

Specification of Static Meters & GTP for DAS



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TECHNICAL SPECIFICATIONS

FOR

STATIC METERS FOR DAS

GETCO/E/TS- STATIC METERS (DAS) 04601/R3 July 2022

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TECHNICAL SPECIFICATION FOR STATIC METER FOR DAS

Specifications for high precision static Export and Import meters with Serial Communication, serial port facility for supply in sub-stations panels for 11Kv to 400Kv.

1. SCOPE:

1.1 METERS:

This specification covers high precision three vectors static energy meters of accuracy class 0.5S capable of performing functions of recording of energy export or import from sub-station and to be installed on sub-station panels /feeders. The meters shall be 3 phase 4 wire type for installation at sub-station panels.

1.2. TEST TERMINAL BLOCK:

The supplier shall have to supply three phase four wires; Flush mounted having connecting terminals on back side Test Terminal Blocks along with the meters wherever required. However, in case of many panels three phase four wire TTBs are already installed. Therefore, the required TTBs shall have to be supplied only where existing TTBs are three phase three wire. The copy of technical specifications and general drawing are furnished here with for ready reference. I.e. Schedule – IV.

2. STANDARD APPLICABLE:

While drafting these specifications, reference has been made to following Indian and International Standard Specifications. In case, certain details are not covered in these specifications, the relevant Indian/International Standard shall be applicable.

IEC 687 (1992-06) - Static watt hour meters - Meteorological specifications for classes--
0.2S and 0.5S

IS 14697 (1999) – AC static Transformer operated Watt-hour and VAR-hour meters,
Class 0.2S and 0.5S specification.

IEC 1036 - Static Energy Meters

IS 9000 - Environmental testing

IS 8161 (Draft) - Impulse wave testing

IS 13010 - AC Watt-hour meters CI-0.5,1 &2

IS 12346 - specification for testing equipment for AC energy meters.

IS 8686 - w.r.t. High frequency disturbance testing

CBIP Report 88 (Revised May-1996 and amended in April-'99 and Sept-'99) –
Specification for A.C. Static electrical energy meters.

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PFC Spec. - For High precision 3 vectors Energy Meter.

CEA Report – September 2000 – Functional Specification of AC electrical energy meters.

3. SUPPLY SYSTEM:

- (I) Solid neutral grounded H.V. and E.H.V. 3 phase, 4 wire 50 Hz. system with CTPT (auxiliary transformers) connected.
- (II) Primary voltages: 400KV & down level of 11 KV.
- (III) Secondary voltages: 110 V or $110\text{ V}/\sqrt{3}$. PTs are normally Y-y (star-star) connected having a secondary Y (star) point brought out or kept floated however Star point NOT earthed.
- (IV) Primary current: Up to 2000 amps.
- (IV) Secondary current: 1 Amp & 5 Amp.

CTs are 1-phase, 2 nos. 3 wire connections to measure balanced and Unbalanced (either Delta or Star connected with floating star point or star point neutral grounded) loads from installation charging (i.e. No load) to 150% of declared rated loads at all power factors.

4. SYSTEM VARIATIONS:

The meters should be suitable for working satisfactorily and accurately with following variations in the supply system parameters and ambient temperatures.

(a) Electrical Quantities:

(I) Voltages: 110 V + 10% to -30%

(ii) Frequency: 50 Hz. + 5% to 5%

(b) Range of Temperature variations:

(i) Ambient Temp. 0° C. to 45° C

(ii) Average working Temp. 27° C. + 10° C to --10° C.

(iii) Reference Temp. 27° C.

4A. SPECIAL FEATURE OF METERS

The meters should be compatible for recording export and import energy from sub-stations panels with RS 485 serial port facility for polling the data to the computer connected with the meters. The meter should have common communication protocol, so that single software can poll, transfer and collect all make, type, rating and category of meters data coordinate with other make meters also.

5. SAMPLING RATE AND DERIVATION OF BASIC MEASURABLE QUANTITIES.

The actual supply wave of related voltages and currents should be sampled out at the rate of minimum 3000 samples per second and should provide billing values of each actual voltage and current cycle while deriving actual basic active (cosine part measurable

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component) and reactive (sine part measurable component) energies (with respect to relevant voltage wave and current wave) to assess actual contents of energies persisting/traversing, to have upto-date information for total energy even when highest order of Harmonics is present in supply wave. ***The meter should have internal Real Time Clock with the back up of a Lithium maintenance free battery of minimum life of Ten (10) years for operation of the time clock. The Real Time Clock shall be based on Quartz crystal timer so as to make it independent of line frequency variations.***

6. QUANTITIES TO BE MEASURED, MONITORED AND MEMORISED:

- [A] The meters shall be capable of measuring and storing in the memory and displaying the following electrical quantities within specified limits of error for polyphase supplies (i.e. 3- phase, 4 wire system with star point (neutral) solidly grounded or floated) of 3 phase Delta or Star connected load having a floating or a grounded Star point with balanced or unbalanced loads at all power factors. Apparent demand and energy should be derived from active energy (CO-sine part recording arrangement) and reactive energy (sine part lagging and leading power factor recording arrangement) through vector summation of Total (Fundamental + Harmonics) Active energy and only lagging Reactive electrical energies traversed for 15 minutes or 30 minutes integration period.

The meters shall also be capable of measuring, monitoring and storing in the memory minimum four (4) zones of time of day electrical quantities for pre-specified periods of the day and the meter's memory storing capability should be minimum for 62 days with 30 minutes' integration period. (i.e. minimum 2 billing periods) The capability of memorizing load survey information for KW/KWh, KVA/KVAh, KVAR/KVARh and /or PF and Tamper events etc should clearly be indicated. However, the meter shall be capable of recording in its memory the load survey for minimum Three parameters, viz Half Hourly Total Active, Apparent and Reactive Demand / Energy.

- (a) Active energy: Absolute (Total of Fundamental + Harmonics) Kwh/Mwh Export & import from sub- station
 - (i) Last billing period.
 - (ii) for current billing period
- (b) Reactive energy: KVARh / MVARh lagging with respect to export of energy for
 - (I) Last billing period.
 - (II) For current billing period.
- (c) Apparent energy: Absolute KVAh / MVAh derived vectorially from lagging reactive and Absolute (Total of Fundamental + Harmonics) Kwh/Mwh Export & import energy
 - (I) For last billing period.
 - (II) For Current billing period.
- (d) Highest apparent Maximum Demand: KVA/MVA derived vectorially from lagging reactive and Absolute (Total of Fundamental + Harmonics) Kwh/Mwh Export & import active energy (of relevant integration period)
 - (I) For last billing period and
 - (II) For current billing period

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- (e) Active energy for: KWH/MWH
each zone of TOD (I) For last billing period
(II) For current billing period
- (f) Harmonics: KWH/MWH active energy measurement at 50 Hz. (pure sine wave)
Traversed (I) during last billing period. (ii) During current billing period
- KWH/MWH Active energy at **50 Hz + Harmonics** traversed
(I) During last billing period
(II) During current billing period
- (g) Phase voltages: Vrn, Vyn and Vbn at the time of retrieving readings.
(i) Indication of missing/partial potentials (reflected due to missing of primary potential) i.e. difference more than 30% between phase to phase(line) and (ii) zero potential between phase to ground with date, time and duration stamped during memory period.
- (h) Line currents: Ir, Iy and Ib at the time of retrieving readings. (I) Indication of Missing/bye-passing or (II) difference of current more than 20% between phases and also (III) Reversals of any line currents with respect to active energy flow with date, time and duration stamped during memory period.
- (i) Power factor : Average power factor of last billing period derived from division of active energy traversed to apparent energy (derived vectorially from total active export energy and only lagging reactive energy) traversed
(I) during last billing period.(II) during current billing period.
- Average power factors of each TOD zone (I) during last billing periods
(II) during current billing period.
- (j) Temperature: Highest temperature attained by meter body and cover in Degree C.
The suitable temperature sticker for the purpose may be fixed on inside of the meter terminal cover.
- (k) Memory of Meter: Meter should be capable to store/memorize of all quantities listed from (a) to (i) for at least 62 days for 30 minutes integration period and ready print outs in the form of analytical and graphic should be available either directly with RS485 modem to computer or through CMRI and off-loading in computer. Necessary software shall be submitted and an accurate analytical and graphic print outs through Board's computer should be obtained to prove products capability.

Note: - The current billing period and last billing period should be programmable as per the requirement.

[B] *The meter must keep following quantities recorded and memorized in its Non Volatile memory chip permanently, so that in event of failure/damage of the meter the last reading of billing quantities would not be lost.*

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Cumulative energies from the date of installation - sum of all tariffs.

1. Cumulative Total export & import KWH/MWH (fundamental + harmonics).
2. Cumulative export & import KVARH/MVARH lag (With respect to export KWH).and
- 3 Cumulative export & import KVARH/MVARH lead (With respect to export KWH/MWH) both separately with identification.
4. Cumulative export & import KVAH/MVAH derived from vectorial summation of Absolute (Total of Fundamental + Harmonics) Kwh/Mwh Export Active export and Reactive (lag only) energy.

7. DISPLAY:

The meter should have legible LED/LCD with backlit for minimum six-digit automatic in cyclic order display. In case a single display is being used to display the values of various parameters in rotation, it should be possible to display contents of relevant memories continuously in a specified cyclic order. Each of the physical quantities shall remain on the display screen for a time interval of minimum seven seconds with latitude of one second on either side. While displaying the memories, proper and adequate identification of each of the quantities being displayed shall be made (like 24 hours, night period, morning peak, evening peak period, and TOD parameters etc.). The following quantities shall be displayed continuously in a specific cyclic order with a gap of two to three minutes between two successive cycles. However, the parameters shall be segregated in different Modes as per specific requirement for ease of reading. The Mode wise parameters to be displayed are listed as under.

Display parameters MODE-1 (Auto display)

1. Instantaneous R - Phase voltage
2. Instantaneous Y - Phase voltage
3. Instantaneous B - Phase voltage
4. Instantaneous R -Phase current
5. Instantaneous Y - Phase current
6. Instantaneous B - Phase current
7. Instantaneous Neutral current
8. Instantaneous line frequency in Hz
9. Instantaneous power factor
10. Phase sequence - voltage and current (preferably both)
11. Rising demand in KW with Elapsed time
12. Instantaneous total Three Phase Active power. (KW/MW)
13. Cumulative KWH/MWH Export
14. Cumulative KWH/MWH Import.
15. Cumulative KVARH/MVARH Export (lag)
16. Cumulative KVARH/MVARH Export (lead)
17. Cumulative KVARH/MVARH Import (lag)
18. Cumulative KVARH/MVARH Import (lead)
19. Total Export KW/MW MD peak hrs.
20. Total Export KW/MW MD night hrs.
21. Total Export KW/MW MD rest hrs.
22. Total import KW/MW MD peak hrs.
23. Total import KW/MW MD night hrs.
24. Total import KW/MW MD rest hrs.
25. RTC - date and time.

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26. Total tamper count.

Display parameters MODE-2 (By push button)

27. Cumulative Total Export KWH/MWH (fundamental + harmonics) for 24 Hours.
28. Cumulative export KVARH/MVARH lag and lead (With respect to export KWH) 24 Hours
29. Cumulative export KVAH/MVAH derived from vectorial summation of Total (Fundamental + Harmonics) Active export and Reactive (lag only) energy for 24 Hours.
30. Cumulative KWH/MWH (Fundamental) export for 24 Hours.
31. Cumulative KWH/MWH (Fundamental) import for 24 Hours.
32. Total Export KWH/MWH peak hrs.
33. Total Export KWH/MWH night hrs.
34. Total Export KWH/MWH rest hrs.
35. Total import KWH/MWH peak hrs.
36. Total import KWH/MWH night hrs.
37. Total import KWH/MWH rest hrs.
38. Total Export KVAH/MVAH peak hrs.
39. Total Export KVAH/MVAH night hrs.
40. Total Export KVAH/MVAH rest hrs.
41. Total import KVAH/MVAH peak hrs.
42. Total import KVAH/MVAH night hrs.
43. Total import KVAH/MVAH rest hrs.
44. Cumulative KW/MW MD since date of installation i.e. cumulative of Maximum of all tariffs.
45. No. of MD reset counts.

Tamper data with separate identification with existing status

46. Voltage failure count – Phase wise.
47. Current failure count- Phase wise.
48. Voltage unbalance count Phase wise.
49. Current unbalance count Phase wise.
50. Current Reversal count Phase wise
51. Nos. of Communication counts
52. Meter CT ratio and PT ratio.
53. Nos of total Hours that the meter is made “ON”. i.e. powered up from the date of installation or date of dispatch.

For testing purpose.

54. Meter's constant. i.e. No of Pulses per KWh/MWh/Wh OR No of Units per Pulses
55. High Resolution Energy register – KWH/MWH. Export & Import
56. High Resolution Energy register KVARH/MVARH Export(lag)
57. High Resolution Energy register KVARH/MVARH import(lag)

Note:-

1. **Wherever Kwh/MWH register is specified, the same shall be Total Kwh/MWH (Fundamental + Harmonics).**

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- 2. Wherever KVAh register is specified, the same shall be from vectorial summation of Total Kwh/MWH (fundamental+Harmonics) & Lagging KVARh/MVARH.**

8. COMMUNICATION INSTRUCTION STORING CAPABILITY:

The meter should have galvanically isolated communication port so that it can be easily connected to a hand-held meter reading instrument for Data transfer or subsequently hooked up to remote metering instrument such as MODEM etc. The meter should have RS485 Serial port for polling out the data to communicate with computer connected with the meter with required software. The meter should be capable of executing instructions from base computer service centre only after due authentication through protected password for the following.

- i) Meter make, type & Sr. No.
- ii) Change in integration period
- iii) Change in automatic re-setting for billing data date & time.
- iv) Modifications in TOD timings

The meter should thereafter communicate above information while off-loading the data to computer through hand-held meter reading instrument and by RS485 serial port to PC relevant energy audit/load survey data.

9. MAXIMUM DEMAND REGISTER:

The meter should monitor demand during pre-specified integration period set and record/display the maximum registered value. The rising demand under the current integration period should be displayed along with elapsed time. The integration period shall be capable of making adjustment with duration of 30 minutes or 15 minutes (as may be required by the provisions of tariff schedule). The adjustment option shall be available and it should be possible to select the period of integration by the user after duly authenticated through base computer service centre only.

10. MAXIMUM DEMAND RESET:

The meter should have the following maximum demand resetting arrangements:

- (a) Automatic resetting at the end of pre-specified period or on a pre-specified date and time of every calendar month (e.g. 00.00 hours on 28/29th day of every month).
- (b) A provision for revising the resetting cycle for modifying the date and time of automatic resetting through base computer service centre or via hand-held meter reading instrument only after using protected pass word should be available.
- (c) Provision for Manual Resetting of the monthly Max Demand with adequate sealing arrangement must also be made

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11. ENERGY AUDIT/LOAD SURVEY CAPABILITY:

The meter should log any minimum SIX nos of parameters depending upon GETCO's requirements which are selectable with 15/30/60 minutes data for at least more than 60 days in its memory. It should be possible to transfer this data on to a base computer station through PSTN / GSM MODEMS or ETHERNET (LAN connectivity). The base computer shall give complete details of load survey particulars both in numeric data form and graphic form. Necessary soft ware for invoking the base computer station should be provided. The bidders should clearly indicate in their bids the maximum memory storing capabilities in terms of Nos. of days for storing of load survey quantities. In addition to above following parameters shall also be recorded

(A) Fixed Parameters / information: - Must be kept recorded permanently

- (i) Meter - make and Sr. No.
- (ii) Prevailing integration period
- (iii) Automatic re setting date and time
- (iv) Meter's constant. i.e. Nos of pulses per unit OR Nos of units per pulses

(B) Variable parameters / information: - Minimum for 62 days

- (i) Active energy: Total Kwh/Mwh Export for last billing period and Total Kwh/Mwh Export for current billing period.
- (ii) Reactive energy: KVARH/MVARH lagging with respect to export of active energy
(I) For last billing period. & (II) For current billing period.
- (iii) Apparent energy: KVAH/MVAH derived vectorially from lagging reactive and Absolute (Total of Fundamental + Harmonics) Kwh/Mwh Export active energy (I) For last billing period. & (II) For current billing period
- (iv) Highest apparent: KVA/MVA derived from lagging reactive and Absolute (Total of Fundamental + Harmonics) Kwh/Mwh Export active energy
maximum demand (I) For last billing &
(II) For current billing period (of relevant integration period)
- (v) Active Energy export: Absolute Total KWH
For each TOD zone. (I) For current billing period
(II) For last Billing period
- (vi) Harmonic: KWH/MWH active energy at 50 Hz (pure sine wave measurement traversed
(I) During last billing period &
(II) During current billing period.

KWH/MWH active energy at 50 Hz. + harmonies traversed during
(I) Last billing period &
(II) Current billing period

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- (vii) Power factor Average power factor of last billing period derived from division of Total Active energy traversed to apparent energy (derived from Total Active and lagging reactive energy) traversed during
- (I) Last billing period. &
 - (II) Current billing period.

(C) Tamper and Fraud information:

Must be kept recorded permanently without facility of resetting.

The event for occurrence and restoration should be recorded for time elapsed 3 minutes after occurrence and similarly for time elapsed 3 minutes after restoration.

- (i) Line voltages:- V_{rn}/V_{ry}, V_{yn}/V_{yb} and V_{bn}/V_{br} at the time of retrieving readings. (i) Indication of missing/partial potentials i.e. difference more than 30% between phase to phase (line) and (ii) zero potential between phase to ground potentials(reflected due to missing of primary/secondary potential) with date, time and duration stamped.
- (ii) Line currents:- I_r, I_y and I_b at the time of retrieving readings. (I) Indication of missing/by-passing or (II) difference of current more than 20% between phases and (III) Reversals of current phase-wise with respect to active energy flow with date, time and duration stamped.
- (iii) Temperature:- Highest temperature attained by meter body and cover in Degree C. The suitable temperature sticker for the purpose may be fixed on inside of the meter terminal cover.

The load survey data must be available quantities like I_r, I_y, I_b, V_{rn}, V_{yn}, V_{bn}, I_n, KW, KVA KVAR and P.F for minimum of 45 in days during each integration period in FIFO manner (First In First Out) and all tamper data separately for each event shall be made available with its time dully stamped and in NO case shall be made available to Reset to ZERO. (i.e. FIFO or in rotational/roll over method). The bidder must also specify Nos. of tamper events that the meter is capable to store.

However, the meter must provide Summary Report for all total Nos of tamper events and (or Total Nos of tamper events) total duration (for each type) for the events occurred from the date of manufacturing or installation.

It should be possible to retrieve these data via communication port on to hand-held meter reading instrument-CMRI and it should be possible to off load these data on to IBM compatible computer and get complete details of the load/demand pattern in terms of KW/KWh, KVA/KVAh, and Average PF both in numeric data form and in graphic form for all the 24 hours a day divided as per the pre-set integration period of 15 minutes in each individual case. Necessary software for this purpose must be provided by the supplier. The total time in minutes to be taken by meter for retrieval of all above data shall have to be clearly indicated in offer.

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12. TIME OF DAY TARIFF/DEMAND: The meter shall be capable to register demand and energy consumption minimum for four different zones in a 24 hours' cycle to record time of day consumptions. It should be possible to change the time of day period for these registers through base computer service center directly or via hand-held meter reading instrument-CMRI only after due authentication through protected password from base computer. The meter should be able to record active energy consumptions for minimum four specified time of day to help application of proper tariff.

13. HARMONIC MEASUREMENTS:

The meter should be capable to measure 50 Hz (pure sine wave) KWh energy and total energy of 50 Hz + harmonic energy. This will help in estimation of harmonic contents in supply system at various points.

14. CONSTRUCTION OF THE METER:

The meter should be manufactured from high quality Industrial grade material viz. Polycarbonate with 10% glass filled which should meet the following properties as per IEC-1036, to ensure higher reliability and long life of the meter case.

- (a) low wire Temperature of 960 C
- (b) Heat Deflection Temperature of 135 C
- (c) Ball Pressure Test of 125 Deg C
- (d) VO rating flammability by UL 94 Under Writers Laboratory of USA - which means the material should be self-extinguishing in 10 seconds.
- (e) The meter terminal block should be molded from High grade Engineering plastic or Phenolic Resin.

As regards the cover the material shall be Polycarbonate / high grade engineering plastic - UV stabilized opaque/Transparent grade. I.e. Display window should be of Ultra Violet resistant transparent material. The meter should be compact and reliable in design and should immune to vibration and shock involved in transportation/handling.

- (f) Overall dimensions, weight and G.A. Drawings:

Bidders are requested to indicate specific dimensions of meters along with weight and general assembly drawings with minimum two views to be shown in the G.A. drawing.

The meter should be Projection type mounted type and suitable to supply in C & R panels if asked.

Clear indication of phase sequence shall be marked and conventional internal circuit diagram relevant to meter must permanently be pasted (manufactured from good quality plastic sticker material) on the inside of the main terminal cover e.g. 3 phase 4 wire 3 element circuit distinctly for current coil and pressure coil to record/register active and reactive power/energy.

- (g) General equations for derivation of actual quantities from missing quantities:

A set of general equations relevant to measurement of Total Active power and Total Active energy KW/KWH (i.e. co-sine component) and reactive power and energy (lagging and leading component) KVAR/KVARH (i.e. sine component) shall be furnished to enable

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derivation of actual quantities for under recorded periods which may be due to missing/partial potentials, defective current pulses (due to by-passing of CT currents or reversal thereof) applicable to the type of meter offered along with the bid.

(h) The meter shall confirm the degree of protection IP 51.

(i) ***The meter should not get damaged or influenced by the electromagnetic disturbances and electrostatic discharges caused by Harmonics, Voltage dips, short interruptions, conducted transients, AC and DC magnetic field.***

15. SEALING OF METER:

Proper sealing arrangement should be provided on the meter to make it tamper proof and avoid mishandling by unauthorized persons. At least 2 (two) seal each on the body and the terminal block shall be provided.

16. TAMPER AND FRAUD PROTECTION/INFORMATIONS:

The meter should have the following special features to prevent/detect different ways of tamper and fraud.

- (a) Potential phase sequence: Meter should 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 anti-clockwise) accurately within the specified limits of errors.
- (b) Potentials/line voltage:
- (I) Indication of missing of voltages. I.e. when the secondary voltage between phase to artificial neutral (inside meter) i.e. no neutral of PT to be connected to meter; drops below 35 volts, the event shall be logged as voltage failure. However this event shall be recorded as voltage failure only if the current is existing in respective phase, or otherwise the event shall be recorded as power failure and/or
 - (II) partial potential reflected due to missing of primary potentials) i.e. If the difference of any two i.e. phase to neutral voltage (i.e. phase to artificial neutral) is more than 30% with respect to higher voltage, the event shall be logged as tamper. However, the lowest voltage shall not be less than 35 volts. Viz. It is already specified that any phase voltage below 35V shall be recorded as voltage failure with date, time and duration stamped specifying appropriate phase affected.
- (c) Line currents:
- (I) Indication of missing of current i.e. The event shall be logged as tamper only when any phase current drops below 0.1 % of the rated basic current. Also this event must be recorded only when the voltage is existing or otherwise the event shall be recorded as power failure and/or
 - (II) Current Unbalance / by-passing i.e. The event shall be logged as tamper when difference of any

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two line current value is more than 20% w.r.to value of higher current. Also this event shall be recorded as tamper only when the value of lower current, i.e. Minimum current, is more than 10% of the rated basic current. The logic for the same is recommended as” **the Current Unbalance event shall be recorded when ($I_{max} - I_{min}$) is more than 10% of I_b and also when the average of three phase currents is more than 10% of I_b ,**” (III) Reversal of current with respect to export of active energy with date, time and duration stamped specifying appropriate phase affected.

- (d) Temperature sensor: The temperature sensor should be provided in physical form of assessment like temperature indicating stickers to sense highest temperature of meter.
- (e) Indication for wrong : association Meter should indicate wrong connections if made to respective phase pressure coils and current coils (i.e. perfect current and potential phase association should be achieved).

The meter shall be able to check wiring and shall flash message for correct wiring as well as Wrong wiring. The meter Phasor Diagram through PC and MRI should also be possible.

Note:- The meter must kept recorded all above events distinctly with type, identification and duration period in a roll over/rotational method and in NO case these tamper data shall be able to set “Zero”. Also the bidder must clearly specify in the technical offer, the capability of meter to store Nos. of tamper events with duration.

17. ACCURACY:

The 0.5S Class accuracy of active power and reactive power and energy measurements by meter shall be tested in accordance with relevant clause of IS -14697 (1999) / IEC 687-1992-06 for 0.5S class of accuracy static alternating current watt-hour meters for active energy. The tests and reference conditions under which tests shall be carried out shall be in accordance with Cl.3.7.1 and Cl.4 of IEC-687, along with tests and test conditions as envisaged under Cl.No: 5 of IEC 687. Sample size for type tests to be conducted shall be 1 out of 300 nos. subject to a minimum of one number per lot. The bidder should clearly indicate name, address and place where the type tests (as envisaged in relevant IS-14697 / IEC 687) can be conducted. Costs of type tests so arrived shall be borne by bidder. It is imperative that bidder shall indicate minimum acceptance tests to be conducted along with accuracy of test set up with brief sequential write up for relevant acceptance tests. It is further emphasized here that any acceptance tests to be carried out in any test house or by bidder's shop laboratory must conform to relevant conditions of IEC 687 and measuring instrument must bear laboratory grade accuracy. Any deviation felt necessary should be brought out clearly.

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18. Following tests to be carried out on the meters of accuracy class 0.5S class according to sub clause of IS-14697(LATEST VERSION) / CEI IEC- 687 second addition 1992-06.

No.	TESTS	Sub Clause of CEI IEC- 687 Second Edition 1992-06	Sub Clause of IS- 14697 (latest version)
1	TESTS OF INSULATION PROPERTIES	5.4.6	12.7.6
1.1	Impulse voltage test	5.4.6.2	12.7.6.2
1.2	AC voltage test	5.4.6.3	12.7.6.3
1.3	Insulation Resistance Test	5.4.6.4	12.7.6.4
2	TESTS OF ACCURACY REQUIREMENTS	5.6	12.9
2.1	Test on Limits of Error	5.6.8	11.1
2.2	Interpretation of test results	---	12.15
2.3	Test of Meter constant	5.6.6	12.14
2.4	Test of starting condition	5.6.5	12.13
2.5	Test of No Load condition	5.6.4	12.12
2.6	Repeatability of Error test	5.6.9	12.16
2.7	Test of Ambient temperature influence	5.6.3	12.11
2.8	Test of Influence quantities	5.6.2	12.10
3	TESTS OF ELECTRICAL REQUIREMENT	5.4	12.7
3.1	Test of power consumption	5.4.1	12.7.1
3.2	Test of influence of supply voltage	5.4.2	12.7.2
3.3	Test of influence of short time over currents	5.4.3	12.7.3
3.4	Test of influence of self-heating	5.4.4	12.7.4
3.5	Test of influence of heating	5.4.5	12.7.5
4	TESTS FOR ELECTROMAGNETIC COMPATIBILITY(EMC)	5.5	12.8
4.1	Radio interference measurement	5.5.5	12.8.5
4.2	Fast transient burst test	5.5.4	12.8.4
4.3	Test of immunity to electrostatic discharges	5.5.2	12.8.2
4.4	Test of immunity to electromagnetic HF- fields	5.5.3	12.8.3
5	Tests of climatic influences	5.3	12.6
5.1	Dry heat test	5.3.1	12.6.1
5.2	Cold test	5.3.2	12.6.2
5.3	Damp heat, cyclic test	5.3.3	12.6.3
6	TESTS OF MECHANICAL REQUIREMENTS	5.2	12.3
6.1	Vibration Test	5.2.3	12.3.2
6.2	Shock tests	5.2.2	12.3.1

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6.3	Spring Hammer Test	5.2.1	12.3.3
6.4	Test of Protection against penetration of dust and water	5.2.5	12.5
6.5	Test of resistance to heat and fire	5.2.4	12.4

19. Soft wares

The Following software shall be supplied free of cost by the meter manufacturer.

The software should be suitable for the operating system of the associated Board's computers.

- (i) Software for reading and programming the meter contents in the MRI.
- (ii) Base computer software for accepting data from MRI and down loading instructions from Base Computer to MRI.
- (iii) Necessary software for loading applications program via communication port
- (iv) The meter should be capable to communicate directly to Lap Top computer.

Any other special applications software and additional software not mentioned above but necessary for functioning of the system.

Protocol:

MODBUS protocol shall be used for communication of meters with PC.

Communication Port: -

Manufacturers shall provide RJ11 (**RS 485**) port to poll data using Modbus protocol.

20. Special Condition to the Bidder:

1. It is mandatory for the supplier to submit three samples of a DAS meters along with bid documents. No Samples will be accepted after opening of the tender in any circumstances. The samples are to be delivered in person to The Executive Engineer (Telecom), 132KV Sub-station, Opp. T.B. Hospital, Gotri Road, Vadodara.

Samples submitted shall be tested at NABL accredited lab as per GETCO specifications. ***Samples testing is mandatory for new suppliers and those who are regular supplier of DAS static energy meters are exempted from testing of meters offered of Model/type same as supplied earlier to GETCO.***

However, decision of GETCO will remain final regarding sample testing for meters of new Model/Type offered by regular supplier and binding to all bidders.

2. Please note that if the technical offer would be found acceptable/qualified on scrutiny, the sample meter will have to be submitted on behalf of GETCO to NABL accredited lab for testing as per GETCO's specification. The necessary fees shall have to be deposited by bidder/supplier. The intimation in this regards will be conveyed to the supplier, for which the name of the person and the contact number may please be provided along with the offer. In event of failure of the sample during any of the tests the offer will be considered as "REJECTED" and consequently the fees paid for tests will be forfeited. Further if the sample passes in testing the necessary fees would be

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reimbursed to bidder/supplier by GETCO. However, the decision of the GETCO for placement of order shall be final and binding to all the bidders.

3. The bidder shall have to demonstrate the meter functionality and compatibility with existing network and ability to generate various reports as per our existing common polling software. It shall work satisfactorily minimum for one month at three different locations; otherwise the bid will be rejected outright.
4. The past performance of the DAS meters will be considered whichever are supplied to GETCO.
5. Service after Sales: The list of service centers in Gujarat and India should be submitted for better service after sale. It should be satisfactory and it will be considered in scrutiny of bid as an important factor for service after sale.
6. The bidder shall furnish the full technical details & drawings for the Static Meter offered.
7. The bidder shall have the experience of at least 10 years of manufacture & supply of similar type of Static Meter.
8. **Any deviation shall be clearly indicated separately.**
9. The GETCO reserves right to increase or decrease the quantity at the time of placing the order.

21. Minimum guaranteed performance requirement

I) GENERAL:

The electrical quantities are required to be measured with a fine degree of precision, (through solid state micro processor, same should have minimum sampling rates of 3000 samples per second for accurate measurement of contents of relevant current and voltage waves) monitor, display and store in non-volatile memory of high precision static demand and energy Trivector meters of 0.5S class accuracy for energy audit, load survey and tariff metering purposes at the installation of HT consumers, conforming to latest IS-14697 / I.E.C 687 and CBIP Report-88 and operated through auxiliary transformers, (conventional version of 3 phase, 4 wire Trivector meter) These meters are required to function accurately within the specified limits of errors under the following conditions of voltage, frequency, current and temperature.

i) Voltage

a)	Phase to phase with star connection (but Neutral either solidly grounded or floated)	110 volts + 10% - 30%
b)	Phase to star point having neutral point either solidly grounded or floated.	110/ $\sqrt{3}$ volts + 10% -30%

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ii) Frequency	50 Hz + 5% or --5%
iii) Currents.	5 Ampere normal (In) and 0.01 In to 1.5 In working
iv) Temperature	0° C to 45° C maximum variation (27° C + 10° C normal working).

II) COMMUNICATION CAPABILITIES:

Meter shall be capable of receiving the following instructions/information from the Base Computer Service Centre either directly or through meter reading instrument CMRI only after due authentication through minimum two level protected pass words from base computer and shall be able to store in its non-volatile memory and shall obey / carry out instructions for accurate measurement of relevant electrical quantities.

- i) Meter Make and Sr.No.
- ii) Change in integration period
- iii) Change in date and time of automatic resetting of billing period
- iv) Modification in TOD timings.

The meter shall carry out all functions as per pre-set instructions and thereafter shall be able to transfer the same to base computer service centre directly or via common meter reading instrument i.e. CMRI with relevant billing data or energy audit / load survey data.

III) MEASURING AND MEMORY STORING CAPABILITIES

Meter shall be capable of measuring following electrical quantities and shall store in its non volatile memory minimum for recent past 62 days within the specified limit of errors.

The meter shall also be capable of measuring and storing all electrical quantities in its non-volatile memory in minimum (4) four zones of time of day for pre-specified period of the day. The meter shall be displaying the rising apparent demand with elapsed time of current integration period.

(A) Recording of active energy:

Absolute Total (Fundamental + Harmonics) active energy Kwh/Mwh export to consumer for (I) last billing period & (II) current billing period.

(B) Recording of reactive energy

Absolute KVARH/MVARH lagging with respect to export of active energy for (I) last billing period & (II) current billing period (even also in case of non recording of active energy due to technical fault in the meter)

(C) Computed Apparent Energy

KVAH/MVAH derived vectorially from absolute Total (Fundamental + Harmonics) export of active and lagging reactive energy for (I) last billing period & (II) current billing period.

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(D) Highest apparent maximum demand

KVA/MVA vectorially derived from absolute Total (Fundamental + Harmonics) export of active energy and lagging reactive energy for

- (I) last billing period &
- (II) Current billing period (of relevant integration period).

(E) Active energy for each zone of TOD facility

Total (Fundamental + Harmonics) Kwh/Mwh for

- (I) last billing period &
- (II) (II) for current billing period

(F) Harmonic Measurement.

Kwh/Mwh active energy at 50 Hz. i.e. Pure Sine wave (Fundamental energy) traversed during (I) last billing period & (ii) current billing period.

Kwh/Mwh active energy at 50 Hz. + Harmonics i.e. Actual Voltage and Current wave traversed during

- (I) last billing period and
- (II) current billing period.

G) Line and Phase voltages:

(i) V_{rn}, V_{yn} and V_{bn} at the time of retrieving readings as snap shot. With (ii) Indication of missing and (iii) partial potential (reflected due to missing of primary potential) i.e. difference more than 30% between phase to phase (Line potentials, with date, time and duration stamped during memory period.

H) Line currents.

(i) I_r, I_y and I_b at the time of retrieving readings as snap shot with (ii) Indication of missing and (iii) by passing or difference in currents more than 20 % between phases and (iv) Reversals with respect to active energy flow with date, time and duration stamped during memory period.

I) Power factor.

Average power factor derived from division of active energy traversed to apparent energy (derived from lagging reactive with respect to export active energy) traversed during last billing period. and ii) Average power factor derived from division of export active energy traversed to apparent energy (derived from lagging reactive with respect to export active energy) traversed in current billing period.

J) Temperature Sensing.

Highest temperature i.e. more than 70 degree centigrade attained by critical parts of the meter. The temperature sticker for the purpose may be affixed on inside of the meter terminal cover.

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K) Memory of meter

Meters memory should be capable to store/memorize information of all quantities listed from A to I permanently (at least for minimum 5-10 years of time period and ready printouts for active, both reactive (i.e. lagging and leading) and apparent [derived vectorially from Total (Fundamental + Harmonics) active and reactive lagging] energies traversed during each integration period of billing period and ready print outs in the form of analytical and graphic shall be possible either directly with modem or through CMRI and off loading in computer. Necessary software shall have to be submitted and an accurate analytical and graphical print out through Board's computer must be obtained/processed to prove products capability.

IV) DISPLAYING CAPABILITIES

The meter shall have legible LED/LCD with backlit for minimum six digits automatic in cyclic order display. In case a single display is being used to display, the multiple value in rotation should be possible to be displayed, the contents of the relevant memories in a specified cyclic order. Each of the following quantities with proper identification shall remain on the display screen for a minimum seven seconds with tolerance of one second on either side.

The meter must display all the quantities as prescribed under Cl.No: 7 as above. However the same are once again reproduced here under.

Display parameters MODE-1 (Auto display)

1. Instantaneous R - Phase voltage
2. Instantaneous Y - Phase voltage
3. Instantaneous B - Phase voltage
4. Instantaneous R -Phase current
5. Instantaneous Y - Phase current
6. Instantaneous B - Phase current.
7. Instantaneous Neutral current
8. Instantaneous line frequency in Hz
9. Instantaneous power factor
10. Phase sequence - voltage and current (preferably both)
11. Rising demand in Kw with Elapsed time
12. Instantaneous total Three Phase Active power.(KW/MW)
13. Cumulative KWH Export
14. Cumulative KWH Import.
15. Cumulative KVARH Export (lag)
16. Cumulative KVARH Export (lead)
17. Cumulative KVARH import (lag)
18. Cumulative KVARH Import (lead)
19. Total Export KW MD peak hrs.
20. Total Export KW MD night hrs.
21. Total Export KW MD rest hrs.
22. Total import KW MD peak hrs.
23. Total import KW MD night hrs.
24. Total import KW MD rest hrs.
25. RTC - date and time.
26. Total tamper count.

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Display parameters MODE-2 (By push button)

- 1 Cumulative Total export KWH (fundamental + harmonics). 24 Hours
- 2 Cumulative export KVARH lag and lead (With respect to export KWH) 24 Hours
- 3 Cumulative export KVAH derived from vectorial summation of Total (Fundamental + Harmonics) Active export and Reactive (lag only) energy.
- 4 Cumulative KWH (Fundamental) export
- 5 Cumulative KWH (Fundamental) import
- 6 Total Export KWH peak hrs.
- 7 Total Export KWH night hrs.
- 8 Total Export KWH rest hrs.
- 9 Total import KWH peak hrs.
- 10 Total import KWH night hrs.
- 11 Total import KWH rest hrs.
- 12 Total Export KVAH peak hrs.
- 13 Total Export KVAH night hrs.
- 14 Total Export KVAH rest hrs.
- 15 Total import KVAH peak hrs.
- 16 Total import KVAH night hrs.
- 17 Total import KVAH rest hrs.
19. Cumulative KW MD since date of installation i.e. cumulative of Maximum of all tariffs.
20. No. of MD reset counts.

Tamper data with separate identification with existing status

1. Voltage failure count - Phase wise.
2. Current failure count- Phase wise.
3. Voltage unbalance count Phase wise.
4. Current unbalance count Phase wise.
5. Current Reversal count Phase wise
6. Nos. of Communication counts
7. Meter CT ratio and PT ratio.
8. Nos of total Hours that the meter is made "ON". i.e. Powered up from the date of installation or date of dispatch.

For Testing purpose.

- 1 Meter's constant. i.e. No of Pulses per KWh/MWh/Whr OR No of Units per Pulses
2. High Resolution Energy register - KWH. Export & Import
3. High Resolution Energy register KVARH Export(lag)
4. High Resolution Energy register KVARH import(lag)

V) Electric VA Burdens of various circuits

The bidder should indicate VA burdens of various circuits of meter, precisely measured and certified at declared/prescribed values of potentials and currents to enable appropriate evaluation of product:

- a) Pressure circuit

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- i) VA Burden per phase. ii) VA burden for all three phases.
- b) Current Circuit
 - i) VA burden per phase. ii) VA burden for all three phases.
- c) Auxiliary power supply
 - i) VA burden to operate auxiliaries of meter.

VI) Data Protection:

The meter supplier shall be responsible for maintaining the security of data extracted from the meters using manufacturer specific algorithms in the software upto down loading to Base Computer Station.

VII) Type Tests:

The following tests as prescribed under CBIP Tech Report No:111 shall be carried out from NABL accredited laboratory. The bidder has to submit type test reports as stated hereunder for the offered item along with the technical bid. The type test reports from NABL approved laboratory shall not be older than **Five years**. Type Test shall be valid as on the last date of submission of bid.

Sr No	Name of Test	Clause No as per CBIP Tech Report No:111
1	Free Fall Test	5.1.1
2	Shock Test	5.1.2
3	Vibration Test	5.1.3
4	Tests of protection against penetration of dust and water	5.2.1
5	Dry Heat Test	5.2.2
6	Cold Test	5.2.3
7	Damp Heat Cyclic Test	5.2.4
	Test for Electromagnetic Compatibility (EMC)	
8	Test of Immunity to Electrostatic Discharge	5.3.1
9	Test of Immunity to Electromagnetic HF Fields	5.3.2
10	Radio Interference Measurement	5.3.3

In case of non-submission/partial submission or type test reports of which validity is over, bidder shall submit pending type test report/s from NABL accredited laboratory, in the event of an order, before commencement of supply without affecting delivery schedule, free of cost to GETCO. Confirmation for above shall be invariably submitted along with technical bid.

(VIII) Types of Optical Ports:

Since different meter manufacturers use different type of optical port and the standardization of the optical port is not so far made by any Govt Body, the scope is left to discretion of supplier subject to compliance to all above requirements.

Note:- However in NO case the MRI shall be capable of Resetting the Nos. of Tamper events and Duration once recorded by the meter.

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DETAILED SPECIFICATIONS FOR HT TEST TERMINAL BLOCK

3 Phase 4 wire Test Terminal block suitable for 3 phase 4 wire 50 Hz supply with neutral point at maximum 440v and up to minimum 15 Amp. class of power supply and insulated for 1100v as per relevant Indian standard manufactured from high grade resin content Bakelite material along with 2 mm thick MS sheet cover minimum 25mm overhung on both entry and exit having minimum 3 mm hole for sealing on diagonally placed 6 mm dia bolts suitable for connecting 2.5 or 4 mm² cu. three current transformers and maximum 440 volt line potential in 3 phase 4 wire system along with neutral terminals having back side terminal connection type. The TTBs shall be of Gyro / IMP / DIP / RIKEN make Test terminal block having following quality.

1. All terminators shall be heavy duty to sustain against fault current up to 20xlc amps. and manufactured either from brass or from copper metals.
2. Potential links shall be manufactured from minimum 16 gauge brass sheet and fixing screws must be minimum 6 mm diameter to secure proper contact.
3. Current shorting screws shall be minimum 8 mm dia with proper threading to ensure proper contact. Minimum clearance of 5 mm between adjoining screw heads of each current guide terminator shall be maintained.
4. All brass screws terminators (guides) and brass links shall be nickel plated to ensure corrosion resistance.
5. Superior quality of bakelite powder in heavy duty electrical insulation grade shall be used in molding the bakelite blocks.

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MINIMUM GUARANTEED PERFORMANCE REQUIREMENT (TO BE FILLED BY BIDDER)

Sr. No.	DESCRIPTION	STANDARD OF GETCO	OFFERED BY SUPPLIER(Please confirm whether you are agreed with column no 3 (Yes/No))
1	2	3	4
A	GENERAL		
1	Static Three Vector Energy Meter for installation at sub-station panels.		
(a)	Accuracy Class	0.5S	
(b)	Meter System Three Phase Four Wire System <i>N.B. Meter should work satisfactorily with combined CTPT unit having 3 Nos PTs/Three phase PTs with neutral grounded or floated and 2 Nos.or 3 Nos of CTs.</i> For reference it is requested to submit circuit diagram as per Cl:15(c) & 15(d) of specification & Cl.No:8.2 of IS-13010		
2	Standard Applicable	As per Clause No. 2 (page no 1) of Specification	
3	Supply System		
(a)	Primary Voltage	11 KV to 400 KV	
(b)	Secondary Voltage (between phase to neutral/star)	110 / $\sqrt{3}$ 3 Volts	
(c)	Primary Current	Up to 2000 Amps.	
(d)	Secondary Current	5 Amps & 1 Amp.	
(e)	Loading of CTS	No load to 150 % of declared rated load at all power factor.	
4	System Variation		
(a)	Voltage	110/ $\sqrt{3}$ Volts +10 % to --30 %	
(b)	Frequency	50 HZ. +5 % to --5 %	
(c)	Temperature		
	(I) Ambient	0° Cen. to 45° Cen.	
	(II) Average Temp	27° Cen. '+' or --10 ° Cen	
	(III) Reference	27° Cen.	
5	Sampling Rate and Derivation of basic measurable Electrical quantities (Corresponding Test Certificate should be attached with offer).The bidder	Minimum 3000 samples Per Second Even when highest order of harmonics is present in	

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	should indicate minimum two name of the third party's national / international laboratory where this test can be authentically conducted and certified if required by Board.	supply wave(detailed as per CL. No. 5)	
6	Quantity to be Measured, Monitored And Memorized (detailed as per CI No 6)		
	N.B. The meter shall capable of measuring , monitoring and sorting in the memory minimum Four(4) zones as follow. (I) Morning Peak (7 to 11 Hrs) PLUS Evening Peak (18 to 22 Hrs) (I) Night Period (22 Hrs to 6 Hrs next morning) (II) Rest Hours (6 to 7 and 11 to 18 Hrs)		
(a)	Recording of Active Energy	Absolute Total (Fundamental +Harmonics) active energy Kwh/Mwh export to consumer considering actual voltage and current wave persisting in supply. (I) For last billing period (II) For current billing period.	
(b)	Recording of Reactive Energy	(I)Absolute KVARH/MVARH lagging with respect to export of active energy considering actual voltage and current wave persisting in supply. (I) For last billing period. (II)For current billing period.	
(c)	Computed Apparent Energy	Absolute KVAH/MVAH derived vectorially from Total (Fundamental + Harmonics) export of active and lagging reactive energy. (I) For last billing period. (II) For current billing period.	
(d)	Highest Apparent Maximum Demand	KVA/MVA derived vectorially from lagging reactive and Total (Fundamental + Harmonics) active export energy (I)	

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		For last billing period. (of relevant integration period) (II) For current billing period(of relevant integration period)	
(e)	Active Export Energy for each zone of TOD facility	(I) KWH/ MWH for last billing Period. (ii) KWH/MWH for current billing period	
(f)	Harmonic Measurement	KWH/MWH active energy at 50 HZ. Pure Sine wave traversed (I) During last billing period) (II) During current billing period KWH/MWH active energy at <u>50 Hz + Harmonics</u> Actual voltage and current wave traversed (I) During last billing period (II) During current billing period	
(g)	Line & Phase Voltages	Vrn, Vyn and Vbn at the time of retrieving readings as snap shot with (I) Indication of missing (II) partial potentials (reflected due to missing of primary potential) i.e difference more than 30 % between phase to phase(line) or zero potential of any phase to ground Potential with date, time and duration stamped. I.e. detailed as specified under Cl.No:17(b) of Technical Specification above.	
(h)	Line Currents	(I) Ir, Iy and Ib at the time of retrieving readings as snap shot with (I) Indication of missing (III) Bye passing or difference in currents more than 20 % between phases and (IV) Reversals with respect to active energy	

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		flow with date, time and duration stamped. I.e. detailed as specified under Cl.No:17(c) of Technical Specification above.	
(i)	Power Factor	(I) Average power factor derived from division of export active energy traversed to apparent energy (derived from export active energy and lagging reactive with respect to export active energy) traversed in last billing period. Average power factor derived from division of export active energy traversed to apparent energy (derived from export active energy and lagging reactive with respect to export active energy) traversed in current billing period.	
(j)	Temperature Sensing	Highest temperature attained by critical parts of meter in Degree Cen. Highest temp. is up to 70 degree Cen. I.e. detailed as specified under Cl.No:17(d) of Technical Specification above.	
(k)	Memory of Meter	Meters Memory should be capable to store / Memorize of all quantities listed from (a) to (i) permanently (for at least 5/10 years of time) (Please refer last para of Cl.No. 6)	
7	DISPLAY(Please refer Cl.No: 7 of Specification)	All listed under Cl.No. 7 are required with given mode.	
8	TAMPER AND FRAUD PROTECTION / INFORMATION:		
(a)	Potential Phase sequence rotation.	Meter Should measure / monitor and store all	

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		variable electrical quantities irrespective of rotation of potential phase sequence (i.e. either clockwise or anticlockwise) accurately within the specified limits of errors.	
(b)	POTENTIAL/ LINE VOLTAGES	Indication of missing and partial potential (reflected due to missing of primary potentials) i.e. difference more than 30 % between phase to phase (line) or zero potential between phase to ground. with date, time and duration stamped specifying appropriate phase affected. I.e. detailed as specified under Cl.No:17(b) of Technical Specification above.	
(c)	Line Currents	Indication of missing by passing i.e. difference more than 20 % in magnitude between relevant of current with respect to export of active energy with date, time and duration stamped specifying appropriate phase affected. I.e. detailed as specified under Cl.No:17(c) of Technical Specification above.	
(d)	Indication for wrong phase association	Meter should indicate wrong connection if made to respective phase pressure coils (i.e. perfect current and potential phase association should be achieved.	
(e)	Temperature Sensing	Highest temperature attained by critical parts of meter in Degree Cen. Highest temp. is up to 70 degree Cen. I.e. detailed as specified under Cl.No:17(d) of Technical Specification above.	

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9	Electrical VA burden of various circuits (To be specified by the bidder)		
(a)	Pressure circuit	(I) VA burden per pressure circuit (II) VA burden for all pressure circuit	
(b)	Current circuit	(I) VA burden per each current circuit (II) VA burden for all current circuit	
(c)	Auxiliary circuit	VA burden to operate auxiliary circuit of the meter	
(d)	Expected life of meter in years		
10	Bidders to certify that product offered is in conformity to technical specification of this Tender? (Yes or No?) If deviations expected, please declare with brief write up against any of the clause of specification in the Performa of deviation attached.		
11	Are you agreed with Quality Assurance Plan attached with this specification? If no, please attach separate sheet showing all deviation/reservation with brief write up.		
12	Are you agreed to carry out routine, acceptance and type tests as per relevant standards/ attached Annexure 1 (List of tests)?(Yes or No) please recommend the name of minimum two third party national and international laboratory where tests/ conformity of QAP can be certified.		

Note: Samples undertaken for testing in accordance to relevant IEC 687 observed non conformity will result in rejection of entire lot offered. Similarly, in case sample from subsequent lot also if found to non-conforming any of the test, supply order placed/ proposed to be placed shall stand cancelled.

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QUALITY ASSURANCE PLAN

1.0 TECHNICAL EVALUATION

The guaranteed technical particulars will be compared with those given in the specifications and evaluated comparatively with all relevant test certificates enumerated as under and in case of non-submission of any Type Test certificate and/or non-submission of any certificate required and stipulated as (a), (b), (c), and (d) here under, the offer may be liable to be disqualified without any further correspondence.

Bidder should agree with condition relating to providing after sales services and terms of payment as given in Annexure II. Non acceptance of this condition given in **Annexure II** will be resulted in rejection of the tender without any further correspondence.

The following documents must invariably be submitted along with the offer.

- (a) All Type tests certificates for the tests conducted on Three phase, Four Wire, 1Amp/5Amp, Class - 0.5S **static meters** as enumerated in **Annexure I**, shall be carried out from NABL accredited laboratory in accordance with latest / amended / up to date IS/IEC. The bidder has to submit the all type test reports for the offered item along with the technical bid. The type test reports from NABL approved laboratory shall not be older than **Five years**. Type Test shall be valid as on the last date of submission of bid.
- (b) Inspection / Test Certificate from independent laboratories or from the principal supplier regarding compliance of the following materials used in the meter. Each electronic component including the microprocessor chips, Sine and Cosine measuring element chip should be tested at 90 degree aging cycle test as per relevant standard.
- (c) Quality plan for all important items /processes at the incoming, manufacturing and final stage of the manufacturing in the format given in Annexure III shall be submitted.
- (d) Test Certificate of any Govt. Test House or Govt. approved Test House regarding the confirmation of the sampling rate as per Cl. No: 5 of GTP.

On the basis of scrutiny of above submissions, the offer will be evaluated technically and recommended for placement of purchase order.

2.0 EVALUATION OF SAMPLES

From the qualified bidder and technically acceptable offer as per technical evaluation (Cl.No.1 above), Company reserves rights, **if required**, to collect the sample of meters and carry out testing of samples as follow before commencement of regular ordered quantity.

NOTE: Therefore, on receipt of purchase order, bulk supply shall be commenced only after receipt of Board's written instruction for supply.

I) Samples will be randomly drawn by Inspection Engineer deputed by GETCO, from

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your works. The samples shall have to be kept ready as finished goods at the time of selection. However, the Board shall decide and inform the Nos. and Rating of the meters to be manufactured and to be offered for inspection.

- II) Normally it is preferred to draw 3 no's of samples. The tests to be carried out on these samples are listed in Annexure I, however the Board reserves all rights about selection of tests and the place (Govt or Third Party Test House) for various suppliers, where the tests would be conducted. If the testing facility at manufacturer's works is found satisfactory and complying to National standard, the required tests may be carried out at their respective works also. In event of failing in any of the tests either at Govt or Third Party Test House or at supplier's works, the Supply Order may be liable to be cancelled without any Notice or correspondence.
- III) The supplier shall have to certify that the samples were drawn from finished goods Stores only and after completion of all operation / tests etc.
- IV) The samples should comply with the STANDARD APPLICABLE as per tender Specification (clause no 2). Manufacturers shall inform in writing about the deviations if any from the GETCO's specifications before the inspection visit of Inspecting Officer.
- V) If the meters are required to be tested for selected/all Type tests among Annex-I, at other Govt. or Third Party Test House, the samples shall be packed carefully by the supplier. The packed meters will be sealed and signed by the supplier and the Inspection Engineer jointly. OR otherwise required tests would be conducted at their works in the presence of Inspecting Officer. If the tests are directed to be conducted at specified Govt. or Third Party Test House, the GETCO may or may not depute Witnessing Officer, and in event of not deputing witnessing officer, the Test House shall have to certify that the seals affixed/pasted on the meter at the works at the time of packing the meter are found intact and untampered at the time of receipt of samples by the Test House.
- VI) These packed samples shall be sent by the supplier directly to the testing lab as Specified by GETCO, with due care to be taken in packing and transporting, and the bidder must interact for all activity relating to testing of meter with the laboratory selected by Company. Any damage to the meter in transportation or failing the meter in any tests due to mishandling in transportation shall be accounted to the supplier and NO claim or representation afterwards will be entertained. Also in event of failing in any of the tests either at Govt or Third Party Test House or at supplier's works, the Supply Order may be liable to be cancelled without any Notice or correspondence.
- VII) All expenses for transporting and testing (i.e. testing fees etc.) of the meters at Govt. Or Third Party Test House as decided by the Company, shall have to be borne fully by the supplier.
- VIII) Daily and Travelling expenses for the Inspection Personal shall be borne by GETCO.
- IX) The samples after conducting necessary tests as directed by Board at Govt or Third Party Test House, shall have to be collected by the supplier at their cost and risk. However, these samples shall be paper sealed and kept as reference at their respective works, so that the same can be verified at the time of inspection visit of Board's Officer if required.

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3. CHOICES OF SUPPLIERS

The choice of supplier for final commencement of the ordered quantity shall be either as per Cl.No:1 above or as per Cl.No:2 (i.e. successful testing of the sample meters at Govt. Test House or Third Party Test House) whichever the case may be and the quoted price.

4. AFTER PLACEMENT OF THE ORDERS

1. After receipt of inspection call for supply of ordered quantity from the supplier, GETCO would depute Inspection Engineer to the supplier's works for witnessing of testing and inspection at the earliest. The supplier shall have to offer inspection of all Accessories also together with meters.
2. The supplier must have to ensure that all the relevant testing equipment/ instruments have valid calibration as on the date of testing/ visit of Engineer.
3. The samples will be tested once again for all tests or selected tests as mentioned in Annexure I either at supplier's works or at other Test house as desired by the Board.

The Company further reserves all rights about selection of tests and the place (i.e. Govt. or Third party Test House) where the tests are required to be conducted. The Results may be compared with the results of the samples tested at the Govt. or Third Party Test House as described under (2) above.

5 OTHER POINTS OF THE TENDER DOCUMENT.

- 1 Bidder should agree with condition relating to providing after sales services as given in Annexure II. Non acceptance of any condition laid under Annexure II will be resulted in rejection of the tender without any further correspondence.
- 2 The following documents shall be invariably supplied with the offer.
 - (a) All Type tests certificates for the tests conducted on Three phase, Four Wire, 1Amp/5Amp, Class - 0.5S **static meters** as enumerated in **Annexure –I** must be carried out at NABL accredited laboratory in accordance with latest / amended / up to date IS/IEC. The bidder has to submit the all type test reports for the offered item along with the technical bid. The type test reports from NABL approved laboratory shall not be older than **Five years**. Type Test shall be valid as on the last date of submission of bid.
 - (b) Inspection / Test Certificate from independent laboratories or from the principal supplier regarding compliance of the following materials used in the meter. Each electronic component including the microprocessor chips, Sine and Cosine measuring element chip should be tested at 90 degree aging cycle test as per relevant standard.
 - (c) Quality plan for all important items /processes at the incoming, manufacturing and final stage in the format given in Annexure III
 - (d) Test Certificate of any Govt. Test House or Govt approved Third Party Test House regarding the confirmation of the sampling rate as per Cl. No: 5 of GTP

Specification of Static Meters & GTP for DAS

ANNEXURE - 1

LIST OF TESTS TO BE CARRIED OUT ON THE STATIC THREE VECTOR ENERGY METERS OF 0.5S ACCURACY CLASS.

No.	TESTS	Sub Clause of CEI IEC- 687 Second Edition 1992-06	Sub Clause of IS- 14697 (latest version)
1	TESTS OF INSULATION PROPERTIES	5.4.6	12.7.6
1.1	Impulse voltage test	5.4.6.2	12.7.6.2
1.2	AC voltage test	5.4.6.3	12.7.6.3
1.3	Insulation Resistance Test	5.4.6.4	12.7.6.4
2	TESTS OF ACCURACY REQUIREMENTS	5.6	12.9
2.1	Test on Limits of Error	5.6.8	11.1
2.2	Interpretation of test results	---	12.15
2.3	Test of Meter constant	5.6.6	12.14
2.4	Test of starting condition	5.6.5	12.13
2.5	Test of No Load condition	5.6.4	12.12
2.6	Repeatability of Error test	5.6.9	12.16
2.7	Test of Ambient temperature influence	5.6.3	12.11
2.8	Test of Influence quantities	5.6.2	12.10
3	TESTS OF ELECTRICAL REQUIREMENT	5.4	12.7
3.1	Test of power consumption	5.4.1	12.7.1
3.2	Test of influence of supply voltage	5.4.2	12.7.2
3.3	Test of influence of short time over currents	5.4.3	12.7.3
3.4	Test of influence of self-heating	5.4.4	12.7.4
3.5	Test of influence of heating	5.4.5	12.7.5
4	TESTS FOR ELECTROMAGNETIC COMPATIBILITY (EMC)	5.5	12.8
4.1	Radio interference measurement	5.5.5	12.8.5
4.2	Fast transient burst test	5.5.4	12.8.4
4.3	Test of immunity to electrostatic discharges	5.5.2	12.8.2
4.4	Test of immunity to electromagnetic HF- fields	5.5.3	12.8.3
5	Tests of climatic influences	5.3	12.6
5.1	Dry heat test	5.3.1	12.6.1
5.2	Cold test	5.3.2	12.6.2
5.3	Damp heat, cyclic test	5.3.3	12.6.3

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6	TESTS OF MECHANICAL REQUIREMENTS	5.2	12.3
6.1	Vibration Test	5.2.3	12.3.2
6.2	Shock tests	5.2.2	12.3.1
6.3	Spring Hammer Test	5.2.1	12.3.3
6.4	Test of Protection against penetration of dust and water	5.2.5	12.5
6.5	Test of resistance to heat and fire	5.2.4	12.4

ANNEXURE II

CONDITIONS RELATING TO PROVIDING AFTER SALES SERVICES

- (I) The supplier shall furnish the guarantee for the satisfactory performance of the meters for a period of five years from the date of installation and any failure in performance or deviation from the specified accuracy shall have to be compensated free of cost either by repair or by replacement within a period of 10 days from the date of communication.
- II) The supplier shall maintain sufficient stock of meters as reserves for immediate replacement.
- III) The supplier shall make its own arrangement to attend the faulty meter's complaints and set them right and replace the faulty meters by the correct ones.

Specification of Static Meters & GTP for DAS

ANNEXURE III

Supplier's Name:

Tender No. :

Reference No. of Energy Meter:

Stage: Incoming/ Manufacturing Process / Final Inspection

Sr. No	Material component or process	Parameters/ Properties checked	Method of check (Visual, dimensional or Test equip)	As per Spec. (IS, IEC, ASST., ICE, GETCO'S etc)	No. of sample Checked per lot. (100%, 5% etc.)	Record Format	Checked by (Own insp/, Indep. lab, etc.

N.B. Supplier should invariably submit this Quality Plan along with offer. In absence of this Annexure, the offer will liable to be rejected.