Technical Specifications of MODEM for 66KV Sub-station

The Dual SIM Cellular Communication Router provide Secure and Reliable Connectivity for Remote Locations. With Cellular (2G - 5G), Wifi, and Ethernet connectivity and additional Features such as Dual SIM, Failover and VPN Support, Cellular Router is ideal for a large range of Applications such as Renewable Energy, Electrical Utilities, Sub-Stations, Telemetry, Smart Cities, etc.

High Performance 32-Bit communication processor and industrial grade wireless module and shall have embedded RTOS (Real Time Operating System). The Router features 1 RS232 Port, 1 RS232 / RS485 Port, 1 Ethernet LAN Port, 1 Ethernet WAN Port which can be easily connected to both Serial and Ethernet Devices along with Wifi to achieve Transparent Data Transmission.

Sr.No	Technical Specifications	Technical Parameters	Compliance Yes /No
	Cellular Standard		
1	Standard	LTE-TDD B38 / B40 / B41	
2		LTE-FDD B1 / B2 / B3 / B4 / B5 / B7 / B8 / B20 / B28	
3	Frequency Bands	WCDMA / HSPA+ B1 / B3 / B5 / B8 GSM / GPRS/ EDGE 850 / 900 / 1800 MHz	
4	Bandwidth	HSPA+: Downlink: 21 Mbps, Uplink: 5.76 Mbps HSDPA: Downlink: 7.2 Mbps, Uplink: 5.76 Mbps	
5	Transmit Power	< 23 dBm	
6	Receiver Sensitivity	> - 97 dBm	
7	Standards and Frequency Bands	IEEE 802.11 b/g/n	
8	Bandwidth	IEEE 802.11 b/g: 54 Mbps IEEE 802.11 n: 150 Mbps	
9	Secure Encryption	WEP, WPA, WPA2, WPA3 and other Encryption Modes	
10	Transmit Power	20 dBm (11n), 24 dBm (11g), 26 dBm (11b)	
11	Receiver Sensitivity	<- 72 dBm @ 54 Mbps	
12	CPU	Industrial Grade 32 Bit Processor	
13	FLASH	16 MB	
14	Power Supply	Industrial Grade 32 Bit Processor	

15	Standby Power Consumption	95 mA @ 12 VDC	
16	Communication Power Consumption	150 mA @ 12 VDC	
17	Button	Reset Button	
18	SIM / UIM	2 Standard SIM Card Interfaces. 1.8V / 3V SIM / UIM Card 15 KV ESD Protection	
19	Indicator Light	1 Power Light (Red) 1 Network Light (Green) 1 SIM Card Light (Green) 1 Online Light (Green)	
20	Serial Ports	1 RS232 Port, 1 RS485 Port Data Bits: 5, 6, 7, 8 Bits Stop Bits: 1, 1.5, 2 Bits Parity: No Parity, Even Parity, Odd Parity Baud Rate: 4800 - 115200	
21	WAN	1 x 10 / 100 Mbps Ethernet Port Adaptive MDI / MDIX 15KV ESD Protection	
22	LAN	1 x 10 / 100 Mbps Ethernet Port Adaptive MDI / MDIX 15KV ESD Protection	
23	WAN	Static IP, DHCP, PPPOE, 2G / 3G / 4G / 5G	
24	VPN Client	PPTP, L2TP, IPSEC, OPENVPN, GRE	
25	VPN Server	PPTP, L2TP, IPSEC, OPENVPN, GRE	
26	Configuration	Remote Management, SYSLOG, SNMP, TELNET, SSHD, HTTPS, HTTP, SMS	
27	Network Protocols	TCP/IP UDP HTTP, HTTPS NTP TELNET DDNS APN / VPDN DHCP Server / Client	
28	Security	SPI Firewall VPN Traversal Access Control URL Filtering, etc.	
29	Others	DHCP Binding MAC Address, DDNS, Firewall, NAT, DMZ Host, QOS, Traffic Statistics, Real-Time Display of Data Transmission Rate, SMS, Phone Ringing, Network Data Trigger Online / Offline	
30	Dimensions	94 x 89 x 28 mm (Not including Antenna + Mounting)	
31	Bandwidth	Approx. 330g	

32	Operating Temperature	- 35C to + 75C	
33	Storage Temperature	- 40C to + 85C	
34	Relative Humidity	95% RH (Non-Condensing)	

Technical Specifications of Switch for 66KV Sub-station

Sr.No	Technical Specifications	Minimum Technical Parameters	Compliance Yes /No
1	Type	Industrial Grade	
2	Width	22.5mm	
3	Height	140.4mm	
4	Depth	92.4mm	
5	Mounting	Din rail mounting	
6	Number of Interface	8	
7	Connection Method	Auto negotiation and auto crossing	
8	Transmission speed	10/100 Mbps	
9	Input buffer	768 kbits	
10	Output buffer	768 kbits	
11	Status and diagnostic indicators	LEDs: US, link and activity per port	
	Maximum power dissipation for nominal condition	1.557 W (at 24 V DC)	
	Supply voltage (DC)	24 V	
	Supply voltage (AC)	24 V AC (50/60 Hz)	
	Supply voltage range	9 V DC ... 32 V DC	
	Degree of protection	IP30	
	Ambient temperature (operation)	-10 ° C ... 60 ° C	
	Ambient temperature (storage/transport)	-40 ° C ... 85 ° C	
	Permissible humidity (operation)	5 % ... 95 % (non-condensing)	
	Permissible humidity (storage/transport)	5 % ... 95 % (non-condensing)	
	Electromagnetic compatibility	Conformance with EMC Directive 2014/30/EU	
	Conformance with EMC directives	EN 61000-6-2 EN 61000-4-2 (ESD) Criterion B EN 61000-6-2 EN 61000-4-3 (electromagnetic fields) Criterion A EN 61000-6-2 EN 61000-4-4 (EFT burst) Criterion A EN 61000-6-2 EN 61000-4-5 (surge) Criterion B EN 61000-6-2 EN 61000-4-6 (line noise immunity) Criterion A EN 61000-6-2 EN 61000-4-8 (electromagnetic fields) Criterion A EN 61000-6-2 Class A	

		EN 61000-6-2:2019	

Technical Specifications of Multi-Function Meters (0.5s class) for 66KV Sub-station

Multifunction meter should be capable to monitor Active power, Reactive power, line current, P-N Voltage, frequency, voltage, power factor, total active power, average power factor, Active total Import/Export energy, total apparent power etc.

Multifunction meter should be communicated with RTU over Modbus protocol on RS 485.

Multifunction meter should be minimum 32 bit complied.

Sampling rate: Minimum 156 samples/cycle/channel. (OEM to certify)

Large four or three line seven digit display (9.7x5 mm) with quadrant identification section and bar graph for instantaneous power level indication.

High accuracy class 0.5s

Average THD measurement upto 31st order & individual harmonics for voltage, current, power up-to **15th** order.

Measurement selection (star or delta/3-Ph 4 wire or 3-Ph 3 wire)

Modbus communication via RS485 port and Ethernet

True root mean squared (RMS) metering

Calibration LED for accuracy test on site

Wide and configurable current range 1-1.2A and 5-6A. Should be field configurable.

a. Field Configurable CT Ratio. Yes/No.
b. CT Secondary& CT Primary (Onsite Programmable Range)

Wide range auxiliary power, suitable for high voltages and or low voltages

Maximum demand recording

Expansion capability via add on modules for analog output or pulse input/ output and Ethernet

MFM with provision of ring type lug fixing capabilities are required to integratewith existing CT connections or meter should have provision for connection flexible/ Rogowski coil CTs range from 1000A to 4000A wherever applicable.

Operating voltages range- the offered meters operating range will vet +20% to -30% of normal voltage, i.e. 100V to 415V (Line values).

Operating frequency range: 50Hz with +/- 5% tolerance

Auxiliary Power Supply: 85-300V AC or 48 – 300V DC

Meter short time over current capacity: 20xImax for 1 sec or 7x Imax for 10 seconds

Meter shall start registering energy at 0.1% Ib

Burden

As per IS14697 Class 0.5s burden must not exceed below mentioned values:
Current Circuit: @1A & @ 5A 0.2VA per phase
Voltage Circuit: 0.2 VA per phase
Auxiliary Burden: < 8VA

LED

Meter must be provided with Calibration LED for accuracy testing on site, the LED could be configured for both active and apparent measurements.

Real time clock

The meter shall have a build in Real Time Clock

Meter mounting and dimensions

Mounting of meter: Flush mounted
Meters should have detachable connectors for easy installation.
Dimension (WxH): 96x96 without module/attachment.
Depth shall be <=65 mm w/0 module to accommodate for meter installation in existing panel.
Cut out size: 92x92mm

Environment Standards:-

IP 54 compliance for Front Fascia
Impulse withstand capacity: 6kV
Insulation: 4kV RMS @ 50Hz for 1 min> 100 M-Ohms
negative 10 degree to + 60 degree(operating)
-25 to +70 degree storage
Humidity: 95% non-condensing

Hardware and software capabilities

Meter shall communicate on RS485 Modbus RTU and data shall be available in floating point.
Meter shall have provision for hot swappable Ethernet port OR IEC 61850 port.

Communication baud rate range: 9600-38400 bps

Common metering hardware for both CT ratio 1A and 5A and all required PT ratio. The meter should be field configurable for the required CT and PT ratios. So that it

can be used for any application like HT 3 Phase 4 Wire, HT 3 Phase 3 Wire or LTCT. These configurations settings should be password protected. This is to ensure minimum spares.

Meter must have configurable password protection for setup mode.

Midnight snapshot (values) for selected energies likewise MWh Import and Export, MVArh for all 4 quadrants, MVAh Import and Export.

Load Survey: 90 days for at least 6 parameters @ 15 minutes' integration period. IP. It shall be possible to configure IP for 5/15 min. This helps in data analysis requirement.

Meter shall be able to detect fault conditions such as missing potential, Voltage unbalance, Current unbalance, Reversal of Current, High Voltage, low voltage, Invalid voltage, invalid phase association etc.

Diagnostic assistance shall be provided on display for phase association to verify correct installation.

Display

The meter shall have multi Colour LCD/TFT 3/4- line 7 digit display preferably with bright green backlight. The display must have quadrant identification facility and bar-graph for instantaneous power-level indication.

The meter shall have 2 different modes for display.

Auto display mode**/**Quick Display page mode with selected parameters, 4-5 parameters in quick display page mode. Push button mode: Parameters scroll manually on pressing push button.

Large multi-colour display with quadrant identification section and bar graph Power/Demand level indication

Instantaneous Parameters:

Phase wise line voltages and average line voltage
Phase wise phase voltages and Average phase voltage
Phase wise line currents and neutral current
Phase wise active currents
Phase wise reactive currents
Phase wise power factor and average power factor
Frequency.
Phase wise Active Power and Total Active power
Phase wise reactive power and Total reactive Power
Phase wise Apparent Power and Total Apparent Power

Energies

Active Total Import
Active Total Export
Apparent Import
Apparent Export
Reactive Import : Q1 + Q2
Reactive Export : Q3 + Q4

Additional Parameters

Power On/Off Hours
Load On/Off Hours
Phase wise Feeder interruption count (in absence of auxiliary power)
In addition meter may have configuration facility to select and group preferred display pages for quick viewing i.e. Favorite page display OR Auto display may be configured for selective Quick viewing display.

Future Expansion capability

Provision to allow addition of following modules as extension to existing meters. add on modules for analogue output or pulse input/outputs and 61850 gateway module should be complied.

OEM confirmation certificate for future provision of detachable modules and associated specifications should be attached with the technical bid.

Password protection for setup mode.

Guarantee/Warranty

10 years from the date of supply, Certify via OEM.

Type Test Report as per IS14697, Class 0.5s

Vendor shall have to submit the type test report for Accuracy class 0.5s as per IS14697 for the offered multi-function meter from NABL accredited testing agencies along with the offer. Type test report should not be older than 5 years.

Accuracy: Meter accuracy class 0.5s, Compliance as per IS14697.

Additionally, Accuracy class 0.5s for active, reactive and apparent Energy.
Please provide OEM certificate for Class 0.5s Accuracy compliance for Active, Reactive and Apparent energy in Technical bid.

List of Type test report

1. Impulse Voltage Test
2. AC High Voltage Test
3. Insulation Resistance test
4. Limit of error
5. Test of meter constant
6. Test of starting condition
7. Test of No-Load test
8. Ambient temp test
9. Repeatability error test
10. Voltage variation test
11. Frequency variation test
12. 10% of THD in current circuit
13. Reverse Phase sequence
14. Voltage unbalance test
15. Phase of auxiliary supply voltage by 120 degree
16. Magnetic induction of external origin 0.5mT
17. Continuous Magnetic induction of external origin of .67Mt
18. Power Consumption
19. Test of influence of supply voltage
20. Short time over current test

GTP of the Multi Function Meter

Sr.No	Technical Features	Required	Offered by bidder – Yes/No.
1	MFM Make	Secure/Satac/Siemens/ABB/Schneider	
2	Model Number	-	
3	Number of bit required	32bit	
4	Communication	Modbus protocol-RS485 & Ethernet	
5	Sampling rate	156 samples/cycle/channel	
6	Display	3 line or 4 line	
7	Accuracy class	0.5s	
8	Wide and configurable current range	1-1.2A and 5-6A. Should be field configurable.	
9	configuration	Can be configured through laptop or manual in MFM	
10	Expansion capability	via add on modules for analog output or pulse input/ output and Ethernet	
11	Integration of CT connection	provision of ring type lug fixing capabilities are required to integrate with existing CT connections	
12	Accuracy: Meter accuracy class 0.5s, Compliance as per IS14697. Additionally, Accuracy class 0.2s for active,	Specify % accuracy and provide OEM certificate for all below parameters. a. Voltage % b. Current % c. Active Power %	

	reactive and apparent Energy. Please provide OEM certificate for Class 0.5s Accuracy compliance for Active, Reactive and Apparent energy in Technical bid.	d. Reactive Power % e. Apparent Power % f. Active Energy % g. Reactive Energy % h. Apparent Energy	
13	Operating voltages range	the offered meters operating range will vet +20% to -30% of normal voltage, i.e. 100V to 415V (Line values).	
14	Operating frequency range	50Hz with +/- 5% tolerance	
15	Auxiliary Power Supply	85-300V AC or 48 – 300 V DC	
16	Meter short time over current capacity	20xImax for 1 sec or 7x Imax for 10 seconds.	
17	Dimension	96x96(wxh)	
18	CT / PT Ratio	HT 3 Phase 4 Wire, HT 3 Phase 3 Wire or LTCT	
19	MVArh	for all 4 quadrants, MVAh Import and Export	
20	Guarantee/Warranty	10 years from the date of supply, Certify via OEM certify along with technical bid.	
21	Type Test Report	Not older than 5 years	
22	Meter short time over current capacity	20xImax for 1 sec or 7x Imax for 10 seconds.	
23	Compliance	IP54	