

Annexure-I**TECHNICAL SPECIFICATION FOR SUPPLY OF INTELLIGENT LT POWER MANAGEMENT MODULE SUITABLE FOR DISTRIBUTION TRANSFORMERS FOR SINGLE/MULTIPLE FEEDERS AGAINST TN-2621****1. INTRODUCTION:**

This LTPM is an intelligent electric safety supervision and power management system.

The Intelligent LTPM should be customizable as per the requirement of the utility which works with the combination of hardware and software and the data is collected and stored safely, processed and displayed for computing and management and to create an alarm system and prevention system in order to prevent tampering and accidents and to ensure a trouble free operations and power distribution.

2. OBJECTIVE:

The objective is to develop a tamperproof, efficient and accident proof distribution system which can be monitored and controlled through remote as well and to prevent from electrocutions.

3. SCOPE OF WORK:

The scope of work shall mainly include the following: -

Designing, manufacturing, supply & installation of the Intelligent LTPM with features required as mentioned in this specification along with providing the platform on mobile or/and web applications and to customize as per the requirement, providing necessary software's, testing and supply of Intelligent LTPM with all necessary accessories.

4. APPLICABLE STANDARDS:

- 4.1 IS: 13947/1993 (Part2)/ IEC:60947 (Pt.2) (amended up to date) for L.T.MCCBs.
- 4.2 IS: 13410/1992 for SMC material.
- 4.3 IS:14772/2000 for general requirements for enclosures.
- 4.4 IS: 8623/1993 for enclosure Module& for degree of protection provided by enclosures of electrical equipment's.
- 4.5 IS:13779/1999 & IS:16444 for A.C static watt-hour meters for active energy .

5. MANUFACTURE/CONSTRUCTION OF INTELLIGENT LT POWER MANAGEMENT MODULES:-**5.1 Intelligent Module**

The intelligent module is a module integrated with the in-built breaker with fault detection and prevention features and ability to access the power and voltage of the outgoing circuit. The Intelligent Module must be connected with the communication module in order to transfer the data to the Nigam's server.

The detailed specification shall be as under:-

Sn	Particulars	Rating of the Transformer (in kVA)		
		250	315	500
1	System Details	3 phase, 4 wire		
2	System Current (in Amp)	133 % of the transformer rating		
3	Rated current of Module (in Amp)	400 Amp	630 Amp	630 Amp
4.	No. of Circuit/Feeders	As per specification.		
5.	Overload release setting	Adjustable Type		
6	No. of poles	Three pole + Neutral		
7	Rated Voltage (Vac)	400		
8	Insulation Voltage (Vac)	800		
9	Frequency (Hz)	50		
10	Rated Impulse withstand Voltage, Uimp (Vac)	8000		
11	Rated Ultimate short circuit breaking capacity ,Icu (kA)	>50		
12	Rated Operating short circuit breaking capacity ,Ics (kA)	>35		
13	Auto-recloser time (s)	20-60		
14	Parameter Value setting	Rated residual current value, Long-delay time for over load, Short-delay time for Short circuit, Instantaneous time for Short Circuit, Over voltage protection value, and Under voltage protection value.		
15	Monitoring of electrical circuit parameter	Current, Voltage, Power, Frequency, Power factor		
16	Protections	Overload, Short-Circuit, Auto-reclose, Phase Loss, Over voltage and Under voltage		
17	Communication Protocol	TCP, Modbus, Wifi etc.		
18	Pollution Degree	2		

Intelligent Breaker must be capable of the following features:

1. Remote Control & Monitoring (Real time):
 - a. Voltage of individual phase
 - b. Active & Reactive Current (Accuracy Class 1.0) of individual phase
 - c. Power Factor
 - d. Earth Leakage
 - e. Frequency of System
 - f. Real time GPS Location
 - g. Communication & other modules
 - h. Real time clock, date & time

- i. Data storage of electrical parameters
 - j. LCD display of parameters
 - k. Alarm
2. The Software of the Intelligent breaker must have a facility to freeze the data on daily, weekly, monthly, quarterly basis and the same must be uploaded to cloud server for better data management facility or server of the DoIT as per Nigam's option. However, billing parameter i.e. kWh, kVAH, Power Factor & MDI shall be shown of previous month.
 3. The data must be stored in encrypted form in the cloud server which can only be accessible through the verified application and that no human intervention is allowed on the data so that no tampering with the data can be done.
 4. Alerts: The breaker must have the following alarms on the abnormalities listed below:
 - a. Abnormal Voltage (Alerts should be sent whenever the Voltage increase/decrease as per provision of the Electricity Act 2003.
 - b. Abnormal Current (Alerts should be sent whenever the Current is increase/decrease as per provision of the Electricity Act 2003
 - c. In case of short Circuit
 - d. Phase Unbalance
 - e. Earth Leakage
 5. Auto-Reclosing System: The breaker must be tripped in the following conditions to prevent the system from accidents:
 - a. Phase Loss
 - b. Phase Unbalance
 - c. Over Voltage & Under voltage condition
 - d. Over current and under current condition
 - e. Earth Leakage with bypass system
 - f. Short Circuit

The breaker must have an auto reclose function which must reclose within 50 seconds after tripping of the breaker and it must repeat this function 2 more times before stopping the supply to further distribute.

6. Communication: Communication module which comes along with MCCB having various communication mode i.e WiFi, TCP, GPRS 2G/4G, NB-IoT, LoRa, Zigbee. However, the sim shall be obtained by the Nigam

6. BUSBARS AND CONNECTIONS:

LTPM will have copper busbar and TPN (Three phase+ Neutral) MCCBs (on outgoing side) with necessary interconnecting Bus Bars.

EC grade copper busbar of appropriate size as per distribution transformer rating shall be used in phase & neutral, PVC sleeved suitably with red, yellow and blue for the phases and black for neutral for the main incoming circuits. All connecting links shall be PVC sleeved of same colour as Phase/Neutral. The bus bars should be mounted on insulators and properly fixed. The bus bars should withstand thermal stress and dynamic forces in the event of short circuit, and it should be supported and arranged so as to withstand any damage or deformation at specified short time current.

All bus bars & links should be properly drilled, de-burred and should be provided with durable PVC insulating sleeves, standard Colour code shall be used for different phases. Minimum clearance wherever shown shall be as per relevant IS for clearances. Other clearance shall be as per requirement of IS: 4237 amended upto date.

The maximum current rating of the bus bar is 1.6Amp /Sq mm

All busbars and links should be properly drilled and de-burred to minimize tearing of joints. Minimum joints preferred.

7. Enclosure

- a. The enclosure must be manufactured with hot compression moulding and the enclosure shall have the rounded corners. The SMC materials must be type tested as per IS:13410. Alternatively, the enclosure can be supplied in Deep Drawn Mild Steel CRCA sheet.
- b. The thickness will be minimum 2.5 mm on load bearing side and 2 mm on non-load bearing side for SMC enclosure and minimum 1.2 mm for Deep Drawn Enclosure
- c. The enclosure shall be openable from front side.
- d. To ensure proper and corrosion resistant movement of the doors, the doors must be fitted with the continuous stainless steel hinges of sufficient thickness duly fitted with good quality rivets at uniform location in SMC enclosures and with minimum 2 nos in Deep Drawn Enclosures.
- e. Adequate slope on the top of Module should be provided to drain out rainwater from the top of the Module. The Module must meet the criteria of IP-44 or above. Two sets of louvers shall be provided to ensure that the temperature inside the enclosure is not substantially different from that of the atmosphere.
- f. Locking Arrangement: The Module must be fitted with the good quality magnetic lock at top & both the sides of door with one no. panel lock in center for proper locking of Module. Lock with handle must be provided on the Module to operate the locking mechanism.
- g. The colour of the Module preferred is grey or off White.

- h. Necessary fixing arrangement at back side provided for fixing of Module on double pole structure.
- i. Instruction leaflet in Hindi/English as per the attachment must be provided in each LTPM from inside.
- j. Danger Marking must be provided with red ink on the door.
- k. The overall tolerance will be **±5%**.
- l. The final drawings must be approved by the purchaser without commencement of the supplied.

8. FINISH OF LT POWER MANAGEMENT MODULES:

- 8.1 Colour of outside/inside surface shall be mentioned in this specification.
- 8.2 All metal parts used in the LT POWER MANAGEMENT MODULE's shall be treated as under.
- 8.3 M.S. parts such as Bolts & Nuts, washers etc. : Electro galvanizing of Zinc except for bus bar & links.

9. SAFETY ARRANGEMENTS: Two earthing studs of galvanized M.S. 35x10 mm shall be provided for external earth and internal neutral connections. These should be complete with plain washer, spring washer, nuts etc. Earthing studs must be provided to prevent removal of the same from the LT POWER MANAGEMENT MODULE.

10. TESTS & TEST CERTIFICATES: The routine and acceptance tests of MCCB shall be as per relevant IS .

- 10.1 Routine Test: (carried out on LT POWER MANAGEMENT MODULE's)
- 10.2 Overall dimensions checking:
- 10.3 Visual Examination as per Specs.
 - (a) Verification of dimensions as per Specs.
 - (b) Verification of fittings as per Std.
- 10.4 High Voltage Withstand Test at 2.5KV.
- 10.5 Routine tests as per IS:13410-1992 on SMC material & IS: 14772 for SMC enclosure for conformance to the values specified as per Standard.
- 10.2 Acceptance Tests (on complete LT POWER MANAGEMENT MODULE):

Following tests shall be carried out as acceptance tests in addition to routine tests as per sampling plan i.e. 1 no out of every lot of 50 or part thereof.

- i) Insulation Resistance tests as per IS.
- ii) Temperature rise test on one sample of each rating .
- iii) Time-Current Characteristics test of Intelligent breaker as per IS.
- iv) Acceptance tests as per IS:13410-1992 on SMC material & IS: 14772 for SMC enclosure for conformance to the values specified as per Standard.

11. TESTING & MANUFACTURING FACILITIES: The tenderer must clearly indicate what testing facilities are available in the works of manufacturer and whether the facilities are adequate to carry out all routine acceptance and type tests. These facilities may be verified by JVVNL Engineers or other testing agency, if deputed to carry out or witness the tests in the manufacturer's works. The tenderer must have all the in-house testing facilities to carry out the acceptance tests on the LT POWER MANAGEMENT MODULE.

The tenderer should have following minimum manufacturing facilities in house to prove his reliability as a manufacturer of LT POWER MANAGEMENT MODULEs.

- i) Hot compression moulding machine
- ii) Power operated power presses
- iii) Assembling tools