

RAJASTHAN ELECTRICITY REGULATORY COMMISSION

NOTIFICATION

Jaipur, 26.02.2015

No. RERC/Secy/Reg. - **110** In exercise of powers conferred under Section 181 read with Sections 61, 66 and 86(1) (e) of the Electricity Act, 2003 (Act 36 of 2003) and all other provisions enabling it in this behalf, the Rajasthan Electricity Regulatory Commission hereby proposes to make the following Regulations for Net Metering and grid connectivity of grid connected Rooftop & Small Solar Photovoltaic systems.

1. Short title, extent and commencement

- (1) These regulations shall be called the Rajasthan Electricity Regulatory Commission (Connectivity and Net Metering for Rooftop and Small Solar Grid Interactive Systems) Regulations, 2015, in short, RERC Net Metering Regulations, 2015.
- (2) These Regulations shall come into force from the date of their publication in the Official Gazette.

2. Definitions and interpretations

- (1) In these Regulations, unless the context otherwise requires,
 - (a) "Act" means The Electricity Act, 2003 (36 of 2003) and subsequent amendments thereof;
 - (b) "Connection Agreement" means the agreement entered into by the Distribution Licensee and the consumer;
 - (c) "Billing cycle or billing period" means the period for which regular electricity bills as specified by the Commission, are prepared for different categories of consumers by the licensee;
 - (d) "Commission" means Rajasthan Electricity Regulatory Commission constituted under the Act;
 - (e) "Connected load" shall mean the sum of rated capacities of all the energy consuming devices on the consumer's premises, which can be operated simultaneously. For the purpose of levy of any charges and for deciding the supply voltage, the connected

load shall be determined as per method prescribed in the Rajasthan Electricity Regulatory Commission (Electricity Supply Code and Connected Matters) Regulations, 2004 and subsequent amendments thereto;

- (f) "Distribution Licensee" or "Licensee" means a person granted a license under Section 14 of the Act or deemed licensee as per Section 14 of the Act authorizing him to operate and maintain a distribution system for supplying electricity to the consumers in his area of supply;
- (g) "Electricity Supply Code" means the Electricity Supply Code specified under section 50 of the Act and subsequent amendments thereof;
- (h) "Eligible Consumer" means a consumer of electricity in the area of supply of the distribution licensee, who uses or proposes to use a rooftop or small solar system installed in the consumer premises, to offset part or all of the consumer's own electrical requirements, given that such systems can be self-owned or third party owned;
- (i) "Financial year" or "year" means the period beginning from first day of April in an English calendar year and ending with the thirty first day of March of the next year;
- (j) "Interconnection point" means the interface of solar power generation facility system with the network of distribution licensee ;
- (k) "Invoice" means either a periodic bill / supplementary bill or a periodic Invoice/ supplementary invoice raised by the Distribution Licensee;
- (l) "kVAh" means kilo volt ampere hour ;
- (m) "kWp" means kilo watt peak;
- (n) "Net meter" means an appropriate energy meter capable of recording both import & export of electricity or a pair of meters one each for recording the import and export of electricity as the case may be;

- (o) "Net metering" means methodology under which the electricity generated by the Solar rooftop system owned by the consumer and delivered to the Distribution Licensee may be utilized to offset the electricity supplied by the Distribution Licensee to the consumer during the applicable billing period;
- (p) "Obligated Entity" means the entity mandated under clause (e) of subsection (1) of section 86 of the Act to fulfill the renewable purchase obligation and identified under RERC (Renewable Energy Certificate and Renewable Purchase Obligation Compliance Framework) Regulations, 2010;
- (q) "Premises" means rooftops or/and elevated areas on the land, building or infrastructure or part or combination thereof in respect of which a separate meter or metering arrangements have been made by the licensee for supply of electricity;
- (r) "Rooftop PV Solar Power Plant" means the solar photo voltaic power plant including small solar systems installed on the rooftops/ground mounted or open land of consumer premises that uses sunlight for direct conversion into electricity through photo voltaic technology;
- (s) "Renewable Energy Certificate (REC)" means the certificate issued in accordance with the Central Electricity Regulatory Commission (Terms and Conditions for recognition and issuance of Renewable Energy Certificate for Renewable Energy Generation) Regulations, 2010 and subsequent amendments thereof;
- (t) "Renewable energy system" means the system to generate electricity from such source(s) which are recognized as renewable energy source(s) by Ministry of New and Renewable Energy (MNRE) or any other agency as may be notified by Government of India/Commission;
- (u) "State Agency" means the agency as designated by the Commission under regulation 6 of the RERC (Renewable Energy Certificate and Renewable

Purchase Obligation Compliance Framework) Regulations, 2010.

- (v) "Third party owner" means a developer who is generating solar energy on a rooftop but does not own the roof top, and who also enters into a lease/commercial agreement with the roof top owner.
- (2) All other words and expressions used in these Regulations although not specifically defined herein above, but defined in the Act, shall have the meaning assigned to them in the Act. The other words and expressions used herein but not specifically defined in these Regulations or in the Act but defined under any law passed by the Parliament applicable to the electricity industry in the State shall have the meaning assigned to them in such law.
- (3) Words or expressions occurring in these regulations and not defined shall bear the same meaning as in the Act.
- (4) Abbreviations used in these Regulations shall have the meanings as stated in **Annexure – I**.

3. Scope and application

- (1) These Regulations shall apply to the distribution licensee and consumers of the distribution licensee availing supply from it in its area of supply in the State of Rajasthan.
- (2) The Eligible Consumer may install the rooftop solar system under net metering arrangement which,
 - (a) shall be within the permissible rated capacity as defined under these Regulations.
 - (b) shall be located on the consumer premises.
 - (c) shall interconnect and operate safely in parallel with the distribution licensee network.
- (3) These Regulations do not preclude the right of State Nodal Agency or Distribution Licensee of the State to undertake Rooftop PV Solar Power Plants of 1 MWp and above capacity through alternative mechanisms.

4. General Principles

The distribution licensee shall offer the provision of net metering arrangement to the consumer, who intends to install grid connected Rooftop PV Solar Power Plants, in its area of supply on non-discriminatory and first come first serve basis:

Provided further that the Consumer is Eligible to install the grid connected Rooftop PV Solar Power Plants of the rated capacity as specified under these Regulations:

Provided also that the interconnection of such system with the grid is undertaken as specified under these Regulations and in compliance of Central Electricity Authority (Technical Standards for Connectivity of the Distributed Generation Resources) Regulations, 2013.

5. Connectivity of Roof Top PV Solar Power Plants

- (1) The cumulative capacity to be allowed at a particular distribution transformer shall not exceed 30% of the capacity of the distribution transformer:
- (2) The distribution licensee shall update distribution transformer level capacity available for connecting Rooftop PV Solar Power Plants under net metering arrangement on yearly basis and shall provide the information on its website as well as to the Commission.

6. Eligible Consumer and Individual Project Capacity

- (1) All Eligible Consumers of electricity in the area of supply of the distribution licensee having or proposing to install a roof top solar energy system may opt for grid connectivity subject to the net metering arrangement pursuant to these Regulations.
- (2) The maximum Rooftop PV Solar Power Plant capacity to be installed at any Eligible Consumer premises shall not be more than 80% of the sanctioned connected load/contract demand of the consumer;
- (3) The capacity of Rooftop PV Solar Power Plant to be installed at the Premises of any Eligible Consumer shall be more than one kilo watt peak minimum and shall not be more than one

Mega Watt peak (1000 kW_p) subject to the condition as specified in sub-regulation (2).

Provided that the capacity of the solar energy system shall be in conformity with the provisions relating to the connected load or contract demand permissible under the Rajasthan Electricity Regulatory Commission (Electricity Supply Code and Connected Matters) Regulations, 2004 and subsequent amendments thereto.

7. Procedure for application

- (1) The Eligible Consumer who proposes to install a solar energy system in his premises shall apply in the application form (**Annexure – II**), which the distribution licensee shall notify on its website as downloadable as well as make available at the relevant subdivisional office of the distribution licensee along with the application fees as specified in the schedule (**Annexure-III**) of these Regulations.
- (2) The licensee shall acknowledge the receipt of the application form and register the application and shall process the application in the order of the receipt.
- (3) Within ten (10) working days of receipt of the Eligible Consumer's application, the distribution licensee shall provide written notice that it has received all documents required by the standard interconnection agreement or indicate how the application is deficient.
- (4) The Distribution Licensee shall assess the feasibility and intimate the Eligible Consumer within fifteen days from the receipt of completed application. The feasibility shall be valid for a period of one month, unless extended by the Distribution Licensee. Provided that if the Distribution Licensee determines that an interconnection study is necessary as per sub regulation (5), the Distribution Licensee shall intimate feasibility or otherwise within sixty (60) days from the receipt of completed application.
- (5) While intimating the feasibility for the connection of Rooftop PV Solar Power Plant as specified in sub-regulation(4), the Distribution Licensee shall also intimate the Eligible Consumer:

- (a) The details of documents to be submitted by the Eligible Consumer.
- (b) Particulars of any deficiencies, if noticed, along with instructions to remove such defects.
- (c) Details of any interconnection study required.
- (d) The amount of security deposit for the installation of the Rooftop PV Solar Power Plant as specified in the schedule at Annexure-III.

(6) The Distribution Licensee shall, on receipt of the security deposit and on removing defects, if any and the documents submitted under sub regulation(5), inform the approval within ten(10) working days from the date of receipt.

Provided that if the deficiency as per sub regulation (5) is not removed by the Eligible Consumer within thirty(30) days from the date of receipt of such intimation to the Eligible Consumer, the application shall stand cancelled and the application fee shall be forfeited.

(7) The interconnection agreement **(Annexure - IV)** shall be executed by the distribution licensee within thirty (30) days of receipt of a completed application. If the distribution licensee determines that an interconnection study is necessary, the distribution licensee shall carry out such interconnection study within sixty (60) days so as to enable it to execute the standard interconnection agreement within ninety (90) days of a completed application.

(8) The Eligible Consumer must execute the standard interconnection agreement and return it to the distribution licensee within thirty (30) days from the date of receipt.

8. Standards, Operation and Maintenance of Solar Power Generators (SPGs)

The Solar Power Generator (SPG) and equipments will conform to the standards and requirements specified in these Regulations and in the following Regulations and codes as amended from time to time:

- (1) Central Electricity Authority (Technical Standards for connectivity of the Distributed Generating Resources) Regulations, 2013.
- (2) Central Electricity Authority (Installation and Operation of Meters) Regulations, 2006.
- (3) RERC (Electricity Supply Code and Connected Matters) Regulations, 2004.

The equipments of Solar PV Roof top shall be pre tested by the supplier and a test certificate for the concerned equipment shall be provided to the consumer. The consumer shall get the equipment installed at his/her premises by the representative of the supplier to confirm satisfactory working.

9. Interconnection with the Grid: Standards and Safety

- (1) The interconnection of the Rooftop PV Solar Power Plant with the network of the distribution licensee shall be made as per the technical specifications and standards for connectivity provided in the Central Electricity Authority (Technical Standards for Connectivity of the Distributed Generation Resources) Regulations, 2013, as amended from time to time.
- (2) The connectivity levels at which the Rooftop PV Solar Power Plants shall be connected with the grid are as specified below:

S.No.	Connected load of Eligible Consumer	Connectivity level
1.	Upto 5 kW	240 V- single phase
2.	Above 5 kW and upto 18.65 kW	415 V-Three phase
3.	Above 18.65 kW and upto 50 kW/kVA	415 V-Three phase
4.	Above 50 kW/kVA	HT/EHT level

- (3) The above connectivity norms are applicable to all the solar power generators who seek connectivity with network of the distribution licensees. EHT/HT consumers may install solar power generators at LT/HT voltage and connect them to their LT/HT system.
- (4) In the interconnection of roof top PV solar energy generator with the local distribution licensee's grid, the relevant provisions of the Central Electricity Authority (Measures

relating to Safety and Electric Supply) Regulations, 2010 as amended from time to time shall apply.

- (5) The solar energy generator shall be responsible for safe operation, maintenance and rectification of defect of its system up to the interconnection point beyond which the responsibility of safe operation, maintenance and rectification of any defect in the system including the net meter shall rest with the distribution licensee.
- (6) The consumer shall be solely responsible for any accident to human being/ animals whatsoever (fatal/non-fatal/departamental/non-departamental) that may occur due to back feeding from the SPG plant when the grid supply is off. The distribution licensee reserves the right to disconnect the consumer's installation at any time in the event of such exigencies to prevent accident or damage to man and material.
- (7) The tests as per EN 50160 and as per distribution licensee's standards shall be done to ensure the quality of power generated from the Solar PV systems.
- (8) Any alternate source of supply shall be restricted to the consumer's network and the consumer shall be responsible to take adequate safety measures to prevent battery power/diesel generator power/ backup power extending to distribution licensee's LT grid on failure of distribution licensee's grid supply.
- (9) The distribution licensee shall have the right to disconnect the roof top PV solar energy generator from its system at any time in the following conditions:
 - i. Emergencies or maintenance requirement on the distribution licensee's electric system;
 - ii. Hazardous condition existing on the distribution licensee's system due to operation of solar energy generator or protective equipment as determined by the Distribution Licensee/Transmission Licensee/SLDC.
 - iii. Adverse electrical effects, such as power quality problems, on the electrical equipment of the other consumers of the distribution licensee caused by the solar energy generation as determined by the distribution licensee.

- (10) Subject to sub regulation 8(5) above, the distribution licensee may call upon the roof top PV solar energy generator to rectify the defect within a reasonable time.
- (11) The Rooftop PV Solar Power Plant should be capable of detecting an unintended islanding condition. These systems must have anti-islanding protection to prevent any unfavorable conditions including failure of supply. IEC-62116 shall be followed to test islanding prevention measure for grid connected photovoltaic inverters.
- (12) Every Rooftop PV Solar Power Plant shall be equipped with automatic synchronization device:

Provided that Rooftop PV Solar Power Plant using inverter shall not be required to have separate synchronizing device, if the same is inherently built into the inverter.

- (13) The Rooftop PV Solar Power Plant operating in parallel with electricity system shall be equipped with the following protective functions to sense abnormal conditions on electricity system and cause the Rooftop PV Solar Power Plant to be automatically disconnected from the electricity system or to prevent the Rooftop PV Solar Power Plant from being connected to electricity system inappropriately:
- i. Over and under voltage trip functions if voltage reaches above 110% or below 80% respectively with a clearing time upto two seconds; however, appropriate licensee may prescribe a narrower range of voltage for the purpose.
 - ii. Over and under frequency trip functions, if frequency reaches 50.5 Hz or below 47.5 Hz with a clearing time upto 0.2 seconds; however, appropriate licensee may prescribe a narrower range of frequency for the purpose.
 - iii. The Rooftop PV Solar Power Plant shall cease to energize the circuit to which it is connected in case of any fault in this circuit.
 - iv. A voltage and frequency sensing and time delay function to prevent the Rooftop PV Solar Power Plant from energizing a de-energized circuit and to prevent the Rooftop PV Solar Power Plant from reconnecting with electricity system unless voltage and frequency is within the prescribed limits and are stable for at least sixty seconds; and

- v. A function to prevent the Rooftop PV Solar Power Plant from contributing to the formation of an unintended island, and cease to energize the electricity system within two seconds of the formation of an unintended island.
- (14) The equipment of the Rooftop PV Solar Power Plant shall meet following requirements, namely:
- i. Circuit Breakers or other interrupting equipment shall be suitable for their intended application with the capability of interrupting the maximum available fault current expected at their location.
 - ii. The Rooftop PV Solar Power Plant and associated equipment shall be designed so that the failure of any single device or component shall not potentially compromise the safety and reliability of the electricity system.
 - iii. Paralleling device of the Rooftop PV Solar Power Plant shall be capable of withstanding 220% of the nominal voltage at the interconnection point.
- (15) Every time the Rooftop PV Solar Power Plant of the Eligible Consumer is synchronized to the electricity system, it shall not cause voltage fluctuation greater than $\pm 5\%$ at the point of inter connection.
- (16) After considering the maintenance and safety procedures, the distribution licensee may require a Rooftop PV Solar Power Plant to provide a manually operated isolating switch between the Rooftop PV Solar Power Plant and the electricity system, which shall meet following requirements:
- i. Allow visible verification that separation has been accomplished;
 - ii. Include indications to clearly show open and closed positions;
 - iii. Be capable of being reached quickly and conveniently twenty four hours a day by licensee's personnel without requiring clearance from the applicant;
 - iv. Be capable of being locked in the open position;
 - v. May not be rated for load break nor may have feature of over-current protection; and
 - vi. Be located at a height of at least 2.44 m above the ground level.
- (17) Prior to synchronization of the Rooftop PV Solar Power Plant for the first time with electricity system, the applicant and

the appropriate licensee shall agree on the protection features and control diagrams.

- (18) The power conditioning unit shall have the features of filtering out harmonics and other distortions before injecting the energy into the system of the distribution utility. The technical standards, power quality standards and inverter standards shall be as per **Annexure – V** of these Regulations or any other standards as may be specified by CEA from time to time.

10. Energy Accounting and Settlement

- (1) Distribution licensee shall install metering equipment at the point of interconnection which shall be capable of measuring the difference between the electricity supplied to the Eligible Consumer from the distribution licensee and the electricity delivered by solar system to the distribution licensee's electric grid. Separate meter shall be provided for measuring quantum of Solar energy generated by the Eligible Consumer.
- (2) Meter readings shall be taken monthly or as per the billing cycle specified under the applicable Electricity Supply Code and Connected Matters Regulations.
- (3) For each billing period, the licensee shall show separately the quantum of electricity injected by Eligible Consumer during the billing period, electricity supplied by distribution licensee during the billing period, net electricity billed for payment by the consumer for that billing period and the solar energy generated by the Eligible Consumer:

Provided that in the event the electricity injected exceeds the electricity consumed during the billing period, such excess injected electricity shall be paid by the Distribution Licensee at feed in tariff determined by the Commission from time to time for Solar Photo Voltaic generation in next billing period provided that such export is above 50 units. Net energy credits less than 50 units under Net Metering achieved in the particular billing period shall be adjusted in the next billing period till credit of 50 units is achieved:

Provided further that in the event the electricity supplied by the distribution licensee during any billing period exceeds the electricity generated by the Eligible Consumer's Rooftop PV Solar Power Plant, the distribution licensee shall raise bill for the net electricity consumption at the tariff applicable after taking into account any electricity credit balance remaining from previous billing period:

Provided also in case the Eligible Consumer is under the ambit of time of day tariff, as determined by the Commission from time to time, the electricity consumption in any time block (e.g., peak hours, off-peak hours, etc.) shall be first compensated with the electricity generation in the same time block. Any accumulated excess generation over consumption in any other time block in a billing cycle shall be accounted as if the excess generation occurred during the off-peak time block:

Provided also that the excess electricity measured in kilo-watt hour may only be utilized to offset the consumption measured in kilo-watt hour and may not be utilized to compensate any other fee and charges imposed by the distribution licensee as per the orders of the Commission:

Provided also that the levy and duties imposed by the State Government shall be recoverable.

- (4) When an Eligible Consumer leaves the system, that customer's unused credits for excess energy generated shall be paid to the Eligible Consumer at the feed in tariff determined by the Commission from time to time for Solar Photo Voltaic Generation.
- (5) Regardless of whether excess energy is delivered to the distribution licensee electric grid, the consumer shall continue to pay applicable charges such as fixed/demand charges, Government levy, etc. The distribution licensee shall charge for electricity used by the consumer in excess of the generation supplied at the distribution licensee's otherwise applicable rate schedule.

- (6) The licensee shall give a statement of accounts of electricity showing the following particulars, along with the electricity bill relating to each billing period:
 - (a) Quantum of solar energy generated by the Eligible Consumer;
 - (b) Quantum of electricity injected into the distribution system by the Eligible Consumer;
 - (c) Quantum of electricity supplied by the distribution licensee to the Eligible Consumer;
 - (d) Quantum of net electricity which has been billed for payment by the Eligible Consumer; and
 - (e) Quantum of electricity injected into the distribution system in excess of the drawal by the Eligible Consumer which is carried over to the next billing period.

- (7) In case of any dispute in billing it would be settled by the Consumer Grievance Redressal Forum and if issue still remains unresolved shall be settled by the Ombudsman.

11. Reporting requirements

Distribution licensee shall report the following, by June 1 of each year and shall also be placed on its web site:

- (1) Total number of Eligible Consumers interconnections at the end of the previous financial year;
- (2) Total kW capacity of the Eligible Consumers interconnected at the end of previous financial year;
- (3) Total kWh received by the Eligible Consumer from the distribution licensee by month and by year for the previous financial year;
- (4) Total kWh of solar energy generated by the Eligible Consumer by month and by year for the previous financial year;
- (5) Total kWh delivered by the Eligible Consumer to the distribution licensee as per billing cycle and by year for the previous financial year;
- (6) For each Eligible Consumer interconnection:
 - (a) Solar technology utilized
 - (b) Gross power rating;

- (c) Geographic location; and
- (d) Date interconnected.

12. Solar Renewable Purchase Obligation

The quantum of electricity generated from the Rooftop PV Solar Power Plant under net metering arrangement by an Eligible Consumer, who is not defined as obligated entity, shall qualify towards compliance of Renewable Purchase Obligation (RPO) for the distribution licensee in whose area of the supply the Eligible Consumer is located.

13. Applicability of other charges

The Rooftop PV Solar Power Plant under net metering arrangement, whether self-owned or third party owned installed on Eligible Consumer premises, shall be exempted from banking and wheeling charges and cross subsidy surcharge.

14. Metering arrangement

- (1) The metering system shall be as per the Regulations for installation & operation of meters for rooftop solar systems under net-metering arrangement specified in these regulations.
- (2) The schematic arrangement for interconnection of Rooftop & Small PV Solar Power Plant with the Distribution Licensee's grid is shown at **Annexure – VI**. There shall be two meters. The metering arrangement shall be as per **Annexure–VII**.
- (3) The bi-directional (net meter) shall be installed at the interconnection point of the Eligible Consumer with the network of the distribution licensee:

Provided that for the existing consumers, the consumer meter shall be replaced with the bi-directional/ net meter:

Provided further that consumers having ABT compliant meters shall not be required to install additional net meter.

- (4) Solar meter shall be installed at the solar facility after the inverter to measure the solar generation.

- (5) These meters shall have the facility for downloading meter readings using Meter Reading Instrument (MRI). Check meters shall be mandatory for rooftop solar systems having capacity more than 250 kW. For installations size of less than and equal to 250 kW, the solar check meters would be optional:

Provided that the cost of new/additional meter (s) shall be borne by the Eligible Consumer and installed & owned by the distribution licensee:

Provided, if bills are prepared on the basis of MRI downloads or if meter reading is taken on the basis of remote meter-reading and the consumer wishes to have a record of the reading taken, he shall be allowed so by the licensee.

- (6) The meters installed shall be jointly inspected and sealed on behalf of both the parties and shall be interfered/tested or checked only in the presence of the representatives of the consumer and distribution licensee or as per the supply code specified by the Commission:

Provided that the Eligible Consumer shall follow the metering specifications and provisions for placement of meter as developed by the distribution licensee from time to time and as per the supply code:

Provided further that in case the Eligible Consumer is under the ambit of time of day (TOD) tariff, meters compliant of recording time of day consumption/generation shall be employed.

- (7) The meter readings taken by the distribution licensee shall form the basis of commercial settlement.
- (8) The technical standards for meters shall be as per **Annexure-VIII** and shall comply with the standards specified by CEA from time to time.

15. Communication Facilities

The meters installed for Rooftop PV Solar Power Plants with capacity above 250 kWp shall have the communication port for exchanging real time information with Distribution Licensee.

16. Sharing of CDM Benefits

The CDM benefits arising from solar energy generation from the roof top PV facility shall be retained by Distribution Licensee:

Provided that the entire CDM benefits obtained by the Distribution Licensee shall be fully passed on to the consumers through ARR.

17. Penalty

In case of failure to meet the requirements under these regulations for net metering, the solar power generator shall be liable to pay penalty as decided by the Commission from time to time.

18. Power to give directions

The Commission may from time to time issue such directions and orders as are considered appropriate for the due implementation of these Regulations.

19. Power to relax

The Commission may by general or special order, for reasons to be recorded in writing, and after giving an opportunity of hearing to the parties likely to be affected may relax any of the provisions of these Regulations on its own motion or on an application made before it by an interested person.

20. Power to amend

The Commission may from time to time add, vary, alter, suspend, modify, amend or repeal any provisions of these Regulations.

By order of the Commission

(Secretary)

LIST OF ABBREVIATIONS

AC	Alternating Current
AT&C	Aggregate Technical and Commercial
BIS	Bureau of Indian Standards
CB	Circuit Breaker
CEA	Central Electricity Authority
CT	Current Transformer
DC	Direct Current
Discom	Jaipur Vidyut Vitran Nigam Limited, Ajmer Vidyut Vitran Nigam Limited, Jodhpur Vidyut Vitran Nigam Limited
EHT	Extra High Tension
EHV	Extra High Voltage
FOR	Forum of Regulators
GBI	Generation Based Incentive
GIS	Geographic Information System
GOI	Government of India
GOR	Government of Rajasthan
GPS	Geographic Positioning System
GSM	Global System for Mobile Communications
GSS	Grid Substation
HT	High Tension
IEC	International Electro-technical Commission
IEEE	Institution of Electrical and Electronics Engineers
INR	Indian Rupee
kV	Kilo Volt
kVA	kilo Volt Ampere
kW	Kilo Watt
kWh	Kilo-Watt Hour
LT	Low Tension
MNRE	Ministry of New and Renewable Energy
MPLS	Multiprotocol Label Switching
MVA	Mega Volt-Ampere
NM	Net-Meter
O&M	Operation and Maintenance
PCU	Power Conditioning Unit
PT/VT	Potential/ Voltage Transformer
RE	Renewable Energy
REC	Renewable Energy Certificate
RERC	Rajasthan Electricity Regulatory Commission
RPO	Renewable Purchase Obligation

RRECL	Rajasthan Renewable Energy Corporation Limited
SLDC	State Load Despatch Centre
SM	Solar Meter
SPV	Solar Photo Voltaic
TVM	Tri-Vector Meter

References of the Standards

Standard	Reference
IS 13779-1999	Standards for single or polyphase electrostatic watt hour meters
IS 14697	Standards for static transformer operated watt hour meters and VAR hour meters
IEEE 61000	Equipment standards to control/curtail flicker
IEEE 519	Standards for limitation for Total Harmonic Distortion
IEC 61215	Standards for Crystalline Silicon terrestrial photovoltaic (PV) modules- Design qualification and type approval
IEC 61646	Standards for thin film terrestrial photovoltaic (PV) modules-Design qualification and type approval
IEC 61730	Standard for Photovoltaic (PV) module safety qualification- Part1: Requirement for construction Part 2: Requirements for testing
IEC 61701	Standards for Salt mist corrosion testing for modules used in coastal corrosive atmosphere
IEC 60068-2(1,2,14,30)	Standards for power conditioning unit/inverters for efficiency measurement and environment tests
IEC 60502	Standards for power cables with extruded insulation and their accessories for rated voltages from 1 kV($U_m=1.2$ kV) upto 30 Kv($U_m=36$ kV)
IEC 60227	Standards for polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V
IEC 62116	Standards for utility-inter connected photovoltaic inverters-Test procedures of islanding prevention measures.

Format for Application for Solar Power Connectivity

To:

The Sub-divisional Officer/ Designated Officer
Distribution Licensee
[Name of office]

Date: [date]

I / we herewith apply for a solar energy net-metering connection at the service connection and for the solar PV plant of which details are given below.

1	Name of applicant	
2	Address of applicant	
3	Service connection number	
4	Service connection tariff	
5	Telephone number(s)	
6	Email ID	
7	Solar PV plant capacity (kilo Watts)	
8	Solar grid inverter make and type	
9	Solar grid inverter has automatic isolation protection (Y/N)?	
10	Has a Solar Generation Meter been installed (Y/N)?	
11	Expected date of commissioning of solar PV system.	
12	Details of test certificates of Solar PV plant/inverter for standards required under the Regulations	

Name:

Signature

Net-metering Application Acknowledgement

Received an application for a solar energy net-metering connection from,

Name:

Date:

Service Connection number:

Application registration no.:

Solar Plant Capacity:

Name of Officer:

Signature:

Designation/ (Name of Discom)

Schedule
(Vide Regulation 7(1) & 7(5))

S. No.	Description	Amount
1.	Application Fee	
	i. LT Single Phase	Rs. 200
	ii. LT Three Phase	Rs. 500
	iii. HT – 11 kV	Rs. 1000
	v. HT – 33 kV	Rs. 2000
2.	Security Deposit for Solar PV plant	
	(a) Domestic	Rs. 100/kW
	(b) Non Domestic	Rs. 200/kW

The amount of security for Eligible Consumer other than the owner of the premises, shall be double of the amount as mentioned above.

The security deposit shall not bear any interest.

Net Metering inter connection agreement

This Agreement is made and entered into at (location)____ on this (date) _____ day of (month)_____ year ____ between

The Eligible Consumer, by the name of ----- having premises at (address) _____ as first party

AND

Distribution Licensee (herein after called as Discom) and represented by ----- (designation of office) and having its registered office at (address)_____ as second party of the agreement

And whereas, the Discom agrees to provide grid connectivity to the Eligible Consumer for injection of the electricity generated from his SPV plant of capacity ___ kilowatts into the power system of Discom and as per conditions of this agreement and RERC (Connectivity and Net Metering for Rooftop and Small Solar Grid Interactive Systems) Regulations, 2015 issued by the Rajasthan Electricity Regulatory Commission.

Both the parties hereby agree to as follows:

1. Eligibility

1.1 Eligibility for net-metering has been specified in the relevant order of the Rajasthan Electricity Regulatory Commission. Eligible Consumer has to meet the standards and conditions for being integrated into grid/distribution system.

2. Technical and Interconnection Requirements

2.1 The Eligible Consumer agrees that his solar generation plant and net metering system will conform to the standards and requirements specified in RERC (Connectivity and Net Metering for Rooftop and Small Solar Grid Interactive Systems) Regulations, 2015 and in the following Regulations and codes as amended from time to time.

- i. CEA's (Technical Standards for connectivity of the Distributed Generating Resources) Regulations, 2013
- ii. Central Electricity Authority (Installation and Operation of Meters) Regulation 2006
- iii. RERC Supply Code Regulations 2004

2.2 Eligible Consumer agrees that he has installed or will install, prior to connection of Photovoltaic system to Discom's distribution

- system, an isolation device (both automatic and inbuilt within inverter and external manual relays) and agrees for the Discom to have access to and operation of this, if required and for repair & maintenance of the distribution system.
- 2.3 Eligible Consumer agrees that in case of a power outage on Discom's system, photovoltaic system will disconnect/isolate automatically and his plant will not inject power into Licensee's distribution system.
 - 2.4 All the equipment connected to distribution system shall be compliant with relevant International (IEEE/IEC) or Indian standards (BIS) and installations of electrical equipment must comply with Central Electricity Authority (Measures of Safety and Electricity Supply) Regulations, 2010.
 - 2.5 Eligible Consumer agrees that licensee will specify the interface/interconnection point and metering point.
 - 2.6 Eligible Consumer and licensee agree to comply with the relevant CEA regulations and RERC (Metering) Regulations, 2007 in respect of operation and maintenance of the plant, drawing and diagrams, site responsibility schedule, harmonics, synchronization, voltage, frequency, flicker etc.
 - 2.7 Due to Discom's obligation to maintain a safe and reliable distribution system, Eligible Consumer agrees that if it is determined by the Discom that Eligible Consumer's photovoltaic system either causes damage to and/or produces adverse effects affecting other consumers or Discom's assets, Eligible Consumer will have to disconnect photovoltaic system immediately from the distribution system upon direction from the Discom and correct the problem at his own expense prior to a reconnection.
 - 2.8 The consumer shall be solely responsible for any accident to human being/animals whatsoever (fatal/non-fatal/departmental/non-departmental) that may occur due to back feeding from the SPG plant when the grid supply is off. The distribution licensee reserves the right to disconnect the consumer's installation at any time in the event of such exigencies to prevent accident or damage to man and material.

3. Clearances and Approvals

- 3.1 The Eligible Consumer shall obtain all the necessary approvals and clearances (environmental and grid connection related)

before connecting the photovoltaic system to the distribution system.

4. Access and Disconnection

- 4.1 Discom shall have access to metering equipment and disconnecting means of the solar photovoltaic system, both automatic and manual, at all times.
- 4.2 In emergency or outage situation, where there is no access to the disconnecting means, both automatic and manual, such as a switch or breaker, Discom may disconnect service to the premises of the Eligible Consumer.

5. Liabilities

- 5.1 Eligible Consumer and Discom shall indemnify each other for damages or adverse effects from either party's negligence or intentional misconduct in the connection and operation of photovoltaic system or Discom's distribution system.
- 5.2 Discom and Eligible Consumer shall not be liable to each other for any loss of profits or revenues, business interruption losses, loss of contract or loss of goodwill, or for indirect, consequential, incidental or special damages, including, but not limited to, punitive or exemplary damages, whether any of the said liability, loss or damages arise in contract, or otherwise.
- 5.3 Discom shall not be liable for delivery or realization by Eligible Consumer for any fiscal or other incentive provided by the Central/State Government beyond the scope specified by the Commission in its relevant Order
- 5.4 The Discom may consider the quantum of electricity generation from the rooftop solar PV system under net metering arrangement towards RPO. (Applicable only in case of Eligible Consumer who is not defined as an Obligated Entity).
- 5.5 The proceeds from CDM benefits shall be retained by the Discom.

6. Commercial Settlement

- 6.1 All the commercial settlement under this agreement shall follow the Net Metering Regulations, 2015 issued by the RERC.

7. Connection Costs

- 7.1 The Eligible Consumer shall bear all costs related to setting up of photovoltaic system including metering and interconnection costs. The Eligible Consumer agrees to pay the actual cost of

modifications and upgrades to the service line required to connect photovoltaic system to the grid in case it is required.

8. Termination

- 8.1 The Eligible Consumer can terminate agreement at any time by providing Discom with 90 days prior notice.
- 8.2 Discom has the right to terminate Agreement on 30 days prior written notice, if Eligible Consumer commits breach of any of the term of this Agreement and does not remedy the breach within 30 days of receiving written notice from Discom of the breach.
- 8.3 Eligible Consumer shall upon termination of this Agreement, disconnect the photovoltaic system from Discom's distribution system in a timely manner and to Discom's satisfaction.

In witness, whereof, Mr. ----- for and on behalf of --- ----- (Eligible Consumer) and Mr. ----- for and on behalf of----- --- (Discom) sign this agreement in two originals.

Eligible Consumer

Name

Address

Service connection No.

Distribution Licensee

Name

Designation

Office Address

Inverter Standards

Inverter should comply with IEC 61683/IS 61683 for efficiency and Measurements and should comply with IEC 60068-2 (1,2,14,30) / Equivalent BIS Standard for environmental testing.

Inverter should supervise the grid condition continuously and in the event of grid failure (or) under voltage (or) over voltage, Solar System should be disconnected by the circuit Breaker / Auto switch provided in the inverter and shall comply with requirements specified at regulation 8 of these Regulations.

Harmonics Standards

As per the standard IEEE 519, the permissible individual harmonics level shall be less than 3% (for both voltage and current harmonics) and Total Harmonics Distortion (THD) for both voltage and current harmonics of the system shall be less than 5%.

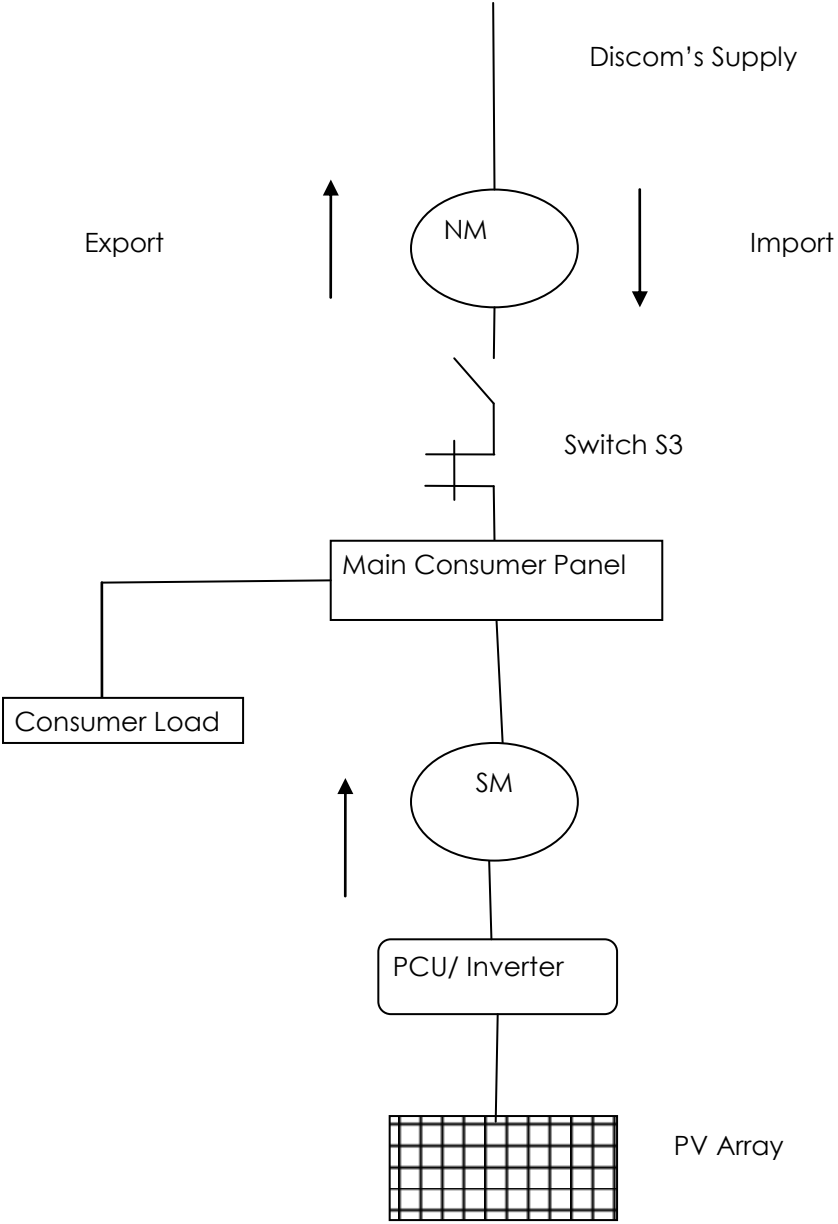
Technical and interconnection requirements Parameters

Parameter	Reference	Requirement
Overall conditions of service	State Distribution/Supply Code	Compliance with the terms and conditions of supply.
Overall Grid Standards	Central Electricity Authority (Grid Standard) Regulations 2010	Compliance with Grid standards as regards the frequency, voltage and protection coordination.
Meters	Central Electricity authority (Installation & Operation of Meters) Regulations, 2006 and RERC Metering Regulations, 2007 as amended from time to time	Compliance with the specifications of the meters.
Safety and supply	Central Electricity Authority (Measures of Safety and Electricity Supply) Regulations, 2010	Compliance with safety provisions for electrical installations and apparatus of voltage below and above 650 volts.
Harmonic Requirements Harmonic Current	IEEE 519 CEA (Technical Standards for Connectivity of the Distributed Generation Resources) Regulations, 2013	The Total Harmonic Distortion (THD) for voltage at the interconnection point should not exceed 5%. For the current distortion limits, the Total Demand Distortion (TDD) in terms of ratio of available short circuit current to the

Parameter	Reference	Requirement
		demand current (I_{sc}/I_L) should remain within limits specified for various harmonics for different TDD values.
Synchronization	CEA (Technical Standards for Connectivity of the Distributed Generation Resources) Regulations, 2013	Photovoltaic system must be equipped with a grid frequency synchronization device. Every time the generating station is synchronized to the electricity system, it shall not cause voltage fluctuation greater than +/- 5% at point of inter connection.
Voltage	CEA (Technical Standards for Connectivity of the Distributed Generation Resources) Regulations 2013	The voltage-operating window should minimize nuisance tripping and should be within operating range of 80% to 110% of the nominal connected voltage. The photovoltaic system must isolate itself from the grid within a clearing time of 2 seconds.
Flicker	CEA (Technical Standards for Connectivity of the Distributed Generation Resources) Regulations 2013.	Operation of Photovoltaic system should not cause voltage flicker in excess of the limits stated in IEC 61000 standards as follows: <u>Short-term flicker (P_{st}):</u> The flicker severity evaluated over a short period of time (10 minutes) should be ≤ 1 . <u>Long-term flicker (P_{lt}):</u> The flicker severity evaluated over a long period of time (typically 2 hours) should be ≤ 0.65 .
Frequency	CEA (Technical Standards for Connectivity of the Distributed Generation Resources) Regulations, 2013	There should be over and under frequency trip functions with a clearing time of 0.2 seconds, when the Distribution system frequency deviates

Parameter	Reference	Requirement
		outside the specified conditions (50.5 Hz on upper side and 47.5 Hz on lower side).
DC injection	CEA (Technical Standards for Connectivity of the Distributed Generation Resources) Regulations 2013.	Photovoltaic system should not inject DC power more than 0.5% of full rated output at the interconnection point or 1% of rated inverter output current into distribution system under any operating conditions.
Power Factor	CEA (Technical Standards for Connectivity of the Distributed Generation Resources) Regulations, 2013.	When the output of the inverter is greater than 50%, the power output from the inverter shall have a lagging power factor of greater than 0.9.
Islanding and Disconnection	CEA (Technical Standards for Connectivity of the Distributed Generation Resources) Regulations 2013	The photovoltaic system must island/disconnect itself within IEC standard stipulated time in the event of fault, voltage or frequency variations.
Overload and Overheat	CEA (Technical Standards for Connectivity of the Distributed Generation Resources) Regulations 2013	The inverter should have the facility to automatically switch off in case of overload or overheating and should restart when normal conditions are restored.
Paralleling Device	CEA (Technical Standards for Connectivity of the Distributed Generation Resources) Regulations 2013	Paralleling device of photovoltaic system shall be capable of withstanding 220% of the normal voltage at the interconnection point.

Schematic Arrangement for interconnection of Rooftop & Small PV Solar Power Plant with the Distribution Licensee's/Discom's grid



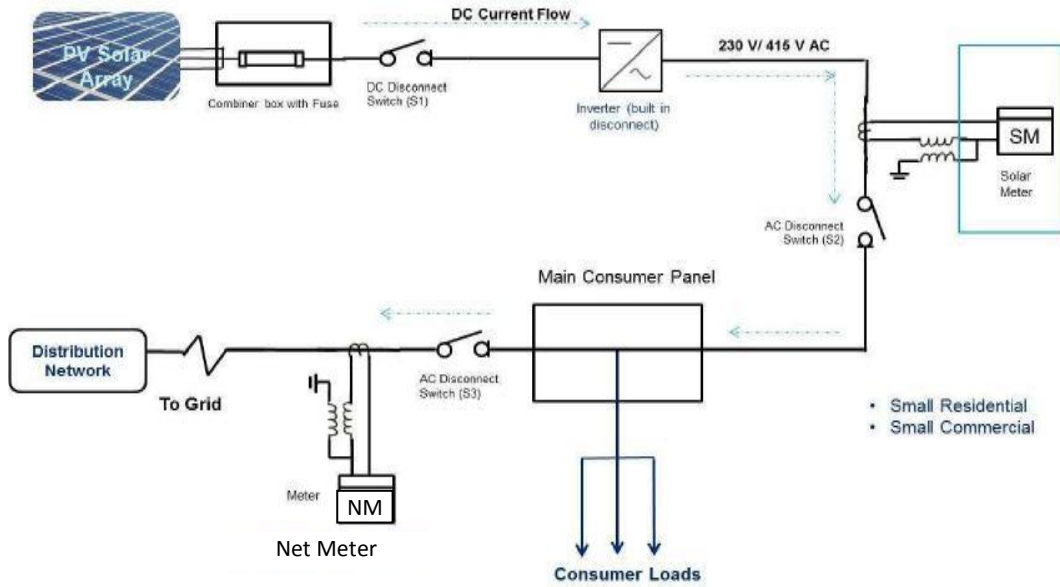
Normally, Solar Generation shall be connected with Grid. When grid fails, Inverter controlled Switch S3 Opens and on restoration of grid S3 Closes.

Abbreviations:

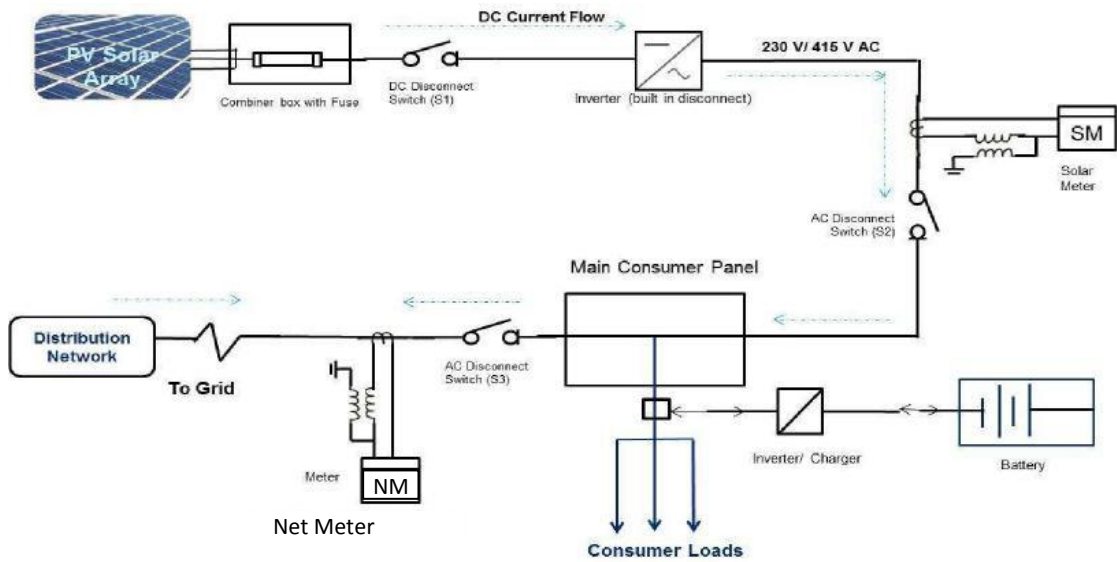
NM: Net Meter, SM: Solar Meter, PCU: Power Conditioning Unit

Net Metering configuration options

(1) Two meter configuration without storage



(2) Two meter configuration with storage



Specification for meters for net metering

(a) Meter for Solar Generation Measurements:

Solar Meter Major Technical Parameters

Sl. No.	Technical Parameters	Connectivity at 415 V & below voltage level			Connectivity at above 415 V voltage level
		Whole current meters		CT operated	CT-PT Operated
1.	Applicability	Solar plant capacity upto 4 kW	Solar plant capacity above 4 kW and upto 15 kW	Solar Plant Capacity above 15 kW and upto 50 kW	HT/EHV supply
2.	Number of phases and wires	Single Phase, 2 Wire	Three Phase, 4 Wire	Three Phase, 4 Wire	Three Phase, 4 Wire
3.	Measurand(s)	kWh	kWh	kWh, kVAh, kVA, PF	kWh, kVAh, kVA, PF, Max. demand
4.	Standard Voltage and frequency	240 V, 50±5%	3X240 V (P-N), 415 V (P-P) 50±5%	3X240 V (P-N), 415 V (P-P) 50±5%	3X63.5 V (P-N), 110 V (P-P) 50±5%
5.	Current Rating	10-60	10-60	1 Amp	1 Amp
6.	Accuracy class	1.0	1.0	0.5S	0.2S
7.	Indian Standard or IEC to which conforming	IS 13779-1999	IS 13779-1999	IS 14697, IS 13779	IS 14697, IS 13779
8.	Import-export feature	Forward import	Forward import	Forward import	Forward import
9.	Communication Port/ Protocol	Optical/ DLMS	Optical, RS-232/ DLMS	Optical, RS-232/ DLMS	Optical, RS-232/ DLMS

(b) Meter for Net-Metering Measurements:

Net-Meter Major Technical Parameters

S. No.	Technical Parameters	Connectivity at 415 V & below voltage level			Connectivity at above 415 V voltage level
		Whole current meters		CT operated	CT-PT Operated
1.	Applicability	Upto 5 kW connected load	Above 5 kW and upto 18.65 kW connected load	Above 18.65 kW and upto 50 kVA contract demand	HT/EHV supply
2.	Number of phases and wires	Single Phase, 2 Wire	Three Phase, 4 Wire	Three Phase, 4 Wire	Three Phase, 4 Wire
3.	Measurand(s)	kWh	kWh	kWh, kVAh, kVA, PF	kWh, kVAh, kVA, PF, Max. demand
4.	Standard Voltage and frequency	240 V,	3X240 V (P-N), 415 V (P-P)	3X240 V (P-N), 415 V (P-P)	3X63.5 V (P-N), 110 V (P-P)

S. No.	Technical Parameters	Connectivity at 415 V & below voltage level			Connectivity at above 415 V voltage level
		50±5%	50±5%	50±5%	50±5%
5.	Current Rating	10-60	10-60	1 Amp	1 Amp
6.	Accuracy class	1.0	1.0	0.5S	0.5S
7.	Indian Standard or IEC to which conforming	IS 13779-1999	IS 13779-1999	IS 14697,IS 13779	IS 14697,IS 13779
8.	Import-export feature	Import & Export	Import & Export	Import & Export	Import & Export
9.	Communication Port/ Protocol	Optical/DLMS	Optical, RS-232/DLMS	Optical, RS-232/DLMS	Optical, RS-232/DLMS