

Guranteed Technical Particulars				
A. ENCLOSURE FOR PSS				
Sr.	Descriptions	Unit	As Specified By TPCODL	Bidder's Reponse (confirm/not confirm/Offered)
1	Application		Outdoor	
2	Rated voltage	KV	12	
3	Service Voltage	KV	11	
4	System Frequency	Hz	50	
5	Rated impulse withstand voltage	KVP	75	
6	Rated power frequency withstand voltage	KV rms	28	
7	Rated LT voltage	V	433	
8	Degree Protection for Enclosure		IP54	
9	Internal Arc Test		IAC-AB as per IEC 62271-202 (20 KA for 1 s)	
10	Max. Permissible Temperature for accessible part of the enclosure.	°C	Maximum permissible temperature shall not be exceed 70 deg C at an ambient temperature not exceeding 40 deg C	
11	Dimension of Enclosure (LxWxH)	mm x mm x mm	To be provided by bidder	
12	Thickness of sheet for enclosure – For base		2-3mm (min) GI sheet steel 3mm (min) GI sheet steel	
13	Control wiring	Colour code	To be provided by bidder	
	a) Type of insulation		PVC	
	b) Voltage grade	KV (Max)	1.1	
	c) Conductor Material with PVC colour coded sleeves.		Copper	
	d) Conductor Size & insulation wiring	Sq. mm	1.5 & 2.5	
	e) CT wiring wiring	Sq. mm	4	
	f) Wiring identification mark & Accessories as per specification		To be provided by bidder	
14	Ventilation aperture		Class k10	
15	Locking arrangement		The doors shall be padlocked As well as protected.	
16	Earthing to be provided -PSS -RMU -Trf body and neutral -LV ACB & MCCB		To be provided by bidder	
17	Accessories like Heater, Lamps, door switch, etc.		To be provided by bidder	
18	Paint		RAL 7032	
19	Guarantee-from date of taking over by TPCODL		As Specified By TPCODL	
20	Availability of spares		Assurance by bidder for 25 years	
21	Total weight	Kg	To be provided by bidder	
22	HT and LT connection between Trf ,RMU & LT ACB		HT RMU Breaker to Transformer: 1 C Al cable LT Transformer to LV bus: Al busbar	
RMU				
S.N.	Description	As specified by TPCODL(Options defined in specs)	Bidder's Reponse (confirm/not confirm/Offered value)	
1	RMU Category	3Way - 1CB & 2 LBS		
2	RMU application	Outdoor		
3	Offered Model nos. and OEM type	To be provided bidder		
4	Dielectric medium	SF6		
5	Interrupting medium	Vacuum- for CB SF6 for LBS and earth switch		
6	System Frequency	50 Hz		
7	Rated Voltage	12 KV		
8	Service Voltage	11 KV		
9	Rated current -Line Switches	630 A		
10	Rated Current-CB and LBS	630 A for all type		
11	Rated Short time current withstand	21 KA /3 s for 11 KV		
12	Rated Short time Making capacity	50 KA		
13	Rated cable charging interrupting current of incomer load break switch	10:00 AM		
14	Rated load interrupting line current	630 A		
15	Rated cable charging breaking current of breaker	25 A		
16	No. of operations at rated short circuit current on line switches, earthing switches should be E2	LBS- 5 close ES- 5 close The ES in line with CB		
17	Opening time of breaker (max.) Without relay time	3 cycle		
18	Closing time of breaker (max.)	3 cycle		
19	Breaker Duty Cycle	O – 3min - CO - 3min - CO		
	i. Mechanical endurance for Isolator & Earth Switch	Min 1000 (M0) Operations		
20	ii. Mechanical endurance for Circuit Breaker	Min 2000 (M1) Operations		
	Electrical operations of at rated current			
21	a. LBS/Disconnecter	To be provided by bidder		
	b. Earth Switch			

22	Temp rise above ambient of +40 deg.	+40 Deg C. (Type Tested as per IEC and complying to requirements)		
23.0	Min Gas pressure in bar	To be provided by bidder based on type tested design		
24	SF6 Gas pressure manometer with indicating bars/scale to measure the actual gas pressure (indirect method RFS etc. not accepted)	Dial type Manometer to be provided for gas pressure indication Contacts to be provided and wires up on the TB for SCADA communication of gas status		
25	Enclosure	The RMU metal parts shall be greater than 2mm thickness high tensile steel/CRCA. The overall paint thickness shall be not less than 70 microns.		
26	Guaranteed SF6 leakage per annum	Less than 0.1% from main tank		
27	Degree of protection	a. IP 67 for the tank and b. IP2X for the front cover / mimic board and c. IP 54 (Main door closed) for Outdoor RMUs. d. IP 54 for cable compartment		
28	Internal Arc rating	IAC AFL or better		
29	Internal Arc test	20kA for 1 Sec.		
30	Lightning Impulse withstand Voltage	75 kVp or 125 KVp as mentioned in tender		
31	Power Frequency withstand voltage	28 kVrms.or 50 KV rms mentioned in tender		
32	SF6 Tank design	Hermetically/robotically sealed unpainted stainless-steel enclosure with SF6 Gas. Sealed pressure system by Laser welding so that no refilling of gas is required for 30 years. No gas work at site. Complete body shall be tamperproof to prevent access to live parts. No gaskets shall be used. No bolts shall be provided.		
32	Tank material and grade of SS 304 and welding	Should be of SS 304 and non-corrosive, offered grade of SS to be mentioned. The welding shall be such that there shall be no corrosion of welding for useful life of equipment.		
33	Earth bus bars	In enclosure to prevent tampering.		
34	Material & size of earth bus bar	Copper earth bus-bar should be Min.105 sq.mm		
35	Earthing of main CCT Cables shall be earthed with earth switch with S/C making capacity as per IEC 129. closing shall be possible only when Isolator is open	To be provided by bidder		
36	Incomer Load Break switch: Shall be SF6 insulated with least maintenance. Shall have at least 3 positions, Open, Close & earth with natural interlocks. Fitting of motor at site shall be possible & shall have mechanical interlock	To be provided by bidder		
37	Circuit Breakers: a. With VCB interrupter and SF6 insulated bus with minimum maintenance and shall have at least 2 positions i.e. Open & Close, Manual operation & fitting of motor at site shall be possible if required. b. In view of safety each VCB shall be assisted with disconnecter having 3 positions, open-disconnected, closed, and earth (having fault making capacity) and shall be constructed in such a way that natural interlocking prevents unauthorized operations.	To be provided by bidder as per specs.		
38	Electrical interlock for cable presence indicator and operation of earth switch in RMU incomer cable compartment of IBS	To be provided by bidder. For 11 KV RMU only		
39	Make of self-powered Relay & offered model	Ashida,241S		
40	Paint thickness	Minimum 80 microns		
41	The cable compartment doors shall have interlocks such that doors can be opened only with earth switch in closed position	To be provided by bidder		
42	Protection against theft	Design of RMU shall be tamper & arc proof. Anti vandal screws shall be provided. Cable covers shall be pad lockable. All live parts and internal parts etc. shall be covered with antitheft covers.		
43	Doors	Hinged Main doors shall be provided for outdoor type RMU. The hinges for the doors need to be riveted and shall not have any access from outside. Bolted shall not be acceptable.		
44	Voltage indicator box shall be fixed type-This device shall be in compliance with IEC 62271-206:2011 standard only	Capacitive dividers type which will supply low voltage to power the lamps AND 3 inlets can be used to check phase sequence or presence of voltage in cable		
45	Cable cleats (full circle)	HDPE/Nylon (Fire Retardant)		
		Suitable for cable sizes		

46	Cable compartment suitability shall be	In the isolators compartment 11kV, 3C X 400 sq. mm		
47	The cable compartment	All cable compartments shall be bottom entry and front opening type only		
48	Size of bimetallic washer in all compartments	Must be suitable for M12 for TPC bolt and bushing sizes with min. 2mm thick.		
49	Height of bushing terminal from base plate	Minimum 550mm for proper termination space.		
50	Fault passage indicator	One per RMU in all LBS compartments		
51	Operating handle	To be provided by bidder as a part of RMU with each RMU and to be placed on front or on door		
52	Non removable MIMIC Diagram on Front of panel	To be provided by bidder with detailed descriptions as mentioned in specs. And earth switch marking background shall be Green.		
53	Main Bus bar Material	Copper		
53	Bus bar Cross Section	Copper earth bus-bar should be Min.105 sq.mm		
54	Opening & Closing times with relay	125 ms maximum		
55	Current Transformer for CB compartment	Shall be epoxy resin casted and mounted on cables. The CTs around the cables shall be supported on the sheet steel bracket and should be fixed with bolts. The mounting frame should be moveable up and down or to and fro but shall be fixed at co-axial position with base plate holes and bushing terminal bolts.		
		75/1 (further finalization in detailed engineering), 5P10		
56	Motorization and SCADA Compatibility	To be provided		
57	Guarantee	As per specification		
58	Dimension (LxWxH) (mm x mm x mm)	To be provided by bidder		
59	Total weight	To be provided by bidder		
60	Paint	Light Gray shade RAL 7032		
61	Type test of product	To be provided by bidder as per specification		
62	Availability of spares	Assurance by bidder for 25 years, list of spares as mentioned in specification to be provide along with RMU lot.		
63	VPIS auxiliary contact	a) The VPIS shall have auxiliary contact such that it can be configured with SCADA for remote status indication of cable charged. The auxiliary contact to be wired up in TB. b) For 11 KV RMU only, the auxiliary contacts in VPIS shall be wired for electrical interlock of cable presence indicator and operation of earth switch in RMU incomer cable compartment of LBS.		
63	VPIS	In all compartments		
64	Breaker operation counter	To be provided by bidder		
65	LBS operation counter	To be provided by bidder		
66	Moisture absorption material in SF6 tank	Bidder should provide the detail of the moisture absorption material.		
68	Making of earthing operations	All earth operation to be marked with green back ground and permanent in nature.		
69	Auxiliary contacts (total numbers and spare numbers)	LBS Earth Switch CB CB Disconnecter - CB earth switch-		
70	Control cable entry provision	To be provided		
71	Shunt trip coil 24V DC/ 230V AC	230V AC shunt trip coil to be provided. Trip coils to be wired up on TB.		
72	MCB for LT AC incomer and TB connection of all CT, Aux switches and relay wiring	To be provided		
74	RMU Cable Boot/ terminal protector for 11 KV RMU			
a	Terminal protector	Insulating Boots		
b	System voltage	12 KV		
c	AC High voltage	28kV For 1 min		
d	Impulse withstand voltage	75kV		
e	Bushing Diameter	To be provided by bidder		
f	Bushing Types	To be mentioned by bidder		
g	Cable cross section suitability	Bidder to provide complying to specs.		
h	Dimensions of cable protector	Suitable for cables & bushing in specs. (Offered size to be provided by bidder)		
i	Material of the component	To be specified by bidder		

74	Cable termination for 11 KV	To be provided		
a	Type	Heat Shrinkable		
b	System Voltage	12KV		
c	AC High voltage	50 kV for 1 min		
d	Impulse withstand voltage	75 KVP		
e	Type	Raychem RICS 5133		
75	Type test reports	Bidders to provide detailed list of tests conducted at lab name, conducted dates, report number along with full reports.		
For motorized RMU				
1	SCADA Compatibility-Remote operation of RMU shall be possible by using motors fitted to operating mechanism of isolators & CB etc.	To be provided		
2	Harting Plug arrangement for individual isolator as well as breaker motor connections, which will be fitted on RMU body itself.	To be provided		
3	Details of I/O	As per Annexure-IO list of this specs		
4	System to prevent mal operation in case of latch command	Bidder to provide inbuilt system to prevent any mal operation in case of latch command at RMU in case of any fuse failure or DC fail situation		
5	Technical Details of motors			
a	Operating Voltage	24 V DC		
b	Max. power rating	240 Watts		
c	Max current drawn	9 Amp (±10%)		
d	Operating time	4-8 seconds		
e	Power Supply	Battery and charger of suitable size and rating required. Preferably 26 AH battery.		
76	Interlock	Electrical interlock for live cable presence indicator and operation of earth switch in RMU incomer cable compartment of LBS		
77	Auxiliary contacts	The breaker and LBS should have minimum spare (exclusively for TPCODL/TPSODL/TPNODL/TPWODL use) 4 NO+ 4 NC auxiliary contacts		
Transformer				
Sl. No	Description	Unit	As Specified by TPCODL	As furnished by Bidder
1	Application		Indoor	
2	Continuous Rating	kVA	630A/1000 kVA	
3	Type of Transformer		Cast Resin	
4	Name of Manufacturer		To be furnished by Bidder	
5	Place of Manufacture		To be furnished by Bidder	
6	Voltage ratio	kV	11/0.433 (As per tender)	
7	Vector group		Dyn-11	
8	Type of cooling		AN	
9	Class of Insulation(Over all)		Class H	
10	Winding Material		Copper	
11	Core material used and Grade			
a)	Thickness		0.23 or less	
b)	Grade		M3 or better	
c)	Flux Density at normal voltage	Wb/mm ²	1.6	
d)	Over fluxing without saturation (Curve to be furnished to)	Wb/mm ²	1.9	
12	Maximum temperature rise of:			
a)	Windings by resistance method	Deg.C	115	
13	Magnetizing (no-load) current at:			
a)	90% Voltage	%	To be furnished by Bidder	
b)	100% Voltage	%	2	
c)	112.5% Voltage	%	5	
14	Resistance of windings at 20 deg.C			
a)	HV windings	Ohms/Ph	To be furnished by Bidder	
b)	LV windings	Ohms/Ph	To be furnished by Bidder	
15	No load losses		To be furnished by Bidder	
16	Load Losses @50% loading at 75 deg C		To be furnished by Bidder	
17	Load Losses @ 100% loading at 75 degC		To be furnished by Bidder	
18	Total losses@50% load	W	Refer cl 5.3.3	
19	Total Losses@100%load	W	Refer cl.5.3.3	
20	Winding insulation class		Class H	
21	Winding insulation material		To be furnished by Bidder	
22	Current density used for :			
a)	HV winding	Amp./sq. mm	2.5	
b)	LV winding	Amp./sq. mm	2.5	
23	Clearances :			
a)	Core and LV	mm	To be furnished by Bidder	

	b) LV and HV	mm	To be furnished by Bidder	
	c) HV Phase to phase	mm	To be furnished by Bidder	
24	Efficiency at 75 deg.C			
	a) Unity P.F.	%	To be furnished by Bidder	
	1) 125% load	%	To be furnished by Bidder	
	2) 100% load	%	To be furnished by Bidder	
	3) 75% load	%	To be furnished by Bidder	
	4) 50% load	%	To be furnished by Bidder	
	5) 25% load	%	To be furnished by Bidder	
	b) 0.8 P.F.	%	To be furnished by Bidder	
	1) 125% load	%	To be furnished by Bidder	
	2) 100% load	%	To be furnished by Bidder	
	3) 75% load	%	To be furnished by Bidder	
	4) 50% load	%	To be furnished by Bidder	
	5) 25% load	%	To be furnished by Bidder	
25	Regulation at :			
	a) Unity P.F.	%	To be furnished by Bidder	
	b) 0.8 P.F. at 75 deg. C	%	To be furnished by Bidder	
26	% Impedance at 75 deg.C	%	4.50%	
27	Power frequency voltage withstand test:			
	a) HV for 1 minute	kV	28	
	b) LV for 1 minute	kV	3	
28	a) Over potential Test (Double voltage and double frequency)	V	830	
	b) Impulse voltage withstand test (HV)	kVP	75	
29	Mass of :			
	a) Core lamination (minimum)	Kg	To be furnished by Bidder	
	b) Windings (minimum)	Kg	To be furnished by Bidder	
	c) Total weight	Kg	To be furnished by Bidder	
30	Transformer :			
	a) Overall length × Breadth × Height	mm × mm × mm	To be furnished by Bidder	
31	Inter layer insulation provided in design for :			
	a) In between all layer	mm	To be furnished by Bidder	
32	Insulation materials provided			
	a) For conductors			
	1. HV		To be furnished by Bidder	
	2. LV		To be furnished by Bidder	
	3. Core		To be furnished by Bidder	
33	Material and size of the wire used			
	1) HV Strip	mm /SWG	To be furnished by Bidder	
	a) Total area of cross section	sq.mm	To be furnished by Bidder	
	2) LV	mm /SWG	To be furnished by Bidder	
	a) Strip size/Foil	mm	To be furnished by Bidder	
	b) No. of conductors in parallel	Nos.	To be furnished by Bidder	
	c) Total area of cross section	sq.mm	To be furnished by Bidder	
34	Painting as per Specifications	YES/NO	To be furnished by Bidder	
ACB				
Sr. No	Descriptions	Unit	As Specified By TPCODL	As Furnished By Bidder
1	Thickness of sheet for the frame	Mm	2-3mm (min) GI	
2	Max. Current Density of bus bar	A/sq mm	1	
3	Max, permissible temperature		80 deg C at terminal with an amb. Temp not exceeding 40 deg C	
4	Min. clearance between phases	Mm	25	
5	Min. clearance between phase to earth	Mm	20	
6	ACB			
7	Application		Indoor	
8	Rated voltage	V	433	
9	Rated current	A	630 kVA -1000A 1000kVA-1600A	
10	Relay		Ashida A22F with 4 Element	
11	Current Transformers		7 Nos. Single resin cast. a) 3 nos dual core CT's of ratio for 630 kVA css rating - 1000A/5A & for 1000 kVA rating - 1600/5A Core 1: Class 0.5 & 15VA burden – For MFM Core 2: 5P20 & 15VA – For Ashida make O/C+E/F relay b) 3 nos single core CTs of ratio 630 kVA- 1000A/5A ;1000 kVA- 1600/5A Class 0.5 & 15 VA for Energy meter (Energy meter is not in bidder scope) c) 1 no single core CT of ratio 630 kVA- 1000A/5A ;1000 kVA- 1600/5A , 5P20 & 15 VA for Neutral unbalance protection	

			Approved Make of CTs: Reco/Newtek/Pragati/Kappa/ECS/Adcon	
11	Rated insulation with colour coded sleeves.	V	690	
12	Rated impulse-Withstand voltage	kV	8	
13	No of poles		3	
14	Rated short time withstand capacity l _{cw}	KA RMS	50 kA	
15	External Shunt trip release coil to be provided		230 V AC	
16	Main LV Busbar size	Sq mm	2000	
17	Earth Fault protection relay (NEF)		Alstom make CDG11 self-powered. Relay type is normal inverse with 3 Sec with E/F setting of 0.5 to 2 A	
MCCBs				
1	Application		Indoor	
2	Rated Voltage	V	433	
3	Rated Current	A	630	
4	No of MCCBs		6 nos. 630A,3P with LSIG release	
5	No of poles		3	
6	Rated insulation voltage	V	690	
7	Impulse-Withstand voltage	kV	8	
8	Rated operation voltage	V	433	
9	Rated short time withstand capacity l _{cw}	KA RMS	36 kA	
10	Overload release setting		50-100%	
11	Thermal shrouds		To be provided	
12	Phase barriers		To be provided	