

**JAMAICA PUBLIC SERVICE COMPANY LIMITED**

**Technical Specifications**

**For**

**The Supply of**

**Automatic Cutout Mounted Reclosers**

## Technical Specifications - Automatic Cutout Mounted Reclosers

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**TS.01 GENERAL REQUIREMENTS****TS.01.1 Scope of Work**

The Supplier shall supply, factory test and deliver all equipment and material in accordance with these specifications.

**TS.01.2 Work Schedule**

The Supplier shall submit within 10 working days of acceptance of the bid a general Work Schedule showing key days required for sub-orders and drawing approvals so that the specified delivery date shall be met.

The schedule shall indicate commencement and completion dates for the principal features of the Works including, but not limited to, manufacture, testing and shipping.

**TS.01.3 Information to be Submitted by the Supplier**

The Supplier shall submit to the purchaser drawings, design data, operation and maintenance manuals, as may be called for herein, or as the purchaser may reasonably require. The Supplier's drawings and design data shall bear the Supplier's official verification that the information shown thereon has been checked by the Supplier and is correct for use in construction, except for drawings of a preliminary nature furnished for information only, which shall be clearly identified as such.

Where applicable, the following drawings and information are to be supplied with equipment.

1. Equipment diagram
2. Dimensioned outline drawings, details and weights of equipment
3. Equipment type test reports
4. Nameplate diagram
5. Equipment wiring diagrams
6. Manuals for installation, operation and maintenance of the equipment
7. Testing and commissioning procedures

**TS.01.5 Installation, Operation and Maintenance Manual**

Copies of the installation, operation and maintenance manual shall be furnished by the supplier with each equipment. The manual shall contain the following minimum information:

1. General descriptive information
2. Assembly and/or erection details
3. Operating and Maintenance instruction
4. Instructions for testing and adjustments
5. One copy of each approved drawing including catalog cuts and other pertinent data.
6. Test Certificate(s)
7. Parts identification list for each item of equipment furnished
8. Manufacturer's descriptive information and instructions for all accessory equipment

**TS.01.6 Standards**

All equipment and materials shall conform to the latest editions of all relevant ANSI standards. Where equipment, components or materials are not covered by appropriate ANSI standards, relevant IEEE, NEMA, ASTM, AISC and AWS shall apply. If equipment or materials conforming to other recognized national standard is offered, the bidder shall provide a copy, in English, of the standard offered and shall itemize the pertinent areas where the standard differs from the requirements of the relevant ANSI standard.

The foregoing referenced standards and their abbreviations are as follows :-

NAME	ABBREVIATIONS
American National Standards, Inc.	ANSI
American Society for Testing and Materials	ASTM
National Electrical Manufacturers Ass.	NEMA
Institute of Electrical and Electronic Engineers, Inc.	IEEE
Insulated Cable Engineers Association	ICEA
American Welding Society	AWS
American Institute of Steel Construction	AISC

**TS.01.8 System Characteristics**

- (i) System Phase to phase voltage: 24 kV
- (ii) Nominal system voltage: 24 kV
- (iii) Maximum operating voltage: 25.8 kV
- (iv) System BIL: 150 kV
- (v) Number of phases: 1
- (vi) Frequency: 50 Hz

- (vii) System connection: Wye
- (viii) Method of Grounding: Grounding effectively transformer grounded
- (ix) Auxiliary power supply: Self powered

### **TS.01.9 Environmental Conditions**

- (i) Altitude: Ranging from 0 to greater than 1,000 meters above sea level.
- (ii) Ambient Temperatures: Maximum 40°C  
Average 30°C  
Minimum 15°C
- (iii) Atmospheric Conditions: Tropical climate subject to direct sunlight, 200 km/hr wind and saline contamination.
- (iv) Seismic Coefficient: 0.20g or 0.2
- (v) Relative Humidity: maximum 100%  
average 50%

### **TS.01.10 Preparation for Shipment**

The Supplier shall prepare all equipment and their components in such a manner as to facilitate handling and to adequately protect them from contamination, corrosion or damage in-transit and shall be responsible for and make good any or all damages due to improper preparation or loading.

Small or fragile pieces shall be carefully boxed or crated or otherwise protected against loss or damage during shipment. Delicate electrical and other parts shall be boxed in weather-proof containers.

It shall be the responsibility of the supplier to take any other precaution required to ensure the arrival of the equipment in an undamaged and satisfactory working condition.

## TS.02 Cutout-Mounted Recloser

### TS.02.1 General

This section of the specification covers the supply of automatic circuit cutout-mounted reclosers. Reclosers shall be installed on JPSCo's 50 Hz distribution system and will be used for switching distribution laterals on fault current that experience frequent transient faults.

Reclosers shall be outdoor, vacuum interrupter, single-pole type, with vacuum interrupters and shall be equipped with accessories to facilitate tripping and closing operations. Each recloser shall be supplied with microprocessor-based protection and mounting bushing insulator.

The automatic circuit cutout-mounted reclosers shall have the form shown in FIG.1 below and shall be S&C TripSaver II Cutout-Mounted Recloser, Base Catalogue number 990232



Figure 1: S&C TripSaver II Cutout-Mounted Recloser

## TS.03 Standard and Codes

TS.03.1 The circuit reclosers shall comply with the requirements of all applicable standards in the ANSI C37 series and any other ANSI relevant standard.

If this specification conflicts in any way with any of the above standards, then this specification shall have precedence and govern. However, the bidder shall point out these conflicts in his bid.

## TS.04 Ratings

TS.01.1 The reclosers shall have the following ratings.

(i) Nominal System Voltage	24 kV
(ii) Maximum Rated Voltage	25.8 kV
(iii) Lightning Impulse Withstand Level	150 kV
(iv) Rated Continuous Current	560-800 A
(v) Interrupting capability at rated voltage	12,000 A Symmetrical
(vi) Frequency	50 Hz
(vii) Reclosing Time	Selectable from 0s to 200s

## TS.05 Construction

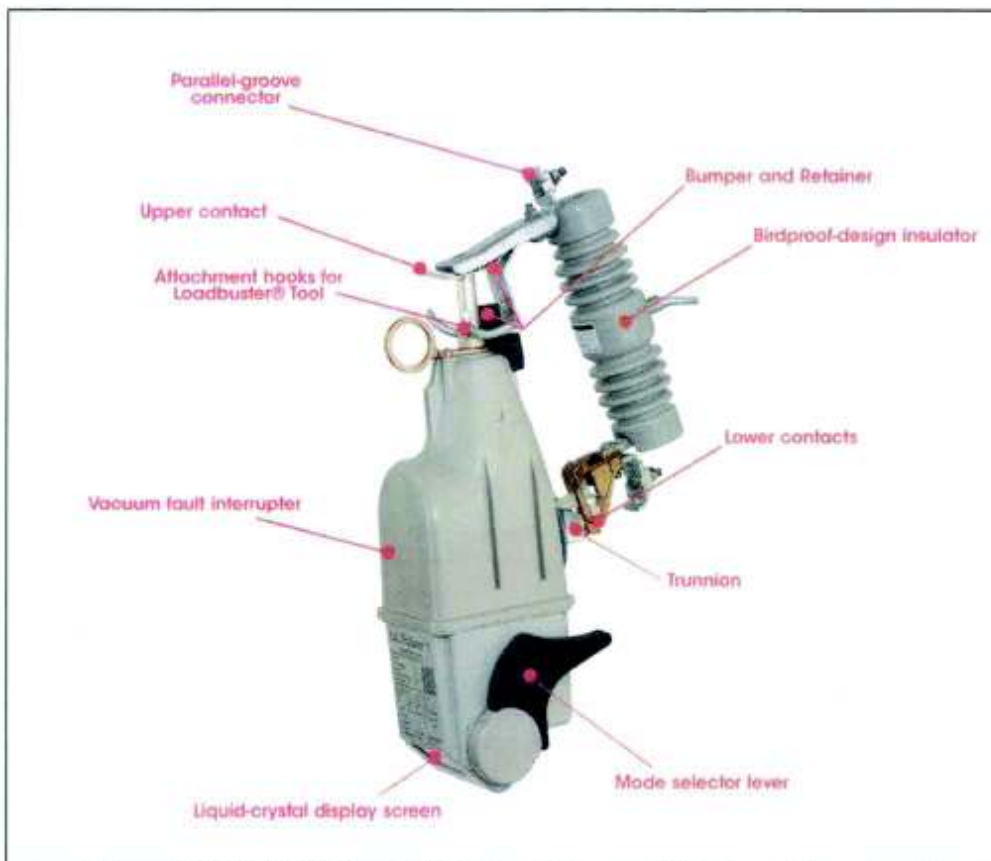


Figure 2: S&C TripSaver II Cutout-Mounted Recloser Construction

TS.05.1 The recloser shall be outdoor type, constructed with vacuum fault interrupter, single pole, with two parallel-groove connectors to accommodate No. 6 solid (13.3 MM<sup>2</sup>) through No.2 stranded (44.4 MM<sup>2</sup>) copper or aluminum in one groove, and No. 2 solid (33.6 MM<sup>2</sup>) through 250 kc mil

(168 mm<sup>2</sup>) stranded copper or aluminum or 4/0 ACSR (161 mm<sup>2</sup>) in the other groove.

- TS.05.2 The construction shall include an 'O' pull ring for manual opening and closing of the cutout mounted recloser with the use of a distribution prong and hookstick.
- TS.05.3 The cutout mounted recloser shall have a non-volatile liquid-crystal display screen that is readily visible from the ground.
- TS.05.4 The cutout mounted recloser shall have a mode selector lever that can be operated from the ground using a talon, fuse handling fitting or a distribution prong attached to a hookstick. The position of the lever shall be visible from ground to readily determine the current operating mode of the recloser. The construction of the recloser body and lever shall be such that when the lever is in auto mode, the red curved label must be completely covered. In the non reclose mode, the label on the lever must align with the label on the lower body.
- TS.05.5 The cutout mounted recloser shall have a trunnion with lifting eye to allow lifting and lowering of the recloser with the use of distribution prong attached to a hookstick.
- TS.05.6 The cutout mounted recloser shall have a communication interface for user configuration and downloading.
- TS.05.7 The cutout mounted recloser shall have a manual reset to allow for resetting of the recloser.

## **TS.06 Display**

- TS.06.1 When the cutout mounted recloser is energized and carrying at least 4 amperes of current, operational information shall be shown on the non-volatile liquid-crystal display screen.
- If less than 4 amperes of load current is present, the control shall temporarily cease to operate and the liquid-crystal display screen will not refresh. The cutout mounted recloser shall however respond properly should a fault occur.
- TS.06.2 The screen shall have two operating modes: "Normal" which is the default mode, and "Display." The "Normal" mode shall show the position of the vacuum interrupter contacts (Open or Closed), and the position of the mode selector lever (Auto or NR). The "Display" screen shall be selected by cycling the mode selector lever down and then up again when the unit is energized and carrying at least 4 amperes of current.
- TS.06.3 A user selectable secondary "Normal" screen shall show the position of the vacuum interrupter contacts (Open or Closed), the number of vacuum

interrupter open operations and remaining contact wear in the form of a bar graph.

- TS.06.4 The "Display" mode shall provide additional functional information and shall be activated by cycling the mode selector handle. The cutout mounted recloser shall scroll through the user-configurable items the specified number of times before the display screen returns to the "Normal" mode.

"Display" mode screens shall include:

1. Load Current: The instantaneous fundamental-frequency RMS load current in amperes
2. Last Fault Magnitude: The fundamental-frequency RMS magnitude of the last fault current in primary amperes, measured just prior to the opening of the vacuum interrupter
3. Number of Open Operations: The number of vacuum interrupter open operations registered. The counter shall return to 0 after it displays 9,999.
4. Remaining Contact Wear in %: Percentage of remaining vacuum interrupter contact wear
5. LCD Screen Temperature: LCD screen temperature in degrees Celsius
6. Sectionalizing Mode Counts: Displays the pre-set number of source-side circuit breaker or recloser operations that the cutout mounted recloser will count up to before dropping open. This screen is automatically skipped if sectionalizing mode is disabled.
7. Software Versions: Application; Bootloader; and Radio Frequency Microcontroller Unit shall be displayed.

- TS.06.5 When the vacuum interrupter reaches 10% of its remaining contact wear, a circular indicator shall appear on the primary "Normal" screen.

- TS.06.6 An X-shaped indicator shall appear on the primary "Normal" screen if the cutout mounted recloser has dropped open due to an overload.

- TS.06.7 When the vacuum interrupter is no longer capable of interrupting a fault, the cutout mounted recloser shall drop open and will not reset, locking the vacuum interrupter in the open position and the operating mechanism in the dropped-open position. The cutout mounted recloser must be returned to the manufacturer for service.

The non-volatile screen maintains the cutout mounted recloser "Normal" screen status if control power is lost.

## TS.07 **Operation**

- TS.07.1 The reclosing operating mechanism shall be operable on JPSCo's 50 Hz 24kV system voltage and shall eliminate sustained interruptions which results when a lateral fuse cutout operates in response to a transient fault.
- TS.07.2 The cutout mounted recloser shall provide up to four tripping operations. A wide variety of user-configurable time-current characteristic (TCC) curves shall be available. The duration of the open interval between tripping operations and the reset time after the last reclosing operation shall be user configurable.
- TS.07.3 The cutout mounted recloser shall drop open at the end of its operating sequence if the fault is persistent. The vacuum interrupter shall reset two seconds after the recloser drops open; the operator can then reclose the recloser into the mounting after the fault has been located and repairs have been made.
- TS.07.4 The cutout mounted recloser shall have a novel inrush-restraint feature which measures second-harmonic current to distinguish fault current from inrush current. If inrush current is detected, The recloser will not trip. The inrush restraint feature facilitates lower minimum pickup currents.
- TS.07.5 When downstream line work is to be performed, the cutout mounted recloser shall be placed in the non-reclose mode by moving the mode selector lever from the "Auto" position to the "NR" position. The recloser shall operate instantaneously and drop open; it shall not reclose.
- TS.07.6 The cutout mounted recloser shall have a user-configurable sectionalizing mode. When enabled, the recloser shall operate as a sectionalizer over a user-specified range of fault currents when the source-side circuit breaker or recloser trips faster than the cutout mounted recloser. It shall count the number of operations of the source-side circuit breaker or recloser, and drops open after a user-specified number of counts. The counter shall reset if no sectionalizing event is registered during a user-specified period.

## **TS.08 Tools and Accessories**

- TS.08.01 The Supplier shall furnish without extra charge a complete set of any special tools or accessories to include software which may be necessary or convenient for the operation, assembly, adjustment or for the routine maintenance of the recloser.

## **TS.09 Spare Parts**

- TS.12.01 The bidder shall recommend and price any spare parts considered necessary.

**TS.10 Factory Tests**

TS.10.1 The reclosers shall be completely assembled at the factory, and shall be subjected to all routine and type tests in accordance with ANSI Standards. If the Supplier can supply certified copies of type tests on identical equipment, the Purchaser may waive such tests entirely.

**TS.11 Operation & Maintenance Instruction Manual**

One operation and instruction manual shall accompany each recloser.

The manual shall include but not be limited to the following:

- (i) General information;
- (ii) Manufacturer's descriptive literature including commissioning, testing and maintenance procedures;
- (iii) List of replacement parts and corresponding catalogue numbers;
- (iv) Complete set of final as-built drawings.

**TS.16 Connections**

TS.16.01 In general, all connections shall be designed for field bolting. All bolts shall be furnished with lock washers and locknuts.

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