

## **Technical Specification for Automation of Single Phase Sectionalizer**

The technical specification for Single Phase Sectionalizer shall be based on the Specification for Single Phase Breaker/Sectionalizer in 11kV HVDS Network as per BRPL Technical Specification No. - BSES-TS-67-SPBS-R0.

The significant features shall be as below:-

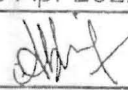
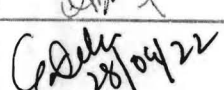
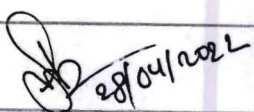

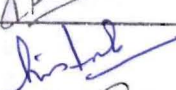
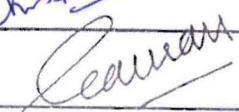

- 1) Single Phase Sectionalizer shall be provided as per the specification mentioned above.
- 2) Single Phase Sectionalizer shall be provided with Modem for communication with BRPL SCADA.
- 3) The Modem shall take signals from the Sectionalizer and communicate the same to BRPL SCADA on IEC 104 Communication protocol.
- 4) The Specification of the modem shall be as per Annexure – C.
- 5) The Erection of Sectionalizer along with Modem Integration, testing with BRPL SCADA shall be in the scope of the OEM.

# BSES

## Technical Specification for

### Single Phase Breaker/Sectionalizer in 11kV HVDS network

Specification No: BSES-TS-67-SPBS-R0

Rev:	0	
Pages	10	
Date:	28 Apr 2022	
Prepared by	Abhishek Vashistha	
	Gautam Deka/Pronab Bairagi	 28/04/22  28/04/2022
Reviewed by	Puneet Duggal	
	Amit Tomar	
Approved by	Gaurav Sharma	
	Gopal Nariya	

**Index**

<b>SI no</b>	<b>Description</b>	<b>Page no</b>
1	General Specification	3
2	Annexure-A Scope, Documentation and Delivery schedule	9
3	Annexure- B Deviation format	10

## General Specification

I)	Scope	This specification covers the design, manufacturing ,testing at manufacturer's work, packing and dispatch , supply and unloading at site/store and Installation & commissioning of 11kV Pole mounted Single phase Sectionalizer complete with all accessories for efficient and trouble free operation.																				
II)	Applicable standards	The equipment covered by this specification shall unless otherwise stated, be designed, manufactured and tested in accordance with the latest editions of the following Indian, International/IEC standards: <ul style="list-style-type: none"> <li>• IEEE Standards C37.60-2012 and C37.41-2008</li> <li>• IEC Standard 62271-111.</li> </ul>																				
III)	Climatic conditions for installation	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 70%;">a) Maximum ambient temperature</td> <td style="text-align: right;">: 50deg.C</td> </tr> <tr> <td>b) Max. Daily average ambient temp</td> <td style="text-align: right;">:40 Deg C</td> </tr> <tr> <td>c) Min Ambient Temperature</td> <td style="text-align: right;">: 0deg.C</td> </tr> <tr> <td>d) Maximum Humidity</td> <td style="text-align: right;">:100%</td> </tr> <tr> <td>e) Minimum Humidity</td> <td style="text-align: right;">:10%</td> </tr> <tr> <td>f) Average Annual Rainfall</td> <td style="text-align: right;">:750mm</td> </tr> <tr> <td>g) Average No. of rainy days per annum</td> <td style="text-align: right;">: 60</td> </tr> <tr> <td>h) Rainy months</td> <td style="text-align: right;">: June to Oct</td> </tr> <tr> <td>i) Altitude above MSL not exceeding</td> <td style="text-align: right;">:300m</td> </tr> <tr> <td>j) Wind Pressure at 10 m elevation</td> <td style="text-align: right;">:126kg/sqm</td> </tr> </table> <p>Atmosphere is generally laden with mild acid and dust suspended during dry months and subjected to fog in cold months. The design of the equipment and accessories shall be suitable to withstand seismic forces corresponding to an acceleration of 0.1g.</p>	a) Maximum ambient temperature	: 50deg.C	b) Max. Daily average ambient temp	:40 Deg C	c) Min Ambient Temperature	: 0deg.C	d) Maximum Humidity	:100%	e) Minimum Humidity	:10%	f) Average Annual Rainfall	:750mm	g) Average No. of rainy days per annum	: 60	h) Rainy months	: June to Oct	i) Altitude above MSL not exceeding	:300m	j) Wind Pressure at 10 m elevation	:126kg/sqm
a) Maximum ambient temperature	: 50deg.C																					
b) Max. Daily average ambient temp	:40 Deg C																					
c) Min Ambient Temperature	: 0deg.C																					
d) Maximum Humidity	:100%																					
e) Minimum Humidity	:10%																					
f) Average Annual Rainfall	:750mm																					
g) Average No. of rainy days per annum	: 60																					
h) Rainy months	: June to Oct																					
i) Altitude above MSL not exceeding	:300m																					
j) Wind Pressure at 10 m elevation	:126kg/sqm																					
IV)	<b>General technical requirements</b>																					
S.no	<b>Description</b>	<b>Single phase breaker</b>																				
1	Service Voltage	11Kv																				
2	Max System Rated Voltage	12 kV																				
3	Rated Frequency	50 Hz																				
4	Number of Phases	1																				
5	Rated continuous current (minimum)	200A at 40 degC																				
6	Rated short time current	16 KA for 1 sec																				
7	Rated Power Frequency dry withstand peak voltage	28kV rms for 60 sec																				
8	Rated Power Frequency wet withstand peak voltage	23kV rms for 60 sec																				
9	Rated Lightning Impulse withstand peak voltage (BIL)	75kVp																				
10	Interrupting Medium	Vacuum																				
11	Operating Mechanism	Magnetic Actuator																				

12	Mode of Operation	Single phase Operated
13	Insulation Medium	HCEP (Hydrophobic cycloaliphatic Epoxy solid) or equivalent
14	Minimum Number of full fault current rated operations	300
15	Minimum Number of mechanical operations (IEC62271-100)	2000
16	Manual Emergency trip provision	To be provided
17	General Construction	<p>The Single Phase Sectionalizer should be a Cutout-Mounted Sectionalizer and should be ideally suited for protection of overhead laterals that experience frequent transient faults. It should be self-powered, microprocessor-controlled with a single-phase vacuum interrupter available for new installations.</p> <p>Sectionalizer shall be made durable material with lightweight design with 1 pole assembly.</p> <p>The control panel shall have inbuilt firmware feature such a way that by re-programming the same panel can be used. The Single Phase Sectionalizer shall have at least one reclose facility.</p>
18	Ingress protection	IP 55 for outdoor application
19	Mounting frame	The Single Phase Sectionalizer should be a Cutout-Mounted Sectionalizer / Galvanized mounting frame suitable for single and double pole. Brackets for LA to be supplied if asked for, at the finalization of order.
20	CT Ratio (minimum)	100/1
21	CT type	Cast resin/ Current sensor, 5VA
22	CT Accuracy	5P10
23	Operating Sequence	0-0.5s-CO--5s-CO
24	Terminal Connectors	Suitable connectors for 95mm <sup>2</sup> HTAB/150mm <sup>2</sup> HTAB/ ACSR Dog conductor to be provided
25	Power up	The Single Phase Sectionalizer should pick up within 60ms when powering up from no load (else the single phase feeder will be unprotected for the time and the upstream CB / RMU will trip).
26	Control features	
i)	Push buttons with indicating LED shall be provided for control purpose by the bidder (manual or via a lap top)	<p>a) Open b) Trip c) Sectionalizing Blocked</p> <p>It should be possible to open the Single Phase Sectionalizer on load with the help of a hook stick</p>
ii)	Indicating LEDs shall be provided by the bidder	<p>a) Over current pickup with phase and ground indication b) Unit Status c) Contact and Breaker Health status.</p>
iii)	Protective features	<p>Protection 1) Over Current : 10A to 200A with IDMT curves, DTL 2) Inrush Restraint 3) Cold Load Pickup 4) Programmable PLC Logic 4.2) There shall be provision to block AR tripping during these conditions When the current load is above a</p>

		threshold limit Through a digital input
iv)	Display	<p>Single Phase Sectionalizer unit should use a nonvolatile liquid-crystal display screen to show its operational information.(dimensions to be provided by bidders)</p> <p>The fault status shall be duly displayed on the control unit as well as through a bright red LED on the control box which shall be visible from a distance of 20 mtr minimum.</p>
v)	Operation and Maintenance	<p>a) When downstream line work is to be performed, the it should be possible to put the Sectionalizer in the non-reclose mode. The Single Phase Sectionalizer should operate instantaneously and drop open; and not go through its reclosing sequence if the Sectionalizer is closed on a fault.</p> <p>b) When the vacuum interrupter reaches 10% of its remaining contact wear, an indication should appear on the primary Normal screen</p> <p>c) When the vacuum interrupter is no longer capable of interrupting a fault, the Single Phase Sectionalizer should drop open and will not reset, locking the vacuum interrupter in the open position and the operating mechanism in the dropped-open position.</p> <p>d) The Single Phase Sectionalizer should have the feature to indicate whether it has dropped open due to fault or overload to Differentiate between Overload and Fault</p> <p>e) It should be possible to open the Single Phase Sectionalizer on load with the help of an external lever without opening an upstream device to be able to perform maintenance work downstream of the device</p> <p>f) When the device is taken down for maintenance, it should be possible to maintain service continuity by just installing a fuse tube with a fuse link, a disconnect blade into the cutout mounting itself. Extra equipment should not be required to maintain service continuity, nor should it be required to make any disconnections / connections in the feeder cable.</p>
27	Name Plate and Marking	<p>The equipment shall be provided with durable and legible name plate marked with all essential particulars as per relevant standards along with the terminal markings.</p> <p>a) Manufacturer's Name</p> <p>b) Rated maximum voltage</p> <p>c) Rated continuous current</p> <p>d) Rated symmetrical interrupting current</p> <p>e) Rated lightning impulse withstand voltage</p> <p>f) Serial number and date of manufacture</p> <p>g) Relevant Standard</p> <p>h) Property of BSES</p> <p>i) PO Number and Date</p> <p>j) Guarantee period</p> <p>k) Sticker may be used for parts of operating mechanism</p> <p>l) Year/ Month of Manufacturer</p>

		m) Rated 1 Sec Short Time Current in Amps
28	Earthing	Double earthing shall be provided as per IS 5613-Part1, One earth wire from first electrode and second earth wire from second electrode will be connected directly with the body of Sectionalizer if the body is metallic. Second pair of the earth wires will be connected directly with metallic structure and control panel body, All the pipe electrode shall be interconnected forming a ring, All earthings should be done using lugs, nut bolts and spring washers, The depth of the electrode shall be such that the effective ohmic resistance shall not exceed 10, The earthing arrangement shall be as per BSES standard of Earthing arrangement of Sectionalizer.
29	Tests	All routine, acceptance & type tests shall be carried out in accordance with the relevant IS/IEC, All routine/acceptance tests shall be witnessed by the Purchaser/his authorized representative  Product should be type tested from CPRI/ERDA/NABL/Any other reputed international lab. Type test reports shall be submitted during the period not exceeding 5 years. If no design change that upto 10 years the Type test shall be valid for consideration. The bidder shall have adequate in house testing facilities for carrying out all routine tests & acceptance tests as per relevant International/Indian standards.
29.1	Type Tests for Sectionalizer	a) Withstand voltage tests b) Continuous current tests c) Switching tests d) Short time withstand current tests e) Fault making current tests f) Mechanical Operation tests g) Operating duty tests h) Partial discharge (corona) tests i) Minimum Tripping current tests

29.2	Routine Tests for Sectionalizer	<ul style="list-style-type: none"> <li>a) Over current trip calibration</li> <li>b) Control, secondary winding and accessory devices check tests</li> <li>c) Dielectric withstand test; 1 min dry power frequency</li> <li>d) Partial discharge test</li> <li>e) Mechanical operation tests</li> <li>f) Calibration test as per IEEE std. C 37.63-2003</li> </ul>
30	Pre dispatch inspection	<p>Equipment shall be subject to inspection (as per relevant standards) by a duly authorized representative of BSES Inspection may be made at any stage of manufacture at the option of the purchaser and the equipment if found unsatisfactory as to workmanship or material is liable to rejection. Supplier shall grant free access to the places of manufacture to purchaser's representatives at all times when the work is in progress. Material shall be dispatched after specific MDCC (Material Dispatch Clearance Certificate) is issued by Purchaser. Following documents shall be sent along with the material</p> <ul style="list-style-type: none"> <li>a) Test Reports</li> <li>b) MDCC issued by BSES</li> <li>c) Invoice induplicate</li> <li>d) Packing list</li> <li>e) Drawings &amp; Catalogue</li> <li>f) Guarantee/Warranty card</li> <li>g) Delivery Challan</li> <li>h) Other documents (as applicable)</li> </ul> <p>The material received at Purchaser store shall be inspected for acceptance and shall be liable for rejection, if found different from the reports of the pre-dispatch inspection and one copy of the report shall be sent to Plant Engineering.</p>
31	Packing	<p>Supplier shall ensure that all equipment covered by this specification shall be prepared for rail/road transport (local equipment) and be packed in such a manner as to protect it from damage in transit.</p>
32	Guarantee	<p>Bidder shall stand guarantee towards design, materials, workmanship &amp; quality of process / manufacturing of items under this contract for due and intended performance of the same, as an integrated product delivered under this contract. In the event any defect is found by the purchaser up to a period of at least 60 months from the date of commissioning or 66 months from the date of last supplies made under the contract whichever is later, bidder shall be liable to undertake to replace/rectify such defects at its own costs, within mutually agreed time frame, and to the entire satisfaction of the Company, failing which the purchaser will be at liberty to get it replaced/rectified at bidder's risks and costs and recover all such expenses plus the Company's own charges (@ 20% of expenses incurred), from the bidder or from the " Security cum Performance Deposit" as the case may be.</p> <p>Bidder shall further be responsible for free replacement for another period of THREE years from the end of the guarantee period for any 'Latent Defects' if noticed and reported by the purchaser.</p>
33	Quality control	<p>The bidder shall submit with the offer Quality assurance plan indicating the various stages of</p>



		inspection, the tests and checks which will be carried out on the material of construction, components during manufacture and bought out items and fully assembled component and equipment after finishing. As part of the plan, a schedule for stage and final inspection within the parameters of the delivery schedule shall be furnished.
34	Minimum testing facilities	The bidder shall have adequate in house testing facilities for carrying out all routine tests & acceptance tests as per relevant International/ Indian standards
35	Manufacturing activities	The successful bidder will have to submit the bar chart for various manufacturing activities clearly elaborating each stage, with quantity. This bar chart shall be in line with the Quality assurance plan submitted with offer. This bar chart will have to be submitted within 15 days from the release of the order.
36	Spares, accessories & tools	The bidder shall submit a list of spares recommended for commissioning along with item wise price. The bidder shall submit a recommended list of spares for 3years operation of the equipment, if any with unit price sand recommended quantity along with item wise price.
37	Deviation	<p>a) Deviations from this specification shall be listed separately by bidder clause wise (format given below) along with optional offer and has to submit the list along with bid/quotation. BSES will review the deviations and if BSES is agreed with the deviation, seller has to take written confirmation from BSES on deviation during tender evaluation.</p> <p>b) In the absence of any separate list of deviations from the bidders with bid as well as written confirmation from BSES on deviations, it will be assumed by the Buyer that the Seller complies with the Specification fully.</p> <p>c) Any deviations mentioned in any other submitted bid documents (i.e.in filled GTP, Catalog, BSES old approval, buyer's/seller's standards etc) by seller without separate deviation sheets will not consider as a deviation from this tech spec at any stage of contract.</p>

**Annexure – A****Scope, Documentation and Delivery schedule**

Document/Drawing submission shall be as per the matrix given below:

- a. All documents/drawings shall be provided in soft copy only in returnable Pen drives
- b. Language of the documents shall be English only.
- c. Incomplete submission shall be liable for rejection.
- d. Document check sheet compliance shall be the first sheet for each submission stage i.e. Technical bid, Drawing Approval, Pre Dispatch, Pre closure
- e. No submission is acceptable without check list compliance.
- f. Deficient/ improper document/ drawing submission shall be liable for rejection.
- g. Order of documents shall be strictly as per the check list.
- h. Any document not included in the below table but necessary for detailed engineering shall be deemed to be included in bidder's scope

<b>S.No.</b>	<b>Detail of Document</b>	<b>For Tender</b>	<b>For Approval/Review</b>	<b>Final Submission</b>
1	Guaranteed Technical Particulars (GTP)	Required	Required	Required
2	Deviation Sheet, if any	Required	Required	Required
3	Detailed GA drawing & Schematics of Breaker and Control panel	Required	Required	Required
4	Installation Instructions		Required	Required
5	Manual/Catalogue	Required	Required	Required
6	Type test reports	Required	Required	Required
7	Inspection and test reports, carried out in manufacturer's works			Required
8	Routine Test Certificates			Required
9	Test certificates of all the raw materials			Required

**Annexure-B: Deviation Format**

Sl. No.	Document Name	Clause No.	Deviation	Reason	Merit to BSES

## Annexure C Specification of 4G Ethernet Modem for FRTU

1. **Module:** 4G Dual SIM with compatible 3G /GSM GPRS
  - a. FDD LTE: B1 (1920-1980/2110-2170) / B3 (1710-1785/1805-1880) / B8 (880-915/925-960) / B20 (800) MHz
  - b. TDD LTE: B38 (2570-2620) / B39 (1880-1920) / B40 (2300-2400) / B41 (2496-2690)
  - c. HSPA / UMTS: B1 (2100) / B8 (900) /800/850/1900 MHz
  - d. GSM: 900/1800/ MHz Class 10
2. WAN Protocol: PPP/IPCP over Asynchronous HDLC with PAP/CHAP Authentication.
3. Modem shall be compatible with IPv4 & IPv6 scheme
4. Console Interface: RS232 on RJ45 connector.
5. LAN Interface: 10/100 Base-T complying to IEEE 802.3 / ANSI 8802-3 on RJ45 connector.
6. Support for SCADA Protocols in transparent pass through mode.
7. Network Protocols: PPP, IPCP, PAP, CHAP, ARP, IP, ICMP, TCP, UDP, IPSEC, SNTP, TFTP.
8. Support for NAT and Port forwarding.
9. Management: Serial, HTTP, HTTPS, Telnet & via SMS, Port Mapping, Event Log & Upload. Firmware Upgrade
10. Modem shall have self healing capability to recover from dead lock situation.
11. Status Monitoring: ICMP to 4 destinations for Keep Alive & Self Heal. Signal Strength & LEDs.
12. SIM Interface: External with locking provision.
13. AT Commands Interface: Supporting AT commands for dialing from FRTU through RS-232 serial port to modem.
14. Communication Interface: Remote management features like telnet & remote download facility
15. LED Indications: Power ON, Network–Signal strength, SIM availability, Ethernet link
16. Connectors: RJ45 Ethernet Port, SIM Card Holder, DC power connector, SMA Antenna connector

17. Power Supply: 24V DC (with reverse current protection) with 2 numbers Terminal Block without adapter. Modem functionality shall not affect during DC voltage supply range of 18 to 30V DC.

18. Enclosure: Metallic Extrusion

19. Mounting: DIN Rail Mounting

20. Temperature: Operating (-10 to 70 Degree Centigrade), 95% Humidity

21. Antenna [R2]:

2 Nos to be provided

- a. 12dB High Gain Antenna with SMA connector and 15mtr wire length
- b. 7dB High Gain Antenna with SMA connector and 5mtr wire length

It shall be ensured that the male pin SMA Connector of Antenna is of copper at the Antenna base and also at the point of modem connection.

22. Accessories:

- a. 1 Meter cable for connecting to external DC power source (24 V)
- b. 1 Meter Standard Ethernet (Straight) data cable with metallic connector (SS/MS) [R2]
- c. Standard Console cable for diagnostic port of Modem
- d. 1 Meter serial cable for dialing modem from FRTU

23. Certification:

- a. All the eligible equipments should complied to requirement of Mandatory Testing and Certification of Telecom Equipment (MTCTE) vide MoP order No. 14/02/2021-UR&SI-II Part( 1 )(E-258136). [R2]
- b. Conducted Immunity : IEC61000-4-6  
Measure emission of the device (referenced to earth) on power mains and to compare them with specified limits to ascertain that the device will not disturb other equipments  
Frequency : 0.15MHz to 80MHz  
Modulation : 80% AM at 1 KHz  
Test Voltage : 3V
- c. Electrostatic Discharge (ESD):IEC61000-4-2  
Check immunity against discharge of static electricity that may occur when a charged operator touches the device  
Contact Discharge : 4KV  
Air Discharge : 8KV  
No of Discharge : 10 at pre-selected spots  
Positive & Negative Polarity
- d. EN55022 CLASS B  
Immunity characteristics of the device when subjected to continuous conducted noise  
Conducted Emission : Frequency - 150 KHz - 30 MHz

Radiation Emission : Frequency – 30 MHz - 1000 MHz

24. Warranty period: 5 years