SKN COLLEGE OF AGRICULTURE

(Sri Karan Narendra Agriculture University)

JOBNER- 303329 Distt. Jaipur (Raj.)

Phone: **01425-254022** (O), E-mail: dean.skncoa@sknau.ac.in

Website: https://skncoa.sknau.ac.in

Dr. M. R. Choudhary
Dean & Faculty Chairman (Ag.)

No.F. ( )//CS/SKNCOA/2025/ 525 Date: 26-06-2025

OPEN TENDER NOTICE

Sealed tenders are invited from the reputed firms/OEM for the Supply, Installation testing & Commissioning of Solar power system to operate 5 Hp Water Pump. The tender can be downloaded from state procurement portal Website www.sppp.rajasthan.gov.in on university website www.sknau.ac.in or will be available in working days from **26-06-2025 to 05-07-2025 up to 10.30 AM.** The tender will be accepted up to **05-07-2025 (11.00 AM)** and will be opened on the same day at 11.30 AM by the competent committee at SKN College of Agriculture, Jobner, Jaipur. Bid document can be obtained from this office by depositing bid document fee in cash **Rs. 500** and also downloaded from the university website www.sknau.ac.in & sppp.rajasthan.gov.in (will have to submit DD or banker's cheque **Rs. 500** in favour of Dean, SKN College of Agriculture, Jobner while submitting bid. **EMD** in the form of DD or banker's cheque will be deposited in favour of the Dean, SKN College of Agriculture, Jobner as per RTPP rules failing which the tender will not be accepted. Approximate purchase can be increased / decreased and F.O.R. at Horticulture Farm, SKN College of Agriculture, Jobner, Jaipur. The detail information regarding above mentioned tender is available at our office and website www.sknau.ac.in. The undersigned reserve the right to Reject/Accept tender without assigning any reason of thereof.

S.No	Particular	Quantity	Tender Fee	Approx. Amount Rs	EMD @ 2% or as applicable
1	Supply, Installation testing, & Commissioning of Solar power system to operate 5 Hp Water Pump	As per requirement	500/-	7,00,000/-	14000/-

DEAN

Copy for information and necessary action to:

1. The Comptroller, SKNAU, Jobner with request to nominate member on dated **05-07-2025** for completion of tender process.
2. Convener & Members, Tender Committee, SKNCOA, Jobner
3. The Treasury Officer, SKNAU, Jobner
4. Incharge CIMCA, SKNAU, Jobner to upload open tender on University website and sppp.rajasthan.gov.in
5. The DDO/SO, Account Section, SKNCOA, Jobner
6. Guard file

DEAN

Terms and Conditions

1. **Technical and financial bids are to be prepared separately in two envelops.**
2. Important annexures/documents except financial bid should be kept in **Envelope 1** along with tender fee DD if not already paid to this office and earnest money DD.
3. **Envelope 2** should contain only financial bid and it will be opened only when technical bid of the bidder is qualified.
4. If technical & financial bids are not given separately, it will be rejected without assigning any reason.
5. The Bidder has to **mention make and model name** of all the items in the technical bid.
6. The rate quoted shall be inclusive of delivery and installation at the Horticulture farm, SKN College of Agriculture, Jobner.
7. Current Authorization letter issued from Manufacturer/Principal Firm whichever is applicable.
8. Delivery within **15 days** after receipt of work order.
9. Earnest money 2% of approximate cost will be deposited by each tenderer as per RTPP rules.
10. Earnest money will be returned to the non-successful bidder after finalization of the tender. Successful bidders will have to deposit 5.0% performance security (of order value) that will be returned after satisfactory completion of warranty period of each supplied item.
11. Self-attested copy of GST/PAN/C.S.T. Nos. may be attached with the bid.
12. In case, any dispute arising out of this contract shall be subject to the jurisdiction of Indian laws & Court at Jaipur.
13. No advance payment will be made to the tenderer and the payment will be released by treasury office SKNAU Jobner only after satisfactory completion of work i.e. supply, installation and verification by the purchaser.
14. The tenderer must put his **signature and stamp on every paper** of tender including terms and condition.
15. Lowest price quoted will not qualify for selection of tender but quality and desired standards will also be considered.
16. Tender will not be considered if bidder fails to submit the security deposit and tender fee.
17. The specifications and warranty obligations should be fulfilled as per **Annexure – VII.**
18. The Dean, SKN College of Agriculture, Jobner reserves the right to accept or reject any or all the tenders either in full or in parts without assigning any reason thereof.
19. **Bidders have to quote their rates in the Proforma given in financial bid, only.**
20. The firm must submit **three years** of turnover certified with CA or GST Return
21. Free Installation and warranty of 3 years of supply of instruments.
22. The firm should enclose last three-years solar panel & satisfactory installation report.
23. The prices should be type written clearly in ink against each items. Cutting should be avoided as erroneous and overwriting are not permissible.
24. Any lapse in time may lead to action against the tenderer under RTPP 2012, RTPP 2013 and other rules laid down by Rajasthan Govt. from time to time and the penalty (L.D.) will be charged.
25. The material should adhere to the specification provided in G- Schedule.
26. Incomplete tenders and tenders received late will not be entertained
27. Any other terms & conditions except cited above will be as per RTPP 2012, RTPP 2013, Rule no.68 of General Finance and Account, Raj. Govt. notification dated 19.11.2015 and other guidelines provided by state government from time to time.

28. The firms from Rajasthan state and outside Rajasthan state which are not included in price preference status by General Finance and Audit rules of Rajasthan, while comparing the price quoted the Rajasthan sale tax/VAT will not be included and only central sale tax will be included. Which means the sale tax/VAT will not be included in price quoted by local firms while central sale tax will be included in price quoted by firms which are not in price preference status of Rajasthan Government. Liquidated damage (2.50 to 10 Percent) will be recovered as per Page 4 General finance and audit rules if the material is not supplied within time as per the following.

a. Lapse of one fourth period than the stipulated time – 2.50%

b. Lapse of one fourth periods but not half than the stipulated time – 5.00%

c. Lapse of half to three fourth period than the stipulated time – 7.50%

d. Lapse of more than three fourth period than the stipulated time – 10%

29. The tenderer will have to sign the "Fall clause"(**Annexure IV** attached) stating that he will have to supply the material to other departments, corporations, boards, PSUs on the same minimum quoted rates as to the college till the contract expires.

30. The tenderer shall give an undertaking that his firm has not been black listed (**Annexure** I attached). If it is found otherwise then bid security, performance security will be seized and court case will be registered against him.

31. The product must be certified

32. The rates quoted must be Freight on Receipt (FOR) at SKN College of Agriculture, Jobner otherwise installation, cost of packing, forwarding, freight etc. and all other charges be given. No amount other than that is quoted in financial bid will be paid.

33. All taxes and excise duty if any to be charged extra should be mentioned clearly

34. Supporting documents shall be verified with originals during the tender process. Supporting documents may also be sought as proof. Further, verifications of documents, claims, etc., may also be done by department any time even before/during or after finalization of tender bid/process

35. The Bid Security amount of the successful bidder may be adjusted in performance security of the bidder

36. The guidelines for number/figure mistakes in financial bids: The tender committee will rectify the numerical mistakes as per the following rules

37. If there is mistake in multiplying unit price with quantity, the unit price will be considered and

a. corrections will be made in grand total. If committee feels that there is mistake in decimal place of unit price then grand total will be considered & corrections will be made in unit price.

b. If there is mistake in addition and subtraction of various units then unit prices will be considered and corrections will be made in total price.

c. If there is mistake in figures and words then the words will be considered unless there is any mistake in writing the numbers. The figures will be considered as per a) & b) listed above.

38. Any accident/ mishap during the execution of the job will be the responsibility of the agency concerned, which will get the necessary insurance done at their cost.
39. There will be no exception in EMD in the bid. The bidder must submit EMD.
40. Installation, Commissioning and Testing of goods will be carried out completely by the supplier.
41. Supplier submitted the installation report supply in the any Institution last 5 year.
42. Supplier/OEM are submitted the customer care (Helpline Number) office and headquarter situated in all over India.
43. The supplied items are expected to have the manufacturer's logo and product details embossed/printed on it.
44. The instrument shall strictly confirm to the specifications with relevant brochure & Photograph with images. The OEM should have proof of atleast 25 installations of long term users using solar panel for more than a period of 10 -15 years showing longevity of operations
45. The bidders / OEM must show online demonstration of the quoted system during technical evaluation of the bids. This is an essential requirement
46. The instrument should be approved registered brand, Certificates issued by Trade Mark Registry under Trade Marks Act 1999 (Govt. of India)
47. The OEM should have at least Rs. 20 lakh average Turnover in last three financial years

Annexure-I

Declaration by the Bidder regarding Qualification

In relation to my/our Bid submitted to …….. for procurement of

…… in response to their Notice Inviting Bid No. ……. Dated…….. 1. I/We hereby declare under Section 7 of Rajasthan Transparency in Public Procurement Act, 2012, that:

1. I/We possess the necessary professional, technical, financial and managerial resources and competence required by the Bidding Document issued by the Procuring Entity;
2. I/We have fulfilled my/our obligation to pay such of the taxes payable to the Union and the State Government or any local authority as specified in the bidding document;
3. I/We are not insolvent in receivership, bankrupt or being wound up, not have my/our affairs administered by a court or a judicial officer, not have my/our business activities suspended and not the subject of legal proceedings for any of the foregoing reasons;
4. I/We do not have, and our directors and officers not have, been convicted of any criminal offence related to my/our professional conduct or the making of false statements or misrepresentations as to my/our qualifications to enter into a procurement contract within a period of three years preceding the commencement of this procurement process, or not have been otherwise disqualified pursuant to debarment proceedings;
5. I/We do not have a conflict of interest as specified in the Act, Rules and Bidding Document, which materially affects fair competition;

Date:
Place:

Signature of Bidder

Name:
Designation:

Annexure - II

DECLARATION BY TENDERERS

We hereby declare that we are Bona-fide manufacturer/Authorized whole sellers/Sole distributors/Authorized Dealer Distributor/Sole Selling/Marketing Agent in the Goods/Store/equipment's/item for which we have tendered.

If this declaration is found to be incorrect then without prejudice to any other action that may be taken, our security may be **forfeited** in full and the tender if any to the extent accepted may be cancelled.

Signature of Tenderer with seal

Annexure-III

DECLARATION BY TENDERERS

I/We hereby declare that we are not blacklisted by any Govt. Department/PSU/Company from last 3 years, wherever we have supplied placement work/service unit, for supplying substandard goods/services to these units.

I/We also declare that I/We are not defaulter, insolvent in receivership, bankrupt or being wound up, not have my/our affairs administered by a court or a judicial officer, not have my/our business activities suspended and not the subject of legal proceedings for any of the foregoing reasons.

Signature of Tenderer with seal

Annexure-IV

FALL CLAUSE CERTIFICATE

This is to certify that we have offered the maximum possible discount to you in our Quotation No. _____ dated ____

The prices charged for the stores supplied under Rate Contract should under no event be higher than lowest prices at which the party sells the items of identical description to any other Govt. Organization/ PSU's/ Central Govt,/State Govt. Autonomous bodies/Central/State Universities/Central/State Educational Institutions during the period of contract failing which the "FALL CLAUSE" will be applicable.

In case, if the price charged by our firm is more, purchasing will have the right to recover the excess charged amount from the subsequent/unpaid bill of the supplier.

Seal and Signature of the Tenderer

ANNEXURE - V
FORM No. 1 [See rule 83 of RTPP]

Memorandum of Appeal under the Rajasthan Transparency in Public procurement Act, 2012

Appeal No .....of .....

Before the ..... (First / Second Appellate Authority)

1. Particulars of appellant:
(i) Name of the appellant:
(ii) Official address, if any:
(iii) Residential address:

2. Name and address of the respondent(s):
(i)
(ii)
(iii)

3. Number and date of the order appealed against and name and designation of the officer / authority who passed the order (enclose copy), or a statement of a decision, action or omission of the Procuring Entity in contravention to the provisions of the Act by which the appellant is aggrieved:

4. If the Appellant proposes to be represented by a representative, the name and postal address of the representative:
5. Number of affidavits and documents enclosed with the appeal:
6. Grounds of appeal:

.....
.....
.....(Supported by an affidavit)

7. Prayer:

.....
.....

Place .....
Date .....

Appellant's Signature

ANNEXURE – VI

Annual Turnover Certificate

I/We hereby declare that the annual turnover of our firm is as under.

S. No.	Financial Year	Turnover (In Lakh)
1.	2021-22	
2.	2022-23	
3.	2023-24	
	Total Turn Over	
	Avg. Turn Over	

If this declaration is found to be incorrect then without prejudice to any other action that may be taken, our security may be forfeited in full and the tender if any to the extent accepted may be cancelled.

Signature of bidder with seal

Verified by C.A. with UDIN

Affidavit

(on non-judicial stamp paper of 100/-)

I..... S/o ..... Aged..... yrs, residing at ..... Proprietor/Partner/Director of M/s ..... Do hereby solemnly affirm and declare that (a) My/our above noted enterprise M/s ..... Has been issued acknowledgement of Entrepreneurial Memorandum Part-II by the District Industries Center..... The acknowledgment No. is ..... Dated ..... And has been issued for manufacture of following items:

(i)
(ii)
(iii)
(iv)
(v)
(vi)

(b) My/our above noted acknowledgement of Entrepreneurial Memorandum Part-II has not been cancelled or withdrawn by the Industries Department and that the enterprise is regularly manufacturing the above items.

© My/our enterprise is having all the requisite plant and machinery and is fully equipped to manufacture the above noted items.

Signature of proprietor /Director
Authorized Signatory with Rubber
Stamp and date

Verification

I..... S/o .....Aged ..... yrs residing at ..... Proprietor / Partner/ Director of M/s ..... verify and confirm that the contents at (a), (b) and (c) above are true and correct to the best of my knowledge and nothing has been concealed there in. So, help me God.

Deponent

SKN COLLEGE OF AGRICULTURE
(S.K.N. Agriculture University-Jobner) Jobner

Date:

Financial Bid

S.NO	Description of Goods	No. & Description of Package	Price without GST (RS.)	GST (%)	Rate with GST (Rs.)
1.	A. SPV Module IEC Certified Poly Crystaline Silicon not less than 300kw B. Solar Photovoltaic (SPV) Pump Controller C. Module Mounting Fixed Structure (GI) D. Balance of System, Earth Kit/Wires (Polycab,Finolex etc) and other Accessories E. Foundation of the structure *F.* Motor Pump Set 5 hp with accessories G. Remote Monitoring System (RMS) and Tracking System	Supply, Installation testing & Commissioning of Solar power system to operate 5 Hp Water Pump as per given specification			

Name of Firm	
Address of the Firm	
Bank Details	Bank & Branch: Account No.: IFSC Code: Mobile No.

Signature of bidder with seal

Annexure VIII

Information to be written compulsorily on the envelope

Name of Department: Central Store, SKN COA, Jobner

Reference No. of Tender:

Name of PI & Unit: Dr. M.R. Choudhary, RKVY-30

Title of Tender: Supply, Installation testing & Commissioning of Solar power system to operate 5 Hp Water Pump

Date of Opening Tender: 05-07-2025

SKN College of Agriculture, Jobner *G-Schedule*

DETAILED SPECIFICATIONS FOR SOLAR PHOTOVOLTAIC WATER PUMPING SYSTEM (5 hp)

A Solar Photovoltaic (SPV) Water Pumping system consists of:

1. Solar Photovoltaic (SPV) Array
2. Motor Pump Set
3. Solar Photovoltaic (SPV) Pump Controller
4. Remote Monitoring System (RMS)
5. Module Mounting Structures and Tracking System

The detailed specifications of each are given below.

1. Solar Photovoltaic (SPV) Array

- ***PV array (Wp)***: 6750 (6.75 kW)
- The power output of individual SPV modules used in the SPV array, under STC, should be a ***minimum of 300 Wp***, with adequate provision for tolerances measurement. Use of SPV modules with higher power output is preferred.
- It will be mandatory to use indigenously manufactured SPV modules with indigenous mono/multi-crystalline silicon SPV cells. Further, the motor-pump-set, controller and balance of system should also be manufactured indigenously. The vendor has to declare the list of imported components used in the SPV water pumping system.
- Modules supplied with the SPV water pumping systems shall have a certificate as per IS 14286/IEC 61215 specifications or equivalent National or International /Standards. STC performance data supplied with the modules shall not be more than one year old.
- Modules must qualify to IS/IEC 61730 Part I and II for safety qualification testing.
- The minimum module efficiency should be minimum 19 percent and fill factor shall be more than 75 percent.
- Modules must qualify to IS 170210 (Part 1) for the detection of potential-induced degradation - Part 1: Crystalline silicon (Mandatory in case the SPV array Open Circuit voltage is more than 600 V DC)
- The name plate of SPV module shall conform to IS 14286/IEC 61215.
- Module to Module wattage mismatch in the SPV array shall be within ± 3 percent.
- Any array capacity above the minimum array wattage requirement as specified in these specifications for various models of SPV Water Pumping Systems is allowed.
- The SPV modules must be warranted for output wattage, which should not be less than
- 90% of the rated wattage at the end of 10 years and 80% of the rated wattage at the end of 25 years.
- The RFID tag shall be placed inside the glass laminate of the SPV modules.

		Generation (kWh), Today Runs Hours (Hrs.), Cumulative Pump Run Hours (Hrs.), Cumulative Water Discharged (Liters), Total Water Discharged (Liters), Peak Power (kW) supplied by the controller to Motor-Pump Set.

- Maximum Power Point Tracker (MPPT) shall be included to optimally use the power available from the SPV array and maximize the water discharge.
- Adequate protections shall be provided in the SPV Controller to protect the solar powered motor-pump set against the following:
    a. Dry running;
    b. Open circuit;
    c. Accidental Output short circuit;
    d. Under voltage;
    e. Reverse polarity; and
    f. Surge protection to arrest high current surge
- A DC switch as per IS/IEC 60947-3 or DC circuit breakers as per IS/IEC 60947-2 suitable for switching dc power ON and OFF shall be provided in the SPV Pump Controller.
- All cables used shall be as per IS 694 or IS 9968(Part 1). Suitable size of cable shall be used in sufficient length for inter-connection from the SPV array to SPV Controller and from the SPV Controller to solar powered motor-pump set. Selection of the cable shall be as per IS 14536.
- Provision for remote monitoring unit for the pumps shall be made in the pump controller using GSM/GPRS Gateway with Geo tagging and through an internal/external arrangement having following basic functions:
    a. Controller shall be assigned with a unique serial number and its live status shall be observed remotely on online portal through login credentials;
    b. Live status shall indicate whether controller is ON/OFF.
    c. The parameter that is, the water output, water flow rate (calculated based on parameters), in fault condition; array input voltage/current and power shall be logged at an interval of 10 min; and
    d. Controller shall have a backup to store the data locally (at least for 1 year).

4. **Protections:** The system should be provided with all necessary protections like earthing, Lightning, and Surge Protection etc., as described below:

a. Earthing and Lightning Protection

- The Earthing shall be done in accordance with the IS 3043 including its amendments and updated versions.
- The Earthing system should be designed in such a way that it should be able to restrict the potential of each conductor according to the level of insulation applied and magnitude of the current conducted through human body should be less than the value that can cause ventricular fibrillation of heart.

2. Motor Pump Set

- ***Type***: Submersible motor-pump set
- ***Motor***: DC motor (PMSM/SRM)
- ***Pump Capacity***: 5 hp
- ***Total Head***: 50 m
- ***Sut off dynamic head***: 70 m
- ***Water Output***: 155250 Liters per day (from a total head of 50 meters)
- ***Performance requirements***: Under the "Average Daily Solar Radiation" condition of 7.15 kWh/sq. m on the surface of PV array (i.e., coplanar with the SPV modules), the minimum water output from a SPV Water Pumping System should be 23 liters of water per watt peak of PV array, from a Total Dynamic Head of 50 meters and the shut off head being at least 70 meters.
- The pump and all external parts of the motor used in the submersible pump which are in contact with water, should be of stainless steel of grade 304 or higher as per IS 6911 and IS 3444. The motor pump set shall have ***60 months guarantee*** and therefore, it is essential that the construction of the motor and pump shall be made using parts which have a much higher durability and do not need replacement or corrode for ***at least 60 months*** of operation after installation.
- The suction/ delivery pipe shall be of HDPE or uPVC column pipes of appropriate size, electric cables, floating assembly, civil work, and other fittings required to install the Motor-Pump set. In the case of HDPE pipes, the minimum pressure rating as per IS 10804 shall be used.

3. Solar Photovoltaic (SPV) Pump Controller

Sr. No.	Requirement	Specifications
1	Controller Power Capacity to drive the Pump	Controller Power Capacity should be at least equal to Solar Panels Power Capacity (Wp), not Pump Capacity. The solar panel capacity will be at least 6750 Wp, the controller capacity should match the solar panel capacity.
2	Point Tracking (MMPT)	Should track power only and not Voltage at Maximum power point.
3	Enclosure	The Controller with RMS must have IP65 protection.
4	Isolator Switch	Should be between Solar panels and the controller.
5	RMS (GSM/GPRS connectivity)	Controller shall be integrated with Remote Monitoring System with GSM/GPRS and Geo tagging. GSM/ GPRS Charges are to be included in the Costing till the end the of the Warranty period of the Motor-Pump set.
6	Controller display/screen	The various parameters should be present on the SPV Pump Controller display/screen such as Pump On/Off status, Array Input DC Voltage, DC/AC output Current & voltage, operating frequency, Latest RMS Latitude, Latest RMS Longitude, Pump Capacity (HP), PV Module Capacity (KW), Pump Status, Current Generation (kW), Today Solar Generation (kWh), Cumulative Solar

- Earth connections shall be done in such a way that they are visible for inspection and all the earth electrodes can easily be tested at any point of time.
- It is recommended to keep the value of resistance of earth electrode less than 5 ohms.
- All the materials, fittings etc. used for doing earthing shall conform to the Indian standard, wherever exists.
- The actual value of soil resistivity should be considered while designing the earthing system at the site and for reference, selection criteria of the site, for any type of soil treatment to improve earth electrode resistance, etc., the IS 3043 shall be referred.
- The electrode material should be selected according to the corrosivity of the soil in which it is used, for the relation between resistivity and corrosivity of the soil and method to safeguard the conductor against excessive corrosion, the IS 3043 shall be referred.
- It is recommended for selection of type and installation of the earth electrode, the provisions of the IS 3043 should be considered. However, the pipe or rod-type earth electrode is preferable.
- In case of the two-earth electrode or more, the separation among them should be twice the length of the electrode driven in the ground. Except in special conditions (for e.g.- where the soil is hard to dig out), a number of electrodes in parallel are to be preferred over a single long electrode.
- The provisions given in the IS 3043 should be considered, while selecting or connecting the earthing/protective/grounding conductor from the components to the earth pit.
- Separate earthing conductor shall be provided for the controller, motor-pump set and SPV array etc., for its connection to the earthing pit and it should be continuous in nature for electrical conductivity. However, even for the earthing of light current equipment (for example, high voltage testing equipment), the cross-sectional area of the earthing lead shall not be less than 6 mm^2.
- For the maintenance of the earth electrode and measurement of the Earth electrode resistance the provisions of IS 3043 shall be referred.
- Motor shall have suitable provision for earthing to facilitate earthing of the motor as per IS 3043 at the time of installation. In case GI pipes are used for the purpose of earthing the motor, an earthing connection may be made to the discharge pipe clamps. However, in case of HDPE/uPVC column pipes, a separate metallic cable from the motor to the control panel shall be provided for earthing purpose, and if a four-core cable is used, then the fourth core that is not connected to the terminals can be used for earthing.
- Lightning protection shall be provided as per IEC 62305 and IEC 63227 standards including its amendments and updated versions.
- An external lightning Rod, of height sufficient to meet the requirement of Lightning Protection System (LPS) designed to comply with the class III or higher (Class-I / Class-II), based on the site requirement including the area-specific lightning activity, shall be installed.

- Arrangement and positioning of the separate air-termination systems (external lightning rod) can be determined using different methods given in the IEC 62305-3. While determining the position following points are to be considered such as: -
  a. The structure to be protected is fully located within the protected volume provided by the air-termination system.
  b. There should be a separation distance between the air-termination system and SPV power supply system to prevent dangerous sparking against parts of the SPV power supply system in case of direct lightning. The separation distances determined in accordance with IEC 62305-3 & IEC 63227 shall preferably be maintained.
  c. The possibility of the SPV modules being shadowed by air-termination systems shall be taken into account and distance from the SPV modules can be calculated using the IEC 63227.
- A separate earth electrode is required for the dispersion of the lightning current into the ground with suitably low value of the earthing resistance i.e., less than 5 ohm and the minimum length (l1) of vertical earth electrodes for lightning protection level III or higher shall be determined according to the IEC 62305-3.
- The cross-section of the metal sub-structures used for the connection of the lightning arrestor to the earth electrode should be no less than 16 mm^2 Cu or 25 mm^2 Al or GI of equivalent current carrying capacity should be used, which will also depend upon the class of the Lightning protection system.
- The earth pits given with the SWPS {i.e., Earth pit(s) for the BoS system (other than LA) and Earth Pit for LA} should be made equipotentialy bonded to each other.

b. Surge Protection Device

- For SPD's IEC 63227 and its updated versions or amendments should be followed.
- At the DC Input side of the controller, it should have protection from an External Surge
- Protection Device of Type-2 or higher (i.e. Type-1) in accordance with the IEC 61643-31.
- The rated voltage of SPD's on the DC side, depends on the type of protective circuit and the magnitude of the maximum operating voltage of the SPV modules.

5. Remote Monitoring System (RMS)

The Remote Monitoring System shall be capable of providing and handling the following:

a. Solar System Performance: DC Voltage, DC current, AC output Current, Power, Drive frequency, Energy, etc.
b. Pump Performance: Running Hours, Water Discharge (Output), etc.
c. RMS Performance: % of Device Connectivity, % of Data Availability, etc.
d. Geo Location: Real time latitude and longitude should be captured with an accuracy of less than 10 m horizontal. This is required to ensure that system is not moved from its original location.
e. Events and Notifications: Faults related to Pump Operation, Solar generation, Controller/Drive faults like overload, dry run, short circuit, etc.
f. Consumer Management: Name, Agriculture details, Service No. Contact Details, etc.

g. Asset Management: Ratings, Serial Number, Make, Model Number of Pump, SPV Module and Controller, Geo Location, IMEI number (of communication module) and ICCID (of SIM).

h. Complaint and Ticket Management: Complaint management system is a part of centralized monitoring software platform.

i. Consumer Mobile Application: Generation, Running Hours, Water Discharge, Complaint logging, etc.

Communication Architecture of the RMS should be as mentioned below:

a. Communication Connectivity:

i. **Pump Controller Connectivity**: Communication between RMS and Pump Controller should be on UART/RS485 MODBUS RTU protocol to ensure interoperability irrespective of make and manufacturer.

ii. **Remote Connectivity**: RMS of SWPS should use GSM/GPRS/2G/3G/4G cellular connectivity.

iii. **Local Connectivity**: Ethernet/Bluetooth/Wi-Fi connectivity to configure parameters, notifications, communication interval, set points etc. or to retrieve locally stored data

iv. **Sensor Connectivity**: RMS should have provision for at least two Analog and Digital inputs with 0.1% accuracy to address the requirement of local sensors connectivity if required by SIA/Consumer for applications such as irradiation, flow meter for water discharge, moisture sensor for micro-irrigation, etc.

As mentioned in specifications, Analog and digital sensor inputs will be required for integration of flow meter for water discharge, moisture sensor for micro irrigation, level sensor for overhead tank water storage etc. Only provision for Analog and digital inputs with 0.1% accuracy of Full-Scale Range is required. Sensors will not be in scope of bidder.

v. RMS should have provision to give various modes of operations which are as follows:

- Remote Mode: - Pump can be made ON/Off using the Mobile App or in case, farmer do not have a smart phone, farmer shall be able to on-off pump through SMS/missed call.
- Auto Mode: - Pump can ON/Off automatically using the sensor data which are installed in the field by the beneficiary. (Cost of sensors will be worn by the beneficiary)
- Timer Mode: - Pump controller shall operate pump as per configured schedule using mobile application i.e., daily start time and running hours of pump.
- Manual Mode: - Pump can be made to run into manual mode from field.

To save ground water, provision for remote operation is required so that farmer can switch on and off remotely.

b. Communication Modes

i. Push Data on Event/Notification: such as pump on, pump off, protection operated, etc.

ii. Push Data Periodically: important parameters of solar pump (as mentioned above) should be pushed to central server on a configurable interval. Default interval should be of 15 minutes. However, if required, it should be possible to configure the periodic interval in multiples of 1 minute starting from 1 minute

and up to 15 minutes. Further, in case of any abnormalities or events, RMS should push on event immediately.

iii. Command on Demand: It should be possible to send commands via GSM or GPRS to RMS either to control pump operations or to update configuration.

c. **Communication Protocol**: RMS should provide data on MQTT protocol to establish communication with thousands of systems.

d. **Security**:

i. Communication between RMS and Server should be secured and encrypted using TLS/SSL/X 509 certificate etc.

ii. As a part of IoT protocol, Authentication and Authorization should be implemented using a token/password mechanism.

e. **Message Format**: RMS should provide data in a JSON message format as per requirement of implementing agency.

f. **Data Storage**: In case of unavailability of cellular network, RMS should store data locally and on availability of network it should push data to the central Server. Local data storage should be possible for one year in case of unavailability of a cellular network. RMUs should have configuration updates over the Air of multiple parameters such as IP, APN, Data logging Interval, Set Points etc. is essential. Software updating should be possible with 2G and even without the presence of SD card. Software updating process and/or failure to update software shouldn't disrupt pumping operations.

RMS should be connected to the Solar Energy Data Management Platform of the implementing Agency.

g. RMUs should have configuration updates over the Air of multiple parameters such as IP, APN, Data logging Interval, Set Points etc. is essential. Software to be updated through "Programming over the air" on SIA server. Software updating process and/or failure to update software shouldn't disrupt pumping operations.

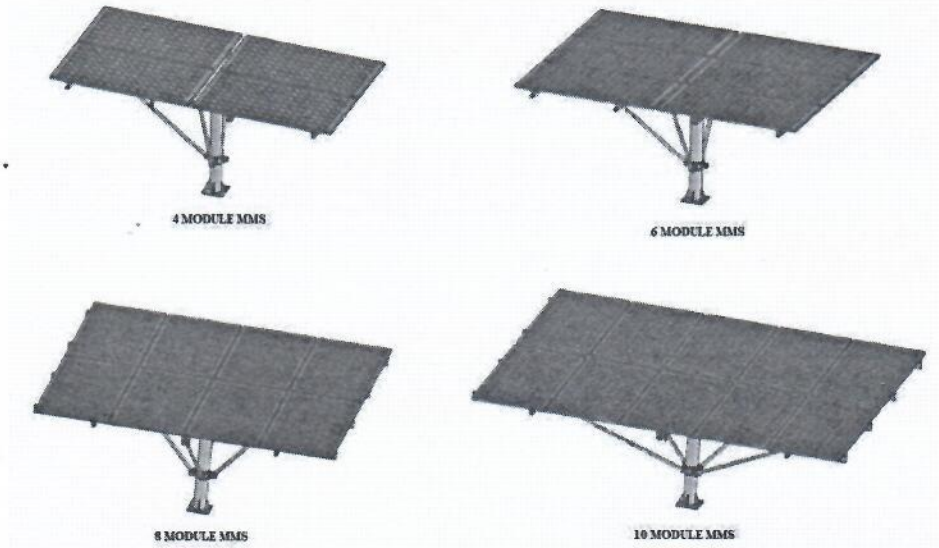
Manufacturer should consider Programming Over the Air (POTA) instead of Firmware Over the Air (FOTA) to update configurable parameters such as server IP, URL, Port, APN, Periodic Interval etc.

6. **Module Mounting Structures and Tracking System**

- Combination of three standard MMS of 8 modules or combination of two standard MMS of 10 Modules and one standard MMS 6 modules for 7.5 HP pump capacity.
- The SPV modules should be mounted on metallic structures of adequate strength and appropriate design, which can withstand the load of modules and high wind velocities up to 150 km per hour. The raw material used and the process for manufacturing of module mounting structure including welding of joints should conform to applicable IS 822. The module mounting structure should be hot dip galvanized according to IS 4759. Zinc content in working area of the hot dip galvanizing bath should not be less than 99.5% by mass.
- To enhance the performance of SPV water pumping systems arrangement for seasonal tilt angle adjustment and three times manual tracking in a day shall be provided. In order to make structure rigid, the gap between

Telescopic pattern supports should be minimal, further, for bearing of center load of whole structure only pins should be used instead of threaded bolts.

- The general hardware for structure fitment should be either SS 304 or 8.8 grade as per IS 6911. Modules should be locked with antitheft bolts of SS 304 Grade. Foundation should be as per the site condition, based on the properties of soil. Foundation can be done either with the help of 'J Bolt' (refer to IS 5624 for foundation hardware) or direct pilling, it should be decided as per the site and relevant IS i.e., IS 6403 /IS 456 /IS 4091 /IS 875 should be referred for foundation design.
- Details of Module Mounting Structure (MMS) are given in following table. These are indicative of minimum standards and the vendors may install MMS with higher standards, which shall be certified by the recognized civil/mechanical/structural engineering department of any IIT/NIT or IISC.



Main Parts of MMS for Solar Water Pumping System		
Sl No.	*Part Name*	*Qty./Set*
1	Main Column	1
2	Top Plate	1
3	Clamp with blade	2
4	Supporting pipe	6/8
5	Main tube	1
6	Side tube	2
7	Mounting purlin	4

5.1.Specifications of Main Parts Used in Mms are given below

1. Centre Shaft

   Centre shaft used in structure shall be of:

   a. For 4, 6 and 8 Modules Structure —Minimum 139 OD with minimum thickness of 4 mm with base plate minimum 10 mm thickness if used and foundation hardware shall be as per IS 5624.

   b. For 10 Modules Structure —Minimum 165 OD with minimum thickness of 4 mm with base plate minimum 20 mm thickness if used and foundation hardware shall be as per IS 5624.

For system without base plate that is, direct pilling is shall be as per the site condition based on the properties of Soil and refer (IS 6403/4091/875/456) for foundation design.

c. Rafters: The main and secondary rafter used in structure shall be of either SHS or RHS pipe sections.

d. Purlin: Mounting purlins used in the structure shall be made of cold form steel section as per IS 1079 with minimum thickness of 2mm.

e. Provision for Seasonal Tilt: In.one structure at least four telescopic supports (three may be used in MMS for 4 modules) either round hollow sections or square hollow section to be provided to support the mounting structure.

f. Provision for Daily Tracking: Provision for daily tracking shall be provided by the way of providing minimum 8 mm thick metal sheet with precision cut grooves.

g. Module Locking System: Modules shall be locked with antitheft bolts of SS 304 Grade.

h. General Hardware for Structure Fitment: Either SS 304 or 8.8 grade hardware shall be used for fitment.

i. Hot Dip Galvanizing: All structure parts shall be hot dip galvanized according to IS 4759.

j. Tolerance for Fabrication: Tolerance for fabrication of steel structure shall as per IS 7215.

k. Welding: Welding shall be done as per IS 822 and grade of welding wire shall be (ER70S-6).

l. Raw Material Test Certificates (MTC): MTC of all types of raw material used in dual axis manual tracking type MMS as per appropriate Indian Standard shall be submitted along with dispatch documents.

m. For ascertaining proper welding of structure part following shall be referred:

   a) Weld wire grade shall be of grade (ER 70 S-6); and

   b) D.P. test (pin hole/crack) (IS 822).

n. For hot dip galvanizing of fabricated structure following shall be referred:

   - Minimum coating required shall be as per IS 4759;
   - Preece test (CuSO4 Dip test) as per IS 2633;
   - Mass of zinc (IS 6745 or IS 4759); and
   - Adhesion test (IS 2629).

Main-Parts of MMS for SPV Water Pumping System

Sl No.	*Part Name*	*Cross Section Detail*	*Length (mm)*	*Quantity Per Set*	*Material Grade*
1.	MAIN COLOUMN				
	4, 6 and 8 Modules	139 OD	1500	1	YST – 240 as per IS 1161/IS 1239 and E250 as per IS 1079/IS 2062
	10 Modules	165 OD	1500	1	
2.	TOP PLATE (Common for all)				
	—	300 OD	—	1	YST – 240 as per IS 1161/IS 1239 and E250 as per IS 1079/IS 2062
3.	MAIN TUBE				
	4 and 6 Modules	60×60×3.6	3300	1	YST – 240 as per IS 1161/IS 1239 and E250 as per IS 1079/IS 2062
	8 and 10 Modules	122×61×3.6	3300	1	
4.	SIDE TUBE				
	4 and 6 Modules	50×50×3.6	3300	2	YST – 240 as per IS 1161/IS 1239 and E250 as per IS 1079/IS 2062
	8 and 10Modules	80×40×3.2	3300	2	
5.	MOUNTING PURLIN				
	4 Modules	80×50×15×2	2050	4	E250 as per IS 1079/IS 2062 and IS 811
	6 Modules	80×50×15×2	3100	4	
	8 Modules	80×50×15×2	4150	4	
	10 Modules	100×50×15×2	5200	4	
6.	CLAMP WITH BLADE				
	4, 6 and 8 Modules (for 139 OD pole)	75×8	380	2	As per IS 1079 and E250 as per IS 2062
	10 Modules(for 165 OD pole)	75×8	380	2	
7.	SUPPORTING PIPES				
	4, 6 and 8 Modules	41 OD and 33 OD	—	6	YST – 240 as per IS 1161/IS 1239 and E250 as per IS 1079/IS 2062
	10 Modules	41 OD and 33 OD	—	8	

GUARANTEE OF PERFORMANCE

- The SPV Water Pumping Systems shall be guaranteed for their performance of the nominal volume rate of flow and the nominal head at the guaranteed duty point under the "Average Daily Solar Radiation" condition of 7.15 kWh/m^2 on the surface of SPV array (i.e., coplanar with the SPV modules. The actual duration of pumping of water on a particular day and the quantity of water pumped could vary depending on the solar intensity, location, season, etc.
- Solar Photo Voltaic Water Pumping Systems shall be guaranteed by the manufacturer against the defects in material and workmanship under normal use and service for a period of **at least 60 months** from the date of commissioning.
- Sufficient spares for trouble free operation during the guarantee period should be made available as and when required.

MARKING AND PARAMETERS TO BE DECLARED BY THE MANUFACTURER

- The motor-pump set and Controller used in SPV Water Pumping Systems shall be securely marked with the following parameters declared by the manufacturer:

1. ***Motor-Pump set***

   a. Manufacturer's name, logo or trade-mark;
   b. Model, size and SI No of pump-set (To be engraved/laser marked on the motor frame);
   c. Motor Rating (kW / HP);
   d. Total head (m), at the guaranteed duty point;
   e. Capacity (LPD) at guaranteed head;
   f. Operating head range (m);
   g. Maximum Current (A);
   h. Voltage Range (V) and;
   i. Type - AC or DC Motor-Pump set;
   j. Solar Photo Voltaic (SPV) Array Rating in Watts peak (Wp);&
   k. Country of origin.

Note: -In addition, a metal name plate containing the above details shall be fixed on the Module Mounting Structure for the information of user.

2. ***Controller***

   a. Manufacturer's name, logo or trade-mark;
   b. Model Number;
   c. Serial Number;
   d. Voltage Range(V);
   e. Power Range (kW) for Controller;
   f. Current rating (A); &
   g. Country of origin.

OPERATION AND MAINTENANCE MANUAL

- An Operation and Maintenance Manual, in English and the local language, should be provided with the solar PV water pumping system. The Manual should have information about solar energy, photovoltaic, modules, DC/AC motor-pump set, tracking system, mounting structures, electronics and switches. It should also have clear instructions about mounting of PV module, Do's and DONT's and on regular maintenance and Trouble Shooting of the pumping system. Helpline number, Name and address of the Service Centre and contact number of authorized representatives to be contacted in case of failure or complaint should also be provided. A guarantee card for the modules and the motor pump set should also be provided to the beneficiary.

Annexure – VII

SKN COLLEGE OF AGRICULTURE
(S.K.N. Agriculture University-Jobner) Jobner

Supply, Installation testing & Commissioning of Solar power system to operate 5 Hp Water Pump
Technical specification

S.NO	Description Of Goods	No. & Description of Package	Specification	Make/ Model of item/ goods offered	Proof (submitted at page No.)
1.	A. SPV Module IEC Certified Poly Crystaline Silicon not less than 300kw B. Solar Photovoltaic (SPV) Pump Controller C. Module Mounting Fixed Structure (GI) D. Balance of System, Earth Kit/Wires (Polycab,Finolex etc) and other Accessories E. Foundation of the structure *F.* Motor Pump Set 5 hp with accessories G. Remote Monitoring System (RMS) and Tracking System	Complete set	As per given specifications		

- **Bid Specific MAF is required**
- **The OEM must be in the top 5 IDC rated IT equipment manufacturer in India**
- **Average turnover of Rs 20.00 lacs in the last 3 financial year.**
- **3 Equal or above value workorder of similar item in govt institute in last 3 years**

Signature of Tenderer with seal