



SUPPLY CHAIN MANAGEMENT THIRUVANANTHAPURAM

SPECIFICATION

CT operated Trivector Energy meter (DTR Meter)

APPLICABLE TO KSEBL

DOC. NO.: **SCM-SPEC/XD/EM**

EFF. DATE: **20-12-2021**

Number of Pages: 24

Technical Committee

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2. Deputy Chief Engineer -SCM
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TECHNICAL SPECIFICATION

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Rev.#: 0

Effective Date: 20-12-2021

(i) Document Approval & Control Status

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Date	20.12.2021	20.12.2021	20.12.2021
Signature	Sd/-	Sd/-	Sd/-

(ii) Amendments and History

Sec. #	Rev. #	Date	History of Change



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1. PURPOSE

Purpose of this document is to document updates & history, upkeep and publish the specifications related to **CT operated Trivector Energy Meter (DTR Meter)** in a professional manner

2. SCOPE

The Scope of this document is to inform and alert all relevant stakeholders including KSEBL. Public, KSERC etc regarding the current specifications and historical changes adopted in specifications of single phase energy meters used in field by KSEBL

3. RESPONSIBILITY

Executive Engineer(M), Office of Chief Engineer, Supply Chain Management shall compile and take necessary steps to publish the specification in KSEBL website and shall inform relevant stakeholders regarding updates and revisions

4. PROCEDURE FOR REVISION

Modifications if any, in the technical Specification will be incorporated as **Revisions** . Any changes in values, minor corrections in pages, incorporation of small details etc. will be considered as Minor Modification. **The Revisions due to minor modifications will be assigned as Rev No. 0.1, 0.2 etc .**

A complete updation of the technical specification will be considered as Major modification. **The Revisions due to major modifications will be assigned as Rev No. 1.0, 2.0 etc .**

All the details regarding the revisions (both minor and major) will be incorporated in “(ii)-Amendments and history ” above.

The concerned officers, in consultation with the Technical Committee will review and suggest changes required and the revision suggestion will be approved by Chief Engineer- SCM. Those who notice any discrepancy or have any suggestion regarding revision , may bring the matter to the attention of Chief Engineer -SCM in writing or through e-mail id: cescm@kseb.in



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TECHNICAL SPECIFICATION FOR 3 PHASE,4 WIRE CT OPERATED FULLY STATIC AMR COMPATIBLE TRIVECTOR ENERGY METERS FOR DISTRIBUTION TRANSFORMERS

1.0. **Scope:-** Design, manufacturing, testing, supply and delivery of AC, 3 Phase, 4 Wire, -/5A CT operated DLMS compliant and AMR compatible, Category A, fully Static Tri-Vector Energy Meters (DTR meters) of class 0.5s accuracy for measurement of different electrical parameters listed elsewhere in this order including Active Energy (KWH), Reactive Energy (KVARH), Apparent Energy (KVAH) etc. The detailed scope is given below.

1.1 **Application:-** On Distribution Transformers.

2.0 **Service Conditions (Climatic conditions):-** The design and manufacture of meters shall take into account extreme tropical conditions such as high temperature, excessive humidity, dust and salt laden corrosive atmosphere.

Maximum Annual Rainfall (mm)	-	5000
Average Annual Rainfall (mm)	-	3200
Specified operation range	-	0°C to (+) 55°C
Limit of range of operation	-	(-) 10°C to (+) 60°C
Limit of range for storage and Transport	-	(-)10°C to (+) 70°C
Relative humidity	-	< 99%
Average No. Of thunderstorm days/ Annum	-	50

3.0. **Standards Applicable:-** The meters shall meet all the requirements specified in the standard specification. (1)IS:14697 /1999 (reaffirmed 2004) Specification for AC Static Transformer operated Watt Hour & VAR-Hour meters (class 0.5S); (2)IS-15707 Specification for Testing, evaluation, installation & maintenance of AC Electricity Meters-Code of Practice. (3)IEC.62056 protocol and the Communication Protocol shall be as per draft guidelines on "Data Exchange for Electricity Meter Reading, Tariff and Load Control (IS 15959).

The equipment meeting with the requirements of other authoritative standards, which ensure equal or better quality than the standard mentioned above, also shall be considered; in case of conflict related with communication protocol, the Guidelines on "Data Exchange for Electricity Meter Reading, Tariff and Load Control - Companion Specification" (IS 15959). For conflict related with other parts of the specification, the order of priority shall be - i) This technical specification ii) IS: 14697 /1999 (reaffirmed 2004).

4.0. **Technical Requirements & Design Criterion:-** The Meters are required for DTR metering. The basic system parameters wherein these meters will be as under.

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1)	Type	DLMS compliant, AMR Compatible Static, 3 Ph, 4 Wire Tri-Vector Energy Meter For Distribution Transformers.
2)	Frequency	50 Hz \pm 5%
3)	Accuracy Class	0.5S
4)	Secondary Voltage	Suitable for operation from 415V Ph-Ph or 240V Ph-N
5)	Basic Current (Ib)	5 Amps.
6)	Voltage Variation	+20% to -30%
7)	Maximum Continuous Current	200% of Ib; Starting and Short time current shall be as per IS-14697
8)	Power Consumption	<ol style="list-style-type: none"> 1. The active and apparent power consumption, in each voltage circuit, at reference voltage, reference temperature and reference frequency shall not exceed 1.5 W and 4VA per phase. 2. The apparent power taken by each current circuit, at basic current, reference frequency and reference temperature shall not exceed 1.0 VA
9)	Power Factor	0.0 Lag - Unity - 0.0 Lead
10)	Design	Meter shall be designed with application specific integrated circuit (ASIC) or micro controller; shall have no moving part; electronic components shall be assembled on printed circuit board using surface mounting technology; factory calibration using high accuracy (0.05 class) software based test bench.

5.0. **Constructional Requirement/ Meter Cover & Sealing/ Fixing & Connection Arrangement:-**

5.1. The meter should be made of high quality raw materials to ensure higher reliability and longer life. The meter should be compact and reliable in design e.g., to transport and immune to vibration and shocks involved in transportation/ handling. The construction of the meter shall be suitable for its purpose in all respects.

The meter case shall be made of engineering plastic conforming to IS 11731(FH-1category), besides meeting the test requirement of heat deflection test as per ISO;75 and glow wire test as per the IS:11000 (Part 2/SEC-1) 1984 OR IEC PUB,60695-2-12, Ball pressure test as per IEC-60695-10-2 and Flammability Test As per UL 94 or as per IS: 11731(Part-2) 1986.



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- 5.2. Proper sealing arrangements shall be provided on the meter to make it tamper proof and avoid mishandling by unauthorized person. The meter shall be designed and constructed in such a manner to make it pilfer proof once it is sealed.

The number of seals required are given below:

Seals to be put - 1 (on the body by the manufacturer)

Loose seals - 3 (For optical port, manual reset and body).

- 5.3. The terminal block cover for the meter shall be extended transparent type, which can be sealed independently & over the meter cover. The terminal cover shall enclose the actual terminals, the conductor fixing screws and 10mm of external conductors and their insulation for which the terminal cover shall be of extended type. The terminal cover shall be transparent and non-detachable. The terminal cover shall fully cover the terminal block.

The terminal block shall satisfy all the conditions such as clearance and Creepage distance between terminals and surrounding part of meter as specified in relevant ISS.

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

- 5.4. The terminals shall be grouped in a terminal block having adequate insulating properties and mechanical strength. The connection diagram of the meter shall be clearly shown on inside portion of terminal cover and shall be of permanent nature. Meter terminals shall also be marked and this marking should appear in the above diagram.

- 5.5. Fixing & Connection Arrangement:- Manufacturer shall ensure following technical points:

Meter shall be suitable for mounting on simplex type vertical panel with front door.

Energy Meter terminals block shall be adequately sized with regard to maximum conductor dimension, commensurate with current rating of Energy Meter.

- 6.0. **Working Environment:-** As per IS 14697-1999 (reaffirmed 2004). Meter to perform satisfactorily under Non-Air Conditioned environment (within stipulations of IS)

Meter body will conform to IP51 degree of protection.

The meter shall be suitably designed for satisfactory operation under the hot and hazardous tropical climate conditions and shall be dust and vermin proof. All the parts and surface, which are subject to corrosion, shall either be made of such material or shall be provided with such protective finish, which provides suitable protection to them from any injurious effect of excessive humidity.



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7.0. Manufacturing Process, Assembly And Testing:- Meters shall be manufactured using latest and 'state of the art' technology and methods prevalent in electronics industry. The meter shall be made from high accuracy and reliable surface mount technology (SMT) components. All inward flow of major components and sub assembly parts (CT, PT, RTCs/Crystal, LCDs, LEDs, power circuit electronic components etc.) shall have batch and source identification. Multilayer 'PCB' assembly with 'PTH' (Plated through Hole) using surface mounted component shall have adequate track clearance for power circuits. SMT component shall be assembled using automatic 'pick-and-place' machines, Reflow Soldering oven, for stabilized setting of the components on 'PCB'. For soldered PCBs, cleaning and washing of cards, after wave soldering process is to be carried out as a standard practice. Assembly line of the manufacturing system shall have provision for testing of sub-assembled cards. Manual placing of components and soldering, to be minimized to items, which cannot be handled by automatic machine. Handling of 'PCB' with ICs/ C-MOS components, to be restricted to bare minimum and precautions to prevent 'ESD' failure to be provided. Complete assembled and soldered PCB should undergo functional testing using computerized Automatic Test Equipment.

Fully assembled and finished meter shall undergo 'burn-in' test process for 12 hrs at 55 degree Celsius (Max. temperature not to exceed 60 degree Celsius) under base current (Ib) load condition.

Test points should be provided to check the performance of each block/ stage of the meter circuitry. RTC shall be synchronized with NPL time at the time of manufacture. Meters testing at intermediate and final stage shall be carried out with testing instruments, duly calibrated with reference standard, with traceability of source and date.

8.0. Displays:- The meter shall have 7 digits (**with '-' indication when applicable**), parameter identifier, backlit Liquid Crystal Display (LCD) of minimum 10 mm height, wide viewing angle. Auto display cycling push button required with persistence time of 10 Seconds. LCD shall be suitable for temperature withstand of 70° C.

The data stored in the meters shall not be lost in the event of power failure. The meter shall have Non Volatile Memory (NVM), which does not need any battery backup. The NVM shall have a minimum retention period of 10 years.

9.0. Performance Under Influence Quantities:- The meters performance under influence quantities shall be governed by IS 14697-1999 (reaffirmed 2004). The accuracy of meter shall not exceed the permissible limits of accuracy as per standard IS: 14697 (latest version) and CBIP technical report No. **325** with its latest amendment.

Output Device:- Energy Meter shall have test output, accessible from the front, and be capable of being monitored with suitable testing equipment while in operation at site. The operation indicator must be visible from the front and test output device shall be provided in the form of LED. Resolution of the test output device shall be sufficient to enable the starting current test in less than 10 minutes.



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10.0. Real Time Internal Clock (RTC):- RTC shall be pre-programmed for 30 Years Day/date without any necessity for correction. The maximum drift shall not exceed +/- 300 Seconds per year.

The clock day/date setting and synchronization shall only be possible through password/ Key code command from one of the following:

8. Hand Held Unit (HHU) or Meter testing work bench and this shall need password enabling for meter;
9. From remote server through suitable communication network or Sub-station data logger 'PC'.

11.0. Quantities To Be Measured & Displayed:- The meter shall be capable of measuring and displaying the following electrical quantities within specified accuracy limits for polyphase balanced or unbalanced loads as per **IS 15959** document :

1. Instantaneous Parameters such as phase and line voltages, currents, power factors, overall kVA, kW, kVA_r, power factor, frequency etc as per details given in the table below.
2. As per the table A2.2. The block load profile parameters may be provided for 62 days.
3. Daily load profile parameters may be provided **as per IS 15959 document.**

In addition to above the meter shall also record the Name plate details, programmable parameters (readable as profile), occurrence and restoration of tamper events along with the parameters.

12.0 Detail of category wise **parameters requirement** suitable for Distribution Transformer Meter should be **as per IS 15959 document** :

Category	Parameter group	Annexure Table No.
Distribution Transformer Meter	Instantaneous parameters	A2.1
	Block Load Profile parameters	A2.2
	Name Plate details	A5.1
	Programmable Parameters	A5.2
	Event Conditions	A6.1 to A6.7
Logging parameters for each of the event condition - shall be selected	Capture parameters for event as applicable (Event Log Profile)	A6.8

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Table – A2.1 – Instantaneous Parameters:-

Sl. No.	Parameter	OBIS CODE A.B.C.D.E.F	Interface Class No./ Attribute
1)	Real Time Clock - Date and Time	0.0.1.0.0.255	8/2
2)	Current -IR	1.0.31.7.0.255	3/2
3)	Current -IY	1.0.51.7.0.255	3/2
4)	Current -IB	1.0.71.7.0.255	3/2
5)	Voltage - VRN	1.0.32.7.0.255	3/2
6)	Voltage - VYN	1.0.52.7.0.255	3/2
7)	Voltage - VBN	1.0.72.7.0.255	3/2
8)	Signed Power Factor- R Phase	1.0.33.7.0.255	3/2
9)	Signed Power Factor- Y Phase	1.0.53.7.0.255	3/2
10)	Signed Power Factor- B Phase	1.0.73.7.0.255	3/2
11)	Three Phase Power Factor- PF	1.0.13.7.0.255	3/2
12)	Frequency	1.0.14.7.0.255	3/2
13)	Apparent Power – kVA	1.0.9.7.0.255	3/2
14)	Signed Active Power –kW (+Forward; - Reverse)	1.0.1.7.0.255	3/2
15)	Signed Reactive Power – kVAr (+Lag; - Lead)	1.0.3.7.0.255	3/2
16)	Cumulative Energy -kWh	1.0.1.8.0.255	3/2
17)	Cumulative Energy -kVArh – Lag	1.0.5.8.0.255	3/2
18)	Cumulative Energy -kVArh – Lead	1.0.8.8.0.255	3/2
19)	Cumulative Energy -kVAh	1.0.9.8.0.255	3/2
20)	Cumulative power-off duration	0.0.96.7.15.255	1/2
21)	Cumulative tamper count	0.0.94.91.0.255	1/2
22)	Cumulative MD resets count	0.0.0.1.0.255	1/2
23)	Cumulative programming count	0.0.96.2.0.255	1/2
24)	Date and time of last MD reset	0.0.0.1.2.255	8/2
25)	Maximum Demand- kW	1.0.1.6.0.255	4/2, 5
26)	Maximum Demand- kVA	1.0.9.6.0.255	4/2, 5

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Table – A2.2 – Block Load Profile Parameters:-

Sl. No.	Parameter	OBIS CODE A.B.C.D.E.F	Interface Class No./ Attribute
1)	Real Time Clock - Date and Time	0.0.1.0.0.255	8/2
2)	Current -IR	1.0.31.27.0.255	3/2
3)	Current -IY	1.0.51.27.0.255	3/2
4)	Current -IB	1.0.71.27.0.255	3/2
5)	Voltage - VRN	1.0.32.27.0.255	3/2
6)	Voltage - VYN	1.0.52.27.0.255	3/2
7)	Voltage - VBN	1.0.72.27.0.255	3/2
8)	Block Energy –kWh	1.0.1.29.0.255	3/2
9)	Block Energy – kVARh - lag	1.0.5.29.0.255	3/2
10)	Block Energy – kVARh - lead	1.0.8.29.0.255	3/2
11)	Block Energy –kVAh	1.0.9.29.0.255	3/2

Table - A5.1 - Name Plate Details:- Downloadable parameters shall be in line with IS 15959

Sl. No.	Parameter	OBIS CODE A.B.C.D.E.F	Interface Class
1)	Meter Serial Number	0.0.96.1.0.255	1 (Data)
2)	Manufacturer Name& trade-mark and place of manufacture.	0.0.96.1.1.255	1
3)	Firmware Version for meter	0.0.96.1.2.255	1
4)	Firmware Version for communications	0.0.96.1.3.255	1
5)	Internal CT ratio	1.0.0.4.2.255	1
6)	Meter month & year of manufacture	0.0.96.1.4.255	1
7)	Meter Constant (pulse rate of testing signal)		
8)	Designation and Type of Meter		
9)	No. of phase and wires		
10)	Voltage Rating		



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11)	Current Rating (Ib/ I _{max})		
12)	P.O No.		
13)	Accuracy		
14)	Property of KSEB		
15)	DLMS marking		
16)	S Marking		
17)	ISI Marking		
18)	Guarantee Period		
19)	Purchaser's name		
20)	Principal unit in which the meter records.		
21)	Reference frequency in Hz.		
22)	Reference Temperature		

Table – A5.2 – Programmable Parameters:-

Sl. No.	Parameter	OBIS CODE A.B.C.D.E.F	Interface Class
1)	Real Time Clock - Date and Time	0.0.1.0.0.255	8 (Clock)
2)	Demand Integration Period	1.0.0.8.0.255	1 (Data)
3)	Profile Capture Period	1.0.0.8.4.255	1
4)	Single-action Schedule for Billing Dates	0.0.15.0.0.255	22
5)	Activity Calendar for Time Zones etc.	0.0.13.0.0.255	20
6)	Time Zones script table	As in table 31 of IS 15959.	9

Table – A6.1 – Indian Event Reference Table – Voltage Related:-

Sl No.	Descriptions
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



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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)	Over Voltage in any Phase - Occurrence
8)	Over Voltage in any Phase - Restoration
9)	Low Voltage in any Phase - Occurrence
10)	Low Voltage in any Phase - Restoration
11)	Voltage Unbalance - Occurrence
12)	Voltage Unbalance - Restoration

Table - A6.2 - Indian Event Reference Table - Current Related:-

Sl No.	Descriptions
1)	Phase - R CT reverse - Occurrence
2)	Phase - R CT reverse - Restoration
3)	Phase - Y CT reverse - Occurrence
4)	Phase - Y CT reverse - Restoration
5)	Phase - B CT reverse - Occurrence
6)	Phase - B CT reverse - Restoration
7)	Phase - R CT Open - Occurrence
8)	Phase - R CT Open - Restoration
9)	Phase - Y CT Open - Occurrence
10)	Phase - Y CT Open - Restoration
11)	Phase - B CT Open - Occurrence
12)	Phase - B CT Open - Restoration
13)	Current Unbalance - Occurrence
14)	Current Unbalance - Restoration
15)	CT Bypass - Occurrence
16)	CT Bypass - Restoration
17)	Over Current in any Phase - Occurrence
18)	Over Current in any Phase - Restoration

Table – A6.3 – Indian Event Reference Table – Power Related:-

Sl No	Descriptions
1)	Power failure - Occurrence
2)	Power failure - Restoration

Table–A6.4–Indian Event Reference Table – Transaction Related:-

Transaction related events may be provided as per table 35 of IS 15959 (Clauses B-6.4,B- 6.5,G-1 and G-1.1).

Table - A6.5 - Indian Event Reference Table - Others:-

Sl No.	Descriptions
1)	Influence of permanent magnet or AC/DC electromagnet - Occurrence
2)	Influence of permanent magnet or AC/DC electromagnet - Restoration
3)	Neutral Disturbance - HF & DC - Occurrence
4)	Neutral Disturbance - HF & DC - Restoration
5)	Very Low PF - Occurrence
6)	Very Low PF - Restoration

Table - A6.6 - Indian Event Reference Table - Non-rollover Events:-

Sl No.	Descriptions
1)	Meter Cover Opening - Occurrence

Table - A6.8 - Capture Parameters for event as applicable (Event Log Profile):-

Sl. No.	Parameter	A	B	C	D	E	F	IC
1)	Date and Time of event	0	0	1	0	0	255	8(Clock)
2)	Event Code	0	0	96	11	0	255	1(Data)
3)	Current -IR	1	0	31	7	0	255	3(Register)
4)	Current -IY	1	0	51	7	0	255	3(Register)
5)	Current -IB	1	0	71	7	0	255	3(Register)
6)	Voltage - VRN (3 ϕ /4W)	1	0	32	7	0	255	3(Register)

7)	Voltage - VYN (3 ϕ /4W)	1	0	52	7	0	255	3(Register)
8)	Voltage - VBN (3 ϕ /4W)	1	0	72	7	0	255	3(Register)
9)	Power Factor- R Phase	1	0	33	7	0	255	3(Register)
10)	Power Factor- Y Phase	1	0	53	7	0	255	3(Register)
11)	Power Factor- B Phase	1	0	73	7	0	255	3(Register)
12)	Cumulative Energy - Wh	1	0	1	8	0	255	3(Register)

High Resolution Parameters (2+4 digits)

- 1) Forward kWh
- 2) Forward kVARh (Lag)
- 3) Forward kVARh (Lead)
- 4) Forward kVAh

13. Annexure - Display Parameters

Display Parameters

Auto Mode

1. Self Diagnostic LCD segment check
2. Meter Serial Number
3. Real Date and Time
4. Instantaneous R phase Voltage (phase to neutral voltage)
5. Instantaneous Y phase Voltage (phase to neutral voltage)
6. Instantaneous B phase Voltage (phase to neutral voltage)
7. Instantaneous R phase current
8. Instantaneous Y phase current
9. Instantaneous B phase current



SUPPLY CHAIN MANAGEMENT

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Administered by TMRs | Kannur | Shoranur | Angamaly | Pallom | Thirumala

TECHNICAL SPECIFICATION

CT operated Trivector Energy meter (DTR Meter)

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Rev.#: 0

Effective Date: **20-12-2021**

10. Phase sequence (voltage and current)
11. Frequency
12. Instantaneous Power factor
13. Instantaneous Active Power in kW
14. Cumulative Forwarded kWh
15. History 1: Cumulative Forwarded Kwh
16. History 1: Maximum demand in KVA with Date and Time
17. History 1: Billed Average power factor
18. Present status of PT related tamper
19. Present status of CT related tamper
20. Present status of other related tamper

Push Button Mode

1. Self Diagnostic LCD segment check
2. Meter Serial Number
3. Real Date and Time
4. Instantaneous R phase Voltage (phase to neutral voltage)
5. Instantaneous Y phase Voltage (phase to neutral voltage)
6. Instantaneous B phase Voltage (phase to neutral voltage)
7. Instantaneous R phase current
8. Instantaneous Y phase current
9. Instantaneous B phase current
10. Phase sequence (voltage and current)
11. Frequency
12. Instantaneous Power factor
13. Instantaneous active Power in KW



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14. Instantaneous reactive power
15. Neutral Current
16. History 1 : Average power factor
17. Cumulative Forwarded KWh
18. Cumulative Forwarded KWh Zone 1
19. Cumulative Forwarded KWh Zone 2
20. Cumulative Forwarded KWh Zone 3
21. Cumulative Apparent Energy KVAh
22. Cumulative Reactive Energy KVAh Lag
23. Cumulative Reactive Energy KVAh Lead
24. Current maximum demand in KW with date and time
25. Current maximum demand in KVA with date and time
26. Current maximum demand in KVA zone 1 with date and time
27. Current maximum demand in KVA zone 2 with date and time
28. Current maximum demand in KVA zone 3 with date and time
29. Bill Reset Count.
30. Cumulative MD in KVA
31. History 1 : Cumulative Forwarded KWh
32. History 2 : Cumulative Forwarded KWh
33. History 3 : Cumulative Forwarded KWh
34. History 4 : Cumulative Forwarded KWh
35. History 5 : Cumulative Forwarded KWh
36. History 6 : Cumulative Forwarded KWh
37. History 1 : Maximum demand in KVA with date and time
38. History 2 : Maximum demand in KVA with date and time



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39. History 3 : Maximum demand in KVA with date and time
40. History 4 : Maximum demand in KVA with date and time
41. History 5 : Maximum demand in KVA with date and time
42. History 6 : Maximum demand in KVA with date and time
43. Present status of PT related tamper
44. Present status of CT related tamper
45. Present status of other related tamper
46. First occurrence tamper ID, Date and Time
47. Last Occurrence of tamper ID, Date and Time
48. Cumulative Power OFF Duration
49. Cumulative Power ON Duration
50. Cumulative Tamper Occurrence Count

High Resolution Display

1. Cumulative Forwarded KWh
2. Cumulative Forwarded KVArh Lag
3. Cumulative Forwarded KVArh Lead
4. Cumulative Forwarded KVAh
5. Cumulative Reverse KWh
6. Cumulative Reverse KVArh Lag
7. Cumulative Reverse KVArh Lead
8. Cumulative Reverse KVAh

14.0. Demand Integration Period:- The maximum demand integration period may be set at 30 minute.

15.0. MD Reset:- It should be possible to reset MD by the following options:

1. Communication driven reset
2. Local push button
3. Auto reset at 24:00 hrs at the end of each billing cycle



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16.0. Billing Point Requirements:- The predefined date and time for registering the billing parameters of kWh, kVAh, PF and KW/ kVA MD as well as Tamper Count and Power-On hours readings shall be 00.00 hours of the first day of each calendar (billing) month. All billing parameters shall be transferred to billing registers. The required billing parameters as mentioned in clause 16 of spec shall be provided in the downloaded data. For tamper count manufacture code may be provided.

The above billing data, TOD register's data, load survey data, tamper information and instantaneous parameters data shall all be retrievable through the meter's communication port through a Hand Held Unit (HHU) and shall be transferred (downloaded) to a PC to get complete details. The necessary base computer software (BCS) shall be provided by the supplier with complete details.

Further, apart from instantaneous parameters like voltage, current, PF and readings of billing parameters, energy registers, TOD registers etc., the Billing Parameters for min. last 12 Histories & MD reset count should be made available at the BCS end.

17.0. TOD Tariff/ Demand:- The meter shall be capable of registering time of day energy consumption data on stand alone basis. The meter shall be provided with an internal time clock and timer both controlled by a quartz crystal with a battery totally independent of power supply and shall be capable of being set into a minimum of 8 time zones in a 24 hour cycle to cover morning and evening peak and off peak periods separately.

The three time zones are

Time zone 1 : 6.00hrs to 18.00hrs.

Time zone 2 : 18.00hrs to 22.00hrs.

Time zone 3 : 22.00hrs to 6.00hrs.

It should be possible to change the time period for these registers through the hand held meter reading device with special authenticated command from the BCS so that only authorized persons can make such changes. The main control for this change along with proper security password/ code should be available on the computer located at metering office. (The meter should be able to record energy consumption up to the specified time of day [as programmed] to help conducting regular energy balance study).

In every case the design shall include the provision of updating of cumulative demand register with updating of reset counter.

18.0 Base Computer Application Software:- Necessary Compatible DLMS Compliant Common Software executable on MS Windows/ Linux based operating System to obtain various details as discussed above shall be provided by the supplier. No separate cost will be borne by the purchaser on this account.



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19.0. Marking of Meters:- The marking of meters shall be in accordance with IS: 14697 / 1999 (reaffirmed 2004).

The meter shall also store nameplate details as given in the table A 5.1. These shall be readable as a profile as and when required. **Name plate profile readout shall be as per IS15959**

20.0. Communication Capability:- The meter shall be provided with two ports for communication of the measured/collected data as per guideline document enclosed in the annexure, i.e. a hardware port compatible with RS 232 specifications which shall be used for remote access through suitable Modem (GPRS/GSM/EDGE/CDMA/PSTN/LPR) and an Optical port complying with hardware specifications detailed in IEC-62056-21. This shall be used for local data downloading through a DLMS compliant HHU.

The RS 232 port shall be used at Distribution Transformer meters capable to transfer and export data to the remote end server through suitable communication mediums (GPRS/GSM/EDGE/CDMA/ PSTN/LPR). Both ports shall support the default and minimum baud rate of 9600 bps.

21.0 Hand Held Unit (HHU):- To enable local reading of meters data a DLMS compliant HHU shall be used. The HHU shall be as per specification given in the guidelines document on Data Exchange for Electricity Meter Reading, Tariff and Load control –issued by CPRI. It shall be compatible to the DLMS compliant energy meters that are to be supplied on the basis of this specification. The supply of HHU is not in the scope of this tender.

22.0 Tamper & Fraud Monitoring Features:- The meter shall work satisfactorily under presence of various influencing conditions like External Magnetic Field, Electromagnetic Field, Radio Frequency Interference, harmonic Distortion, Voltage/ Frequency Fluctuations, and electromagnetic High Frequency Fields etc. The meter shall be immune to abnormal voltage/ frequency generating devices and shall record the occurrence and restoration of such tamper events along with parameters such as current, voltages, kWh, power factor, event code, date & time etc. (listed in Table A6.1 to A6.6)

Tamper details shall be stored in internal memory for retrieval by authorized personnel through either of the following:

1. HHU.
2. Remote access through suitable communication network.

Minimum 200 numbers of events (occurrences & restoration with date & time) should be available in the meter memory.

23.0. Type Tests:-The meter to be supplied should have successfully passed all type tests described in the IS 14697 and the meter Data Transfer and Communication capability as per guidelines Specification on Data Exchange for Electricity Meter Reading, Tariff and Load control – Companion Specification issued by CPRI.

Further Purchaser reserves the right to pick up energy meters at random from the lots offered and get the meter tested CPRI / Govt. of India approved lab. The supplier has no



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right to contest the test results of the third party lab or for additional test and has to replace/take corrective action at the cost of the supplier.

It shall be the responsibility of the supplier to arrange such tests and Purchaser shall be informed of the date and time of conduction of tests well in advance to enable him to witness such tests. Test charges of the testing authority, for such successful repeat type tests, shall be reimbursed at actual by the Purchaser.

24.0. Acceptance & Routine Tests:- Criteria for selection for such tests and performance requirements shall be as per IS 14697-1999 (reaffirmed 2004)

Additional acceptance shall include Surge withstand (SWC) for 10 kV_p as per IEC 62052-11, Lightning impulse test and HF disturbance test as per IS 14697. One sample meter per order from one of the offered lot shall be subjected to these specific tests. Meters subjected to these tests shall not be used after tests.

Accuracy tests shall be performed at the beginning and at the end of the acceptance tests specified.

The communication capability of the meter through RS 232 port via modem may be ensured during acceptance test.

25.0. Quality Assurance:- The manufacturer shall have a comprehensive quality assurance program at all stages of manufacture for ensuring products giving reliable, trouble free performance.

26.0 Component Specification:-

Sl. No.	Component Function	Requirement	Makes
1)	Measurement or computing chips	The measurement or computing chips used in the Meter should be with the Surface mount type.	USA: Anolog Devices, Cyrus Logic, Atmel, Philips Dallas, ST Germany:Siemens Texas, Japan : NEC Freescale Renesas
2)	Memory chips	The memory chips should not be affected by external parameters like sparking, high voltage spikes or electrostatic discharges. Meter shall have non volatile memory (NVM). No other type of memory shall be used for data recording and programming. (The life of the NVM is highest) There shall be security isolation between metering circuit, communication circuit, and power circuit.	USA: Atmel, National Semiconductors, Texas Instruments, Philips, ST, Japan : Hitachi Germany: Siemens Renesas

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3)	Display modules	<p>a) The display modules should be well protected from the external UV radiations.</p> <p>b) The display visibility should be sufficient to read the Meter mounted at height of 0.5 to 2m from ground level (refer 3.2 d for Viewing angle). The LCD and ToD facility display should have wide viewing angle of 45 degree to 60 degree cone up to 1m distance</p> <p>c) The construction of the modules should be such that the displayed quantity should not disturbed with the life of display (PIN Type).</p> <p>d) It should be trans-reflective HTN (HTN - Hyper Twisted Nematic (120°)) or STN (STN - Super Twisted Nematic (160°)) type industrial grade with extended temperature range.</p>	<p>Japan : Hitachi, Sony, L&G, Haijing Tinma (China) TEXAS RCL, Yeboo, Truly</p>
4)	Electronic components	The active & passive components should be of the surface mount type & are to be handled & soldered by the state of art assembly processes.	<p>USA : National Semiconductors, Atmel, Philips, Texas Instruments, BC Component</p> <p>Japan : Hitachi, Oki, AVZ</p> <p>Samsung</p> <p>Japan : Panasonic</p> <p>Germany : Vishay</p> <p>NXP, Murata, AVX, ROHM, Yageo, Kernet, Onsemi, Epcos</p>
5)	Battery	Only non rechargeable battery should be used for RTC, in absence of Power since the life & Reliability of these are better than the rechargeable batteries and for display both rechargeable and non rechargeable battery may be used. The RTC battery and battery for display in the case of power failure should be separate.	<p>USA : Maxell</p> <p>Japan,Indonesia : Panasonic, Sony,</p> <p>Germany : Varta</p> <p>France : Saft</p> <p>Elegance , Vitzro, Tekcell</p> <p>Saft, Mitsubishi, Eterncell</p>

Sd/-

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GUARANTEED TECHNICAL PARTICULARS FOR LT CT OPERATED STATIC TRIVECTOR ENERGY METERS (DTR METERS) OF CLASS 0.5S ACCURACY (DLMS COMPLIANT)

SI. No	PARTICULARS	REMARKS
1)	Makers Name	
2)	Type/ Model	
3)	Standard Applicable	
4)	Class of accuracy	
5)	Electronic Display with No. of digits and decimals of display	
6)	(a) Material of Meter case	
	(b) Standard applicable IS/ IEC	
7)	PF Range	
8)	Basic current, Ib	
9)	Maximum Current I max	
10)	Starting current (minimum as % of Ib)	
11)	Manufacturing technology	
12)	Details of LED indications provided	
13)	Whether terminal cover is transparent	
14)	Power Consumption in	
	(a) Voltage circuit at rated voltage	
	(b) Current circuit at Ib.	
15)	(a) Anti-tamper features provided	
	(b) No. of tamper events that can be recorded	
16)	Display parameters provided	



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17)	Remote read-out facility provision	
a)	Communication protocol used	
b)	Sealing provision for optical port	
18)	Specify the overall dimensions of the meter	
19)	Total weight of the meter.	
20)	NV memory retention time of the meter	
21)	Details of Battery backup provided	
22)	Real Time Clock	
a)	Whether pre-programmed for 30 years	
b)	Maximum Drift per year	

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