**TECHNICAL SPECIFICATION FOR NET METERING 3 PHASE, 4 WIRE A.C. STATIC (10-60 Amps) DIRECT CURRENT CLASS 1.0 ELECTRONIC ENERGYMETER ALONG WITH METER BOX FOR SOLAR APPLICATION**

1. **SCOPE:**

I) This specification covers the design, manufacture, assembly, inspection, testing at manufacturers works before dispatch, supply and delivery at site/FOR destination anywhere in " state" of Class 1.0 accuracy static whole current electronic meter of current range 10-60 Amps for tariff purpose along with other associated equipment as per requirement given in this specification.

The meter should be 3 phase 4 wire type suitable for connection to LT 3 x 240V, 3 phase

4 wire systems. The meter shall be suitable for balanced as well as unbalanced load at all power factors i.e. Zero lag-Unity –Zero lead. The meter should be capable to record and display (Import & Export) kWh, KVAh and maximum demand in kW& KVA for 3 phase 4 wire AC balanced/unbalanced loads for a power factor range of zero (lagging), unity and zero (leading) as per requirement given in this specification.

II) It is not the intent to specify completely herein all the details of the design and construction of material. The material shall, however, conform in all respects to high standards of engineering, design and workmanship and shall be capable of performing for continuous commercial operation in a manner acceptable to the purchaser, who will interpret the meanings of drawings and specification and shall have the power to reject any work or material which in his judgment is not in accordance therewith. The offered materials shall be complete with all accessories, hardware, software and components necessary for their effective and trouble free operation. Such components shall be deemed to be within the scope of Bidder's supply irrespective of whether those are specifically brought out in this specification and/or the commercial order or not.

**2. STANDARDS APPLICABLE:**

Unless otherwise specified elsewhere in this specification, the performance and testing of the meters shall conform to the following Indian/International Standards and all related Indian/International standards to be read with upto-date and latest amendments/revisions thereof:

|  |  |  |
| --- | --- | --- |
| Sr. No. | Standard No. | Title |
|  | IS 13779/ 1999 | Specification of AC Static Watt hour meters, class 1.0 & 2.0. |
|  | IS : 9000 | Basic Environmental Testing Procedures for Electronic & Electrical items. |
|  | IS 12346 (1999) | Specification for testing procedure for electrical and electronic items. |
|  | IS 11000 (1984) | Fire hazard testing |
|  | IEC 62052-11 (2003) | Electricity Requirements (AC) General Requirements Test and Test conditions for A.C. Static Watt hour meter for active energy Class 1.0 and 2.0 |
|  | IEC 62053-21 (2003) | A.C. Static Watt hour meter for active energy Class 1.0 and 2.0 |
|  | IEC 60068 | Environmental testing |
|  | CBIP Technical Report no. 111 | Specification for Common Meter Reading Instrument. |
|  | IEC 61036-1996 | Specification for AC static Watt-hour Meters, Class 1 & 2. |
|  | CBIP Technical Report No. 325 & any amendment thereof. | Specification for AC Static Electrical Energy Meters. |
|  | CEA Regulation (2006) | Installation and Operation of meters Dtd: 17/03/2006 |
|  | IS: 14772/2000: | General requirement for enclosures for accessories for household and similar fixed electrical installation specification. |
|  | IS: 15707(2006): | Testing evaluation installation and maintenance of AC electricity meter code of practice. |
|  | IS 15959 | Data exchange for electricity meter, reading, tariff and load control – companion specification |

ETER SPECS 3 PHASE 4 WIRE DIRECT CONNEC

Meter matching with requirements of other national or international standards which ensure equal or better performance than the standards mentioned above shall also be considered. When the equipment offered by the tenderer conforms to standards other than those specified above, salient points of difference between standards adopted and the standards specified in this specification shall be clearly brought out in the relevant schedule.

**3. CLIMATIC CONDITIONS:**

The meters to be supplied against this specification shall be suitable for satisfactory continuous operation under the following tropical conditions. Meters shall be capable of maintaining required accuracy under hot, tropical and dusty climate.

|  |  |  |
| --- | --- | --- |
| a) | Maximum ambient air temperature in shade. | 50 Deg. C |
| b) | Minimum ambient temperature | (-) 5 Deg. C |
| c) | Maximum relative humidity | 95% |
| d) | Minimum relative humidity | 10% |
| e) | Height above mean sea level | Up to 1000 meters. |
| f) | Dust storms likely to occur | March to July. |
| g) | Average number of thunder storm days per annum | 50 |
| h) | Average number of tropical monsoon(conditions)  per annum | 4 months |
| i) | Average annual rain fall | 10 cms to 100 cms. |
| k) PHASE k) | Seismic level(Horizontal accn) | 0.30g |
| l) | Isoceraunic level (days per year) | 40 |
| m) | Average No. of rainy days per annum | 60 |
| n) | Maximum Annual Rainfall | 750mm |
| o) | Rainy Months | June to Oct. |
| p) | Altitude above MSL not exceeding | 300 meters |
| q) | Wind Pressure | 126 kg/sq m |

The temperature range and relative humidity for performance of meters shall be as per relevant standards.

**4. SUPPLY SYSTEM:**

|  |  |
| --- | --- |
| Rated voltage (Vref) | 3 x 240 V - Phase to Neutral (3 phase 4 wire  system)  3 x 415 V - Phase to Phase |
| Rated current (Ib) (connected through CT) | Basic current 10A (Ib), Maximum current-60  Amps (Imax.) |

**5. POWER FACTOR RANGE:**

The meter shall be suitable for full power factor range from zero (lagging) through unity to zero

(leading).

**6. POWER SUPPLY VARIATION**:

The meter should be suitable for working with following supply system variations:-

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Specified operating range | | | 0.8 to 1.1 V ref. | | |
|  | Limit range of operation |  |  | 0.6 to 1.2 V ref. |  |
| Frequency | | | 47.5 Hz to 52.5 Hz (Reference frequency 50 Hz) | | |

**7. ACCURACY:**

Class of accuracy of the meter shall be 1.0. within limit range 0.7 to 1.2 V ref.

8. POWER CONSUMPTION:

**8.1. Voltage Circuit:** The active and apparent power consumption in each voltage circuit including the power supply of meter at reference voltage, reference temperature and reference frequency shall not exceed 1Watt per phase and 4 VA per phase respectively.

**8.2. Current Circuit:** The apparent power taken by each current circuit at basic current, reference frequency and reference temperature shall not exceed 1 VA per phase.

**9. STARTING CURRENT:**

The meter should start registering the energy at 0.2% of Ib and unity power factor in all the 3 phases.

**10. MAXIMUM CURRENT:**

The rated maximum current for the meter shall be 60 Amps (600 % Ib) at which the meter purports to meet the accuracy requirement.

**11. GENERAL AND CONSTRUCTIONAL REQUIREMENTS:**

11.1. Meters shall be designed and constructed in such away so as to avoid causing any

danger during use and under normal conditions. However, the following should be ensured.

11.1.1. Personal safety against electric shock

11.1.2. Personal safety against effects of excessive temperature

11.1.3. Protection against spread of fire

11.1.4. Protection against penetration of solid objects, dust and water

11.2. All the material and electronic power components used in the manufacture of the meter shall be of highest quality and reputed make to ensure higher reliability, longer life and sustained accuracy.

11.3. The meters shall be designed with application specific integrated circuit and shall be manufactured using SMT (Surface Mount Technology) components. Power supply and voltage divider circuits may be of PTH technology.

11.4. All insulating material used in the construction of meters shall be non- hygroscopic, non-ageing and of tested quality. All parts that are likely to develop corrosion shall be effectively protected against corrosion by providing suitable protective coating.

11.5. The meter shall have an operation indication device such as a blinking LED. The operation indicator shall be visible from the front window and capable of being monitored conveniently with suitable testing equipment.

11.6. The meter shall conform to the degree of protection IP 51 of IS:12063/IEC:529 for protection against ingress of dust, moisture and vermin.

11.7. The meter shall be supplied with a transparent extended terminal block cover

(ETBC) with proper sealing arrangement.

11.8 The meter shall have seamless ultrasonically welded insulated body, along with unidirectional screws and wall mounted projected type to be fitted with the help of screws.

11.9. The meter-base, meter cover, terminal block and ETBC shall be made of unbreakable, high grade, fire resistant, reinforced, non-flammable, polycarbonate or equivalent high grade and good quality engineering plastic.

11.10. **NAME PLATE MARKING:**

Every meter shall be provided with a name-plate which shall be clearly marked/embossed as per clause-7 of IS:13779/1999 and IS:15959. The name plate shall have following markings which shall be indelible, distinct and readable from outside the meter:—

(a) Purchase name, Purchase order No. and date with inscriptions or "PROPERTY OF PVVNL".

(b) Manufacturers name, Trade mark and place of manufacturer. (c) Designed of type.

(d) Nature of current and no. of phases and no. of wires for which meter is suitable for.

(e) The manufacturer’s serial no., year of manufactures and warrantee period.

(f) Reference voltage

(g) Reference current

(h) Meter constant (if any) (i) Class of accuracy

(j) Reference temperature

(k) Transformation ratios of instrument transformers (s) of which account is taken for meter constant.

(I) **Bar Code**

Bar code as per 128C format shall be provided on the plate inside meter glass. Meter serial numder to be written in barcode.

11.11. The terminal block, the ETBC and the meter case shall ensure reasonable safety against the spread of fire. They should not be ignited by thermic overload of live parts in contact with them.

11.12. The terminal block shall be of high grade non-hygroscopic, fire retardant, low tracking, fire resistant, reinforced poly-carbonate (not Bakelite) or equivalent high grade engineering plastic which should form an extension of the meter case and have terminal holes and shall be of sufficient size to accommodate the insulation of the conductors, meeting the requirement of IS 13779:1993/CBIP technical report- 304

11.13. The terminals shall have suitable construction with barriers and cover to provide firm and safe connection of current and voltage leads of stranded copper conductors or copper reducer type terminal ends (thimbles). The terminal cover shall enclose the actual terminals, the conductor fixing screws, the external conductor and their insulation.

11.14. The manner of fixing the conductors to the terminal block shall ensure adequate and durable contact such that there is no risk of loosening or undue heating.

HASE 4 WIRE DIRECT CONNECTED

Screw connections transmitting contact force and screw fixing which may be loosened and tightened several times during the life of the meter shall be such that the risk of corrosion resulting from contact with any other metal part is minimized. Electrical connections shall be so designed that contact pressure is not transmitted through insulating material. The internal diameter of the terminal holes shall be 8.5 mm minimum , depth of terminal hole shall be 25 mm. The clearance and creepage distance shall conform to relevant clause of IS

13779:1993/CBIP technical report no.-325.

11.15. The meter shall be compact in design. The entire design and construction shall be capable of withstanding stresses likely to occur in actual service and rough handling during transportation. The meter shall be convenient to transport and immune to shock and vibration during transportation and handling.

11.16 The potential link shall not be provided out side on meter terminal block.

**12. SEALING OF THE METER:**

Meter cover should be physically joined by ultra sonic welding on both sides in such a way that

meter cover cannot be opened without breaking and shall be physically evident as well as it should be protected thorough cover open switch. It shall be displayed and as well as recorded in MRI. Reliable sealing arrangement should be provided to make the meter tamper evidence and avoid fiddling or tampering by unauthorized persons. For this, at least two (2) Nos. seals on meter body, one (1) No. seal on meter terminal cover and one (1) No. seal on communication port and scroll push button shall be provided. All the seals should be provided on front side only. Rear side sealing arrangement will not be preferred. The suppliers in their offer should explain the sealing arrangement.

**13. CONNECTION DIAGRAM & TERMINAL MARKINGS:**

The connection diagram of the meter shall be clearly shown on inside portion of the terminal cover. The meter terminals shall also be marked and this marking should appear in the above diagram.

**14. SOFTWARE:**

Software for reading, down loading data of the meter and TOD programming in the meter,

normally resident in the Common Meter Reading Instrument (CMRI), software suitable for MS- DOS 5.0 or higher version.

Windows based Base Computer Software (BCS) for retrieving data from CMRI and downloading instructions from base computer software to CMRI. This BCS should have, amongst other requirements and features and facilities described later in this specification, the facility to convert meter reading data into user definable ASCII file format so that it may be possible for the user to integrate the same with the user's billing data and process the selected data in desired manner.

Necessary software for loading application program via CMRI serial port.

The following software shall be made available and installed on CMRI & BCS by the firm whose meters are to interface with CMRI without any extra charges. Any future up gradation in both the software shall also be provided free of cost.

(a) Software to be resident in CMRI for the purpose of reading and programming the specific make(s) of static meters.

(b) Base computer stations (BCS) software for accepting data for CMRI, processing generating reports and down loading instruction from the BCS to CMRI. The firm will also provide ASCII conversion utility alongwith BCS software for processing of the billing data.

(c) The firm shall install the above software without any extra cost on call from one of the Test Division located in each of the Zones. The purchaser will arrange these software installations in rest of the existing and future Test Divisions for which necessary softcopies with appropriate licences shall be provided by the firm.

(d) It should not be possible to re-program the meter at site (write facility through optical port). The meter programming through optical port shall not be acceptable except time of day (TOD) and real time clock (RTC). Provision for programming of TOD and RTC shall necessarily be provided.

(e) For efficient and speedy recovery of data read through CMRI, view & analysis, a Base Computer Software (BCS) shall have to be supplied having the following features:

The BCS software shall be windows based (windows 98 & all higher version) user friendly. The data transfer shall be highly reliable and fraud proof. Base Computer software shall give all details adequate for analysis and abnormal event data & load surveys parameters. The software shall have the facility to convert all the consolidated information / data of selectable parameters into ASCII format. EDP department of purchaser can generate its own DBF (data base files) to downloaded all the required information into it.

**(i) Platform:**

The BCS shall be executable on MS WINDOWS 98, WINDOWS 98, WINDOWS-2003 XP, WINDOW XP PROFFESIONAL, VISTA, WINDOWS 2007 or higher updated operating platform or higher operating system. The BCS shall be suitable to run on IBM PC or compatible hardware platform.

**(ii) Meter Data Display:**

The software shall show electrical condition existing at the time of reading the meter in tabular forms as well as graphical format (Phase diagram with phase angle)

All the information about energy, maximum demand and their respective TOD register reading, billing register readings shall be shown in a manner which user can easily understand.

All the load survey data shall be available in numerical as well as graphical format. It shall be possible to view this data daily, weekly, and monthly format. The load survey graph will show values where the cursor is placed for the selected or for all parameter.

All the information about abnormality events shall be accompanied with date and time stamping of respective electrical conditions. This information shall be displayed in the sequence in which it happened in cumulative format as well as summary format.

BCS should display the Date and Time for followings - Meter Reading, MRI taken at site and MRI dump in the computer. The software shall be capable of preparing CMRI to read the meter information or time setting of the meter.

**(iii) Support Display:**

There shall be "user friendly" approach for viewing meter data for the reading collected now or for the reading collected in the past. All information about a particular consumer will be sorted out and available at one place so that locating any consumer 's past data is easy. It shall be possible to retrieve/locate data on the basis of either one of the following particulars:

a) Site ‘s ID/Numbers.

b) Meter Sr. No.

c) Date of meter reading. d) Location.

BCS of the bidder should support the supplied meters of it own make

**(iv) The Data Transfer:**

It shall be possible to transfer data to and fro from CMRI through serial interface.

**(v) Configurability :**

It shall be possible to have selective print out of all available data of the meter. Print out shall not include anything and everything available with the BCS. The

software shall support "print wizard" whereby user can decide what to print out.

The use of the software need not revert back to the supplier of the software for modifying the software just to print what he desires.

BCS shall have facility to export data to ASCII or spreadsheet format for integrating with the purchaser's billing system. Here again an "Export wizard" or similar utility shall be available whereby user can select file format, what data to export, the field width selection etc.

**(vi) Security:**

The BCS shall have multilevel password for data protection and security. The first level shall allow the user to enter the system. The different software features shall be protecting by different passwords. The configurable of passwords shall be user definable. The software installed on one PC shall not be capable on another PC.

**(vii) Help :**

The exhaustive online help shall be available with the software so that user can

use all the features of the software by just reading the help contents.

Necessary software for loading application program via CMRI through serial port. Also meter reading data downloading facility directly from meter to laptop with 1 cord per 500 meter shall be provided with desired software.

**15. SALIENT FEATURES:**

The meters shall have the following additional salient features:-

15.1. Meter shall have provision of Phase indicators to show healthiness of individual voltages. In addition to above, phase indicators shall blink in case of connection abnormality persist at meter terminal.

15.2. The meter shall have provision of reading in the absence of power through an external source. An inductive coupling arrangement shall be provided so that it should not be possible to damage the circuit of the meter by applying excess voltage directly in the meter. The meter should be powered up using an external battery pack only in absence of power supply to the meter to enable taking of meter readings through display and optical communication port.

If any bidder proposes for Internal Battery backup in the meter in case of mains

supply failure for meter reading and meter data downloading, no power shall be consumed for this circuit when mains are available to recharge the battery.

In case of power failure data downloading for Historical energy, maximum Demand & all the tamper events through CMRI (common meter reading instrument) shall be possible though battery internal/ external backup. Rechargeable capacitor back up power shall not be used for display under Power absence condition. To verify that the sample meters are not having capacitor rechargeable battery, the samples will be kept in power off conditions for 7 days (168 hrs.) and then meters will be checked by pressing the push button and the CMRI shall be done.”

15.3. The meter should work accurately irrespective of phase sequence of the mains supply only in forward direction.

15.4 The meter preferably shall have scroll lock facility to lock desired parameter from push button displays parameter.

15.5. The meter should remain powered up and functional even when either any two phases or any one phase with neutral is available to the meter.

15.6. The meter should continue to record accurately as per prevailing electrical conditions even if the neutral of potential supply gets disconnected.

15.7 The meter shall remain powered up and functional on all prevailing tamper practices.

**16. DISPLAY OF MEASURED VALUES**

|  |  |  |
| --- | --- | --- |
| **Parameters** | **ON Display** | **ON BCS** |
| KWH (FORWARD) | 7+0 | **7+0** |
| KVAH (FORWARD) | 7+0 | **7+0** |
| MAX. DEMAND(KW) | 3+2 | 3+2 |
| MAX. DEMAND**(KVA)** | 3+2 | 3+2 |
| CUMULATIVE MAX. DEMAND | **4+2** | **4+2** |

16.1. The measured value(s) shall be displayed on seven segments, seven digit Liquid Crystal Display (LCD) display unit/register with Backlit, having minimum character height of 8 mm.

16.2. The data should be stored in non-volatile memory. The non-volatile memory should retain data for a period of not less than 10 years under un-powered condition. Battery back-up memory will not be considered as NVM.

16.3. It should be possible to easily identify the displayed parameters through symbols/legend on the meter display itself.

16.4. In case of multiple values presented by a single display, it shall be possible to identify each displayed value/parameter through separate symbol/legend to be made available on the display itself.

16.5. The register shall be able to record and display starting from zero, for a minimum of 1500 hours, the energy corresponding to rated maximum current at reference voltage and unity power factor. The register should not roll over in between this duration.

**17. METER SERIAL NUMBER:**

In addition to providing serial number of the meter on the display unit of the meter and display plate, the meter serial number shall also be programmed into meter memory for identification through CMRI/meter reading print out.

**18. DISPLAY SEQUENCE:**

**PUSHBUTTON MODE DISPLAY PARAMETERS**

1. LCD segment check
2. Meter serial number
3. Real time
4. Date or Date and Time
5. Net Active Energy
6. Cumulative Active Energy KWH (Import & Export)
7. Cumulative Apparent KVAH (Import & Export)
8. Cumulative KWH (Import & Export) of Pre defined date & Time of pre defined billing month
9. Cumulative KWAH (Import & Export) of Pre defined date & Time of pre defined billing month
10. Meter reading count
11. Cumulative power-on hours
12. Current Month Max. Demand (Import & Export) (kW).
13. Prev. Month Max. Demand (Import & Export) (kW).
14. Cumulative max. demand(Import & Export) (kw)
15. Current Month Max. Demand.( KVA) during Peak hours (Import & Export)
16. Prev. Month Max. Demand.( KVA) during Peak hours (Import & Export)
17. Cumulative Max. demand(KVA) (Import & Export)
18. MD reset count
19. All Phases Voltage ( P-N)
20. All Phases Line Current
21. Inst. Frequency ( Hz)
22. Power factor
23. Inst load KW
24. Inst. Load KVA
25. Cumulative power on hours reading of predefined date and time of the last two consumption months (BP POH).
26. Tamper Data:
27. Present status of tamper:
    1. Missing potential with phase identification
    2. Current polarity reversal with phase identification
    3. Current short & open.
    4. Other tampers(magnet. ND)
28. Date and time of last tamper occurrence with tamper identification
29. Date and time of last tamper restoration with tamper identification.
30. Cumulative tamper count of all types of tampers.

**AUTO MODE DISLAY PARAMETERS**

1. LCD segment check .
2. Meter serial number
3. Real time
4. Date or Date and Time
5. Net Active Energy
6. Cumulative Active Energy KWH (Import & Export)
7. Cumulative Apparent Energy KVAH (Import & Export)
8. Current month max. demand (kw) (Import & Export)
9. Prev. Month Max. Demand (kw) (Import & Export)
10. Cumulative Max. demand(kw) (Import & Export)
11. Current month max. demand(KVA) (Import & Export)
12. Previous month max. demand(KVA) (Import & Export)
13. Cumulative max. demand(KVA) (Import & Export)
14. Inst. Load KW
15. MD reset count
16. Cumulative tamper count of all types of tampers.
17. Existing tamper, if any.
18. Avg. Power factor
19. Voltage all phase
20. Current all phase

Each parameter shall be on meter display for 10 seconds and the time between two auto cycles shall not be more than 60 seconds subject to 10% tolerance.

Detailed tamper information as per DLMS should, however, be logged in the meter memory and be capable of downloading to the BCS through the CMRI and be available for viewing at the BCS end.

Note : The TOD wise bill point active energy, and maximum demand though not provided on meter-display, should be logged in the meter memory and be capable of downloading to the BCS through the CMRI and be available for viewing at the BCS end.

**19.0 TIME OF DAY (TOD) TARRIF:**

19.1 Meter should be able to store apparent and active energies ((Import & Export)) consumption along with maximum demand in KVA for at least different 8 time zones.

19.2 Meter shall be able to record and store apparent and active energies, consumption alongwith maximum demand in KVA during specific peak hours described as following time Zone of register in sequence:—

1. 17.00 to 18.00 Hrs.
2. 18.00 to 22.00 Hrs.
3. 22.00 to 23.00 Hrs.
4. 23.00 to 05.00 Hrs.
5. 05.00 to 06.00 Hrs.
6. 06.00 to 08.00 Hrs.
7. 08.00 to 11.00 Hrs.
8. 11.00 to 17.00 Hrs.

19.3 The starting of display of TOD zones shall be from 17:00 hrs to 18:00 hrs as first slot and last slot as 11:00 hrs to 17:00 hrs.

19.4 The meter shall have facility for recording and storing of TOD consumption and maximum demand data on minimum Three Tariff Rates, per day basic.

19.5 It should be possible to change the time period for TOD recordings through the portable device or programmable BLOCK installed in the meter itself or manually with proper security at site. The main control for this change shall be available on the computer located at the Metering Office.

**20. OUT PUT DEVICE:**

The meter shall have a test output accessible from the front and be capable of being monitored with suitable testing equipment. The operation indicator, if fitted, must be visible from the front. Test output device shall be provided in the form of LED output device. The relation between test output and the indication on display shall comply with the marking on the name plate (imp per kWh)

**21. COMMUNICATION PORT:**

The meter shall have facilities for data transfer locally through CMRI and remotely by GSM, CDMA , PLCC and GPRS modems/devices with proper security via an optically isolated communication port using serial communication. It should be possible to configure meter for TOD tariff demand integration period, billing date, real time clock and date etc. through CMRI locally without any extra cost to PVVNL, but the same shall be done by the manufacturer only after taking due approval of MD, PVVNL or his authorized representative. The meters shall have a galvanically isolated optical communication ports as per IEC 1107 so that it can be easily reading instrument for data transfer. The meter shall have additional RJ11 (RS232)/Micro USB (RS232) port along with optical port for reading data through CMRI and AMR modem. Communication ports shall not be affected by any type of injection/unauthenticated signals. The baud rate should not be less than 9600 bps and higher baud rate shall be preferred for down loading the data. The complete data shall be downloaded within 5 minutes from meter to CMRI & from CMRI to BCS.

The bidder shall supply software required for local (CMRI) & remote (AMR) connectivity including required training to use the software free of cost. Both the communications port work simultaneously**.** Separate communication cords for optical port and RJ11 port have to be supplied with each meter free of cost duly fitted with meter box with a provision of reading the data without opening the meter box. Also the meter box shall have provision of sealing optical port. RJ11 port should have sealing provision at the meter body. **The bidder shall provide meters as per DLMS compliance i.e. meters with open protocol as per IS: 15959.**

**22. SPECIAL REQUIREMENT FOR DISPLAY:**

22.1 The meter shall have indication for unsatisfactory/non-functioning of the following:—

a) Time and calendar

b) Real time clock with battery c) All display segments

d) Non-volatile memory.

22.2 The meter serial number, consumers name and address, C.T. and P.T. ratio and date with time of taking reading shall invariable be available at base computer software.

22.3 The meter shall be factory programmed for each and every month for minimum 20 years at the time of manufacture and correctness of 20 years calendar. In addition following parameters should also be factory programmed:—

a) Integration period b) Display sequence

22.4 The meter shall have provision of reading in the absence of power through an external source. An inductive coupling arrangement shall be provided so that it should not be possible to damage the circuit of the meter by applying excess voltage directly in the meter. The meter should be powered up using an external battery pack only in absence of power supply to the meter to enable taking of meter readings through display and optical communication port. The supplier has to supply one no. Power Pack unit with each lot of

100 nos. of meters without any extra cost in case of external source of supply. In case of internal battery back up for reading and data downloading through MRI in absence of power supply, the battery must be able for a backup time of minimum 7 days (168 hrs) as per Clause 15.2.

**22.5 INTERFACE WITH MS DOS BASED CMRI:**

For Physical interface between meter and Common Meter Reading Instruments shall consist of meters optical sensor terminating into a 9 Pin D type male connector with a cable of 500mm + 10mm length with a provision of reading the data without opening the meter box. Also additional RJ11 port at the meter body shall have sealing provision.

**ILLUSTRATION NO.1**

500mm long Cable 1500mm long Cable

Optical Port for connecting to Meter 9 pin Male 9 pin female Connection to CMRI The configuration of 9 Pin D type male connector shall be as given below:

|  |
| --- |
| PIN SIGNAL NAME |
| 01 NC |
| 02 TRANSMIT DATA (TXD) |
| 03 RECEIVE DATA (RXD) |
| 04 NC |
| 05 SIGNAL GROUND (SG) |
| 06 NC |
| 07 NC |
| 08 NC |
| 09 POWER SUPPLY |

O5

O9 O4

O8 O3

O7 O2

O8 O1

**ILLUSTRATION NO.2**

1500mm long Cable

Connection to CMRI 9 Pin Female connector to

Base Computer Station (BCS)

22.6 Meter shall invariably be provided with LCD display cycling facility for essential parameters, as envisaged under clause No. 7.0 of the technical specification.

22.7 While installing the meter, it shall be possible to check the correctness of the C.T. & P.T. connections to the meter and their polarity with the help of common meter reading instrument.

22.8 The meter and related instruments, when installed, shall be constructed in a way offering full protection against contact voltage, other hazards resulting from/or related to the operating principle and the utilization of the equipment. In particular if any metal part accessible while covers are in place, then the base shall be fitted with protective Earth terminal identified by the Earthing symbol ⊥ and connected to all accessible metal parts.

* 1. **The Static Trivector Meter shall have memory capacity to store followings parameters**

22.9.1 The static tri vector meter shall measure and retain previous 12 months data (month wise) of the KWH and KVAH reading at 2400 hrs. of the last days of each calendar month, along with monthly consumption in kwh and kvAh for each month including current month consumption. Average power factor and maximum demand with date and time of occurrence of that particular month . These parameters shall also be obtainable through common meter reading instrument whenever required of last 12 months.

22.9.2 The meter shall also have memory capacity to measure & retain tampers evident data of 200 events in compartments as per DLMS (treated occurrence & restoration as separate event). Upto 50 events configured in one compartment which will rollover on FIFO basis(except the non roll over events).

* + 1. The meter shall record three phase voltage, current, power factor separately with KWh energy, at the time of each event ( except power ON/OFF.)
    2. Meter shall also store & communicate instantaneous electrical parameters, vector representation as and when meter data downloaded from meter to MRI at BCS end.
    3. The meter shall have sufficient memory capacity to store above parameters with defined duration / frequency / numbers of event with FIFO basis.

22.10 The meter shall be provided with an accurate quartz crystal based real time clock. The maximum drift permissible in the real time clock shall be +5 minutes per year for class 1.0S Meters.

**23. MAXIMUM DEMAND REGISTRATION AND RESETS:**

23.1 The meter shall continuously monitor and calculate the (Import & Export)- average maximum demand for Kw and KVA for each interval of time of 30 minutes and maximum of these shall be stored along with date and time when it occurred.

23.2 The meter shall automatically store the 30 minute average demand. At the end of every

30 minutes, the new calculated demand should be compared with previous maximum demand and stored whichever of them is higher. The maximum demand for every calendar month along with the date and time when it occurred should be registered.

23.3 The maximum demand shall automatically reset at 24.00 Hrs. of the last date of each calendar Month for which minimum 20 calendar years shall be programmed by the manufacturer at his work.

23.4 The meter shall be provided with its own real time clock calendar with built in battery backup and time derived from this clock shall be used for maximum demand intervals. The meter shall display the maximum demand reset count.

23.5 The billing purpose parameters for both import and export mode (active energy, apparent energy, maximum demand in kW and kVA) shall be registered and shall be available for a minimum period of last 12 (Twelve) months through BCS. Midnight data (KWH, KVAH) of last two months shall be provided in MRI.

**24. LOAD SURVEY CAPABILITY & BILLING POINT REQUIREMENTS:**

*Measure & retain minimum Load Survey data of past 2 months to store average KW*(Import & Export)*, KVA*(Import & Export)-*, PF, 3 phase voltage and current parameters of 30 min integration period. It shall be possible to select either demand or energy view at the BCS end.*

The load survey data can be downloaded & presented in the form of bar charts as well as in spread sheets. The BCS shall have the facility to give complete load survey data both in numeric and graphic form.

**25. BILLING PARAMETERS**

The predefined date and time for registering the billing parameters of Net Active Energy ,Import & Export- KWh, KVAh , KVA and kW MD as well as Tamper Count and Power-on hours readings shall be 24:00 Hrs of the last day of every month . All current billing parameters shall be transferred to billing registers.

The above billing data, TOD register's data, load survey data, tamper information data shall all be retrievable through the meter's communication port through a common meter reading instrument (CMRI) and shall be transferred (downloaded) to a PC with windows based software to get complete details in numerical and/or graphic form. The necessary base computer software (BCS) for this purpose shall be provided by the supplier with complete details.

**26. SELF DIAGNOSTIC FEATURE:**

The meter shall be capable of performing complete self diagnostic check to monitor the circuits for any malfunctioning to ensure integrity of date memory location all the time. The meter shall have indication for unsatisfactory/nonfunctioning/malfunctioning of the following:-

a. Time and date and

b. All display segments as per the requirement under G 19 of IS 14697. c. Real Time Clock (RTC)

d. Non Volatile Memory (NVM)

If possible, the details of malfunctioning should be recorded in the meter memory.

**27. TAMPER AND FRAUD PROTECTION**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Tamper detection Feature** | **Occurrence** | | | **Restoration** | |  |
| **Voltage** | **Current** | **Occurrence Time** | **Voltage** | **Current** | **Restoration Time** |
| **Voltage Failure** | < 55% Vbasic | Ignored | 5Min | > 55% Vbasic | ignored | 2Min |
| **Current Open** | Ignored | Iph<2%Ib & CT Bypass >15% Ib& No current reversal in any Ph | 5Min | Ignored | Iph>2%Ib or CT Bypass <15% Ib | 2Min |
| **Current reversal** | Vref | Iph> 10% of Ib& Power factor>0.5 in that phase and current flow in reverse direction | 5Min | Vref | 10% of Ib& Power factor>0.5 in that phase and current flow in forward direction | 2Min |
| **Voltage unbalance** | V max-Vmin>30% Vref | Ignored | 5Min | V max-Vmin< 30% Vref | ignored | 2Min |
| **Current Bypass** | Ignored | CT Bypass >20% Ib&Iph> 2% Ib(in all phases) & No current reversal in any Ph | 5Min | Ignored | CT Bypass < 20% Ib or any Iph< 2%Ib | 2Min |
| **Current unbalance** | Ignored | I max-Imin>30% Ib | 5Min | Ignored | I max-Imin< 30% Ib | 2Min |
| **Magnetic logging** | Meter shall record at Imax ,**Whenever effected by magnetic field. Ocuurance & resoration within 30 sec** | | | | | |
| **Neutral disturbance** | For any abnormal neutral disturbance signal, meter either remains immune or in case the meter functionality is getting affected, neutral tamper will be logged with date and time as an even and meter to record energy (V ref, actual current and UPF will be taken for metering | | | | | |
| **Top Cover open** | Event will be logged incase of power failure also, "Cover open" message will be activated on display along with date and time. Once the meter cover open display appears on screen, no other reading kwh, kvAh, demand etc should be on display . However the reading shall be available on push button mode. Event is not resettable. Once occurred the event will be there permanently on display | | | | | |
| **Low Voltage** | Vph<75% Vref | Ignored | 5Min | Vph>75% Vref | Ignored | 2Min |
| **Over Voltage** | 115% Vref<Vph | Ignored | 5Min | 115% Vref>Vph | Ignored | 2Min |
| **Over Current in any phase** | Ignored | Iph>120% In | 5Min | Ignored | Iph<120% In | 2Min |
| **Power Failure event** | When all three phases are switched off for 2 minute and more | | | | | |

* + - * 1. The meter shall be capable of recording power and remain functional on all prevailing Tampering practice.

In addition to this, meter should log minimum 10 events for meters authenticated transaction i.e time setting, time zones, Integration period change etc.

* + - * 1. Meter cannot be put in dead zone (non functioning zone) either by high voltage discharge( Spark) upto 35KV& by any external high frequency source. Hidden memory fully secured for outer / internal impact compare actual supply parameters & if functionally of meter gets changed/change in parameters, the tamper shall display on meter LCD. **35KV Spark test** – The meter (without box) shall be capable to withstand 35KV and should be immune if applied on the terminal, optical port and all sides of meter.
        2. **DC Immunity**: The meter shall not saturate on passage of direct current which can cause the meter either to stop recording/record inaccurately. Measurement by meter shall not get influenced by injection of chopped signal/DC signal /DC pulse of low frequency.
        3. **Snap Shots** The meter shall record three phase voltage, current, power factor separately with KWh energy at the time of each tamper event ( except power on off) with the date and time.

e. While connecting 3 phase capacitive bank unit to meter, under balance and unbalanced pure capacitive load meter should not log current reversal and should not increment in active energy (at no-load condition).

f. The meter shall keep working accurately irrespective of the phase sequence of the supply.

* + - 1. Mid night snap shot is required for configured energy Active (Import & Export) and Apparent (Import & Export) for last 35 days.
      2. Provision should be there for indication of existing tamper status in the meter preferably providing additional LED on meter body/LCD annunciator which should glow/display incase of tamper existing

**28. TAMPER LOGIC:**

Properly designed meter tamper logic should be provided. The tamper logic should be capable of discriminating the system abnormalities from source side and load side and it should not log/record tamper due to source side abnormalities.

There shall be minimum five separate compartments for logging of different types of tampers.

Bidder under their offer should explain the logging of various tampers in each compartment.

Once one or more compartments have become full, the last tamper event pertaining to the same compartment will be entered and the earliest (first one) tamper event should disappear. Thus, in this manner each succeeding tamper event will replace the earliest recorded event, compartment wise. Events of one compartment/category should overwrite the events of their own compartment/category only.

Bidders may indicate alternate proposals for the above tamper detection and logging scheme. Tamper count should increase as per occurrence (not restoration) of tamper events. The total

number of tamper counts should also be provided on the meter display as well as at the BCS end.

**29. TAMPER PERSISTENCE TIME:**

The tamper persistence time for logging/registration of an occurrence of a tamper should be 5 minutes +/- 10 seconds. The persistence time for logging of restoration of tamper should not be more than 120 seconds.Except ND, Magnet & Power ON/OFF

**30. ACCURACY REQUIREMENT:**

The accuracy of parameters measured by meters shall be tested in accordance with the relevant standards described in clause 2.0 of this specification.

**31. ELECTRICAL REQUIREMENT:**

The electrical requirement of meters shall be as specified in the relevant standards described in clause 2.0 of this specification.

**32. ELECTROMAGNETIC COMPATIBILITY AND INTERFERENCE REQUIREMENT:**

The meter shall meet EMI/EMC requirements as specified in the relevant standards described in

Clause2.0 of this specification.

**33. MECHANICAL REQUIREMENT:**

The meter shall meet the mechanical requirements as specified in the relevant standards described in clause 2.0 of this specification.

**34. CLIMATIC INFLUENCE REQUIREMENT:**

The meter shall meet Dry Heat/Cold/Damp heat cycle test requirement as per the relevant standards described in clause 2.0 of this specification.

**35. MINIMUM TESTING FACILITIES:**

The tenderer should have the necessary minimum testing facilities for carrying out the following tests:

1. AC voltage test

2. Insulation resistance test

3. Test of limits of errors

4. Test of meter constant

5. Test of starting condition

6. Test of no load condition

7. Repeatability of error test

8. Test of power consumption

9. ESD Test at 35 KV

10. Tamper conditions - as per this specification

The manufacturer should have duly calibrated RS meter of Class 0.2 accuracy or better. Manufacturer also should possess fully computerized meter test bench system for carrying out the relevant routine/acceptance tests as well as facility to generate test reports for each and every meter tested.

36. Purchaser reserves the right to ask the successful Bidder to carry out complete type testing and anti-tamper feature test on the sample meter from their delivered lot, from any of the below mentioned test laboratories at their own cost, which shall be reimbursed by purchaser on submission of successful type test reports as per IS : 13779 : 1999 (read with latest revision thereof)/CBIP technical report No. 325 with latest revision thereof.

**37. TESTS:**

The type test reports/certificates/records for all type tests specified having been successfully performed on the type of meter offered shall be submitted with the tender.

The bidder shall clearly bring out the deviations from this specification clause by clause whether on account of tests or manufacturing process or features incorporated in the meter. The tender lacking with above information and without supporting test reports for meter meeting the requirement of tests laid in this specification are likely to be rejected.

TER SPECS 3 PHASE 4 WIRE DIRECT CONNECTED

**a) Type Tests:**

The Energy meter offered shall be fully type tested at any of the test laboratories mentioned below by the bidder as per relevant standards but test reports shall not be more than five years old from the date of opening of bid. The bidder shall furnish two sets of type test reports along with the bid.

1. CPRI
2. ERDA
3. ERTL

**b) Acceptance Test :**

All acceptance tests as stipulated in the relevant standards shall be carried out by the supplier in the presence of the purchaser's representative.

**38. Routine Tests:**

All routine tests as stipulated in the relevant standards shall be carried out and routine test- certificates/reports shall be submitted to the purchaser for approval and also placed inside individual meter packing.

TER SPECS 3 PHASE 4 WIRE DIRECT CONNECTED

**39. TECHNICAL SPECIFICATION OF PILFER PROOF METER BOX TO HOUSE THE THREE PHASE WHOLE CURRENT ENERGY METER**

The offered meter box is to house one number three-phase four-wire energy meter. The meter box shall comply with IS: 5133/IS14772 (Part-II).

**39.1 MATERIAL**

The meter box shall be made of high grade Engineering Plastic with following properties

a. UV Stabilized

b. HDT - 120C±10° C.

c. UL rating – UL94 ( Flame Retardant )

d. It shall be capable of withstanding temperatures of boiling water for 5 minutes continuously without distortion or softening.

e. It shall also be capable of withstanding Glow wire test at 650C as per IS 14772:2000

f. It shall be environment friendly and easily recyclable.

**39.2 CONSTRUCTION:**

(i) Meter box shall have a roof tapering down to both sides for easy flow of rainwater.

(ii) The thickness of the box shall be not less than 2.5 mm in the load bearing side

(i.e. back side of the box) and other sides, doors and the roof shall not be less than

2.0 mm.

(iii) The overall dimensions of the box shall be such that a minimum side clearance should be maintained in between meter & side wall of meter box. Minimum clearance from both sides 30 mm top side 30 mm, front side 25 mm, back side 10 mm and 75 mm from the terminals of energy meter.

1. Box cover shall have minimum 1 nos. snap to fit type arrangement on each side of box. The snap fit arrangement should have adequate barriers)except for cable entry side.).

(v) Self rubber gasket for protection from ingress of dust and water shall be provided on all around the box.

(vi) For sealing the box cover with base minimum 2 nos. sealing hole shall be   
 provided.

(vii) The box shall be made of transparent polycarbonate material conforming to IS 14434 or equivalent.

(viii) Each meter box base shall have only 3 nos. round holes for fixing of meter box in the board. There shall be no key hole.

(ix) Meter box should comply with IP-51.

x. For cable entry , suitable circular holes fitted with engineering plastic/hope gl

ands shall be provided at the bottom of the box for cable inlet and outlet . The internal diameter of the gland shall be such as to accommodate the 25-27 mm outer diameter cable.

(xi) Purchase order No. date and purchaser’s name shall be provided on metallic name plate in such a manner that it shall not be removed easily. Name of manufacturer shall be embossed on meter box cover.

(xii) Push button shall be provided on the cover of meter box to operate the meter pushbutton without opening the meter box cover.

(xiii) Arrangement for meter reading through meter reading instrument should be provided on meter box cover to read the meter without opening the meter box. Suitable sealing arrangement shall be provided for such meter reading arrangement.

(xiv) Drawing of offered meter box should be enclosed along with bid.

(xv) Partition wall shall be provided in between terminal block & cable glands, so as to obstruct entry of any unwanted material/instrument, which may facilitate the approach for opening of the anchors. Width of this partition shall be the same as the width of base cover of the box.

(xvi) Meter serial no. shall also be engraved/embossed on meter box base & cover by lazer printing from inside.

(xvii) Partition wall shall be having 8 nos. 10 mm dia holes for 3 phase meters, to facilitate the cable connections to the terminal block.

**40. TESTS:**

**40.1 Type Tests:**

The type test report at following features of the meter box conducted by any NABL

accredited laboratory should be enclosed with the offer as per IS :5.33/IS 14772

i) Test of material identification i.e., (as specified in per Clause No.40.1 of this specification.)

ii) Test for mechanical strength iii) Test for water absorption.

iv) Test for stability at high temperature.

v) Test for withstanding temperature of boiling water for 5 minutes continuously for non-distortion or softening of material.

vi) Glow wire test at 650C as per clause 5.2.4 of CBIP Technical Report No.88 read with amendments.

**40.2. Acceptance & Routine Tests:**

**40.3 Acceptance Tests:**

The following shall constitute acceptance test for box:

i. Physical verification of dimensions of the box.

ii. Compatibility of the box for housing the meter for ensuring ease of connections and reading the meter.

**40.4 Routine Tests:**

Following Routine test certificates shall be furnished for approval.

i. Physical verification of the box.

**GUARANTEED TECHNICAL PARTICULARS OF FOR 3 PHASE, 4 WIRE A.C.** **STATIC WHOLE CURRENT CLASS 1.0 ELECTRONIC ENERGY**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sr.**  **No.** | **Particulars** |  | **As specified by UPPCL** | **As Furnished by**  **Bidders** |
| 1 | 2 |  | 3 | 4 |
| 1 | Maker's Name | : |  |  |
| 2 | Make | : |  |  |
| 3 | Type of Meter/Design designation | : |  |  |
| 4 | State the year since the design is  in vogue | : |  |  |
| 5 | Standard to which meters  conforms | : | IS 13779, CBIP-325, IEC  61036 |  |
| 6 | Class of accuracy | : | 1.0 |  |
| 7 | Rated Current (Amp) | : | 10 Amps |  |
| 8 | Rated Maximum current as  percentage of basic current | : | 600% of Basic Current |  |
| 9 | Rated voltage (volts) | : | 3 X 240 V – Phase to  Neutral  3 X 415 V – Phase to  Phase |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 10 | Rated frequency (Hz) | : | 50 Hz±5% |  |
| 11 | Specified operating voltage range | : | 0.8 to 1.1 V ref. |  |
| 12 | Limit voltage range of operation | : | 0.6 to 1.2 V ref. |  |
| 13 | Reference temperature | : | 27˚C |  |
| 14 | Temperature range of operation  a) Specified operation range b) Limit range of operation  c) Limit range for storage and transport | :  : | As per the relevant standard |  |
| 15 | Relative humidity  a) Annual mean  b) For 30 days these days being spread in a natural manner over the years.  c) Occasionally on other days | :  :  : | As per the relevant standard |  |
| 16 | Power consumption  (a) Power consumption in voltage circuit at rated current  a. Active in watts  b. Apparent in VA.  b) Power consumption in current  (in VA) at rated current | :  :  : | 1 W  4VA  1 VA |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 17 | Current that mater is capable of  carrying continuously without injury to the meter (Amp.) | : | 60 Amp. |  |
| 18 | Short time over current capability  of the meter | : | 3000 Amp for 0.01 sec  (30 Imax for one half cycles at rated frequency) |  |
| 19 | Percentage minimum current  which shall start the meter and continue to run thereafter at rated voltage and unit power factor of basic current (% of basic current) | : | 0.2% of basic current |  |
| 20 | Type of material along with its  thickness or dimensions (in mm.) and details of the important components parts of the meter  a) Case  b) Terminals covers c) Terminals | : | Drawing should be  submitted by the bidder |  |
| 21 | a) Size of terminals holes (in mm.)  b) Whether Display Character Height, specify Height in mm. | : | 8.5mm (minimum)  10 mm (minimum) |  |
| 22 | a) Whether carrying handle is provided.  b) Arrangement to read the meter in Power Off mode. | : | Inductive coupling arrangement to power meter in the absence of power or Internal  Battery as per clause no.  15.2 |  |
| 23 | Meter constant (if any) | : |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 24 | Tamper & Fraud Protection details | : | State whether as per  specification or not?  a) Missing potential  b) CT Polarity reversal c) Current Short  (Bypass) & Open d) Whether tamper  information/ logic have been provided  as per specification  e) Whether meter is  tamper proof against influence of high magnetic field as per CBIP report 325 and any amendment thereof.  f) Snap Shots: The meter shall record three phase voltage, current, power factor separately with KWh and KVAh energy at the time of each tamper event ( except power on off) with the date and time.  g) While connecting 3  phase capacitive bank  unit to meter, under balance and unbalanced pure capacitive load meter should not log current reversal and should not increment  in active energy (at no-load condition). |  |
| 25 | a) Display type  b) No. of digits in display | : | LCD with Backlit  7 |  |
| 26 | I. Display sequence in Push  and Auto Mode  II. Specify other parameters/qty. which may be available on display without any extra cost. | : | Are the parameters in  sequence as specified in clause no. 18.0 |  |
| 27 | Instantaneous and Billing  parameter Display and record in meter memory. | : | Is the meter capable of  measuring and storing the data per clause no.  18.0 of the specification Other information in memory available through CMRI without any extra cost.  Mid night snap shot  is required for  configured energy  (Active and Apparent)  for last 35 days.  The BCS shall  show electrical condition existing at the time of reading the meter in tabular forms as well as graphical format (Phase diagram with phase angle).  Meter shall measure and retain previous 12 months data (month wise) of the (Import & Export)- KWH and KVAH reading at 2400 hrs. of the last days of each calendar month, |  |
| 28 | (a) Specify, tamper data  available on the display of the meter  (b) Specify tamper data available through CMRI  (c) Whether optical port is  compatible with different  make CMRI or not | : | a) Type of tamper with  occurrence and restoration time  b) On FIFO Basic  c) SANDS/ANALOGIC |  |
| 29 | Details of internal diagnostic  available as per clause 26.0 tech. specification  (a) On display, if any  (b) On memory | : |  |  |
| 30 | Sealing arrangement (specify)  Whether sealing at the following has been provided :-  (a) Body of the meter  (b) Terminal cover of the meter  (c) Sealing arrangement to be scroll push button.  (d) Optical Port | : |  |  |
| 31 | Overall dimensions of the meter  (with tolerance)  (a) Height (mm) (b) Width (mm) (c) Depth (mm) |  | Drawing should be  submitted by the bidder |  |
| 32 | Total weight of the meter (kg.)  with tolerance | : |  |  |
| 33 | State whether –  (a) Load survey capabilities of  60 days have been provided as per clause relevant technical specification.  (b) Time of day zones have been provided as per clause 19.0 of technical specification | :  :  : | (a) 2 months to store average KW(Import & Export), KVA(Import & Export), PF, Average voltage profile and all phase current with half an hour slot.  (b) TOD time zone in sequence as mention in clause no. 19.0. |  |
| 34 | Whether hand held unit is able to  download data to base computer software at PC end |  |  |  |