

## I. ABBREVIATIONS

S.No	Acronym	Definition
1	AMR	Automated Meter Reading
2	ATP	Acceptance Test Plan
3	CDCS	Central Data Collection System
4	CMRI	Common Meter Reading Instrument
5	C&R	Control & Relay
6	CTU	Central Transmission Utility
7	DCD	Data Collection Device
8	DCU	Data Concentrator Unit
9	DSM	Deviation Settlement Mechanism
10	EA	Energy Accounting
11	EHV	Extra High Voltage
12	FAT	Factory Acceptance Test
13	FTE	Full Time Equivalent
14	GPRS	General Packet Radio Service
15	GSM	Global System of Mobile
16	HHU	Hand Held Unit
17	IEC	International Electro-technical Commission
18	IEEE	Institute of Electrical and Electronics Engineers
19	IEM	Interface Energy Meter
20	IP	Ingress Protection
21	IS	Indian Standard
22	ISTS	Inter State Transmission System
23	LAN	Local Area Network
24	MDP	Meter Data Processing
25	NMS	Network Management System
26	OEM	Original Equipment Manufacturer
27	PCB	Printed Circuit Board
28	RDBMS	Relational Database Management System
29	RMS	Root Mean Square
30	SAT	Site Acceptance Test
31	SEM	Special Energy Meter
32	SRS	Software Requirements Specification
33	TOC	Taking Over Certificate
34	VPN	Virtual Private Network
35	WAN	Wide Area Network
36	RLDC	Regional Load Despatch Centre
37	RPC	Regional Power Committee

## II. INTERFACE ENERGY METERS

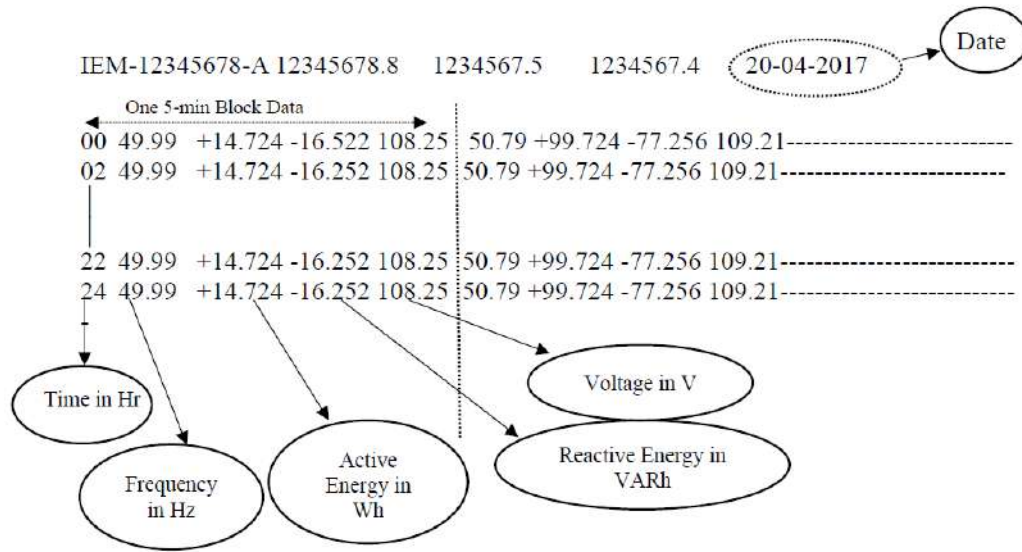
### 1. Basic Features of Interface Energy Meters

- a) The energy metering system specified herein shall be used for tariff metering for bulk, inter-utility power flows, in different States of India., Static composite meter shall be installed at interface points as a self-contained device for measurement of Voltage (V), Frequency (f), Active (Wh) and Reactive (VARh) energy exchanged in each successive 5 min time block. All meters shall be compliant to IS 15959 and its latest amendments.
- b) Each meter shall have a unique identification code, which shall be marked permanently on its front, as well as in its memory. All meters supplied to as per this specification shall have their identification code starting with "IEM", which shall not be used for any other supplies. "IEM" shall be an eight digit running serial number, further followed by "A" and "B" for the use with CT secondary of 1A and 5A respectively. This shall be mutually agreed between the buyer and the vendor.
- c) The meters shall be suitable for communication with external device like modem, DCU, etc. which shall be able to communicate with CDCS for local/remote data transfer. The meter shall compulsorily have at least 1 optical port for taking reading through Hand Held Unit (HHU).
- d) **Auxiliary Supply to IEM-** The meters shall normally operate with the power drawn from DC auxiliary power supply ( Range 110V to 220V DC )to reduce the Voltage Transformer (VT) burden. In addition, there shall be provision to operate the meter from the Voltage Transformer (VT) secondary circuit having a rated secondary line-to-line voltage of 110V, and current transformers (CTs) having a rated secondary current of 1 A or 5A. Any further transformers/ transactions/ transducers required for their functioning shall be in-built in the meters. Necessary isolation and/or suppression shall also be built-in, for protecting the meters from surges and voltage spikes that occur in the VT and CT circuits of extra high voltage switchyards. The reference frequency shall be 50Hz. Also, the meter shall have suitable tolerance (up to 15% either side) for DC supply.
- e) The meters shall safely withstand the usual fluctuations arising during faults etc. In particular, VT secondary voltages 115% of  $V_{ref}$  applied continuously and 190% of  $V_{ref}$  for 3.0 seconds, and CT secondary current 150% of  $I_{ref}$  applied continuously and 30 times of  $I_{ref}$  applied for 0.5 seconds shall not cause any damage to or maloperation of the meters.
- f) The meters shall continue to function for the remaining healthy phase(s), in case one or two phases of VT supply fails. In case of a complete VT supply failure, the computation of average frequency shall be done only for the period during which the VT supply was available in the 5-minute block. Any time block contraction or elongation for clock correction shall also be duly accounted for.
- g) The total burden imposed by a meter for measurement and operation shall be defined as per IS 14697. An automatic backup for continued operation of the meter's

calendar-clock, and for retaining all data stored in its memory, shall be provided through a long-life battery, which shall be capable of supplying the required power for at least 2 years. The meters shall be supplied duly fitted with the batteries, which shall not require to be changed for at least 10 years, as long as total VT supply interruption does not exceed two years. The battery mounting shall be designed to facilitate easy battery replacement without affecting PCB of the meter.

- h) The meters shall fully comply with all stipulations in IS 14697 except those specifically modified by this specification. The reference ambient temperature shall be 27°C.
- i) Each meter shall have a test output device (visual), as per clause 6.11 of IS 14697.1999, for checking the accuracy of active energy (Wh) measurement. The preferred pulsing rate is twenty (20) per Wh for CT sec-1A and four (4) per Wh for CT sec -5A. It shall be possible to couple this device to suitable testing equipment also.
- j) **Exception Management**- The three line-to-neutral voltage shall be continuously monitored and in case any of these falls below defined threshold (70% of Vref), meter shall have suitable indication on LED/ LCD. The meter shall also have provision for low voltage event logging in meter memory in case of any phase voltage going below a defined threshold. The time blocks in which such a voltage failure occurs/persists shall also be recorded in the meter's memory with a symbol "\*" if 3 Phase RMS voltage applied to the IEM is in between 5% to 70% of Vref and if Voltage is less than 5% of Vref, meter should record Zero voltage symbol "Z".
- k) **Time Accuracy** - Each meter shall have a built-in calendar and clock, having an accuracy of 10 seconds per month or better. The calendar and clock shall be correctly set at the manufacturer's works. The date (year-month-day) and time (hour-min.-sec.) shall be displayed on the meter front on demand. Meter shall have the intelligence to synchronize the time with GPS (Local GPS/CDCS GPS/ NAVIC) signal and from PC using software. Limited time synchronization through meter communication port shall be possible at site. When an advance or retard command is given, twelve subsequent time blocks shall be contracted or elongated by five seconds each. All clock corrections shall be registered in the meter's memory and suitably shown on print out of collected data.
- l) A touch key or push button shall be provided on the meter front for switching on the display and for changing from one indication to the next. The display shall switch off automatically about one minute after the last operation of touch key/push button. When the display is switched on, the parameter last displayed shall be displayed again, duly updated.

m) The whole system shall be such as to provide a print out (both from the local PC, and from remote central computer) of the following format:



**Figure 1: Standard raw data format for IEM**

There are 4 values in one 5 min time block. The first row shall contain the meter data for 2 hours, i.e. 24 time blocks, 00 hrs to 02:00 hrs. Similarly the 2<sup>nd</sup> row shall contain the data for the next 2 hours and henceforth.

The above data shall be available in text file format (file extension as per IEEE standard/.txt) exportable to Excel. Indication of time retard or advance to be provided without disturbing the proposed format. Each 5-min block data consists of Frequency (in HZ), Active energy (in Wh), Reactive energy (in VARh) and Voltage (in V). All 5 minute Wh and VARh figures in .NPC/output report shall be rounded off upto third decimal.

n) The portable hand held unit (HHU)/ Common meter reading instrument (CMRI)/ Data Collecting Device (DCD) shall be having IS-15959:2011 compatibility for standardized parameters. The optical coupler for tapping data stored in the SEMs memory shall be compatible universally across different make of SEMs.

#### o) Constructional Features

(i) The meters shall be supplied housed in compact and sturdy, metallic or moulded cases of non-rusting construction and/or finish. The cases shall be designed for simple mounting on a plane, vertical surface such as a control/relay panel front. All terminals for CT and VT connections shall be arranged in a row along the meter's lower side. Terminals shall have a suitable construction with barriers and cover, to provide a secure and safe connection of CTs and VTs leads through stranded copper conductors of 2.5 sq. mm. size.

(ii) All meters of the same model shall be totally identical in all respects except for their unique identification codes. They shall also be properly sealed and tamper evident, with no possibility of any adjustment at site, except for transactions allowed in IS 15959.

(iii) The meters shall safely withstand, without any damage or mal operation, reasonable mechanical shocks, earthquake forces, ambient temperature variations, relative humidity etc. in accordance with IS-14697. They shall have an IP-51 category dust-tight construction, and shall be capable of satisfactory operation in an indoor, non-air conditioned installation.

(iv) Either the meters shall have built-in facility (e.g. test links in their terminals) for in-situ testing, or a separate test block shall be provided for each meter.

## 2. Measurement

a) The active energy (Wh) measurement shall be carried out on 3-phase, 4-wire principle, with an accuracy as per class **0.2S** (IS 14697).

b) The meter shall compute the net active energy (Wh) sent out from the substation bus bars during each successive 5 min block, and store it in its memory up to fourth decimal with plus sign if there is net Wh export and with a minus sign if there is net Wh import. Further Wh data in .NPC/output report shall be rounded upto third decimal.

c) The meter shall count the number of cycles in VT output during each successive 5 min block, and divide the same by 300 (60 sec/min x 5min) to arrive at the average frequency. The frequency data shall be stored in the meter's memory in Hertz up to third decimal. Further Frequency data in .NPC/output report shall be rounded off upto second decimal.

d) The meter shall continuously compute the average of the RMS values of the three line-to-neutral VT secondary voltages as a percentage of 63.51 V, and display the same on demand. The accuracy of the voltage measurement/computation shall be at least 0.5%, a better accuracy such as 0.2% in the 95-105% range being desirable. The voltage data shall be stored in the meter's memory in volts up to third decimal. Further voltage data in .NPC/output report shall be rounded off upto second decimal.

e) The Reactive energy (VARh) measurement shall be carried out on 3-phase, 4-wire principle, with an accuracy of 0.5S as specified in IS 14697. The meter shall compute the net Reactive energy (VARh) sent out from the substation bus bars during each successive 5 min block, and store it in its memory up to fourth decimal

with plus sign if there is net VARh export and with a minus sign if there is net VARh import. It shall also display on demand the net VARh sent out during the previous 5 min block. Further VARh data in .NPC/output report shall be rounded off upto third decimal.

- f)** The meter shall also integrate the reactive energy (VARh) algebraically into two separate registers, one for the period for which the average RMS voltage is above 103.0%, and the other for the period for which the average RMS voltage is below 97.0 %. The current reactive power (VAR), with a minus sign if negative, and cumulative reactive energy (VARh) readings of the two registers (>103% and <97%) shall be displayed on demand. The readings of the two registers at each midnight shall also be stored in the meter's memory. When reactive power is being sent out from substation bus bars, VAR display shall have a plus sign or no sign and VARh registers shall move forward. When reactive power flow is in the reverse direction, VAR display shall have negative sign and VARh registers shall move backwards. Generally, the standard PT ratios are 220 kV /110 V, 400 kV /110 V and 765 kV / 110 V. However, at the time of commissioning the vendor may confirm the same from site and configure the meter accordingly to ensure correct recording of reactive energy.
- g)** For CT secondary rating of 5A, all computations, displays and memory storage shall be similar except that all figures shall be one fifth of the actual, worked out from CT and VT secondary quantities.
- h)** Further, the meter shall continuously integrate and display on demand the net cumulative active energy sent out from the substation bus bars up to that time. The cumulative Wh reading at each midnight shall be stored in the meter's memory. The register shall move backwards when active power flows back to substation bus bars.
- i)** Errors for different power factors shall be as defined in IS14697.
- j)** For reactive power (VAR) and reactive energy (VARh) measurements, IS14697 shall be complied with. The accuracy of measurement of reactive energy shall be as per class 0.5S.
- k)** The harmonics shall be filtered out while measuring Wh, V and VARh, and only fundamental frequency quantities shall be measured/computed.
- l)** Data security shall be ensured as per IS 15959 (three layers of security).

### 3. Memory/ Storage

a) Each meter shall have a non-volatile memory in which the following shall be automatically stored:

- (i) Average frequency for each successive 5 min block, in Hertz up to third decimals.
- (ii) Net Wh transmittal during each successive 5 min block, up to fourth decimal, with plus sign if there is net Wh export and with a minus sign if there is net Wh import.
- (iii) Net VARh transmittal during each successive 5 min block, up to fourth decimal, with plus sign if there is net VARh export and with a minus sign if there is net MVARh import.
- (iv) Cumulative Wh transmittal at each midnight, in eight digits including one decimal.
- (v) Cumulative VARh transmittal for voltage high condition, at each midnight in eight digits including one decimal.
- (vi) Cumulative VARh transmittal for voltage low condition, at each midnight, in eight digits including one decimal.
- (vii) Average RMS voltage for each successive 5min block.
- (viii) Date and time blocks of failure of VT supply on any phase, as a star (\*)/ (Z) mark.

b) The meters shall store all the above listed data in their memories for a period of fifteen (15) days. The data older than fifteen (15) days shall be erased automatically.

c) The software provided at CDCS, i.e. RLDC, will manage all functionalities of collection of data through DCUs, validate the data, store the data in a database, and manage the complete system. Software will also have a scheduler for scheduling the task of collection of data periodically. The periodicity of data collection shall be user defined.

### 4. Display

Each meter shall have digital display for indication of the following (one at a time), on demand:

- (i) Meter serial no. and model : IEM12345678A or IEM12345678B
- (ii) Date (year month day /yyyy mm dd) : 20160311 d
- (iii) Time ( hour min sec /hh mm ss) : 195527 t
- (iv) Cumulative Wh reading : 1234567.8 C
- (v) Average frequency of the previous block : 49.89 F
- (vi) Net Wh transmittal during the previous block: - 28.75 E
- (vii) Net VARh transmittal during the previous block: - 18.75 R
- (viii) Average % Voltage : 99.2 U

- (ix) Reactive power (VAR) : 106.5 r
- (x) Voltage - high VARh register reading : 1234567.5 H
- (xi) Voltage - low VARh register reading : 1234567.4 L
- (xii) Low battery indication
- (xiii) The three line-to-neutral voltages shall be continuously monitored and in case any of these falls below 70 %, a preferably flashing three LEDs (one LED/phase) provided on meter's front shall become steady. They shall go off if all three voltages fall below 70 %. The LED shall automatically resume flashing when all VT secondary voltages are healthy again.
- (xiv) The two VARh registers (xv and xvi) shall remain stay-put while VT supply is unhealthy.

Any other better or more informative mechanism to display the above shall be preferred. The above shall be mutually agreed between the meter buyer and vendor.

Navigation keys to be provided at the meter front plate to navigate the display menu.

## 5. Communication

- a) Each meter must have an optical port on its front for tapping all data stored in its memory through HHU. In addition to the above each meter shall also be provided with a RS-485, Ethernet and USB port on one of its sides, from where all the data stored in the meter's memory can also be transferred to CDCS (through DCU), local computer and external storage. The overall intention is to tap the data stored in the meter's memories at a scheduled time from any of the above mentioned ports or any other means and transmit the same to a remote central computer using suitable means of communication. It shall be possible to securely download the IEM data through an USB port via external storage thereby removing the requirement of a MRI (Meter Reading Instrument). It shall be ensured that data transfer through USB shall be unidirectional only i.e. from Meter to external storage device through an authentication process. Meter data shall be tamper-proof.
- b) All meters shall be compatible with Optical port, RS-485 port, Ethernet port and USB all together at a time and communicate independently. It shall also be possible to obtain a print out (hard copy) of all data collected from the meters, using the local PC. Data collection from any local laptop/PC shall be possible by installing data collection software.
- c) The bidder shall adhere to the appropriate security algorithm for encryption and decryption.
- d) The Bidder shall provide the necessary software which would enable a local PC/ CDCS to:
  - (i) Accept the data from the Optical/Ethernet/WAN and store it in its memory in user defined formats (text, csv, xls, etc.) in a user-defined file name (file name format must be ddmmysubstation name-utility name).
  - (ii) Polling feature along with a task scheduler to run the data downloading software at a pre-designated date and time repeatedly or by manually selecting a meter. File naming for such downloaded data should also be in user-defined format. A detailed activity log shall also be available for each downloading operation.



- (iii) Upload/Import meter data (binary files) in the software for further processing. While uploading, there shall be provision to upload all selected files with single key-stroke.
  - (iv) Convert the binary file(s) to text file(s). There should be provision to select multiple files based on filename, convert all selected files with single key-stroke and store the text files in the same location where binary files are stored.
  - (v) Display the collected data on PC's screen in text format, with forward/backward rolling.
  - (vi) Print out in text format the data collected from one or more meters, starting from a certain date and time, as per operator's instructions.
  - (vii) Store the collected data in binary format, on a CD/Pen Drive. In addition to above, in general the software shall be able to convert IEMs data to existing format as well as in tabular (.csv) format as applicable.
- e) The above software shall further ensure that absolutely no tampering (except erasing of complete data with password protection) of the collected metering data is possible during its handling by the PC. The software shall be suitable for the commonly available PCs, (Windows) and shall be supplied to Owner in a compatible form to enable its easy loading into the PCs available (or to be installed by the Owner/others) at the various substations.
- f) The bidder shall ensure data integrity checks on all metered data received from data collection systems.
- g) The quality of installation of the various equipment & power supply wiring to all field equipment shall be as per standards/ regulations/prevailing practices of the utility. The supply of electricity needed for operation and maintenance of entire Metering system shall be provided free of cost by the respective owners of the premises.

## **6. Quality Assurance**

The quality control procedure to be adopted during manufacturing of the specified equipment shall be mutually discussed and finalized in due course, generally based on the established and proven practices of the manufacturer. The software shall be user friendly which can be easily installed in any PC/Laptop irrespective of operating system of the PC/Laptop, and shall be certified for ensuring data handling capabilities. The same shall be demonstrated by the party during technical evaluation. During demonstration party shall bring standard meter. Thereafter software shall be offered for technical compatibility before taking up further necessary action in the procurement process.

## **7. Testing**

- a) All equipment, after final assembly and before dispatch from manufacturer's works, shall be duly tested to verify that is suitable for supply to the Owner. Routine and acceptance tests shall be carried out on the meters in line with IS 14697.

b) Any meter which fails to fully comply with the specification requirements shall be liable to be rejected by the Owner. However, the Owner may purchase such meters at a reduced price in case of marginal non-compliance, at his sole discretion.

c) Acceptance Tests for PC Software and data down loading using meter communication ports-

All IEMs after final assembly and before despatch from Bidder's/Manufacturer's works shall be duly tested to verify that they are suitable for downloading data using meter communication ports shall be subjected to the following acceptance test.

- (i) Downloading Meter Data from the Meter(s) to PC via optical port.
- (ii) Downloading meter data through USB port and RS 232.
- (iii) Downloading meter data to DCU/CDCS through Ethernet as well as RS 485 port.
- (iv) Compatibility with PC Software.
- (v) Functioning of Time synchronisation, advance and retard time commands.
- (vi) Per meter downloading time verification.

d) Copy of Test certificate shall be submitted to POWERGRID/OWNER

## **8. Type Tests**

a) One (1) out of every hundred (100) meters shall be subjected to the complete range of type tests as per IS14697 and IS15959, after final assembly. In case of any failure to pass all specified tests, the bidder shall arrange to carry out the requisite modifications/replacements in the entire lot of meters at his own cost. After any such modifications and final assembly, two (2) meters selected out of the lot by the Owner's representative shall be subjected to the full range of type tests. The lot shall be accepted by the Owner only after successful type testing.

b) The meters used for type testing shall be separately identified, duly marked, and supplied to the Owner in case they are fully functional and as good as other (new) meters, after necessary touching up/refurbishing. In case this is not possible, the bidder shall provide their replacements at no extra cost to Owner.

c) The Bidder shall arrange all type testing specified above, and bear all expenses for the same.

d) Copy of Test certificate shall be submitted to POWERGRID/OWNER.

## **9. Installation and Commissioning**

a) The Bidder shall be responsible for total installation and commissioning of the meters (along with test blocks, if supplied separately) as per Owner's advice, including unpacking and inspection on receipt at site, mounting the meters on existing control and relay panels at an appropriate viewing height, connection of CT and VT circuits including any required rewiring, functional testing, commissioning and handing over. The Bidder's personnel shall

procure/carry the necessary tools, equipment, materials and consumables (including insulated wires, lugs, ferrules, hardware etc.)

**b)** As part of commissioning of DCDs the Bidder shall load the software specified in clause 5(d) into the PCs at the respective substations, and fully commission the total meter reading scheme. He shall also impart the necessary instructions to substation engineers. At least 2-hour training session shall be arranged for substation staff and RLDCs. Also, an operating manual (pdf as well as hard copy) of the meter containing all details of the meter, various data downloading features, etc. shall be made available at site and RLDC.

**c)** Bidders to check the dimensions of the existing SEM's. IEMs shall fit in the same location in the panel.

**d)** Following technical information shall be furnished by the Bidders in their offers:

**(i)** Foreseen dimensions of proposed meter.

**(ii)** Expected weight of proposed meter.

**(iii)** Dimensions and weight of the test block, if supplied separately.

**e)** At the time of commissioning, the meters lying in stores shall be time synchronized through GPS signal before installation in the panel to avoid the large time mismatch.

## **10. General**

**a)** The meter shall be supplied with latest/compatible software (shall be compatible with old & new meters data download handling). Any new software as required to be installed within warranty period are to be done by party or through remote support to client.

**b)** The total arrangement shall be such that one (1) operation (click on "data download from meter" button on software ) can carry out the whole operation in about five (5) minutes per meter or preferably faster.

**c)** The layout of software front end/user interface has to be approved by RLDC during technical evaluation/demonstration. However a standard template sheet will be provided along with bid for reference.

**d)** Software for windows/office/antivirus to be supplied. Antivirus should not slow down processes and same will be demonstrated during technical demonstration.

**e)** Above specification is minimum only, any higher standard required for the purpose intended (meter data handling) would be assessed by vendor and would be supplied accordingly. The detailed architecture shall be approved during drawing approval stage.

**f)** Meter shall be accommodated in existing C&R panel of standard size (Alstom/ER/ABB/Siemens) in kiosk or C&R panel with door closed. If required before bidding, bidder may collect necessary data or else the scope is deemed to be included.

**g)** Step by Step procedure (on screen shot type and desktop video capture) shall be provided for

**(i)** Installation/Re-installation of Database handling software in to Laptop / PC

**(ii)** Meter maintenance/site-testing procedure as per relevant IS/IEC standard.

**(iii)** Procedure for data downloading from Meter by HHU/Laptop/Desktop PC.

**h)** As on date of delivery, the supplied meters shall comply with all statutory regulation as required under CERC/CEA/IEGC as applicable and the same should be declared by the vendor during delivery along with warranty certificate.

**i)** Bidder is responsible for dismantling of old special energy meters and to purchase on buy back basis on successful installation of interface energy meters.

### **11. Dismantling / Buy-Back of Existing SEM**

Dismantling of existing SEMs and taking it, away-shall also be in the scope of bidder.

## **III. WARRANTY**

- 1.** The IEM shall be under warranty for 60 months from the date of installation. The bidder shall be responsible for meter testing as per CEA metering regulations. Support and maintenance during 5 years extended period after expiry of warranty period.
- 2.** The warranty would include repair, replacement, part material replacement cost and one way (return) transportation cost (including insurance of transit).
- 3.** Meter software, if upgraded by OEM should be supplied free of cost with initiation taken from party. Remote service person name to be indicated during bidding.
- 4.** Meters which are found defective/inoperative at the time of installation or become inoperative/defective within the warranty period, these defective/inoperative meters shall be replaced within one week of receipt of report for such defective/inoperative meters.
- 5.** Copy of warranty certificate shall be submitted to owner.

#### IV.SPARES/FUTURE REQUIREMENT

Bidder shall maintain sufficient number of IEMs as spares/future requirement at each substation/Generating station.

#### V. STANDARDS TO BE COMPLIED WITH

S.No	Reference	Reference Title
	<b>Detail</b>	
1	IS-15959:2011	Data Exchange for Electricity Meter Reading Tariff & Load Control – Companion Specification
2	IS-14697:1999	Specifications for AC Static Transformer operated Watt Hour & VAR-Hour meters, class of 0.2S and 0.5S
3	IEEE 830-1998	IEEE Recommended Practice for Software Requirements Specifications

Figure 2:Standards

Sl No	Technical specification approved by WRPC for Interface energy meter IN 34 <sup>th</sup> TCC/WRPC on 28 <sup>th</sup> July-17	Changes in technical specification for Interface energy meter for 5-minute pilot project as per CERC order dated 16 <sup>th</sup> July-18(07/SM/2018)	Remarks
1	<p>III. Interface Energy Meter</p> <p>1. Basic Features of Interface Energy Meters</p> <p>a. The energy metering system specified herein shall be used for tariff metering for bulk, inter-utility power flows, in different States of India. <b>Draw out type</b>, Static composite meter shall be installed at interface points as a self-contained device for measurement of Voltage (V), Frequency (f), Active (Wh) and Reactive (VARh) energy exchanged in each successive 5 min time block. All meters shall be compliant to IS 15959 and its latest amendments.</p>	<p>II. Interface Energy Meter</p> <p>1. Basic Features of Interface Energy Meters</p> <p>a) The energy metering system specified herein shall be used for tariff metering for bulk, inter-utility power flows, in different States of India. Draw out type, Static composite meter shall be installed at interface points as a self-contained device for measurement of Voltage (V), Frequency (f), Active (Wh) and Reactive (VARh) energy exchanged in each successive 5 min time block. All meters shall be compliant to IS 15959 and its latest amendments.</p>	<p>Considering the time bound fast implementation of the pilot project and discussion with CTU/POWERGRID (26<sup>th</sup> July-18) and RLDCs, Draw out type meter was removed.</p>
2.	<p>III. Interface Energy Meter</p> <p>1. Basic Features of Interface Energy Meters</p> <p>b.Each meter shall have a unique identification code, which shall be marked permanently on its front, as well as in its memory. All meters supplied to as per this specification shall have their identification code starting with "IEM", which shall not be used for any other supplies. "IEM" shall be followed by a dash and an eight digit running serial number, further followed by a dash and "A" and</p>	<p>II. Interface Energy Meter</p> <p>1. Basic Features of Interface Energy Meters</p> <p>b)Each meter shall have a unique identification code, which shall be marked permanently on its front, as well as in its memory. All meters supplied to as per this specification shall have their identification code starting with "IEM", which shall not be used for any other supplies. "IEM" shall be an eight digit running serial</p>	<p>"by a dash" removed after discussion with CTU/POWERGRID and RLDCs.</p>

SI No	Technical specification approved by WRPC for Interface energy meter IN 34 <sup>th</sup> TCC/WRPC on 28 <sup>th</sup> July-17	Changes in technical specification for Interface energy meter for 5-minute pilot project as per CERC order dated 16 <sup>th</sup> July-18(07/SM/2018)	Remarks
	"B" for the use with CT secondary of 1A and 5A respectively. This shall be mutually agreed between the buyer and the vendor.	number, followed by "A" and "B" for the use with CT secondary of 1A and 5A respectively. This shall be mutually agreed between the buyer and the vendor.	
	<p>III. Interface Energy Meter</p> <p>1. Basic Features of Interface Energy Meters</p> <p>c. The meter shall count the number of cycles in VT output during each successive 5 min block, and divide the same by 300 (60 sec/min x 5min) to arrive at the average frequency. <b>The least count of the frequency data shall be 0.01 Hz.</b> The frequency data shall be stored in the meter's memory in Hertz up to second decimal.</p>	<p>II. Interface Energy Meter</p> <p>1. Basic Features of Interface Energy Meters</p> <p>c. The meter shall count the number of cycles in VT output during each successive 5 min block, and divide the same by 300 (60 sec/min x 5min) to arrive at the average frequency. The frequency data shall be stored in the meter's memory in Hertz up to third decimal. <b>Further Frequency data in .NPC/output report shall be rounded off upto second decimal</b></p>	The least count of the frequency data shall be 0.01 Hz- deleted- as it is inconsistent with 3 decimal places
3	<p>III. Interface Energy Meter</p> <p>1. Basic Features of Interface Energy Meters</p> <p><b>d. Auxiliary Supply to IEM-</b> The meters shall normally operate with the power drawn from DC auxiliary power supply to reduce the Voltage Transformer (VT) burden. In addition, there shall be provision to operate the meter from the Voltage Transformer (VT) secondary circuit having a rated secondary line-to-line voltage of 110V, and current transformers (CTs) having a rated secondary current of 1 A</p>	<p>II. Interface Energy Meter</p> <p>1. Basic Features of Interface Energy Meters</p> <p><b>d) Auxiliary Supply to IEM-</b> The meters shall normally operate with the power drawn from DC auxiliary power supply ( Range 110V to 220V DC )to reduce the Voltage Transformer (VT) burden. In addition, there shall be provision to operate the meter from the Voltage Transformer (VT) secondary circuit having a rated secondary line-to-line voltage of 110V, and current transformers (CTs) having a rated secondary current of 1 A or 5A. Any</p>	(up to 15% either side) added

Sl No	Technical specification approved by WRPC for Interface energy meter IN 34 <sup>th</sup> TCC/WRPC on 28 <sup>th</sup> July-17	Changes in technical specification for Interface energy meter for 5-minute pilot project as per CERC order dated 16 <sup>th</sup> July-18(07/SM/2018)	Remarks
	or 5A. Any further transformers/ transactions/ transducers required for their functioning shall be in-built in the meters. Necessary isolation and/or suppression shall also be built-in, for protecting the meters from surges and voltage spikes that occur in the VT and CT circuits of extra high voltage switchyards. The reference frequency shall be 50Hz. Also, the meter shall have suitable tolerance for DC supply.	further transformers/ transactions/ transducers required for their functioning shall be in-built in the meters. Necessary isolation and/or suppression shall also be built-in, for protecting the meters from surges and voltage spikes that occur in the VT and CT circuits of extra high voltage switchyards. The reference frequency shall be 50Hz. Also, the meter shall have suitable tolerance (up to 15% either side) for DC supply.	
4	III. Interface Energy Meter 1. Basic Features of Interface Energy Meters h.The meters shall fully comply with all stipulations in IS 14697 except those specifically modified by this specification. The reference ambient temperature shall be 30°C.	II. Interface Energy Meter 1. Basic Features of Interface Energy Meters h) The meters shall fully comply with all stipulations in IS 14697 except those specifically modified by this specification. The reference ambient temperature shall be 27°C.	Temperature changed from 30 to 27, as per standards.
5	III. Interface Energy Meter 1. Basic Features of Interface Energy Meters  <b>j.Exception Management-</b> The three line-to-neutral voltage shall be continuously monitored and in case any of these falls below defined threshold (70% of Vref), meter shall	II. Interface Energy Meter 1. Basic Features of Interface Energy Meters  <b>j)Exception Management-</b> The three line-to-neutral voltage shall be continuously monitored and in case any of these falls below defined threshold (70% of Vref), meter shall have suitable indication on LED/ LCD. The	“There shall also be a provision to generate an alarm/SMS (to predefined mobile numbers) in the software at CDCS in case of VT supply failure or to generate error log.”



SI No	Technical specification approved by WRPC for Interface energy meter IN 34 <sup>th</sup> TCC/WRPC on 28 <sup>th</sup> July-17	Changes in technical specification for Interface energy meter for 5-minute pilot project as per CERC order dated 16 <sup>th</sup> July-18(07/SM/2018)	Remarks
	<p>have suitable indication on LED/ LCD. The meter shall also have provision for low voltage event logging in meter memory in case of any phase voltage going below a defined threshold. The time blocks in which such a voltage failure occurs/persists shall also be recorded in the meter's memory with a symbol "*" If 3 Phase RMS voltage applied to the IEM is in between 5% to 70% of Vref and if Voltage is less than 5% of Vref, meter should record Zero voltage symbol "Z". <b>There shall also be a provision to generate an alarm/SMS (to predefined mobile numbers) in the software at CDCS in case of VT supply failure or to generate error log.</b></p>	<p>meter shall also have provision for low voltage event logging in meter memory in case of any phase voltage going below a defined threshold. The time blocks in which such a voltage failure occurs/persists shall also be recorded in the meter's memory with a symbol "*" if 3 Phase RMS voltage applied to the IEM is in between 5% to 70% of Vref and if Voltage is less than 5% of Vref, meter should record Zero voltage symbol "Z".</p>	<p>Removed as it is part of AMR scheme.</p>
6	<p>III. Interface Energy Meter 1. Basic Features of Interface Energy Meters <b>k)Time Accuracy</b> - Each meter shall have a built-in calendar and clock, having an accuracy of 10 seconds per month or better. The calendar and clock shall be correctly set at the manufacturer's works. The date (year-month-day) and time (hour-min.-sec.) shall be</p>	<p>II. Interface Energy Meter 1. Basic Features of Interface Energy Meters <b>k)Time Accuracy</b> - Each meter shall have a built-in calendar and clock, having an accuracy of 10 seconds per month or better. The calendar and clock shall be correctly set at the manufacturer's works. The date (year-month-day) and time (hour-min.-sec.) shall be displayed on the meter front on demand.</p>	<p>NAVIC added</p>

SI No	Technical specification approved by WRPC for Interface energy meter IN 34 <sup>th</sup> TCC/WRPC on 28 <sup>th</sup> July-17	Changes in technical specification for Interface energy meter for 5-minute pilot project as per CERC order dated 16 <sup>th</sup> July-18(07/SM/2018)	Remarks
	displayed on the meter front on demand. Meter shall have the intelligence to synchronize the time with GPS (Local GPS/CDCS GPS) signal and from PC using software . Limited time synchronization through meter communication port shall be possible at site. When an advance or retard command is given, twelve subsequent time blocks shall be contracted or elongated by five seconds each. All clock corrections shall be registered in the meter's memory and suitably shown on print out of collected data.	Meter shall have the intelligence to synchronize the time with GPS (Local GPS/CDCS GPS/ NAVIC) signal and from PC using software. Limited time synchronization through meter communication port shall be possible at site. When an advance or retard command is given, twelve subsequent time blocks shall be contracted or elongated by five seconds each. All clock corrections shall be registered in the meter's memory and suitably shown on print out of collected data.	
7	<p>III. Interface Energy Meter</p> <p>1. Basic Features of Interface Energy Meters</p> <p>m) The above data shall be available in text file format (file extension as per IEEE standard/.txt) exportable to Excel. Indication of time retard or advance to be provided without disturbing the proposed format. Each 5-min block data consists of Frequency (in HZ), Active energy (in Wh), Reactive energy (in VARh) and Voltage (in V)</p>	<p>II. Interface Energy Meter</p> <p>1. Basic Features of Interface Energy Meters</p> <p>m) The above data shall be available in text file format (file extension as per IEEE standard/.txt) exportable to Excel. Indication of time retard or advance to be provided without disturbing the proposed format. Each 5-min block data consists of Frequency (in HZ), Active energy (in Wh), Reactive energy (in VARh) and Voltage (in V). All 5 minute Wh and VARh figures in .NPC/output report shall be rounded off upto third decimal.</p>	<p>All 5 minute Wh and VARh figures in .NPC/output report shall be rounded off upto third decimal.</p> <p>For maintaining 0.2S accuracy class, output report need to have higher decimal place then 2 decimal places in NPC file</p>

SI No	Technical specification approved by WRPC for Interface energy meter IN 34 <sup>th</sup> TCC/WRPC on 28 <sup>th</sup> July-17	Changes in technical specification for Interface energy meter for 5-minute pilot project as per CERC order dated 16 <sup>th</sup> July-18(07/SM/2018)	Remarks
8	III. Interface Energy Meter 2.Measurement b)The meter shall compute the net active energy (Wh) sent out from the substation bus bars during each successive 5 min block, and store it in its memory up to second decimal with plus sign if there is net Wh export and with a minus sign if there is net Wh import.	II. Interface Energy Meter 2.Measurement b)The meter shall compute the net active energy (Wh) sent out from the substation bus bars during each successive 5 min block, and store it in its memory <b>up to fourth decimal</b> with plus sign if there is net Wh export and with a minus sign if there is net Wh import. <b>Further Wh data in .NPC/output report shall be rounded upto third decimal.</b>	Meter shall store in memory energy (Wh) up to 4 <sup>th</sup> decimal and output report shall be rounded upto third decimal. For maintaining 0.2S accuracy class, output report need to have higher decimal place then 2 decimal places in NPC file
9	III. Interface Energy Meter 2.Measurement c.The meter shall count the number of cycles in VT output during each successive 5 min block, and divide the same by 300 (60 sec/min x 5min) to arrive at the average frequency. The least count of the frequency data shall be 0.01 Hz. The frequency data shall be stored in the meter's memory in Hertz up to second decimal.	II. Interface Energy Meter 2.Measurement c) The meter shall count the number of cycles in VT output during each successive 5 min block, and divide the same by 300 (60 sec/min x 5min) to arrive at the average frequency. The least count of the frequency data shall be 0.01 Hz. The frequency data shall be stored in the meter's memory in Hertz <b>up to third decimal</b> . Further Frequency data in <b>.NPC/output report</b> shall be rounded off <b>upto second decimal</b> .	The frequency data shall be stored in the meter's memory in Hertz up to third decimal. And output report shall be rounded off upto second decimal.
10	III. Interface Energy Meter 2.Measurement	II. Interface Energy Meter 2. Measurement	The voltage data shall be

Sl No	Technical specification approved by WRPC for Interface energy meter IN 34 <sup>th</sup> TCC/WRPC on 28 <sup>th</sup> July-17	Changes in technical specification for Interface energy meter for 5-minute pilot project as per CERC order dated 16 <sup>th</sup> July-18(07/SM/2018)	Remarks
	d)The meter shall continuously compute the average of the RMS values of the three line-to-neutral VT secondary voltages as a percentage of 63.51 V, and display the same on demand. The accuracy of the voltage measurement/computation shall be at least 0.5%, a better accuracy such as 0.2% in the 95-105% range being desirable.	d) The meter shall continuously compute the average of the RMS values of the three line-to-neutral VT secondary voltages as a percentage of 63.51 V, and display the same on demand. The accuracy of the voltage measurement/computation shall be at least 0.5%, a better accuracy such as 0.2% in the 95-105% range being desirable. <b>The voltage data shall be stored in the meter's memory in volts up to third decimal. Further voltage data in .NPC/output report shall be rounded off upto second decimal.</b>	stored in the meter's memory in volts up to third decimal and output report shall be rounded off upto second decimal.
11	III. Interface Energy Meter 2.Measurement e)The Reactive energy (VARh) measurement shall be carried out on 3-phase, 4-wire principle, with an accuracy of 0.5S as specified in IS 14697. The meter shall compute the net Reactive energy (VARh) sent out from the substation bus bars during each successive 5 min block, and store it in its memory up to second decimal with plus sign if there is net VARh export and with a minus sign if there is	II. Interface Energy Meter 2. Measurement e)The Reactive energy (VARh) measurement shall be carried out on 3-phase, 4-wire principle, with an accuracy of 0.5S as specified in IS 14697. The meter shall compute the net Reactive energy (VARh) sent out from the substation bus bars during each successive 5 min block, and store it in its memory <b>up to fourth decimal</b> with plus sign if there is net VARh export and with a	Meter shall store Reactive energy (VARh) in its memory up to fourth decimal and output report shall be rounded off upto third decimal. For maintaining 0.2S accuracy class, output report need to have higher decimal place then 2 decimal places in NPC file

SI No	Technical specification approved by WRPC for Interface energy meter IN 34 <sup>th</sup> TCC/WRPC on 28 <sup>th</sup> July-17	Changes in technical specification for Interface energy meter for 5-minute pilot project as per CERC order dated 16 <sup>th</sup> July-18(07/SM/2018)	Remarks
	net VARh import. It shall also display on demand the net VARh sent out during the previous 5 min block.	minus sign if there is net VARh import. It shall also display on demand the net VARh sent out during the previous 5 min block. Further VARh data in .NPC/output report shall be rounded off upto third decimal.	
12	III. Interface Energy Meter 2.Measurement k) No rounding off to the next higher last decimal shall be done for voltage and frequency displays. All 5 min Wh and VARh figures shall however be rounded off to the nearest last decimal.	Deleted	Statement conflict with II.2.C of revised specification
13	III. Interface Energy Meter 3. Memory/ Storage a.Each meter shall have a non-volatile memory in which the following shall be automatically stored:  i.Average frequency for each successive 5 min block, in Hertz up to second decimals.  ii.Net Wh transmittal during each successive 5 min block, up to second decimal, with plus sign if there is net Wh export and with a minus sign if there is net Wh import.  iii.Net VARh transmittal during each successive 5 min block, up to second decimal, with plus	II. Interface Energy Meter 3. Memory/ Storage a) Each meter shall have a non-volatile memory in which the following shall be automatically stored: (i)Average frequency for each successive 5 min block, in Hertz up to third decimals.  (ii)Net Wh transmittal during each successive 5 min block, up to fourth decimal, with plus sign if there is net Wh export and with a minus sign if there is net Wh import.  (iii)Net VARh transmittal during each	For maintaining 0.2S accuracy class, output report need to have higher decimal place then 2 decimal places in NPC file

SI No	Technical specification approved by WRPC for Interface energy meter IN 34 <sup>th</sup> TCC/WRPC on 28 <sup>th</sup> July-17	Changes in technical specification for Interface energy meter for 5-minute pilot project as per CERC order dated 16 <sup>th</sup> July-18(07/SM/2018)	Remarks
	sign if there is net VARh export and with a minus sign if there is net MVARh import.	successive 5 min block, <b>up to fourth decimal</b> , with plus sign if there is net VARh export and with a minus sign if there is net MVARh import.	
14	III. Interface Energy Meter 4. Display x)Voltage - high VARh register reading : 01234567.5 H  xi)Voltage - low VARh register reading : 00123456.4 L	II. Interface Energy Meter 4.Display x)Voltage - high VARh register reading : <b>1234567.5 H</b>  xi)Voltage - low VARh register reading : <b>1234567.4 L</b>	
15	III. Interface Energy Meter 4. Display xiii)The three line-to-neutral voltages shall be continuously monitored and in case any of these falls below 70 %, a normally flashing LED provided on meter's front shall become steady. It shall go off if all three voltages fall below 70 %. The LED shall automatically resume flashing when all VT secondary voltages are healthy again	II. Interface Energy Meter 4.Display (xiii)The three line-to-neutral voltages shall be continuously monitored and in case any of these falls below 70 %, a preferably flashing three LEDs ( <b>one LED/phase</b> ) provided on meter's front shall become steady. They shall go off if all three voltages fall below 70 %. The LED shall automatically resume flashing when all VT secondary voltages are healthy again.	one LED/phase shall be provided

## Annexure-II

Sl No	Technical specification approved by WRPC for Interface energy meter IN 34 <sup>th</sup> TCC/WRPC on 28 <sup>th</sup> July-17	Changes in technical specification for Interface energy meter for 5-minute pilot project as per CERC order dated 16 <sup>th</sup> July-18(07/SM/2018)	Remarks
16	<p>III. Interface Energy Meter 5.Communication a)..... It shall be ensured that data transfer through USB shall be unidirectional only i.e. from Meter to external storage device. Meter data shall be tamper-proof.</p>	<p>II. Interface Energy Meter 5.Communication a).... ). It shall be ensured that data transfer through USB shall be unidirectional only i.e. from Meter to external storage device <b>through an authentication process</b>. Meter data shall be tamper-proof.</p>	<p>“through an authentication process.” Added for data security.</p>
17	<p>III. Interface Energy Meter 5.Communication c,d, f, g(vii)</p>	Removed	<p>Both the sub-clause is for AMR. Considering the time bound fast implementation of the pilot project AMR may not be the standard requirement of pilot project.</p>
18	<p>III. Interface Energy Meter 7.Testing C(ii) Downloading meter data through USB port</p>	<p>II. Interface Energy Meter 7.Testing C(ii) Downloading meter data through USB port &amp; RS232</p>	<p>RS232 added for more option</p>
19	<p>III. Interface Energy Meter 9.Installation and commissioning b).... As part of commissioning of DCDs the Bidder shall load the software specified in clause 6(F) into the PCs at the respective substations, and fully commission the total meter reading scheme. He shall also impart the necessary instructions to substation engineers.</p>	<p>II. Interface Energy Meter 9.Installation and commissioning b) As part of commissioning of DCDs the Bidder shall load the software specified in clause 5(d) into the PCs at the respective substations, and fully commission the total meter reading scheme. He shall also impart the necessary instructions to substation engineers. At least 2-hour training session shall be arranged for</p>	<p>6(f) changed to 5(d) and word WRLDC is changed to RLDC.  For training session RLDCs also included.</p>

SI No	Technical specification approved by WRPC for Interface energy meter IN 34 <sup>th</sup> TCC/WRPC on 28 <sup>th</sup> July-17	Changes in technical specification for Interface energy meter for 5-minute pilot project as per CERC order dated 16 <sup>th</sup> July-18(07/SM/2018)	Remarks
	At least 2-hour training session shall be arranged for substation staff. Also, an operating manual (pdf as well as hard copy) of the meter containing all details the meter, various data downloading features, etc. shall be made available at site and WRLDC.	substation staff and <b>RLDCs</b> . Also, an operating manual (pdf as well as hard copy) of the meter containing all details of the meter, various data downloading features, etc. shall be made available at site and <b>RLDCs</b> ..	
20	IV. Automated Meter Data Reading (AMR) V. Meter data processing and reporting VI. General Software requirements VII. General Hardware requirements VIII. Documentation requirements IX. Testing requirements X. Training requirements XI. Support and maintenance requirements XII. Warranty- Part-B (AMR system and MDP software) XIII. Annual Maintenance contract	These clause removed	These clause are part of AMR and Meter data processing and reporting software. Considering the time bound fast implementation of the pilot project AMR and Meter data processing and reporting software may not be the standard requirement of pilot project



**List of 05-minute IEMs installed in the pilot project**

SI No	Station Name	Region	Place of installation of SEM	Meter No	Meter Type (M-Main, C-Check, S-Standby)	
1	BARH	ER	400 KV BARH(NTPC)-PATNA(PG)-1(MAIN)	IEM00000058A	M	
2			400 KV BARH(NTPC)-PATNA(PG)-1(CHECK)	IEM00000060A	C	
3			400 KV BARH(NTPC)-PATNA(PG)-2(MAIN)	IEM00000064A	M	
4			400 KV BARH(NTPC)-PATNA(PG)-2(CHECK)	IEM00000062A	C	
5			400 KV BARH(NTPC)-PATNA(PG)-3(MAIN)	IEM00000063A	M	
6			400 KV BARH(NTPC)-PATNA(PG)-3(CHECK)	IEM00000065A	C	
7			400 KV BARH(NTPC)-PATNA(PG)-4(MAIN)	IEM00000053A	M	
8			400 KV BARH(NTPC)-PATNA(PG)-4(CHECK)	IEM00000051A	C	
9			400 KV BARH(NTPC)-KAHALGAON(NTPC)-1(MAIN)	IEM00000061A	M	
10			400 KV BARH(NTPC)-KAHALGAON(NTPC)-1(CHECK)	IEM00000059A	C	
11			400 KV BARH(NTPC)-KAHALGAON(NTPC)-2(MAIN)	IEM00000050A	M	
12			400 KV BARH(NTPC)-KAHALGAON(NTPC)-2(CHECK)	IEM00000052A	C	
13			400 KV BARH(NTPC)- GORAKHPUR(NR) LINE-1(MAIN)	IEM00000055A	M	
14			400 KV BARH(NTPC)- GORAKHPUR(NR) LINE-1(CHECK)	IEM00000057A	C	
15			400 KV BARH(NTPC)- MOTIHARI LINE-2(MAIN)	IEM00000056A	M	
16			400 KV BARH(NTPC)- MOTIHARI LINE-2(CHECK)	IEM00000054A	C	
17			Teesta-V	400 KV TEESTA-RANGPO-1 (MAIN)	IEM00000110A	M
18				400 KV TEESTA-RANGPO-1 (CHECK)	IEM00000111A	C
19				400 KV TEESTA-RANGPO-2 (MAIN)	IEM00000112A	M
20				400 KV TEESTA-RANGPO-2 (CHECK)	IEM00000113A	C
21	Bongaigaon	NER	NTPC END OF 400 KV NTPC(BGAON)-BGAON(PG)-1_MAIN	IEM00000123A	M	
22			NTPC END OF 400 KV NTPC(B'GAON)-B'GAON(PG)-1_CHECK	IEM00000119A	C	
23			NTPC END OF 400 KV NTPC(B'GAON)-B'GAON(PG)-2_MAIN	IEM00000118A	M	
24			NTPC END OF 400 KV NTPC(B'GAON)-B'GAON(PG)-2_CHECK	IEM00000120A	C	
25			LV SIDE OF 400/220 KV NTPC ICT - 1_MAIN	IEM00000115A	M	
26			LV SIDE OF 400/220 KV NTPC ICT - 1_CHECK	IEM00000122A	C	
27			LV SIDE OF 400/220 KV NTPC ICT - 2_MAIN	IEM00000117A	M	
28			LV SIDE OF 400/220 KV NTPC ICT - 2_CHECK	IEM00000116A	C	
29	Loktak	LOKTAK-IMPHAL_5MIN_MAIN	IEM00000066A	M		
30		LOKTAK - IMPHAL_CHECK/ GT-II	IEM00000072A	C		
31		LOKTAK-NINGTHOUKHONG_5MIN_MAIN	IEM00000067A	M		
32		GT-I	IEM00000071A	S		
33		LOKTAK -RENGPANG_5MIN_MAIN	IEM00000068A	M		
34		LOKTAK -RENGPANG_CHECK/ GT-III	IEM00000073A	S		
35		LOKTAK-JIRIBAM_5MIN_MAIN	IEM00000069A	M		
36		LOKTAK-JIRIBAM_CHECK/ ST	IEM00000070A	C		

SI No	Station Name	Region	Place of installation of SEM	Meter No	Meter Type (M-Main, C-Check, S-Standby)	
37	Dadri- Solar	NR	33 KV SIDE ICT-1 (33KV/220KV) AT DADRI SOLAR,NTPC	IEM00000016A	M	
38			220 KV SIDE ICT-1 (33KV/220KV) AT DADRI SOLAR,NTPC	IEM00000002A	S	
39	Dadri STG-1		ICT-1 (400KV) AT DADRI-NTPC	IEM00000012A	M	
40			ICT-2 (400kv) at Dadri-NTPC	IEM00000010A	M	
41			6.6kV HVDC-1(aux) at Dadri-HVDC(from thermal)	IEM00000029B	M	
42			220kv feeder from Dadri Gas to Thermal	IEM00000005A	M	
43			ICT-5 (400kv) at Dadri-NTPC	IEM00000011A	M	
44			ICT-1 (220kv) at Dadri-NTPC	IEM00000009A	M	
45			ICT-2 (220kv) at Dadri-NTPC	IEM00000023A	M	
46			220kv Bus-3 sectionaliser (Dadri_Th)	IEM00000017A	M	
47			220kv Bus-4 sectionaliser (Dadri_Th)	IEM00000019A	M	
48			Dadri STG-2	GT-5-STAGE-2 (400KV) AT DADRI-NTPC	IEM00000018A	M
49	GT-5-STAGE-2 (400KV) AT DADRI-NTPC			IEM00000021A	C	
50	GT-6-STAGE-2 (400KV) AT DADRI-NTPC			IEM00000006A	M	
51	GT-6-STAGE-2 (400KV) AT DADRI-NTPC			IEM00000007A	M	
52	Dadri Gas		ICT-3 (400KV) AT DADRI-NTPC	IEM00000015A	M	
53			ICT-4 (400KV) AT DADRI-NTPC	IEM00000008A	M	
54			6.6KV HVDC-2(AUX) AT DADRI-HVDC(FROM GAS)	IEM00000025B	M	
55			220KV RAILWAYS-1 AT DADRI GPS	IEM00000014A	M	
56			220KV RAILWAYS-2 AT DADRI GPS	IEM00000013A	M	
57			ICT-3 (220KV) AT DADRI-NTPC	IEM00000003A	S	
58			ICT-4 (220KV) AT DADRI-NTPC	IEM00000004A	S	
59			220KV FEEDER FROM DADRI GAS TO THERMAL	IEM00000022A	S	
60	Tehri		400KV KOTESHWAR POOLING(PG)-1 AT TEHRI-THDC	IEM00000034A	M	
61			400KV KOTESHWAR POOLING(PG)-2 AT TEHRI-THDC	IEM00000030A	M	
62			400KV KOTESHWAR POOLING(PG)-1 AT TEHRI-THDC	IEM00000032A	M	
63			400KV KOTESHWAR POOLING(PG)-2 AT TEHRI-THDC	IEM00000033A	S	
64	Mouda		WR	400KV MOUDA GT1	IEM00000103A	S
65				400KV MOUDA GT2	IEM00000097A	S
66				132KV ST2 AT MOUDA	IEM00000079A	S
67				132KV ST1 AT MOUDA	IEM00000086A	S
68				132KV ST3 AT MOUDA	IEM00000108A	S
69				400KV MOUDA GT3	IEM00000100A	S
70		132KV ST4 AT MOUDA		IEM00000092A	S	
71		400KV MOUDA GT4		IEM00000076A	S	
72		400KV MOUDA ICT1		IEM00000095A	S	
73		400KV MOUDA ICT2		IEM00000077A	S	
74		400KV BUS SECTIONALIZER 1 AT MOUDA		IEM00000078A	S	
75		400KV WARDHA LINE 1 AT MOUDA (MAIN)		IEM00000093A	M	
76		400KV WARDHA LINE 2 AT MOUDA (MAIN)		IEM00000094A	M	
77		132KV MSETCL LINE 1 AT MOUDA		IEM00000081A	M	

SI No	Station Name	Region	Place of installation of SEM	Meter No	Meter Type (M-Main, C-Check, S-Standby)
78			132KV MSETCL LINE 2 AT MOUDA	IEM00000087A	M
79			400KV WARDHA LINE 1 AT MOUDA (CHECK)	IEM00000088A	C
80			400KV WARDHA LINE 2 AT MOUDA (CHECK)	IEM00000090A	C
81			400KV BETUL LINE 1 AT MOUDA (MAIN)	IEM00000089A	M
82			400KV BETUL LINE 1 AT MOUDA (CHECK)	IEM00000102A	C
83			400KV BETUL LINE 2 AT MOUDA (MAIN)	IEM00000104A	M
84			400KV BETUL LINE 2 AT MOUDA (CHECK)	IEM00000099A	C
85			400KV MOUDA ICT3	IEM00000105A	S
86			Simhadri	SR	400KV BUS SECTION -1 AT SIMHADRI ST 2
87	400KV BUS SECTION -1 AT SIMHADRI ST 2	IEM00000036A			C
88	400KV BUS SECTION-2 AT SIMHADRI ST 2	IEM00000037A			M
89	400KV BUS SECTION-2 AT SIMHADRI ST 2	IEM00000038A			C
90	400KV GAJUWAKA LINE -1 AT SIMHADRI ST 2	IEM00000039A			M
91	400KV GAJUWAKA LINE -1 AT SIMHADRI ST 2	IEM00000040A			C
92	400KV GAJUWAKA LINE-2 AT SIMHADRI ST 2	IEM00000041A			M
93	400KV GAJUWAKA LINE-2 AT SIMHADRI ST 2	IEM00000042A			C
94	400KV VEMAGIRI LINE -1 AT SIMHADRI ST 2	IEM00000043A			M
95	400KV VEMAGIRI LINE -1 AT SIMHADRI ST 2	IEM00000044A			C
96	400KV VEMAGIRI LINE-2 AT SIMHADRI ST 2	IEM00000045A			M
97	400KV VEMAGIRI LINE-2 AT SIMHADRI ST 2	IEM00000046A			C

PERIOD FROM 0000 HRS OF 04-01-2021 TO 0848 HRS OF 13-01-2021

IEM0000076A 0110616.9 9982498.8 9999994.3 04-01-2021

00	00.00 *	+00.000	+00.000	000.00	00.00 *	+00.000	+00.000	000.00	49.95	+03.870	+01.090	065.14	49.95	+03.910	+01.100	065.14	49.98	+03.900
02	50.00	+04.090	+01.260	065.27	49.93	+04.040	+01.220	065.23	49.92	+03.970	+01.200	065.23	49.98	+03.990	+01.240	065.26	49.97	+03.990
04	50.07	+03.980	+01.230	065.27	49.97	+04.150	+01.170	065.16	49.92	+04.000	+01.140	065.16	49.99	+04.030	+01.180	065.20	49.97	+04.010
06	50.06	+04.010	+00.900	064.93	50.01	+04.180	+00.860	064.85	49.90	+04.220	+00.810	064.78	49.98	+03.960	+00.800	064.82	49.95	+04.110
08	50.05	+05.160	+00.550	064.40	49.94	+05.380	+00.480	064.28	49.86	+05.430	+00.450	064.25	49.97	+06.070	+00.530	064.22	49.91	+06.580
10	49.99	+07.200	+00.570	064.03	50.00	+07.220	+00.500	063.96	49.96	+07.210	+00.460	063.92	49.95	+07.220	+00.460	063.92	50.00	+07.210
12	50.06	+06.310	+00.470	064.11	49.96	+06.820	+00.470	063.99	49.98	+07.080	+00.500	063.98	49.98	+07.210	+00.530	063.98	49.96	+07.410
14	50.02	+03.860	+00.430	064.45	50.00	+03.940	+00.440	064.45	49.89	+04.070	+00.350	064.33	49.89	+03.950	+00.330	064.33	50.01	+04.000
16	50.02	+06.910	+00.760	064.29	50.04	+06.870	+00.760	064.29	49.94	+06.880	+00.670	064.19	49.97	+06.710	+00.670	064.22	49.98	+06.900
18	50.08	+06.380	+01.100	064.74	50.01	+06.390	+01.010	064.64	50.00	+06.200	+00.930	064.59	50.01	+06.560	+00.900	064.50	50.05	+06.680
20	50.07	+04.730	+01.120	065.02	49.92	+04.410	+00.980	064.92	49.96	+03.950	+00.970	064.98	50.03	+03.980	+00.970	064.98	50.03	+03.970
22	50.10	+03.900	+01.200	065.23	50.02	+04.110	+01.160	065.15	49.98	+04.020	+01.100	065.11	50.00	+03.980	+01.090	065.11	50.03	+03.990
98	+03.880	+01.220	065.26	50.00	+03.850	+01.240	065.28	49.99	+03.890	+01.220	065.26	50.02	+04.030	+01.260	065.28			
01	+04.000	+01.220	065.24	50.03	+04.030	+01.230	065.25	50.01	+03.990	+01.210	065.23	50.02	+03.960	+01.210	065.24			
97	+03.960	+00.820	064.85	50.03	+03.960	+00.880	064.91	49.97	+04.110	+00.870	064.87	49.94	+04.050	+00.850	064.86			
03	+04.950	+00.500	064.38	50.00	+04.870	+00.500	064.39	50.01	+04.720	+00.480	064.39	50.03	+04.690	+00.480	064.40			
99	+07.320	+00.540	063.97	50.01	+07.300	+00.590	064.03	50.01	+07.240	+00.570	064.02	50.01	+07.250	+00.570	064.02			
03	+07.130	+00.510	063.98	49.98	+06.530	+00.410	063.99	49.92	+06.380	+00.340	063.94	49.99	+06.270	+00.390	064.02			
96	+04.980	+00.390	064.26	49.94	+04.300	+00.320	064.27	49.96	+03.880	+00.310	064.33	49.98	+03.850	+00.350	064.37			
94	+04.680	+00.460	064.35	49.91	+05.280	+00.500	064.30	49.94	+05.660	+00.590	064.33	49.96	+06.420	+00.670	064.28			
02	+07.020	+00.970	064.48	50.05	+06.930	+01.020	064.55	50.02	+07.050	+01.060	064.56	50.01	+06.870	+01.070	064.60			
04	+06.400	+01.180	064.81	50.01	+05.960	+01.150	064.85	50.03	+05.360	+01.110	064.92	50.08	+04.960	+01.130	065.01			
04	+03.850	+01.140	065.17	50.05	+03.870	+01.130	065.16	50.00	+03.910	+01.140	065.16	50.03	+03.910	+01.160	065.18			
05	+03.990	+01.040	065.06	50.08	+03.990	+01.060	065.08	50.08	+03.990	+01.070	065.09	50.12	+03.980	+01.120	065.14	+01480.700	+00236.770	

### Issues with newly installed 5-min IEM meters at NTPC Barh

1. Data download time from new IEM meters is very high and it ranges from 6-10 min per meter (details provided below). This time excludes opening panel, establishing connection etc. With an average download time of 10 min per meter 5-6 hours i.e., almost one skilled manday every week will be required for downloading meter data.
2. It has been observed that sometimes multiple attempts for data downloading is required in meters on random basis, this further delays data download process.
3. While installing meters meter time synch with GPS time is not ensured owing to which meters have a time mismatch of upto 2min. Since blockwise settlement is in practice this will lead to incorrect accounting.
4. Earlier for data download and time synchronization of meters DCD was provided, but few years back this was discontinued. No provision / manual for time synchronization of meters with GPS time provided using laptop. Owing to this there is always a mismatch in block-wise actual generation and meter recorded generation.
5. PGCIL was requested to provide the procedure to convert downloaded files from meters in readable format (.txt, .csv etc). Not received yet.
6. Many a times during audits (NTPC internal audits, Statutory audits, CAG audits etc) auditors ask for valid calibration certificate of meters which are being used for commercial accounting. As of now there's no practice of periodic meter calibration.

Meter No.	Meter Location	Time drift wrt to GPS time (mm:ss)	Meter Data Download Time (mm:ss)
IEM00000059A	KH-1 M	01:17	06:44
IEM00000061A	KH-1 C	01:02	08:21
IEM00000052A	KH-2 M	02:00	06:03
IEM00000050A	KH-2 C	00:35	06:02
IEM00000058A	PAT-1 M	01:30	09:00
IEM00000060A	PAT-1 C	01:12	08:42
IEM00000064A	PAT-2 M	02:00	09:14
IEM00000062A	PAT-2 C	00:40	09:13
IEM00000063A	PAT-3 M	01:04	08:42
IEM00000065A	PAT-3 C	00:30	08:35
IEM00000053A	PAT-4 M	01:00	09:15
IEM00000051A	PAT-4 C	01:20	09:15
IEM00000055A	GKP-1 M	01:00	05:25
IEM00000057A	GKP-1 C	01:01	05:26
IEM00000056A	MOT-2 M	00:30	06:43
IEM00000054A	MOT-2 C	00:35	06:45

***Following are the observations regarding 5 Min Energy Meter Data  
Downloading – NTPC Mouda***

1. Time taking for downloading data from Secure Meter to DCD: Approx. 18-20 Mins / Meter
2. Time taking for dumping data from DCD to PC: Approx. 18-20 Mins / Meter
3. Previous data Keep on accumulating in DCD. They are not getting deleted.
4. Only one charger was provided to charge the DCD. This charger is not working now. So we are not able to charge the DCD.
5. M-Cubed software is installed which seems to be very slow. Please make it convenient to get the other software installed to make the process faster.
6. Only one set of USB Cable, Data transfer cable (between DCD to PC) and Charger was provided which may become non-functional at any point of time. One more set of these accessories may be provided so that reliability of whole process gets improved.
7. Remote Access of PC to Secure Personnel is not possible for any issue in DCD and Software as PC are connected to LAN Network. So after resolving all these issues, one site demo by Secure Personnel to be planned for better understanding.
8. Possibility of Direct availability of Meter data to PC through Cable may be explored. This will save lot of time.

**From:** [TEESTAV POWER HOUSE](#)  
**To:** [Manas Das \( \)](#)  
**Cc:** [TEESTA STAGE-V POWER STATION](#); [Pinki Debnath \( \)](#)  
**Subject:** Issues in 5 min Meter data NHPC Teesta-V Power Station, Sikkim  
**Date:** 03 December 2020 18:39:38

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Dear Sir,

We are facing the following difficulties in Secure Make 5 min Meter:

1. Data downloading time from Meter to DCD is more than 5 Min. Time needs to be reduced.
2. Data dumping from DCD to PC is more by using DB9 cable which takes 40min approx.. Time needs to be reduced.
3. Data dumping to the PC is fast using a USB cable but too many steps are involved (not user friendly). Also we need to use two softwares Mcubed and Lincon.
4. Secure requests for remote access to our PC during installation of softwares. The softwares should be installed locally to prevent any cyber threats.
5. For downloading data from meter to DCD, two cables (optical cable as well as DB9 cable) need to be connected. However in the L & T meter we just need an optical cable.

Suggestions: Secure should make handout of all steps involved in use of 5-min Meter for easy reference by our Staff.

Thanks and Regards.

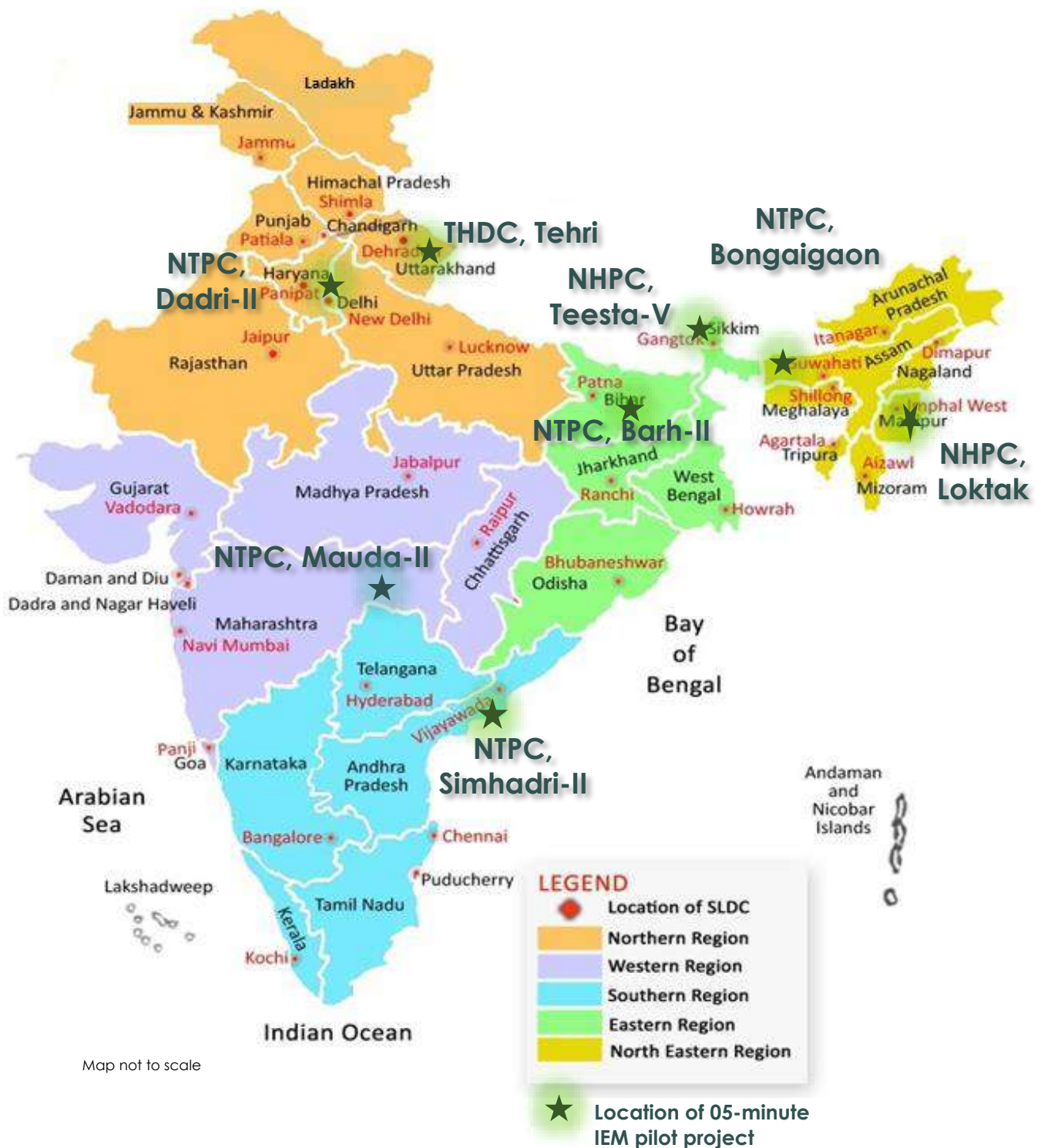
Alok Kumar Gupta  
Dy. Manager (Electrical)  
Teesta-V Power Station, NHPC Ltd.  
East Sikkim  
Mob: 7063180456

**A. Secure 5-min SEM Data Dumping related issues faced by BgTPP, NTPC:**

1. No Software has been provided in the site location to convert the data files.
2. Time taken for downloading data from SEM to DCD is 30 mins for each of the SEMs (i.e 8 meters taking almost 4hrs), which is not practical.



## Locations of 05-Minute IEM Pilot Project



Map not to scale

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