Doc. No.	KPT/13041/135/11/012
Issue No.	6
Revision No.	1
Date of Issue	2024-09-11
Page 8 of 42	

- 4.2.2 The Autorecloser tank (primary part) shall be made of stainless steel or aluminum alloy, suitably coated to prevent corrosion. The Coating shall be UV resistant.
- 4.2.3 **Insulation Medium and Arc Interruption:** The Autorecloser shall have Air/Solid electrical insulation inside the Autorecloser tank and employ Vacuum interrupters for Arc interruption in accordance with IEC 62271-111.
- 4.2.4 The breaking duty curve for the vacuum interrupter offered shall be provided with the tender bid. The remaining percentage of contact wear shall be recorded in the Autorecloser Control Cabinet and accessible on the HMI screen.
- 4.2.5 In case the Control Cabinet is replaced, it shall be possible to program the remaining contact duty in the new control cabinet. This data shall be accurate and shall indicate when the vacuum interrupter is due for replacement.
- 4.2.6 The Autorecloser shall be complete with suitable and sufficiently sized brackets fitted on both sides of the Autorecloser tank for fixing of surge diverters. (Drawings and technical details shall be submitted with the tender.)
- 4.2.7 The Autoreclosers shall be supplied complete with mounting frame/brackets for the Autorecloser Tank (primary unit) and Control Cabinet (secondary unit).
- 4.2.8 The mounting brackets shall be adequate and suitable to independently carry the weight of the Autorecloser tank and the Autorecloser control cabinet.
- 4.2.9 **Status Indication:** The Autorecloser tank shall have a mechanical status indicator for both the Open (green colour) and the Closed (Red Colour) position.
- 4.2.10 The status indication shall be provided on the Autorecloser Tank and be visible from the ground. The status indication label shall be either ON and OFF or IEC-designated labels, I for close and O for Open. The colours for close and open shall be Red and Green respectively on a white background.
- 4.2.11 The unit shall be equipped with inbuilt current transformers of appropriate ratio, which will be connected to the control so that faults on the load side or source side can be detected and the Autorecloser opened.
- 4.2.12 The current transformer shall be appropriately rated taking into consideration a minimum continuously rated load current of 630A and a minimum rated short circuit current of 21 kA for 3 seconds.
- 4.2.13 All current-carrying parts shall be made of electrolytic high-conductivity copper with the contacts silver-plated.

Issued by: Head of Section, Standards Development
 Signed: 
 Date: 2024-09-11

Authorized by: Head of Department, Standards
 Signed: 
 Date: 2024-09-11



TITLE:
**12kV VACUUM AUTORECLOSERS
(POLE MOUNTED) – SPECIFICATION**

Doc. No.	KP/33D/01/TSP/11/011
Issue No.	8
Revision No.	1
Date of Issue	2024-09-11
Page # of 42	

- 4.2.14 **Local Mechanical Trip Facility:** Facilities shall be provided to allow the Autorecloser to be tripped manually without the need for external power supplies.
- 4.2.15 This shall normally be provided using a yellow pull ring mounted on the exterior of the autorecloser tank. The Trip ring shall be designed to be operated from the ground using the normal insulated operating rod.
- 4.2.16 Once the manual trip has been operated, it shall not be possible to close the autorecloser either locally or remotely by electrical means without the manual trip lever being manually reset.
- 4.2.17 A single bushing providing the required creepage shall be mounted on the tank for each phase. The use of additional boot or cable tails to be connected between the bushing and the overhead line to achieve the required creepage shall not be accepted.
- 4.2.18 The bushings shall be either HCEP (Hydrophobic Cycloaliphatic Epoxy) or silicon rubber material. The material used must be hydrophobic to achieve satisfactory autorecloser primary insulation performance. The materials used shall not be affected by ultraviolet radiation.
- 4.2.19 The minimum creepage distance for bushings shall not be less than 372mm in compliance with IEC/TR 60815 for Pollution Level IV
- 4.2.20 Pollution severity category shall be "d" in accordance with IEC 60812
- 4.2.21 The Autorecloser shall be complete with suitable primary terminals and connecting clamps for connection of Copper or Aluminium or ACSR conductors of up to 20 mm diameter.
- 4.2.22 The Autorecloser HV terminals shall be shrouded to protect against interference from birds or small animals. The shrouding accessories shall be included in the tender bid.
- 4.2.23 **Mounting Frame:** Both the Tank and the mounting frame (bracket) shall have a ground/earth connection point to allow the tank and the mounting bracket to be connected to the pole earthing system. The mounting frame shall be galvanised as per ISO 1461.
- 4.2.24 A detailed drawing of the complete Autorecloser mounting arrangement shall be provided illustrating the minimum electrical clearances; phase to phase and phase to ground, and clearance to the structure.
- 4.2.25 **Erection Facilities:** The Autorecloser tank and the Control Cabinet shall have suitably rated lifting eyes to allow the Autorecloser and the tank to be lifted vertically in a safe manner to the mounting position.

Issued by: Head of Section, Standards Development

Signed:

Date: 2024-09-11

Authorized by: Head of Department, Standards

Signed:

Date: 2024-09-11



TITLE:
**12kV VACUUM AUTORECLOSERS
(POLE MOUNTED) – SPECIFICATION**

Doc. No.	KP/CLD/A/TSP/11/012
Issue No.	6
Revision No.	1
Date of Issue	2024-09-11
Page 10 of 02	

4.2.26 The lifting shall be done using a standard sling or rope. Other suitable means of safe lifting the Autorecloser and the control box shall be considered.

4.2.27 **Surge Arrester Bracket:** Bracket shall be attached to the tank next to the bushings for mounting of surge arresters both on the source side and on the load side.

4.2.28 The mounting bracket shall be used as the connection point for the surge arrester to ground.

4.2.29 The brackets shall have unpainted corrosion resistant metal connecting zone which has the capability to conduct the surge arrester current.

Note The Autoclosers shall be installed on round pre-stressed concrete poles with embedded integral earthing to ensure earthing is permanent and vandal-proof.

4.3 Operating Mechanism

4.3.1 The autorecloser shall be provided with a multi-shot auto-reclosing mechanism able to undertake up to 4 trips and auto-reclose operations in one cycle.

4.3.2 This mechanism shall be a magnetic actuator for each phase and linked together for three-phase operation.

4.3.3 Autorecloser Lockout link shall be provided on the autorecloser Tank.

4.3.4 Provision of Operation counters in the Autorecloser Control Cabinet as specified under the Control cabinet, shall also be supplied.

4.3.5 The Control Cabinet door shall have a provision for padlocking in the closed position with Kenya Power Standard Safety Padlock.

The padlock shall have the following features:

(i) Hardened boron 8mm Steel shackle

(ii) Shackle height approximately 50mm

(iii) Chrome plated brass Body

(iv) Ball-bearing locking mechanism

(v) Key retaining in the unlocked position

4.3.6 The degree of protection of the Control Cabinet enclosure shall be class IP65 as per IEC 60529.

4.3.7 The bidder shall indicate the number of Autorecloser tank operations to the first maintenance and provide the Autorecloser tank breaking duty curve.

Issued by: Head of Section, Standards
Development

Signed:

Date: 2024-09-11

Authorized by: Head of Department, Standards

Signed:

Date: 2024-09-11



TITLE:
**12kV VACUUM AUTORECLOSERS
(POLE MOUNTED) – SPECIFICATION**

Doc. No.	KPI/130/43/TSP/11/012
Issue No.	6
Revision No.	1
Date of Issue	2024-09-11
Page 11 of 42	

4.3.8 The Autorecloser duty cycle shall be stated showing the ability of the unit to carry out four(4) auto-reclose operations before lock out.

4.4 Ratings

Description	Requirement	
System Nominal Voltage & Frequency	11kV, 50Hz	
System highest operating voltage	12kV	
Equipment Rated Voltage	15kV	
Rated continuous current, minimum	630A	
Minimum Power Frequency Withstand Voltage, rms (50Hz, 60s)	38kV	
Minimum Lightning Impulse Withstand Voltage, 1.2/50µs, +ve, dry, KVp	95kVp	
Minimum rated short time withstand current for symmetrical fault for 3 seconds	21 kA	
Opening Time	< 35 ms	
Closing Time	< 60 ms	
Interrupting Time	< 50 ms	
Rated recloser Operating Sequence	O –0.3s –CO–12s – CO–12s–CO	
Minimum creepage distance of insulator (Heavy Pollution at 3 [mm/kV])	372mm	
Minimum clearance	Phase-to-phase	280mm
	Phase-to-earth	170mm
Minimum number of Mechanical & Full Load Operations	10,000	
Weight of the Autoclosers	< 120 kg	

Note: The Basic Insulation Levels indicated above shall be applied to suit the service conditions given in clause 4.1 of this specification.

4.5 Autoclosers Control Cabinet

4.5.1 General

4.5.1.1 The Control Cabinet shall be mounted independent of the Auto reclosers.

Issued by: Head of Section, Standards Development

Signed:

Date: 2024-09-11

Authorized by: Head of Department, Standards

Signed:

Date: 2024-09-11

- 4.5.1.2 The Control Cabinet shall be adequately sealed and dust-protected and shall be internally protected to prevent moisture condensation. The degree of protection shall be suitable for this purpose and in any case not less than IP65.
- 4.5.1.3 Electronic modules shall perform continuous diagnostic monitoring and shall contain both software and hardware watchdog checking.
- 4.5.1.4 The supplier shall ensure that the equipment housed in the Control Cabinet can withstand the heating effect of direct solar radiation without causing failure and/or abnormal operation.
- 4.5.1.5 The Autoreclosers Tank Bushings shall be clearly marked to indicate the normal source side and the load side of the Autoreclosers, with indelible markings that will last the lifetime of the Autoreclosers.
- 4.5.1.6 Rating plate shall be provided on the Autorecloser tank and on the controller using a non-ferrous material that shall be weather and corrosion-resistant. Stainless steel is preferred, with the following details, engraved, indelibly stamped or etched.
- (i) Manufacturer's Name
 - (ii) Manufacturer type or Identification Number
 - (iii) Serial Number
 - (iv) Date of Manufacture
 - (v) Equipment rated Maximum Voltage
 - (vi) Rated Continuous Current
 - (vii) Rated Symmetrical Interrupting Current capacity and withstand time
 - (viii) Rated Power frequency withstand Voltage
 - (ix) Rated Impulse Withstand Voltage
 - (x) Property of Kenya Power & Lighting Co. Plc
- 4.5.1.7 The nameplate shall be mounted clear of live parts in a position that can be read while the Autorecloser is in service, without compromising the safety of personnel.
- 4.5.1.8 The Control Cabinet shall be designed for the service/climatic conditions specified and shall be adequately ventilated and fitted with substantial door-securing devices capable of ensuring entry only by authorized personnel.
- 4.5.1.9 The Control Cabinet shall be mounted below the Autorecloser tank, on the same structure and shall be connected to the Autorecloser tank by a minimum seven-meter-long multi-core control cable.
- 4.5.1.10 The multi-core cable shall be stabilized against ultra-violet activity and adequately screened against electrostatic or electromagnetic interference, which may distort signals for the protection or control equipment.

Issued by: Head of Section, Standards Development.

Signed: 

Date: 2024-09-11

Authorized by: Head of Department, Standards

Signed: 

Date: 2024-09-11



TITLE:
**12KV VACUUM AUTORECLOSERS
(POLE MOUNTED) – SPECIFICATION**

Doc. No.	KP/CDM/TSR/11/012
Issue No.	4
Revision No.	1
Date of Issue	2024-09-11
Page 17 of 42	

- 4.5.1.11 This cable shall connect into the Autorecloser tank and the Control Cabinet using plug and socket arrangements. Entry of the control cable into the Control Cabinet shall be from the bottom.
- 4.5.1.12 It shall be possible to disconnect the cable at the tank, while the Autorecloser is in service, without causing interruption or maloperation. Also, when the cable is disconnected, the CTs shall be short-circuited. A robust, multi-plug weatherproof connector shall be provided.
- 4.5.1.13 **Provision for cable termination:** The bottom plate of the Control Cabinet shall make provision for entry of at least two additional control cables. The cabinet shall be pre-punched with at least 21 mm and 33 mm holes. The holes shall be suitably blanked off.
- 4.5.1.14 The cabinet shall be fitted with an earthing terminal for the connection of the autorecloser Control Cabinet to the autorecloser installation grounding system.
- 4.5.1.15 **Space for Communication Equipment:** The Control Cabinet shall have adequate space, inside the cabinet for mounting communication equipment and network modules.
- 4.5.1.16 **Cabinet Heater:** The Control Cabinet shall be supplied complete with a heater controlled by a hygrostat with adjustable humidity and temperature settings, designed to ensure that no condensation occurs inside the cabinet.
- 4.5.1.17 The equipment including control and communications shall comply with EMC directive 89/116/EEC, IEC60694 and BS EN 62271
- 4.5.1.18 **Serial Communication Port:** The equipment shall be supplied with a serial communication port to allow connection to a laptop computer for configuration and parameter settings and downloading faults and events records for analysis. The serial port shall be accessible only when the cabinet door is open.
- 4.5.1.19 **Internal Power Socket:** An electrical socket outlet designed for operation at 230V AC with 3 Pin British Standards shall be provided within the control cabinet. This shall be used to power laptop computers or test equipment. The socket shall be protected by a suitably rated MCB.
- 4.5.1.20 The Control Cabinet shall have a dustproof drainage filter.
- 4.5.1.21 The Control Cabinet door shall have a stay to hold the door at an angle of at least 110 degrees.
- 4.5.1.22 A drawing showing the dimensions of the Control Cabinet shall be provided with the bid.

Issued by: Head of Section, Standards Development

Signed:

Date: 2024-09-11

Authorized by: Head of Department, Standards

Signed:

Date: 2024-09-11

4.5.2 Control box features

The control box shall have the following features on its front face:

- 4.5.2.1 The Control Cabinet shall be a fully programmable digital (numerical) unit.
- 4.5.2.2 The Control Cabinet shall have a Large LCD Screen to facilitate manual programming of the protection & control unit and for viewing data such as events, fault records and measurements.
- 4.5.2.3 The LCD light shall dim after a settable time delay when not in use and shall be activated by pressing the appropriate keys such as the panel ON/OFF switch, etc. Provision shall be made for adjustment of the brightness of the LCD screen.
- 4.5.2.4 **Key Pad:** This shall be used for configuring, setting and viewing the protection and control settings and for viewing the instantaneous and historical measurements, events records and fault records. All data stored in the unit shall be accessible through the keypad.
- 4.5.2.5 **Control/Functional Keys:** Control keys shall be provided on the front face of the control cabinet, accessible once the door is open to enable and disable various protection and control functions, as follows:
- (i) Enable/block earth fault protection
 - (ii) Enable/block sensitive earth fault protection
 - (iii) Enable/block cold load (load inrush) protection
 - (iv) Enable/block auto reclose.
 - (v) Remote/Local Control selector key.
- 4.5.2.6 Electrical Close Push-button to manually close the autorecloser. The status of the autorecloser shall be shown on the same control key or via a Red LED next to the control key.
- 4.5.2.7 Electrical Open Push-button to manually open the autorecloser. The status of the autorecloser shall be shown on the same control key or via a green LED next to the control key.
- 4.5.2.8 **Control Cabinet Healthy Status:** This shall be indicated by a Green LED, on the Control Cabinet and by "Control Cabinet healthy status" on the LCD screen.
- 4.5.2.9 **Autorecloser Control Failure:** This shall be indicated by Red LED on the Control Cabinet and by "Autorecloser Control Faulty status" on the LCD Screen.

Note: If the Control Cabinet fails, then all protection functions shall be blocked from operation.

Issued by: Head of Section, Standards Development

Signed: 

Date: 2024-09-11

Authorized by: Head of Department, Standards

Signed: 

Date: 2024-09-11



TITLE:
**12kV VACUUM AUTORECLOSERS
 (POLE MOUNTED) – SPECIFICATION**

Doc. No.	KPD/300/01/CSP/11/012
Issue No.	6
Revision No.	1
Date of Issue	2024-09-11
Page 15 of 42	

4.5.2.10 **Autorecloser Control Safety:** The autorecloser control shall have a door on the front, which is lockable with a padlock to prevent unauthorized access to the control unit. The Standard Kenya Power Padlock will be used for this purpose.

4.5.2.11 **Communication Port:** The autorecloser control shall be provided with either a RS232, USB or Ethernet port (RJ45) port for ease of configuration and programming of settings in the unit and downloading of data from the unit via a laptop computer. Twelve (12) cables for connecting a laptop to the control unit shall be supplied with the Autoreclosers.

4.5.3 Software

4.5.3.1 **Software for Autorecloser control:** The necessary software for installation on Laptop computers to facilitate communication with the autorecloser Control Unit for configuration of the unit and programming protection & control settings, and for viewing, downloading and analysing data and records (Event, Fault and Disturbance) from the autorecloser Control Cabinet shall be provided.

4.5.3.2 Copies of the latest operating systems shall be supplied with the Auto-reclosure software. The portable storage devices of flash memory storage with USB plug-in provision in which the software will be supplied shall clearly be labelled.

4.5.3.3 The software shall provide for at least two password-controlled user levels.

4.5.3.4 **Software manuals:** The copies of the supplied software shall include manuals that describe the software installation procedure and the application for programming the settings and configurations for the control unit. The manual shall also detail how to download data for interruption and disturbance analysis. The manual shall be both in hardware print and software versions. The software and subsequent upgrades if any shall be free and easily downloadable from the manufacturer's website.

4.5.4 Laptops

4.5.4.1 Four (4) New Laptop computers loaded with the latest version of the Windows Operating System and the autorecloser software program shall be prepared for use during acceptance testing and shall be delivered together with the Autoreclosers for use by Kenya Power Engineers/Technicians in commissioning and operations and maintenance of the autorecloser units.

4.5.4.2 Technical Specifications for Laptop Computer

Description	Mandatory Minimum Requirements
Processor	Intel Core i7-5500 (2.60GHz 1600MHz 3MB, 2 Cores)

Issued by: Head of Section, Standards Development

Authorized by: Head of Department, Standards

Signed:

Signed:

Date: 2024-09-11

Date: 2024-09-11

RAM	8GB 1600 MHz DDR3L
Operating System	Windows 11 Pro 64 bit
Hard Disk	512 GB SSD
Display Panel	15 inches
Graphics	Intel HD Graphics
Internal Audio	Integrated HD audio
Description	Mandatory Minimum Requirements
Security	Security Lock Slot plus steel cable with a combination lock
Interfaces	Multi-Media Card (MMC) compatible, 1 USB 2.0 port, 2 USB 3.0 ports, 1 Ethernet port, 1 HDMI port, Bluetooth, Wi-Fi enabled.
Keyboard	Standard Keyboard
Mouse	External USB Mouse
Warranty	12 Months
Power Supply	230V AC, 50 Hz, British plugs
Carrying Case	Genuine leather Carrying Case
Manufacturer's Authorization	a) Manufacturers Authorization Certificate/ Letter and for the models quoted, the principal (Manufacturer) MUST have an established regional office in Kenya.

4.5.5 Control Cabinet

4.5.5.1 **Default Display on LCD:** This shall be selectable. However preferred default screen shall be instantaneous values of Current, Voltage (phase to phase and phase to ground), Total Power, Active Power, Reactive and Power Factor measurements.

4.5.5.2 **Autorecloser Lockout:** An LED shall be provided to indicate autorecloser lockout. Also, this status shall be displayed on the LCD Screen of the autorecloser control.

4.5.5.3 **External Trip Accessory:** This feature shall be included in the control cabinet, to enable the autorecloser to be tripped via an external signal/command and shall be wired to the Terminal block of the Control Cabinet for external connection. This shall allow the autorecloser to be tripped by the Transformer mechanical protection functions such as Buchholz trip.

4.5.5.4 The auxiliary DC supply to be used for the external trip input shall be 24V DC according to Table 6 of IEC 62271-1:2017. Alternatively, a dry input contact can be configured to actuate the auto recloser trip and lockout. Other alternative methods of actuating the external trip command shall also be considered, provided that a satisfactory trip by external

Issued by: Head of Section, Standards Development

Signed: 

Date: 2024-09-11

Authorized by: Head of Department, Standards

Signed: 

Date: 2024-09-11

command is demonstrated. The switchgear operation may be designed with capacitor-supported magnetic actuator technology.

4.5.5.5 **Remote Close Accessory:** This feature shall be included in the Control Cabinet to enable the autorecloser to be operated from a remote position and shall be wired to the terminal block of the control Box for external connection.

4.5.5.6 **Autorecloser Auxiliary Contacts:** One set each of NO and NC auxiliary contacts of the autorecloser shall be wired to the terminal board of the control box for remote/supervisory indication of the autorecloser open/close status.

4.5.5.7 **SCADA Facility:** This feature is required to allow remote open/close control of the autorecloser and to monitor the status of the autorecloser and transmit data such as measurements, fault details, events list, etc., to the control centre. The autorecloser shall be resourced to provide for SCADA integration using a standard protocol, IEC61870-4-103.

4.5.6 **Battery**

4.5.6.1 The autorecloser control unit shall be powered by a sealed maintenance-free rechargeable battery, having a minimum of 5 years of service life. The battery auxiliary AC charging supply will be from an external auxiliary supply source. The charger and the control unit shall be suited to the auxiliary power supply rated at 230V AC \pm 12.5%, -20%, 50Hz. A higher tolerance will be most suited.

4.5.6.2 The battery shall provide a controlled supply to operate (open/close) the auto recloser primary unit (circuit breaker). Calculations shall be provided showing how many open/close operations a fully charged battery can perform without getting discharged. The battery hold-up time shall be at least 8 hours.

4.5.6.3 Battery low voltage alarm shall be displayed on the HMI and be provided for remote indication.

4.5.7 **LV Surge Arrester**

4.5.7.1 An LV surge Arrester shall be supplied with each autorecloser control unit and mounted inside the control cabinet.

4.5.7.2 This LV surge arrester will ensure that the autorecloser control unit power supply and electronics are fully protected from auxiliary power supply surges and sustained LV overvoltage.

4.5.7.3 The technical details of the LV surge arrester and its performance shall be stated.

Issued by: Head of Section, Standards Development

Signed: 

Date: 2024-09-11

Authorized by: Head of Department, Standards

Signed: 

Date: 2024-09-11



TITLE
12kV VACUUM AUTORECLOSERS
(POLE MOUNTED) – SPECIFICATION

Doc. No.	KPI/EDM/GI/TSF/11/012
Issue No.	0
Revision No.	1
Date of Issue	2024-09-11
Page 18 of 62	

4.5.7.4 Compatibility between Autorecloser Tank and Autorecloser Control Cabinet: Any control box shall work with any autorecloser Tank, without any limitation and achieve the declared functionality. Cases, where a given control box is calibrated and programmed to only work with a specific autorecloser Tank to achieve the declared performance, shall not be accepted.

4.5.8 Protection and Control Functions

The following Protection Functions shall be provided in the control cabinet.

4.5.8.1 Three-Phase Over-Current Protection

The overcurrent function protection shall be equipped with three protection elements as follows:

- 4.5.8.1.1 Low set element with overcurrent setting range of 20 Amps to 1200 Primary Amps and a time multiplier setting range of at least 0.01 to 2.0.
- 4.5.8.1.2 A set of inverse time characteristics shall be available for selection, including, but not limited to Standard Inverse, Very Inverse, Extremely Inverse, and Long time Inverse curves as per IEC 60255 and ANSI IEEE standard.
- 4.5.8.1.3 Two-stage high-set elements with a current setting range of 20-1500/2000 Amps primary and definite time delay setting of 0 – 120 seconds.
- 4.5.8.1.4 Directional elements shall be freely assigned to any element so that the autorecloser shall be able to detect and operate for faults in both the forward and the reverse directions. This will also ensure that Autoclosers can be used to protect a distribution ring Feeder.
- 4.5.8.1.5 The directional feature is to be separately assigned to each overcurrent protection element and shall be either: Forward, Reverse or Non-direction.

4.5.8.2 Earth Fault Protection Function

The Earth Fault protection function shall be equipped with three elements as follows:

- 4.5.8.2.1 Low set element with setting range of 20 Amps to 1200 Primary Amps and a time multiplier setting range of at least 0.01 to 2.0.
- 4.5.8.2.2 A set of inverse time characteristics shall be available for selection, including, but not limited to Standard Inverse time, Very Inverse time, Extremely Inverse time and Long-time Inverse curves as per IEC 60255 standard and ANSI IEEE standards.
- 4.5.8.2.3 Two-stage high-set elements with a current setting range of 20-1500/2000 Amps primary and definite time delay settings of 0 – 120 seconds.

Issued by: Head of Section, Standards Development

Signed:

Date: 2024-09-11

Authorized by: Head of Department, Standards

Signed:

Date: 2024-09-11



TITLE:
**12kV VACUUM AUTORECLOSERS
(POLE MOUNTED) – SPECIFICATION**

Doc. No.	KPL/13D-47/ESP/11/012
Issue No.	0
Revision No.	1
Date of Issue	2024-09-11
Page 19 of 42	

4.5.8.2.4 Directional element shall be freely assigned to any element so that the autorecloser shall be able to detect and operate for faults in both the forward and the reverse directions. This will also ensure that Autoreclosers can be used to protect a distribution ring feeder.

4.5.8.2.5 The directional feature to be assigned to each Earth fault protection element shall be, either, Forward, Reverse or Non-direction.

Note: For both Overcurrent and Earth Fault functions, provision shall be made for programming of custom-made fault current-time curves to enhance the coordination of the unit with existing relays, Autoreclosers and fuses.

4.5.8.3 Sensitive Earth Fault Function

4.5.8.3.1 Sensitive Earth Fault function shall be provided with definite time characteristics. The setting range shall cover the range of 1 – 40 Amps, the primary setting. A definite time delay of 0– 60 seconds shall be provided.

4.5.8.3.2 The SEF protection element shall be assigned a directional feature, of forward, reverse or non-direction.

4.5.8.3.3 The Earth Fault and the Sensitive Earth Fault functions shall be provided with harmonic restraint to prevent operation when harmonics are present in the primary residual Earth fault currents.

Note: Higher/wider settings range for Amps, TMS or definite time delay for overcurrent, earth fault and/or sensitive earth fault beyond the ranges given above are acceptable.

4.5.8.4 Cold Load Pick-up Function

4.5.8.4.1 A cold load pick-up feature shall be incorporated to allow successful energization of the protected feeder following long periods of power outage, hence loss of load diversity.

4.5.8.4.2 Appropriate selectable settings range for, Cold Load Multipliers, Cold Load Recognition Time and Cold Load Time, will be provided.

4.5.8.5 Inrush Feature

4.5.8.5.1 An Inrush feature shall be provided to prevent feeder trip during energization and autorecloser auto-reclose operation due to inrush currents associated with transformers, motor start currents and others.

4.5.8.5.2 A suitable settings range shall be provided for the Inrush Restraint Multiplier and the Inrush Restraint Time.

Issued by: Head of Section, Standards Development

Signed:

Date: 2024-09-11

Authorized by: Head of Department, Standards

Signed:

Date: 2024-09-11



TITLE:
**12kV VACUUM AUTORECLOSERS
(POLE MOUNTED) – SPECIFICATION**

Doc. No.	KPLD3D4/LTSP/11/012
Issue No.	0
Revision No.	1
Date of Issue	2024-09-11
Page 20 of 42	

4.5.8.6 Auto reclose Function

- 4.5.8.6.1 The Sequence of trip and auto-reclose characteristics for Overcurrent, Earth fault and SEF functions, shall be freely programmable to enable the selection of any combination of the available elements for each trip in the trip and reclose functions.
- 4.5.8.6.2 Only operation of the selected protection functions shall lead to successful auto reclose following each trip.
- 4.5.8.6.3 Auto reclose of up to four shots shall be provided and shall be initiated by any of the above protection functions which are selected to do so for each auto reclose shot.
- 4.5.8.6.4 The tripping curves for each stage of the auto-reclose sequence shall be programmed separately for over-current and earth fault protection.
- 4.5.8.6.5 The dead time shall be freely programmable for each reclose sequence. Appropriate time settings range for reclaim time shall be provided.
- 4.5.8.6.6 Following the manual close of the autorecloser, the auto-reclose sequence shall only be enabled after the expiry of the set reclaim time.
- 4.5.8.6.7 Following a successful autorecloser trip and auto-reclose, the full reclose sequence shall be enabled after the expiry of the reclaim time.

4.5.8.7 Control unit functions/features

- 4.5.8.7.1 The battery for the control box shall be rechargeable.
- 4.5.8.7.2 The charger circuit shall accept input from a single-phase distribution transformer rated at 230V AC, 50Hz with a tolerance of +12.5% and -20%.

4.5.8.8 Software Functions/Features

- 4.5.8.8.1 Number of trips to lock out shall be selectable from the menu.
- 4.5.8.8.2 Operations counters for each Phase and Earth Fault and Sensitive Earth Fault.
- 4.5.8.8.3 Fault Records logging: with date, time, faulted phase, fault current and fault duration of the fault.

4.6 Energy and Power Measurements

- 4.6.1 The Autoreclosers offered shall be equipped with instantaneous measurements for various parameters as well as energy measurements. The following measurements shall be provided:
- (i) Instantaneous values: rms phase current, rms phase to phase and phase to ground voltage, three-phase KVA, KW, KVAR and power factor.

Issued by: Head of Section, Standards Development

Signed:

Date: 2024-09-11

Authorized by: Head of Department, Standards

Signed:

Date: 2024-09-11



TITLE:
**12KV VACUUM AUTORECLOSERS
 (POLE MOUNTED) – SPECIFICATION**

Doc. No.	KP/133/41/TSP/11/011
Issue No.	0
Revision No.	1
Date of Issue	2024-09-11
Page 71 of 43	

- (ii) **Maximum Demand values:** KW, KVA, I, KVAR with Date and Time stamps of occurrence.
- (iii) **Energy measurements:** KWh & KVARh, Cumulative.

4.7 Operation

In addition to trip/close push buttons provided on the control unit, the control of the autorecloser shall be enabled in the software for control through a Laptop computer or a remote connection such as SCADA.

4.8 Events and Fault Records Lists

- 4.8.1 The unit shall also generate a sequence of events (time-tagged) for all operations, Auto and Manual and System status (e.g. supply failure etc.).
- 4.8.2 When tripping of the unit occurs, the protection function responsible for the trip, phase(s) affected, fault current magnitudes, fault duration, date and time (up to a hundredth of a millisecond) of the trip, shall be displayed on the LCD screen and shall remain on the screen until reset via a reset button on the control unit.
- 4.8.3 These details shall also be available in the events list and the fault records list and accessible by use of a laptop computer.

4.8.4 Events Log

Each event whether generated by manual or automatic operation of the autorecloser control, shall have the following details:

- (i) Serial no.
- (ii) Date of occurrence (DD:MM: YY)
- (iii) Time of occurrence; up to millisecond level and
- (iv) The phase affected and the magnitude of the current.

4.9 Auxiliary Power Supply

- 4.9.1 The auxiliary supply for the autorecloser control shall be from a voltage transformer(VT) whose design and manufacturing shall meet the requirements of IEC 61896-3
- 4.9.2 The Ratio and Power rating of the power VT shall be 11kV/220 VAC, 500VA Limit output and a Minimum burden of 200VA or other higher rating adequate to meet the auxiliary supply requirement for the autorecloser control.
- 4.9.3 The manufacturer shall specify the AC Power burden of the autorecloser control.
- 4.9.4 The VT will be delivered with the mounting frame. The secondary wiring of the VT shall be protected against short circuits with suitably rated fuses mounted on the VT secondary terminal box.

Issued by: Head of Section, Standards Development	Authorized by: Head of Department, Standards
Signed:	Signed:
Date: 2024-09-11	Date: 2024-09-11



TITLE:
**12kV VACUUM AUTORECLOSERS
(POLE MOUNTED) – SPECIFICATION**

Doc. No.	KP/12041/2SP/1/012
Issue No.	0
Revision No.	1
Date of Issue	2024-09-11
Page 22 of 43	

4.10 DC Voltage

- 4.10.1 Upon loss of 230V AC auxiliary supply, a battery shall power the electronics and supply control of the auto recloser for at least 8 hours.
- 4.10.2 The battery capacity shall be >25Amp-hour and this shall be demonstrated during factory acceptance testing in the presence of KPLC Engineers.
- 4.10.3 The normal life of the battery shall be at least 5 years.
- 4.10.4 The supplier shall provide KPLC with a written guarantee for the batteries of at least 5 years.

4.11 Technical Literature and Drawings

- 4.11.1 Detailed manuals and catalogues with all relevant technical literature and relevant drawings required for understanding the performance and application of the whole autorecloser unit and all that is required for correct installation of the autorecloser and the Control Cabinet as well as configuration and protection and control parameter settings on the control cabinet, including test and commissioning of the complete autorecloser unit, and effective performance of FAT tests, to correctly and safely put the autorecloser unit into service shall be provided.
- 4.11.2 The manuals shall also provide details for the operation and maintenance of the whole autorecloser unit.
- 4.11.3 A separate specific manual for providing step-by-step procedures for the installation, test and commission of the autorecloser unit shall be provided.
- 4.11.4 Instructions for diagnosis and identification of faults and repair for minor faults as well as replacement procedures for failed components/units shall be well documented in the technical literature provided with the autorecloser units.
- 4.11.5 One Complete set of the literature and drawings shall be provided with the tender bid, for purposes of tender evaluation.

Issued by: Head of Section, Standards
Development

Signed:

Date: 2024-09-11

Authorized by: Head of Department, Standards

Signed:

Date: 2024-09-11



TITLE:
**12KV VACUUM AUTORECLOSERS
(POLE MOUNTED) – SPECIFICATION**

Doc. No.	KP/13DM/1/ISS/11/012
Issue No.	1
Revision No.	1
Date of Issue	2024-09-11
Page 23 of 42	

5.0 APPENDICES

APPENDIX A: TESTS AND INSPECTION (NORMATIVE)

A.1. The autorecloser shall be tested in accordance with IEC 62271-111, IEC 60529, ANSI C37.60:2012, ISO 1461 and the requirements of this specification. It shall be the responsibility of the manufacturer to perform or to have performed all the relevant tests. Routine tests shall be carried out on every autorecloser.

A.2. **Type Tests:** Certificates of type test reports as per relevant IEC standards shall be submitted with the tender bid for purposes of tender evaluation. This shall include: -

- (i) Dielectric Tests
- (ii) Rated Symmetrical Interruption Test
- (iii) Making currents
- (iv) Partial Discharge Test
- (v) Temperature rise test
- (vi) Mechanical operations test
- (vii) Control electronic elements surge withstand capability tests
- (viii) Accelerated weathering test in accordance with IEC 62217 (on bushing insulators)
- (ix) Radio Interference Voltage Test
- (x) Short Time Peak Withstand Current
- (xi) Tightness Test
- (xii) Dielectric Test on Auxiliary & Control Circuit

A.3. The test certificates shall be from an accredited reputable independent testing laboratory, acceptable to the purchaser. Proof of accreditation by a national/international authority shall be forwarded with the offer. Test reports shall be complete including all the pages as issued by the testing authority. Submission of only Parts of test reports shall not be acceptable.

A.4. Copies of previous type test reports by the relevant International or National Testing Standards Authority of the country of manufacture (or ISO/IEC 17025 or ILAC accredited independent laboratory) shall be submitted with the tender for evaluation (all in the English language). A copy of the accreditation certificate for the laboratory shall also be submitted.

A.5. **Routine Tests:** Certificates of routine test reports as per relevant IEC standards shall be submitted with the tender bid for purposes of tender evaluation. This shall include: -

- (i) Dielectric Test on the Main circuit

Issued by: Head of Section, Standards Development

Signed:

Date: 2024-09-11

Authorized by: Head of Department, Standards

Signed:

Date: 2024-09-11



TITLE:
**12kV VACUUM AUTORECLOSERS
(POLE MOUNTED) – SPECIFICATION**

Doc. No.	KPI/13DA/1/TSM/11/013
Issue No.	6
Revision No.	1
Date of Issue	2024-09-11
Page 24 of 42	

- (ii) Measurement of the resistance of the main circuit.
- (iii) Partial Discharge Test
- (iv) Temperature rise test
- (v) Mechanical operations test
- (vi) One-minute power frequency withstand test for the autorecloser control cabinet.

A.6. The test certificates shall be from an accredited testing laboratory, acceptable to the purchaser. Proof of accreditation by a national/international authority shall be forwarded with the offer. Test reports shall be complete including all the pages as issued by the testing authority. Parts of test reports shall not be acceptable.

A7. Factory Acceptance Test(FAT)

A7.1 Kenya Power shall conduct compulsory inspection of all major components and accessories at the manufacturer's factory, and thereafter post-delivery to selected sites, installation, testing, and commissioning. This testing shall include, but not be limited to, verification of controls, logic, drives, releases, failover functions, monitoring and signalling functions, etc.

A7.2 Upon completion of manufacturing, the Autoreclosers shall be subject to acceptance tests at the manufacturer's works before dispatch. Acceptance tests shall be witnessed by two or more Engineers appointed by The Kenya Power and Lighting Company Plc. (KPLC.)

A7.3 The manufacturer/supplier shall give one month's notice to Kenya Power on intended dates to conduct the Factory Acceptance Tests (FATs). The Supplier shall further provide letters of invitation to the Kenya Power Engineers nominated to attend the FATs

A7.4 During FATs, thirty (30%) per cent of all Autoreclosers manufactured shall be subject to the Factory Acceptance Tests in the presence of KPLC Engineers. The Autoreclosers shall be randomly selected via their serial numbers by the KPLC Engineers who will attend the FATs. If failure of any component is witnessed during the FATs, then the number of autoreclosers to be tested during the FATs shall be increased to forty (40%) per cent of the total manufactured units.

A7.5 The following tests shall be conducted on all the sampled manufactured units and all the other units:

- (i) Dielectric Test on the Main circuit
- (ii) Measurement of the resistance of the main circuit
- (iii) Partial Discharge Test
- (iv) Temperature rise test
- (v) Mechanical operations test

Issued by: Head of Section, Standards Development

Signed:

Date: 2024-09-11

Authorized by: Head of Department, Standards

Signed:

Date: 2024-09-11



TITLE:
**12kV VACUUM AUTORECLOSERS
(POLE MOUNTED) – SPECIFICATION**

Doc. No.	KPL/132-41/TSP/11.012
Issue No.	6
Revision No.	1
Date of Issue	2024-09-11
Page 25 of 42	

- (ii) One-minute power frequency withstand test for the autorecloser control cabinet;
- (iii) All Protection functions;
- (iv) Creepage measurements;
- (v) Phase-Phase and Ph-Earth Clearances measurements;
- (vi) Battery Capacity Tests.

A8: Inspection and Acceptance

- A8.1. On receipt of the auto recloser, KPLC will carry out Acceptance Inspections which may involve performing tests to verify compliance of the equipment with this specification.
- A8.2. The supplier shall replace/rectify without charge to KPLC, any equipment which upon inspection and test fails to meet any requirements in this specification.

APPENDIX B: WARRANTY

- B.1. The supplier/manufacturer warrants the purchaser that all goods supplied under this contract shall have no defect arising from design, materials or workmanship.
- B.2. A warranty of 5 years from the date of delivery of the Autoreclosers to KPLC store shall be offered by the manufacturer for the autorecloser.
- B.3 Any electronic parts/modules found to have failed at commissioning or while the autorecloser is in service or store during this warranty period shall be replaced free of charge by the manufacturer/supplier.

APPENDIX C: MARKINGS AND NAMEPLATE

- C.1. The autorecloser tank bushings shall be marked to indicate the normal source side and the load side of the autorecloser, with indelible markings that will last the lifetime of the autorecloser.
- C.2. A Rating plate shall be provided on the autorecloser tank and the controller using a non-ferrous material that shall be weather and corrosion-resistant. Stainless steel is preferred, with the following details, engraved, indelibly stamped or etched.
 - (i) Manufacturer's Name
 - (ii) Manufacturer type or Identification Number
 - (iii) Serial Number
 - (iv) Date of Manufacture
 - (v) Equipment rated Maximum Voltage
 - (vi) Rated Continuous Current
 - (vii) Rated Symmetrical Interrupting Current capacity and withstand time
 - (viii) Rated Power frequency withstand Voltage

Issued by: Head of Section, Standards
Development

Signed:

Date: 2024-09-11

Authorized by: Head of Department, Standards

Signed:

Date: 2024-09-11



TITLE:
**12kV VACUUM AUTORECLOSERS
(POLE MOUNTED) – SPECIFICATION**

Doc. No.	KPU/SD/CI/ISP/11/012
Issue No.	6
Revision No.	1
Date of Issue	2024-09-11
Page 26 of 62	

- (ix) Rated Impulse Withstand Voltage
- (x) Kenya Power & Lighting Co. Ltd.

C.3. The name plate shall be mounted clear of live parts in a position that can be read while the autorecloser is in service, without compromising the safety of personnel.

APPENDIX D: MANUFACTURERS' RECOMMENDED SPARES

- D.1. The manufacturer shall provide a list of recommended spare parts to ensure that the Autoclosers provide failure-free service for at least 10 years. List of spares shall be supported by Mean Time Before Failure(MTBF) calculations
- D.2. The cost of the recommended spares shall be indicated separately on the bid price as an option. The cost of one unit of recommended spare(s) shall be indicated, as well as the total price. The battery shall be included in the list of recommended spares.
- D.3. The purchaser shall decide whether to accept all, part or none of the offered spares.

APPENDIX E: QUALIFICATION OF THE MANUFACTURER (NORMATIVE)

- E.1. The manufacturer whom shall be considered for tender award shall among other requirements outlined in the bidding fulfil the following requirements:
- E.2. **Quality Assurance:** The manufacturer shall possess a valid ISO 9001:2015 or later quality assurance certification for the manufacture of the Autoclosers for the factory where the autocloser units are to be manufactured. This shall cover the duration of manufacture and delivery of the autocloser units. The bidder shall furnish a copy of the ISO certificate certified as a true copy of the original together with the tender bid.
- E.3. **Manufacturing Experience:** The manufacturer of the autocloser shall have minimum of 12 years' experience in the manufacture of the autocloser. The manufacturer shall provide evidence of overseas sales.
- E.4. **Letters of Customer Satisfaction:**
Reference letters from four (4) overseas customers for the particular autocloser offered in this tender shall be furnished with the bid. The reference letters shall bear the rubber stamp of the purchasing utilities and the name and signature of the author of the letter.
- E.5. **Previous Performance:**
Autoclosers with previous poor performance in Kenya Power shall not be considered.

Issued by: Head of Section, Standards Development

Signed:

Date: 2024-09-11

Authorized by: Head of Department, Standards

Signed:

Date: 2024-09-11



TITLE:
**12kV VACUUM AUTORECLOSERS
(POLE MOUNTED) – SPECIFICATION**

Doc. No.	KPI/ITD/41/TSP/11/012
Issue No.	6
Revision No.	1
Date of Issue	2024-09-11
Page 27 of 43	

APPENDIX F: TRAINING (NORMATIVE)

F.1 Training at Manufacturers Premises

- (a) During the factory acceptance testing (FAT), the manufacturer shall conduct complete training for the complete autorecloser and the control box for KPLC Engineers/Technicians.
- (b) This shall include theory on how the equipment works followed by practical demonstrations. All the operational, protection and control features of the Tank and the control Box shall be exhaustively explained and demonstrated, including the operation of the interface software.
- (c) The manufacturer shall plan adequate time for the training separate from the FATs. The duration of the training shall however not be less than three (3) eight hour working days. The employer may send a separate team from the team witnessing the FATs to attend the training. The duration and the cost of the training shall be indicated in the bid.
- (d) The Training shall be considered to have been successful once the engineers/Technicians are able to:
- (i) Competently carry out all the operations on the autorecloser Tank and Control cabinet
 - (ii) Correctly install the equipment, including effective earthing of the tank and the control box
 - (iii) Establish communication from a laptop to the control box and carry out complete parameter settings and download and analyse data
 - (iv) Trouble shoot and analyze and rectify any minor breakdowns that may occur, including safe replacement of parts/modules and recommissioning of the autorecloser units back to service.
- (e) The manufacturer shall conduct evaluation tests and give a feedback report on the training to the employer for each of the Engineers/Technicians. The Engineers/Technicians shall receive relevant Competency/Authorisation certificates to carry out the said works.

F.2 Local Training In Kenya

- F2.1 Following the delivery of the equipment, the manufacturer shall conduct complete training for the complete autorecloser and the control box for a total of 30No. KPLC Engineers/Technicians, in Nairobi Kenya. The training shall be conducted in two sessions each lasting at least 3 days.
- F2.2 The Training shall include theory on how the equipment works followed by practical demonstrations on operation and protection and control configuration and parameter settings. All the operational, protection and control features of the Tank and the control Box shall be exhaustively explained and demonstrated, including the operation of the interface software.
- F2.3. The Training shall be considered to have been successful once the Engineers/Technicians are able to: -
- (i) Competently carry out all the operations on the equipment.

Issued by: Head of Section, Standards
Development

Signed:

Date: 2024-09-11

Authorized by: Head of Department, Standards

Signed:

Date: 2024-09-11



TITLE:
**11kV VACUUM AUTORECLOSERS
(POLE MOUNTED) – SPECIFICATION**

Doc. No.	KPLD/01/41/TSP/11/012
Issue No.	6
Revision No.	1
Date of Issue	2024-09-11
Page 25 of 02	

- (ii) Correctly install the complete equipment, including effective earthing of the tank and the control box.
- (iii) Establish communication from a laptop to the control box and carry out complete configuration, parameter settings and download and analyse data from the control box.
- (iv) Trouble shoot and analyse and rectify any minor breakdowns that may occur.
- (v) To ensure that the installation and commissioning of the Autoreclosers is carried out correctly, the manufacturers' Technical staff shall supervise the installation of two autorecloser units on two selected 11kV feeders in Kenya.
- (vi) This event shall be arranged to follow immediately after the local training to optimize on the resources.

APPENDIX G: DOCUMENTATION (NORMATIVE)

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

- a) Guaranteed Technical Particulars signed by the manufacturer;
- b) Copies of the Manufacturer's catalogues, brochures, and technical data sheets (including ratings) for 11kV Autoreclosers, the complete assembled unit and layout drawings. Mechanical drawings on the design and construction of the autorecloser shall also be submitted;
- c) Detailed drawing and step by step procedure for safe installation and correct commissioning process of the autorecloser. This shall include the recommended maximum earthing resistance values for safe operation of the autorecloser control and the autorecloser tank.
- d) Sales records for the last five years and at least four customer reference letters;
- e) Details of manufacturing capacity and the manufacturer's experience;
- f) Copies of required type test reports by a third-party testing laboratory accredited to ISO/IEC 17025;
- g) Copy of accreditation certificate to ISO/IEC 17025 for the third-party testing laboratory;
- h) Manufacturers letter of authorization, ISO 9001:2015 certificate and other technical documents required in the tender.

G.2. The successful bidder (supplier) shall submit the following documents/details to The Kenya Power & Lighting Company for approval before manufacture:

- a) Fully filled clause by clause Guaranteed Technical Particulars (GTP) signed by the manufacturer;
- b) Design drawings and technical details;
- c) Quality assurance plan (QAP) that will be used to ensure that the design, material, workmanship, tests, service capability, maintenance and documentation will fulfil the requirements stated in the

Issued by: Head of Section, Standards Development

Signed:

Date: 2024-09-11

Authorized by: Head of Department, Standards

Signed:

Date: 2024-09-11



TITLE:
**12KV VACUUM AUTORECLOSERS
(POLE MOUNTED) – SPECIFICATION**

Doc. No.	KPL/13DN/1-TRP/11/012
Issue No.	6
Revision No.	1
Date of Issue	2024-09-11
Page 29 of 42	

contract documents, standards, specifications and regulations. The QAP shall be based on and include relevant parts to fulfil the requirements of ISO 9001:2015 or later;

- d) Detailed test program to be used during factory testing;
- e) Marking details;
- f) Packaging details (including packaging materials and marking and identification of hatches). The Autoclosers shall be packaged for outdoor storage in tropical conditions. The manufacturer shall state the maximum acceptable storage duration for the complete autocloser unit.
- g) 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 Autoclosers for The Kenya Power & Lighting Company.

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

————— Space Intentionally Left blank —————

Issued by: Head of Section, Standards
Development

Signed:

Date: 2024-09-11

Authorized by: Head of Department, Standards

Signed:

Date: 2024-09-11



TITLE:
**12kV VACUUM AUTORECLOSERS
 (POLE MOUNTED) – SPECIFICATION**

Doc. No.	KPL/3D/4/UTSP/11/012
Issue No.	0
Revision No.	1
Date of Issue	2024-09-11
Page 30 of 42	

APPENDIX M: GUARANTEED TECHNICAL PARTICULARS (NORMATIVE)

To be filled, all clauses stamped and signed by the Manufacturer and submitted together with relevant copies of the Manufacturer's catalogues, brochures, drawings, technical data, sales records, four customer reference letters, details of manufacturing capacity, the manufacturer's experience and copies of complete type test reports for tender evaluation and for approval before manufacture, all in English Language.

Tender No.

CLAUSE	DESCRIPTION	KPLC'S REQUIREMENT	MANUFACTURERS/ BIDDERS' OFFER	Remarks
01	Manufacturer's name and address	Bidder to state		
02	Model or Type Reference Number of autorecloser offered	Bidder to state		
03	Applicable manufacturing standards	Bidder to state		
4.1.1, 4.1.4	Operating Service conditions	Bidder to state guaranteed conditions		
4.2	General requirements			
4.2.1	Type of autorecloser and mounting options	Out door and II or Single pole mounting	Specify	
4.2.2	Autorecloser tank material	Stainless steel or Aluminium alloy, UV-protected	Specify	
4.2.3	Arc interruption and insulation	Vacuum interruption, Solid or air insulation.	Specify	
4.2.4	Breaking duty curve for the vacuum interrupter & Remaining percentage contact wear	Recorded in the Control Cabinet and accessible on the HMI	Provide	
4.2.5	Reprogramming a new Control Cabinet to work with existing autorecloser tank	To detail the programming	Specify	
4.2.6	Brackets for fixing surge diverters		Provide	
4.2.7	Mounting brackets for Autorecloser and control cabinet		Provide	

Issued by: Head of Section, Standards Development

Signed:

Date: 2024-09-11


Authorized by: Head of Department, Standards

Signed:

Date: 2024-09-11

4.2.8	Adequate to carry the weight of Autorecloser and control cabinet		Provide	
4.2.9-4.2.10	Status Indication	Mechanical indicator visible from ground	State	
4.2.11-4.2.12	Inbuilt current transformers and ratings	provide 630A and STC of 23 kA	Specify	
4.2.13	Material of conductive parts	Electrolytic high conductivity copper with the contacts silver-plated	Specify	
4.2.14-4.2.16	Local Mechanical trip facility.	Tank with electrical and mechanical interlocks	Provide	
4.2.17-4.2.20	HV bushing, material creepage distance,	Vermin bird proof, HCEP or silicon rubber, (UV treated) EMC compatibility creepage: 372mm	Specify	
4.2.21	Primary terminal clamps	Bimetallic for ACSR conductor of $\Phi 20\text{mm}$	Specify	
4.2.24-4.2.26	Clearances, Mounting brackets, lifting lugs	With safety factor of 2.	Provide	
4.2.27-4.2.29	Surge arrester bracket and earthing points	Tank surface and clear current path	Provide	
4.3	Operating mechanisms			
4.3.1-4.3.2	Operating mechanisms and number of trips in a cycle	Magnetic actuator (multi-shot auto-reclosing), 4 trips and auto-reclose. (state the cycle)	Specify	
4.3.3	Autorecloser Lockout link	Tank surface	Specify	
4.3.4	Operation counters	In the Autorecloser Control Cabinet	Specify	
4.3.5-4.3.6	Padlocking facility and degree of protection	Features and IP65 as per IEC 60529.	Specify	
4.3.7-4.3.8	Number of Autorecloser tank operations to the first maintenance.	Breaking curves	Provide	
4.4	Ratings			
	System Nominal Voltage & Frequency		Specify	
	System highest operating voltage	Bidder to state (after altitude correction)	Specify	

Issued by: Head of Section, Standards Development

Signed: 

Date: 2024-09-11

Authorized by: Head of Department, Standards

Signed: 

Date: 2024-09-11



TITLE:
**12kV VACUUM AUTORECLOSERS
 (POLE MOUNTED) – SPECIFICATION**

Doc. No.	KIP/1338-6/13/SP/11/012
Issue No.	0
Revision No.	1
Date of Issue	2024-09-11
Page 22 of 42	

Rated Continuous Current carrying capacity	630A	Specify	
Short Time Withstand Current & Time	21kA, for 3Secs	Specify	
Control Box enclosure [IP] class of protection [attach type test certificate]	≥IP65	Specify	
Rated power frequency withstand voltage; 50Hz-60Hz, wet [attach routine test report]	38kV (bidder to apply altitude correction)	Specify	
Rated lightning impulse withstand voltage, 1.2/50µs +ve, dry [attach type test report]	95kVp (bidder to apply altitude correction)	Specify	
Opening Time	< 15 ms	Specify	
Closing Time	< 60 ms	Specify	
Interrupting Time	< 20 ms	Specify	
Operating Sequence	State	Specify	
Minimum creepage distance of insulator (Heavy Pollution at 31kV/mm)	372mm	Specify	
Minimum clearance	Phase to phase	2500mm	Specify
	Phase to earth	170mm	
Minimum number of Mechanical & Full Load Operations	10,000	Specify	
Weight of the Autorecloser		state	
4.5	Autorecloser Control Cabinet		
4.5.1	General		
4.5.1.1-	Control Cabinet mounting, sealing, and dust proof	IP 65	Specify
4.5.1.2-	Electronic modules	Perform continuous diagnostic monitoring Contain both software and hardware watchdog checking	Specify
4.5.1.4-	Withstand	Equipment can withstand the heating effect of direct solar radiation without causing failure	Specify

Issued by: Head of Section, Standards Development

Signed:

Date: 2024-09-11

Authorized by: Head of Department, Standards

Signed:

Date: 2024-09-11



TITLE:
**12kV VACUUM AUTORECLOSERS
(POLE MOUNTED) - SPECIFICATION**

Doc. No.	KPD/1330/01/TSP/11/012
Issue No.	6
Revision No.	1
Date of Issue	2024-09-11
Page 33 of 42	

		and/or abnormal operation	
4.5.1.5	Bushings marking	To indicate the normal source and load side of the Autorecloser	Specify
4.5.1.6 – 4.5.1.7	Rating plate	Material Details Mounting	Specify Specify Specify
4.5.1.8	Control cabinet	Designed for the service/climate conditions specified, ventilated, door securing devices	Specify
4.5.1.9		Mounting	Specify
4.5.1.10	Control cables	Multicore UV stabilized, EMC compatibility	Specify
4.5.1.11		Connection and bottom entry	Specify
4.5.1.12	Provision for disconnection between Autorecloser and control cabinet		Specify
4.5.1.13	Provision of connection points for the cable on both Autorecloser and control cabinet	Pre-punched and blanked Multi-plug connection point provided on both units, 21mm & 32mm	Specify
4.5.1.14	Earthing stud in the control cabinet		Provide
4.5.1.12	Space for communication equipment		Provide and state size
4.5.1.16	Cabinet heater	Hygrostat control gear	Provide
4.5.1.17	Equipment standard	EMC directive 89/116/EEC, IEC60694 and BS EN 62271	Specify
4.5.1.18	Serial communication port	USB (latest) or RS 232 or Ethernet	Specify
4.5.1.19	Internal socket & MCB	Rated 230VAC	Specify
4.5.1.20	Dust proof drainage filter		Provide
4.5.1.21	Door stay		Provide
4.5.1.22	Drawing		Provide
4.5.2	Control box features		
4.5.2.1	Fully programmable digital (numerical) unit.		Specify

Issued by: Head of Section, Standards Development

Signed:

Date: 2024-09-11

Authorized by: Head of Department, Standards

Signed:

Date: 2024-09-11



TITLE:
**12kV VACUUM AUTORECLOSERS
 (POLE MOUNTED) – SPECIFICATION**

Doc. No.	KPI/CD/41/ESP/11/012
Issue No.	6
Revision No.	1
Date of Issue	2024-09-11
Page 34 of 41	

4.5.2.2-4.5.2.6	LCD Screen	Data entry, retrieval and downloads	Provide	
4.5.2.3	Dimming	Sortable time delay	Specify	
4.5.2.4	Key pad	Functions as per spec	Specify	
4.5.2.5	Control /Functions Keys	To detail and provide as per specification	Specify	
4.5.2.6	Electrical Close Push-button	Functions as per spec	Specify	
4.5.2.7	Electrical Open Push-button	Functions as per spec	Specify	
4.5.2.8	Control Cabinet Healthy Status	Functions as per spec	Specify	
4.5.2.9	Autoreclosers Control Failure	Functions as per spec	Specify	
4.5.2.10	Autoreclosers Control Safety	Per specification	Provide	
4.5.2.11	Communication Port	As per spec	Provide	
4.5.3	Software			
4.5.3.1	Autoreclosers control software	Windows-based	Specify	
4.5.3.2		Provide in memory devices and operational manuals (all in English)		
4.5.3.3		Two passwords		
4.5.3.4		Print and soft Manuals		
4.5.4	Laptop Specification			
4.5.4.1	Number	4	Specify	
4.5.4.2	Technical Specifications			
	Description	Mandatory Minimum Requirements		
	Processor	Intel Core i7-5500 (2.60GHz 1600MHz 3MB, 2 Cores)	Specify	
	RAM	8GB 1600 MHz DDR3L	Specify	
	Operating System	Windows 11 pro 64 bit	Specify	
	Hard Disk	512 GB PCIe NVMe M.2 SSD	Specify	
	Display Panel	15 inches	Specify	
	Graphics	Intel HD Graphics	Specify	
	Internal Audio	Integrated HD audio internal	Specify	
		Memory Stick Pro (MS-Pro) compatible.1 USB 2.0 port, 2 USB 3.0 ports,	Specify	

Issued by: Head of Section, Standards Development

Signed:

Date: 2024-09-11

Authorized by: Head of Department, Standards

Signed:

Date: 2024-09-11



TITLE:
12kV VACUUM AUTORECLOSERS
(POLE MOUNTED) – SPECIFICATION

Doc. No.	KPI/ISD/4/ISP/11/012
Issue No.	6
Revision No.	1
Date of Issue	2024-09-11
Page 35 of 40	

	Interfaces	1 Ethernet port, 1 HDMI port, Bluetooth, Wi-Fi enabled.		
	Pointing Devices	Touchpad with scroll zone, two pick buttons or Point stick, two pick buttons	Specify	
	Keyboard	Standard Keyboard	Specify	
	Mouse	External USB Mouse	Specify	
	Warranty	1 Year or More Warranty	Specify	
	Power Supply	230V AC, 50 Hz, British plugs	Specify	
	Carrying Case	Genuine Leather Carrying Case	State	
	Manufacturer's Authorization	Must have an established regional office in Kenya.	State	
4.5.5	Control Cabinet			
4.5.5.1	Default Display on LCD	To detail and provide as per specifications	Specify	
4.5.5.2	Autorecloser Lockout	To detail and provide as per specifications	Specify	
4.5.5.3	External Trip Accessory	To detail and provide as per specifications	Specify	
4.5.5.4	Auxiliary DC supply	To detail and provide as per specifications	Specify	
4.5.5.5	Remote Close Accessory	To detail and provide as per specifications	Specify	
4.5.5.6	Autorecloser Auxiliary Contacts	To detail and provide as per specifications	Specify	
4.5.5.7	SCADA Facility	To detail and provide as per specifications	Specify	
4.5.6	Battery			
4.5.6.1	DC Battery System	>25 Amp/ hour capacity, should be able to sustain a minimum of 8hrs without charging ac supplies. Battery should have a service life of at least 5 years	Specify	
4.5.6.2	Calculations & hold up time	Provide	Specify	

Issued by: Head of Section, Standards Development

Signed:

Date: 2024-09-11

Authorized by: Head of Department, Standards

Signed:

Date: 2024-09-11



Kenya Power

TITLE:
**12kV VACUUM AUTORECLOSERS
(POLE MOUNTED) – SPECIFICATION**

Doc. No.	KPI/33D/01/ESP/11/012
Issue No.	6
Revision No.	1
Date of Issue	2024-09-11
Page No. of 02	

4.5.6.3	Low voltage alarms	Provide	Specify	
4.5.7	LV Surge Arrestor			
	LV Surge Arrestor	Together with technical and performance details	Provide	
4.5.7.1- 4.5.7.3	Auxiliary Power Supply to the Control Box Nominal: 240Vac, 50Hz	A VT to provide this as per clause 4.6.19.	Specify	
4.5.7.4	Compatibility Between Autorecloser Tank and Autorecloser Control Cabinet	Either Autorecloser or Control Cabinet shall be compatible (Ensure compliance to this requirement)	Specify	
4.5.8	Protection and Control Functions			
4.5.8.1	Three Phase Over-Current Protection			
4.5.8.1.1- 4.5.8.1.5	Relays Operating Characteristics	According to IEC 60255 with at least NI, VI, EI, LTI and DT. Other types of curves like the ANSI curves are acceptable as additional to the IEC curves	Specify	
	Protection Functions Available	Must offer, JOC+EF+SEF+AR as a minimum	Specify	
4.5.8.2	Earth Fault Protection Function			
4.5.8.2.1- 4.5.8.2.5	Setting Ranges for Earth Fault Protection (50N/51N)	I.....300A, 2 stage	Specify	
	Setting Ranges for Sensitive Earth Fault Protection (50N-2/51N-2)	I.....50A, I.....1000Seconds	Specify	
	All other requirements as per 4.5.8.2.1 – 4.5.8.2.5	Detail compliance to all clauses	Specify	
4.5.8.3	Sensitive Earth Fault Functions	Detail compliance to all clauses	Specify	
4.5.8.4	Cold load pick up function	Detail compliance to all clauses	Specify	
4.5.8.5	Inrush feature	Detail compliance to all clauses	Specify	
4.5.8.6	Auto Reclose Function			

Issued by: Head of Section, Standards Development

Signed:

Date: 2024-09-11

Authorized by: Head of Department, Standards

Signed:

Date: 2024-09-11



TITLE:
**12kV VACUUM AUTORECLOSERS
 (POLE MOUNTED) – SPECIFICATION**

Doc. No.	KP/STD/001/SP/1/0012
Issue No.	6
Revision No.	1
Date of Issue	2024-09-11
Page 37 of 42	

4.5.8.6.1- 4.5.8.6.7	Sequence of trip and auto-reclose characteristics	Shall be freely programmable to enable the selections)	Specify	
	Setting Ranges for Auto Reclose Function	1,.....,4 Shots to Lockout Independently selectable for OC & EF	Specify	
	All other requirement	Detail compliance to all clauses	Specify	
4.5.8.7	Control unit functions/features		Specify	
4.5.8.7.1	Battery	Rechargeable		
4.5.8.7.2	Charger input	230V AC, 50Hz Tolerance +12.5% and -20%	Specify	
4.5.8.8	Software Functions/Features	Detail compliance to all clauses	Specify	
4.5.8.8.1	Trips to lock-out	Selectable from the menu		
4.5.8.8.2	Operations counters	For each Phase, Earth Fault and Sensitive Earth Fault	Specify	
4.5.8.8.3	Fault Records logging	With date, time, faulted phase, fault current and fault duration of the fault	Specify	
4.6	Energy and Power Measurements			
	Measurements displayable on the LCD screen			
	Instantaneous values	rms I, V, kW, kVA, kVAR, pf	State	
	Maximum Demand values	KW, KVA, I, KVAR	State	
	Energy measurements	kVARh, kWh		
4.7	Operation	control of Autorecloser through a Laptop or a remote connection such as SCADA	Specify	
4.8	Events & Fault Records Lists			
4.8.1- 4.8.4	LCD screen and MMI for programming and viewing measurements/settings	Should be able to display all the 3 phase and 1 neutral current simultaneously	Specify	

Issued by: Head of Section, Standards Development

Signed:

Date: 2024-09-11

Authorized by: Head of Department, Standards

Signed:

Date: 2024-09-11



Kenya Power

TITLE:
12kV VACUUM AUTORECLOSERS
(POLE MOUNTED) – SPECIFICATION

Doc. No.	KPI/ADM/ITSP/11/012
Issue No.	0
Revision No.	1
Date of Issue	2024-09-11
Page 25 of 41	

		Most of the setting parameters should be editable from the MMI. Should indicate Autorecloser status on the MMI Features to Disable (Enable EF, SEF and AR on the MMI Ability to operate unit from MMI		
	Fault Event Records	At Least 50 events with time and date stamps. Affected phases Magnitude of current and fault duration for each phase.	State	
	SCADA Accessory	Facility for connection to a SCADA system.	Provide	
	Provision for Remote operation of autorecloser facility		Provide	
	Shunt trip accessory		Provide	
4.9	Auxiliary Power Supply			
4.9.1-	Ratio and Power rating of the power VT: 11kV/230 VAC, 500VA (Minimum burden of 200 VA).		Specify	
4.9.4	VT shall be complete with mounting frame.		Provide	
	VT shall be protected against short circuits with suitably rated fuses mounted on the VT secondary terminal box		State protection mode offered	
4.10	DC Voltage			
	The charger shall be supplied with 230 VAC 50Hz. Battery shall power the electronics and provide supply for control of the auto recloser for at least 8 hours on loss of AC supply		specify	

Issued by: Head of Section, Standards Development

Signed:

Date: 2024-09-11

Authorized by: Head of Department, Standards

Signed:

Date: 2024-09-11



TITLE:
**12kV VACUUM AUTORECLOSERS
 (POLE MOUNTED) – SPECIFICATION**

Doc. No.	KPL1204/UTSP/10012
Issue No.	6
Revision No.	1
Date of Issue	2024-09-11
Page 29 of 43	

4.10.2- 4.10.3	Battery shall be at least 25Ah, with a service life of at least 5 years. The battery capacity. This shall be demonstrated during factory acceptance testing in the presence of KPLC Engineers.	≥25Amphour State	
4.10.4	Battery guarantee and warranty of at least 5 years. Spare Auxiliary contacts – minimum requirement.	provide	
4.10.5	Detailed manuals and drawings of the installation and control unit circuits and components shall accompany the tender (all in English Language).	Specify	
4.11	Technical Literature and Drawings		
4.11.1- 4.11.2	Detailed manuals and catalogues with all relevant technical literature and relevant drawings required for understanding the performance and application of the whole autorecloser.	Specify	
4.11.3	Manual for providing step-by-step procedures for the installation, test and commission of the autorecloser.	Specify	
4.11.4	Instructions for diagnosis and identification of faults and repair for minor faults as well as replacement procedures for failed components/units shall be well documented in the technical literature provided with the autorecloser units.	Specify	
4.11.5	Complete set of the literature and drawings provided with the tender bid, for purposes of tender evaluation.	Specify	
APPENDICES			
Appendix A: Tests and Inspection			
A1	Applicable Test Standards	State	
A2	Type Test submitted with tender	List	
A3-A4	Accreditation Certificate as per ISO/IEC 17025 of Testing Laboratory Provide name, valid address, email, Telephone contacts of the Testing Laboratory	Provide	

Issued by: Head of Section, Standards Development	Authorized by: Head of Department, Standards
Signed:	Signed:
Date: 2024-09-11	Date: 2024-09-11



Kenya Power

TITLE:
**12kV VACUUM AUTORECLOSERS
(POLE MOUNTED) – SPECIFICATION**

Doc. No.	KPI/EDS/UTSP/11/011
Issue No.	0
Revision No.	1
Date of Issue	2024-09-11
Page 40 of 41	

A5	List routine tests to be witnessed during FAT by KPLC engineers	List	
A6	Test certificates to be from an accredited testing laboratory, to be complete	State	
A7. Factory Acceptance Tests			
A7.1 - A7.2	Acceptance tests shall be witnessed by KPLC Engineers	State compliance	
A7.3	The manufacturer/supplier shall give (one month's notice and letters of invitation) to the Kenya Power Engineers nominated to attend the FATs	State compliance	
A7.4	Sampling and Testing to be as per standard and requirements	State compliance	
A7.5	Tests to be conducted	State	
A8. Inspection at Delivery Point			
A8.1	KPLC shall inspect Autoclosers at stores to verify compliance of the equipment with this specification.	State compliance	
A8.2	Supply to replace without charge to KPLC any Autoclosers found defective during inspection at stores.	State compliance	
Appendix B: Warranty			
B1	The supplier/manufacturer to warrant KPLC that all goods supplied under this contract shall have no defect arising from design, materials or workmanship.	Submit warranty as per tender	
B2-B3	Warranty period	Autoclosers	State warranty period as per specification
		Replacement of faulty electronic cards	
Appendix C. Markings and Name Plate			
C1	Specify Autocloser tank bushings markings and method of marking (To be permanent as per specifications)	Specify	
C2	Specify name plate markings and method of marking (To be permanent as per specifications)	Specify	
C3	Name plate mounting	Clear of live parts	
Appendix D. Manufacturers' Recommended Spares			
D1-D3	List of recommended spare for at least 10 years of continuous service with all the Autoclosers in service	List	
Appendix E. Qualification of The Manufacturer			
The manufacturer/supplier to submit the following documents			
E1	Quality Assurance: ISO 9001: 2015	Submit	
E2	Manufacturing Experience	Over 12 years	

Issued by: Head of Section, Standards Development

Signed:

Date: 2024-09-11

Authorized by: Head of Department, Standards

Signed:

Date: 2024-09-11



TITLE:
**12kV VACUUM AUTORECLOSERS
 (POLE MOUNTED) – SPECIFICATION**

Doc. No.	KPI/ESD-41/ESP/11/112
Issue No.	6
Revision No.	1
Date of Issue	2024-09-11
Page 4) of 4)	

E3	Letters of Customer Satisfaction	At least 4 (four) reference letters for overseas customers)	
E5	Previous Performance	Provide evidence	

Appendix F: Training

F1	Training at The Manufacturer's Premises		
F1(a)- F1(d)	Training during FAT, Theory and Practical & Trouble shooting and installation procedures Installation during FAT	State compliance and specify duration of training. Provide provisional training schedule with Topics and durations	
F2	Local Training (In Kenya)		
F2.1 -F2.3	Local Training: For Engineers and Technicians Theory, Trouble shooting and installation procedures	State compliance and specify duration of training. Provide provisional Training schedule with Topics and durations.	
	Demonstrate correct installation of the Autorecloser by the manufacturer at KPI, guided and supervised the Manufacturer representative	State compliance	
	Evaluate and give feedback on the trained teams	State compliance:	

Appendix G: Documentation

G1	Tender submitted with all technical documents	List submitted documents	
----	---	--------------------------	--

Issued by: Head of Section, Standards Development

Signed:

Date: 2024-09-11

Authorized by: Head of Department, Standards

Signed:

Date: 2024-09-11



TITLE:
12kV VACUUM AUTORECLOSERS
(POLE MOUNTED) - SPECIFICATION

Doc. No.	KP1/110/6/1/187/11/012
Issue No.	6
Revision No.	1
Date of Issue	2024-09-11
Page 42 of 42	

G2	Successful bidder to submit documents/details for approval before manufacture	State compliance	
G3	Recommendations for use, care, storage and routine inspection/testing, procedures	Submit	
	Deviations	State (if) any deviations	

NOTE:

Bidders should note that the above Guaranteed Technical Particulars Schedules must be fully completed and submitted with the bid. Failure to complete the schedules shall lead to rejection of the bid. Guaranteed values shall be specified. Words like "noted and fulfilled", "Yes", "comply" etc. shall be treated as non-compliant and the bid shall be rejected.

Deviation: Any deviation from these specifications if any shall be clearly stated. The bidder shall demonstrate that the technical specifications are still fully met in spite of such minor deviations. Deviations from the Bill of materials or from the ratings of various equipment listed in the specifications shall not be acceptable.

Before Contract signing, any minor deviations shall be discussed and resolved.

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

Issued by: Head of Section, Standards
Development

Signed:

Date: 2024-09-11

Authorized by: Head of Department, Standards

Signed:

Date: 2024-09-11