

Technical Specifications for PR No: 6000003092

1.0. SCOPE:

S.No	Brief Description of the Material	Material Code	Qty
I	Summation ABT meters (CT/PT operated), 19 inch rack, class 0.2S, 63.5V phase to neutral, 110V phase to phase, Ib 1A, I _{max} 1.2A, PACT port, RS 232(RJ11), Including Software, Meter Reading Instrument and Communication cable	CG3500208584	3 Numbers

Sl. No.	Description	Required in Specification	Vendor to Confirm/Specify
1.	Summation ABT meters (CT/PT operated), 19 inch rack, class 0.2S, 63.5V phase to neutral, 110V phase to phase, Ib 1A, I _{max} 1.2A, PACT port, RS 232(RJ11)	3 Numbers Summation ABT (Availability Based Tariff), Four Quadrant, Bi-Directional power flow, solidly earthed system with balanced and un-balanced load for a power factor range from zero to unity (lagging and leading), with accuracy class 0.2s. These are to be installed in TSTRANSCO Substation. The below contains technical specification of the above equipment. The specification shall be suitable for being connected directly to Potential transformers (PT) having a rated secondary line-to-line voltage of 110V and to current transformers (CTs) having a rated secondary current of 1A, 3 element 4 wire. The energy meter shall be suitable for rack/ panel/ metal box mounting. It is not the intent to specify completely herein all details of the design and construction of equipment. However, the equipment shall conform in all respects to high standards of engineering, design and workmanship and shall be capable of performing in continuous operation in TSTRANSCO substation. The equipment offered shall be complete with all components necessary for its effective and trouble free operation in TSTRANSCO Substation.	
2.	Purpose	The Summation meters shall be able to sum two different 132 KV feeders at TSTRANSCO substation and shall provide summated readings for TSSPDCL billing purpose.	

		The meters shall be specifically designed for application of combination of two very different tariffs simultaneously in the same meter. i.e the system will be capable of measuring recording, and storing all required billing/ history / tamper / load survey parameters in Import / Export mode	
3	Name of the Manufacturer and Origin.	Vendor to specify	
4	Type of meter/model	3phase,4wire	
5	Accuracy class	0.2S	
6	Meter case	The meter shall be made out of high quality materials to ensure higher reliability and long life. It should be compact and of reliable design to make it immune to vibrations and shocks in normal service and transportation and should be capable of withstanding several stresses likely to occur in actual service. The latest state of the art technology of surface mounting of components etc., may be used for the purpose. The soldering if any shall be perfect without dry solders. The components shall be of high quality and comply with international industrial standard practices. The construction of the meter shall be such as to permit sealing of the meter cover, terminal cover etc. independently to ensure that the internal parts are not accessible for tampering etc. without breaking the seals. The meter window shall be transparent and made out of UV Stabilized material so that the window does not turn yellow after some years. The meter case and meter terminal block and cover shall meet the IS 14697 in all requirements like shock, dust proof, creepage distances and insulation etc., The meter shall be totally sealed and tamper proof.	
7	Battery life for clock	Vendor to specify	
8	Applicable standards:	IEC 62053-22, IS 14697, IEC 61036, IS 9000, IS 8161, IS 13010, IS 12346, CBIP report 88 and CEA Notification dtd: 17/03/2006 on standard for operation of meters.	
9	Climatic Conditions Location : Hyderabad	Max. ambient air temp. (°C) – 55 Min ambient air temp. (°C) – 5 Average daily ambient air temperature (°C) 30-35 Maximum Relative humidity (%) 74	

		Average annual rainfall (mm) 925 Max. wind pressure (Kg/sq.m.) 200	
10	Supply voltage PT secondary	Phase to Phase 110 Volts +10% -30% Phase to Neutral 110/V3 Volts +20% -30%.	
11	Frequency	50 Hz, +/- 5%	
12	Power factor Range:	Zero lagging through Unity to Zero leading.	
13	Currents	1 A normal (In) and 0.01 in to 1.2 in working.	
14	Maximum Current (I max)	120% of Ib.	
15	Starting Current (Is)	0.1% of Ib at UPF.	
16	Marking of meter	i) Manufacturer's name and trade mark ii) Type Designation iii) BIS mark – (ISI mark) iv) Number of phases and wires v) Serial number vi) Month & year of manufacture vii) Reference voltage/ PT ratio viii) Rated secondary current of CT (1A) ix) Principal unit(s) of measurement x) Meter constant (impulse/kWh) xi) Class index of meter xii) Property of BHEL	
17	Quantity to be measured	The meters should be capable of measuring and storing in the memory, and displaying following electrical quantities on summator controller within specified limits of error for poly phase supplies (i.e. 3- phase, 4 wire system with star point (neutral) solidly grounded or floated) at all power factors. The apparent demand & energy is derive from active energy cosine part recording arrangement) & reactive energy (sine part lagging power factor recording arrangement) trough vector summation of active energy and only lagging reactive energy transwars for 15 min integration period and billing period. The offered meter should have different time zones (00:00 to 06:00 Hrs, 06:00 to 10:00 Hrs, 10:00 to 14:00 Hrs, 14:00 to 18:00 Hrs, 18:00 to 22:00 Hrs, 22:00 to 24:00 Hrs) and have additional time zones in case required.	
18	Memory of the meter	The offered meter shall keep following quantities recorded for each 15 Min successive integration block and memorized in its Non Volatile memory chip, so that in event of failure/damage of the meter the last reading of billing quantities would not be lost.	

		1. Cumulative Total Active energy Import. 2. Cumulative Total Active energy Export 3. Average system frequency 4. Cumulative KVARH lag while KWh import. 5. Cumulative KVARH lead while KWh import 6. Cumulative KVARH lag while KWh export. 7. Cumulative KVARH lead while KWh export.	
19	Power Loss	• Voltage Circuit: Shall not exceed 1W and 1 VA per Phase. • Current Circuit: Shall not exceed 1VA per Phase.	
20	Clock Time Accuracy	+/- 2 minutes per year drift or better	
21	Type of installation	Outdoor	
22	Energy Measurement	• The active energy (Wh) and reactive energy (Varh) measurement shall be carried out on 3-phase, 4-wire principle, with an accuracy as per class 0.2 S of IS 14697, the energy shall be computed directly in CT and VT secondary quantities, and indicated in watt-hours/varh. The harmonics shall be filtered out while measuring Wh, Var and VArh, and only fundamental frequency quantities shall be measured/computed. • The 15-minute Wh shall have a +ve sign when there is a net Wh export from substation bus bars, and a –ve sign when there is a net Wh import. The integrating (cumulative) registers for Wh and Varh shall move forward when there is Wh/Varh export from substation busbars, and backward when there is an import. • There shall be exclusive separate reactive energy registers in addition to all other billing parameters, one for the period when average RMS voltage is above 103% and the other for the period the voltage is below 97%.	
23	Immunity to External Factors	The meters shall be immune to external influences like magnetic induction, vibration, electrostatic discharge, switching transients, surge voltages, oblique suspension and harmonics. The meter accuracy shall not be affected by AC / DC magnetic field up to 0.2 Tesla on all the sides of meter i.e. front, sides, top and bottom of the meter as per CBIP publication No. 304 with latest amendments.	

		Under influence of any magnetic field (AC / DC / Permanent) above 0.2 Tesla, if the accuracy of the meter gets affected, then the same shall be recorded as magnetic tamper event with date & time stamping. The energy recorded during such tamper shall be registered in a separate register in addition to main register.	
24	Sealing Points	Sealing provision shall be made available to the following: • Meter body or cover • Meter terminal cover • MD reset button • Communication ports	
25	Auxiliary power	The auxiliary power supply shall be drawn from P.T circuit from all the three phases, preferably equally, so as to ensure meter supply even if any/two of the three phases of the potential supply is lost at a time.	
26	Name plate and Marking of meter	It shall be as per IS 14697.	
27	Instantaneous parameters	<u>Parameters:</u> The display of metering system would be dot matrix alpha numeric LCD display with 4 lines of each 20 characters with back-lit. The display would read in a temperature range of –20 °C to +55 °C. The data recorded by the meters would be continuously stored on EEPROM, thus being able to retain the data in case of power failure without the aid of batteries. Each of the physical quantity shall remain on display screen for 7 sec. Following quantity shall be displayed continuously in a specific cyclic order with a gap of 2-3 min. 1. LCD segment check 2. Instantaneous per phase Voltages (R,Y,B) 3. Instantaneous per phase Current (R,Y,B) 4. Instantaneous Line frequency 5. Phase Sequence of voltages 6. Instantaneous Total Active Power KW (Import/ export) 7. Instantaneous power factor 8. Real Time 9. Date 10. Raising demand in KVA – Export/ Import with elapsed time	

		11. Cumulative (24 Hrs) Total active energy import 12. Cumulative (24 Hrs) Total active energy export 13. Cumulative (24 Hrs) reactive energy lag while active import. 14. Cumulative(24 Hrs) reactive energy lead while active import 15. Cumulative (24 Hrs) reactive energy lag while active export 16. Cumulative (24 Hrs) reactive energy lead while active export 17. Cumulative (24 Hrs) apparent energy while active import 18. Cumulative (24 Hrs) apparent energy while active export 19. TOD (time of day) KWh Export 20. TOD KVarh (lag while KWh export) 21. Present KVA Maximum demand import / Export – 24 Hrs 22. Last month KVA Maximum demand import / Export – 24 Hrs (between last two resets) 23. Maximum demand Apparent export for current month (TOD wise) 24. No of MD reset Count 25. Last 15 minutes block average frequency 26. Last 15 minutes block average of the KWh energy import 27. Last 15 minutes block average of the KWh energy export 28. Cumulative Reactive energy for the voltage high condition. (ie. when RMS voltage >103%Vn) 29. Cumulative Reactive energy for the voltage low condition. (ie. when RMS voltage >97%Vn) 30. Tamper data Information 31. Present anomaly status 32. Date of first occurrence of anomaly 33. Time of first occurrence of anomaly 34. time of last restoration of anomaly Date of last restoration of anomaly 35. Total anomaly count 36. Cumulative Fundamental KWh –Export 37. Cumulative Total KWh –Import 38. Cumulative Fundamental KWh –Export	
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		39. Cumulative KVAh – Import/ export 40. TOD History-1 KVA MD Import/ export 41. TOD Current KVA MD Import/ export 42. Programmed external CT and PT ratios set in the meter 43. Total Power ON hrs. 44. Meter Constant i.e pulse/ KWh & KVArh 45. High resolution displays – High resolution for Active and Reactive Energy will be available through MRI under Calib function, for testing purpose. 46. Total Voltage Harmonic Distortion VTHD 47. Total Current Harmonic Distortion ITHD 48. Cumulative Demand Integration Period 49. Voltage-high VARh register reading 50. Voltage-low VARh register reading.	
28	LOAD SURVEY PARAMETERS	1. Average Frequency (Coded 00-99 for 49.00-51.00 Hz) 2. Average Power factor (Export) 3. Average Power factor(Import) 4. Net active energy 5. Active Energy (KW/kwh) Import 6. Active Energy (KW/kwh) Export 7. Apparent Energy (KVA/kvah) import 8. Apparent Energy (KVA/kvah) export 9. Kvar/ Kvarh Lag Export 10.Kvar/ Kvarh Lead Export 11.Kvar/ Kvarh Lag Import 12.Kvar/ Kvarh Lead Import 13.Percentage Voltage unbalance 14. Total harmonic distortion of voltage in percentage of fundamental 15. Total harmonic distortion of current in percentage of fundamental 16.Phase wise voltages and currents also shall be made available. 17.Date and time shall also be included 18.Serial number must be 10 digit only.	
29	Billing parameters	The parameters listed below for billing purpose and are logged at each day midnight (00.00Hrs) and stored in non-volatile memory for 45 days. 01. Cumulative Active Energy (kWh) – Import up to two decimal 02. Cumulative Active Energy (kwh) – Export up to two decimal	

		03. Cumulative Apparent Energy (kvah) – Import 04. Cumulative Apparent Energy (kvah) – Export 05. Cumulative Reactive Energy (kvarh) (Lag/Lead) - While KW is Import 06. Cumulative Reactive Energy (kvarh) (Lag/Lead) - While KW is Export 07. Kvarh during low voltage <97% } 08. Kvarh during high voltage >103% } * 09. T.O.D Parameters: • Kwh and kvah- Export • Kwh and kvah – Import • MD in KVA • Power Factor for programmed periods. 10. Power Down Time or Power Off Data (DD:HH:MM)	
30	Historical	Meter shall be capable of recording in its Non-Volatile (NVM) historical data consisting of billing energy, demand, TOD registers, minimum of six such data sets shall be stored and it should be possible to retrieve these data through communication port on common meter reading instrument (CMRI) or RMR.	
31	PROGRAMMABLE PARAMETERS	1. Real time clock 2. Demand integration Period 3. Block Capture Time 4. Billing Date/MD reset date 5. Time Zones (1 to 6) 6. External CT/PT ratios. 7. events/tampers Provisions shall be made to program the above parameters at sight using CMRI, Laptop or using Base computer software from remote station with proper security system. Logging of programmable parameter changed event (date & time) along with display of the same under On Demand Display Parameters & snapping of billing data at that time shall be stored and can be retrievable with CMRI and RMR and Laptop.	
32	Name plate details	1 Manufacturer name 2 Meter serial number The Meter serial Number must be in 10 digit Order only. 3 Firmware version for meter 4 Firmware version of communication software The above parameters shall be displayed on demand	

33	Display	The meter shall have a display of liquid crystal display (LCD) for measured values with one digit indicating legend. The characters shall be clearly visible. Provision shall be made to read consumption in either whole units or decimal multiples or submultiples of one unit. The display shall be continuously with backlight digital type and with non-destructive read out. In case of multiple values presented by a single display it must be possible to display the contents of all relevant memories. When displaying the memory, identifications of each tariff/parameter shall be available. The register shall be able to record and display starting from zero, for a minimum of 1500 h, the energy corresponding to rated maximum current at reference voltage and unity power – factor. Register should not rollover in between this duration. RESOLUTION: 1. Voltage = 0.1V 2. Current = 0.001A 3. P.F. = 0.001 4. Energy = 0.001 MWH 5. Demand = 0.1 KVA / KW=0.001 MVA/MW.	
34	Communication instruction storing capability :	The Offered metering system will have multiple communication ports for local reading and remote communication facility. Each meter has an optical Galvanically isolated communication port compatible to RS232 on its front for tapping all the data stored in its memory. Meter reading instrument (MRI) shall be provided for this purpose, as per the requirement so as to serve as interface between the meters specified above and the PC loaded with Base Computer Software. The offered metering system will be compatible to GSM network remote data transfer to a central location. Following parameters can be change after due authentication and protected password 1. Change in integration period	

		2. Change in automatic MD reset date and time 3. Modification in TOD timing Additionally, the offered metering system will provide a communication port compatible to RS-232 port for online data transfer to a central location (optional). This port will be capable of data transfer to a main computer on real time basis using suitable communication network (VSAT/ Leased line/ OFC) via compatible hardware (interfacing equipment/ communication cables etc. as required).	
35	Maximum Demand(MD) Recording	The maximum demand is to be monitored during each demand interval set with 15 minutes integration and the maximum of these in a month shall be stored. Whenever MD is reset the maximum demand value so registered shall be stored along with date and time. Under the current integration period, the rising demand should be displayed continuously along with the elapsed time. The registered demand and the number of times the MD is reset up to 10 shall be stored in the memory.	
36	MD Reset	The meter shall have the following provisions regarding MD reset. a) Manually by operation of a button, which is to be covered and sealing provision available for such, cover. b) Resetting shall also be possible through a hand held common meter reading instrument (CMRI), Widows based Laptop capable of communicating with the meter. c) Provision for automatic resetting at the end of certain period may be made available and it should be possible to invoke this through CMRI, Widows based Laptop with date and time.	
37	Time Of Day Tariff (TOD)/Time of Use(TOU)	The meter shall contain provisions for differential pricing of energy and/or maximum demand. The meter shall be capable of being set in to minimum of 6 time zones (00:00 to 06:00 Hrs, 06:00 to 10:00 Hrs, 10:00 to 14:00 Hrs, 14:00 to 18:00 Hrs, 18:00 to 22:00 Hrs, 22:00 to 24:00 Hrs) optionally more time zones can be	

		offered).The entire hours of one day or seven days of one week or 365 days of one year shall be grouped in specific time slots, each slot being associated with specific metered register(s). The meter shall have a real time clock based on a quartz crystal with a battery very independent of power supply. It should be possible to change the time for the TOD recording through a CMRI, Laptop/remote communication using a proper security system. Meter shall be capable to log such changes with date and time stamping. The main control for this change shall be available in the base computer system.	
38	Communication Capability	The meter shall be provided with multiple ports for communication of the measured / collected data, i.e. hardware ports. The meter shall have a galvanically isolated optical communication port as per IEC 1107/ANSI and additional communication port RS 232/RS 485 should be provided for remote meter reading purpose with open standard protocols. All ports shall communicate simultaneously. All the ports shall be of universal type conforming to relevant standard so that these can be easily connected to a DCD, CMRI, MODEM (e.g. GSM, GPRS, CDMA, PLCC, Microwave, Radio, VSAT, Leased Line, PSTN, VPN, Ethernet etc.), Laptop, PC, GPS Time device for data communication/ time synchronization etc. The ports shall be integral part of body and sealable. All of the parameters available in the register of the meter shall be user selectable through CMRI and also with laptop.	
39	compatible software	The manufacturer shall supply the meter compatible software, Protocol software required for Windows based Laptop, CMRI, Base Computer, RMR. It is the responsibility of the meter manufacturer to provide the required software and all the facilities required by the TSTRANSCO to use the Windows based Laptop, DOS based hand held CMRI for reading and retrieving the data from the meter or to retrieve the available data through P&T lines, GSM, VSAT to the central computer station and regenerating appropriate reports required by the TSTRANSCO. After loading the software in the purchaser's base computer station/ central computer station, the meter manufacturer shall demonstrate the data transfer through hand held CMRI, Windows based Laptop, P & T lines, GSM,	

		VSAT and regeneration of appropriate reports to BHEL. The data element size and its over head speed of transmission shall be such that the entire billing data can be transferred within maximum time of 5 minutes. The baud rate preferable is 9600. It should not possible to change software configuration and recorded data edit in the meter by any means except for programmable parameters agreed.	
40	Communication cable:	The Energy meter communication cable of 1500mm length shall be supplied by vendor for communicating with Energy meter and Windows based Laptop (Optical to USB). The cable should be flexible shielded and the two ends of the cable shall be stress relieved.	
41	Data transfer and meter reading instrument	MRI shall be supplied by the vendor. The offered meter reading instrument is compact and portable with (rechargeable battery powered. This MRI will be capable to cover data from various energy meters and transfer them in minimum time on an IBM compatible computer. The computer s/w will detail information on billing, energy audit and load survey.	
42	Harmonic measurement	The offered meter is capable to measure 50 Hz. (pure sine wave) and total energy i.e (50 Hz + harmonics)	
43	Tamper and fraud protection / information	The meter will have features to detect the occurrence and restoration of, at least, the following common anomaly: a) Potential phase sequence- The offered meter shall measure/monitor phase rotation and store all variable electrical quantities (active and reactive both) irrespective of rotation of potential phase sequence (i.e. either clockwise or anticlockwise) accurately within the specified limits of errors. b) Phase-wise missing potential – Indication of missing of voltages and/or partial potential reflected due to missing of primary potentials i.e. difference more than 30% between phase to phase (line) potential with date, time and duration	

		stamped specifying appropriate phase affected. c) Line Currents: (I) Indication of missing and/or (II) bye-passing i.e. different more than 20% in magnitude between relevant phase currents with date, time and duration stamped specifying appropriate phase affected. d) Temperature Sensor: The temperature sensor should be provided in physical form of assessment i.e. temperature indicating stickers to sense highest temperature of meter. e) Phase wise current circuit reversal - meter will detect reversal of polarity provided the current terminals are reversed. This will be recorded for 1 or 2 phase CT reversal. f) Voltage unbalance – meter will detect voltage unbalance if there is unbalance in voltages. The deviation from the phase with highest voltage will be used to detect an unbalance in voltage. g) Current unbalance – meter will detect current unbalance if there is unbalance in load conditions. Meter should ensure true system conditions before going for current unbalance checks. These conditions Include voltage unbalance and average line current below a specified threshold. In addition the offered meter shall record and snapshots of phase wise voltage, active current and power factor as well as date and time of logging of occurrence and restoration of all the above anomaly events will be logged into the meter memory. h) Power on/off – meter will detect power off if both the auxiliary supplies fail. The event will be recorded on the next power up. At the same time power on event will	
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		be recorded. No snapshot will be logged with this event. i) Feeder Supply fail -This event will be logged when feeder supply, i.e. all the voltages goes below certain threshold. Event will be restored when any of the voltage goes above certain threshold. No snapshot will be logged with this event. Last hundred (occurrence + restoration) such events in total with date and time will be stored in the meter memory on first in first out basis. There will be four separate compartments for logging of different type of anomalies as follows: Compartment No.1: 20 events of missing potential Compartment No.2: 20 events of CT polarity reversal Compartment No. 3: 40 events for voltage and current unbalance Compartment No.4: 20 events of feeder fail and power On/Off The logging of various anomalies in each compartment will be as under: Once one or more compartments have become full, the last anomaly event pertaining to the same compartment will be entered and the earliest (first one) anomaly event should disappear. Thus, in this manner each succeeding anomaly event will replace the earliest recorded event, compartment wise. Events of one compartment/category should overwrite the events of their own compartment/category only. Anomaly count should increase as per occurrence (not restoration) of anomaly events.					
44	Tamper Events Records	The following shall be captured when event occurrence and restoration and for each of event Captured “Cumulative tamper count” value shall be incremented. <table><thead><tr><th>Events</th><th>Description</th></tr></thead><tbody><tr><td>1</td><td>R-Phase – PT link Missing (Missing Potential) – Occurrence</td></tr></tbody></table>	Events	Description	1	R-Phase – PT link Missing (Missing Potential) – Occurrence	
Events	Description						
1	R-Phase – PT link Missing (Missing Potential) – Occurrence						

		2 R-Phase – PT link Missing (Missing Potential) – Restoration 3 Y-Phase – PT link Missing (Missing Potential) – Occurrence 4 Y-Phase – PT link Missing (Missing Potential) – Restoration 5 B-Phase – PT link Missing (Missing Potential) – Occurrence 6 B-Phase – PT link Missing (Missing Potential) – Restoration 7 Phase – R CT reverse – Occurrence 8 Phase – R CT reverse – Restoration 9 Phase – Y CT reverse – Occurrence 10 Phase – Y CT reverse – Restoration 11 Phase – B CT reverse – Occurrence 12 Phase – B CT reverse – Restoration 13 Phase – R CT Open - Occurrence 14 Phase – R CT Open - Restoration 15 Phase – Y CT Open - Occurrence 16 Phase – Y CT Open - Restoration 17 Phase – B CT Open - Occurrence 18 Phase – B CT Open - Restoration 19 Influence of AC / DC or permanent magnet - Occurrence 20 Influence of AC / DC or permanent magnet - Restoration 21 Power failure – Occurrence 22 Power failure – Restoration Tamper Information: Minimum 100 events (occurrences and restoration) with date and time of event shall be recorded. The Information shall be logged on first in first out basis and total number of tamper events during the period. All these information should be available in simple and easily understandable format i.e. slot wise (i). Voltage tampers (ii). Current tampers (iii) Other tampers. iv) meter wise.	
45	Self Diagnostics Features	The meters shall have indications for unsatisfactory/non-functioning of the following. 1. Time and calendar 2. Real Time clock(RTC) 3. RTC battery 4. Non-Volatile Memory 5. All display segments	
46	Calendar	30-year calendar with automatic leap year adjustment	

47	Pulse Outputs	The meter shall have a test output (pulses) accessible from the front and be capable of being monitored with suitable testing equipment. The operation indicator must be visible from the front. The resolution of the test output shall be sufficient to conduct satisfactorily accuracy test at the lowest load in less than 5 minutes and starting current test in less than 10 minutes. Test outputs are required for both kwh, and kvarh.	
48	DIFFERENTIAL DATA SUMMATION UNIT:	A dedicated, numeric summation unit shall be provided that would collect the incremental data from the feeder meters. There can be maximum of two feeder meters in a typical installation. The incremental data used for transmission to the summator will be in numeric format for highest resolution and the data should have the details of full four quadrant increments. This summation module will process the digital out put data of each feeder to provide the concurrent demand and other resultant outputs as specified below: The data summation module shall be capable for processing the meter reading for billing. The required quantities for billing shall be as per normal HT tariff and ABT tariff. ✕ Cumulative summated kWh (Import/Export) ✕ Cumulative summated kVAh (lag and lead with respect to Import/Export) ✕ Cumulative summated kVAh (Import/Export) ✕ Cumulative summated kWh in different rates (Imports/Exports) ✕ Cumulative summated kVAh in different rates (lag and lead with respect to Import/Export). ✕ Cumulative summated kVAh in different rates (Import/Export) ✕ Summated reactive lag energy while active import ✕ Summated reactive lead energy while active import ✕ Summated reactive lag energy while active export ✕ Summated reactive lead energy while active export	

		⌘ kW or kVA in different rates (Import/Export) KW/MW demand for 15 minutes in Export AND Import mode and Arithmetic sum of KVA max demand. i.e. KVA1+KVA2.....for 15 minutes integration period in Export and Import mode.	
49	Type tests	Four copies of Type test reports shall be furnished with the Bid for meters manufactured with same voltage and current reference of this specification. The type tests must have been conducted not earlier than 2 years from the date of opening of the Bid. The Bids received without type tests reports will be treated as non-responsive.	
50	Acceptance tests	The acceptance tests as stipulated in IS 14697 shall be carried out by the supplier in the presence of purchaser's representative. No of samples and criteria for conformity from each lot offered for inspection is also as per IS14697. 1. 15 minutes block average frequency registration. 2. 15 minutes block net active power registration. 3. Net kVArh High registration in all four quadrants when voltage is above 103% of VREF. 4. Net kVArh registration in all four quadrants when voltage is at VREF. 5. Net kVArh Low registration in all four quadrants when voltage is 97% of VREF. 6. Net kVArh Low registration in all four quadrants when voltage is below 97% of VREF. 7. Test for confirmation of midnight energy banking in power ON & power OFF conditions.	
51	Routine tests	The routine tests as stipulated in IS 14697 shall be carried out by the supplier for 100% meters supplied and test certificates, technical leaflet shall be enclosed along with each and every meter.	
52	INSPECTION:	The inspection may be carried out by the BHEL/TSTRANSCO at any stage of manufacture. The manufacturer shall grant free access to the BHEL/TSTRANSCO's representative at a reasonable time when the work is in progress. Inspection and acceptance of any equipment under this specification by BHEL, shall not relieve the supplier of his obligation of furnishing the equipment in accordance with the specification and shall not prevent subsequent rejection if the equipment is found to be defective.	

		The supplier shall keep BHEL informed in advance, about the manufacturing program so that arrangement can be made for inspection. BHEL along with TSTRANSCO reserves the right to insist for witnessing the routine testing of the bought out items. The supplier shall give 15 days advance intimation to enable BHEL to depute his representative for witnessing the acceptance and routine tests. In the event of order, Supplier shall have to get type tests conducted as per the requirement of relevant standards . Material shall be despatched only after approval of these test reports and granting of despatch clearance. After completion of Type testing and acceptance by BHEL/TSTransco, payment for the delivered consignment against despatch instructions of the Lot will be made.” Payment terms will be as per BHEL norms.	
53	Training of Personnel	The Supplier shall provide necessary facilities for training of personnel of BHEL at their works/Principal Works relating to design, manufacture, assembly, testing and operation & maintenance of static meters for 4 personnel free of cost including boarding and lodging. However travel and incidental charges of the personnel will be borne by BHEL.	
54	DOCUMENTATION	a) All drawings shall conform to International Standards Organization (ISO) 'A' series of drawing sheet India Standards Specifications IS: 656. All dimensions and data shall be in S.I. Units. Also a soft copy of Drawings shall be submitted. b) List of drawings and documents: The bidder shall furnish the following along with bid. • Two sets of drawings showing clearly the general arrangements, fitting details, electrical connections etc., • 5 sets of Technical leaflets (users manual) giving operating instructions. • The manufacturing of the equipment shall be strictly in accordance with the approved drawings and no deviation shall be permitted without the written approval of BHEL. All manufacturing and	

		fabrication work in connection with the equipment prior to the approval of the drawing shall be at the supplier's risk. • Approval of drawings/work by BHEL shall not relieve the supplier of his responsibility and liability for ensuring correctness and correct interpretation of the Drawings for meeting the requirements of the latest revision of application standards, rules and codes of practices. The equipment shall conform in all respects to high standards of engineering, design, workmanship and latest revisions of relevant standards at the time of ordering and BHEL shall have the power to reject any work or materials which, in his judgment is not in full accordance therewith. • The successful Vendor shall, within 2 weeks of placement of order, submit three sets of final versions of all the drawings as stipulated in the purchase order for BHEL's approval.	
55	GUARANTEE	The meters should be guaranteed for satisfactory operation for a period of 5 years from the date of receipt of material at destination stores by the consignee in good condition. During the guarantee period if the meter while in its normal operation is found defective, it shall be replaced by the supplier with a new meter free of cost with in 15 days. if the meter is not replaced within 30 days of intimation the supplier should note that the guarantee period will be extended to that extent by the number of days delayed beyond 30 days. If the tenderer does not replace within 180 days the cost of the meter(s) will be recovered from the Bank Guarantees available with the BHEL.	

SCOPE of Other Materials:

S.No	Brief Description of the Material	Material Code	Qty	Vendor to confirm	Remarks
2.	Pre wired metering cubicle suitable for the Summations ABT meters. Arrangement: two meters in one panel (main & check). As per TSTRANSCO norms.	CG3500208592	1 Number	Vendor to confirm	
3	Pre wired metering cubicle suitable for the Summation ABT meters. Arrangement: one meter in one panel (standby meter). As per TSTRANSCO Norms.	CG3500208614	1 Number	Vendor to confirm	

PQ & Other Terms and Conditions

S.No	Other Terms and Conditions	Vendor Remarks
1.	Prequalification Criteria Vendor shall have successfully supplied <u>Summation ABT meters</u> at least 1 number to AP/TS TRANSCO (or) to Industries with AP/TS TRANSCO metering facility . Vendor shall submit proof for the same. Along with the above Commissioning/Performance certificate of the equipment from AP/TSTRANSCO/ Industries needs to be Submitted.	
2	Vendor shall offer inspection of the above material to TSTRANSCO officials and BHEL officials. Only after clearance from TSTRANSCO official's material will be accepted.	
3	Third party testing charges are to be quoted separately by vendor and shall be conducted as per TSTRANSCO norms. (NABL accredited labs only)	
4	4 sets of test reports of each item to be submitted.	