

Chapter 12.00 : SOLAR PHOTOVOLTAIC INSTALLATION FOR WATER PUMPING SYSTEM

For 1 HP, 2 HP, 3 HP, 5 HP, 7.5 HP, 10 HP, 15 HP, 17.5 HP & 20 HP Off-Grid Solar Water Pumping System (Surface Pump-Motor Set / Openwell / Submersible Pump-Motor Set)

Sl. No.	Description of Item as proposed	Unit	Basic Rate in Rs
1	<p>Solar Module: Supply , transport , installation and commissioning of ISI marked Solar Modules as per following specification: 1. Cell: Indigenous mono crystalline silicon SPV cells 2. Solar Module: Monocrystalline cell with PERC technology / module with bifacial cell. 3. Standards: ISI marked as per IS 14286 and having certification of IEC 61853(1), 61730(1&2), 61710 4. Modules must qualify to IS 170210 (Part 1) 5. Min. Efficiency: 19.5%. 6. Fill factor: More than 75% . 7. Module wattage mismatch in the SPV array: within $\pm 3\%$ 8. Wattage output warranty: Should not be less than 90% at the end of 10 years and 80% at the end of 25 years.</p> <p>9. The power output of individual PV modules used in the PV array, under STC: minimum 300 Wp. Necessary test certificates also to be supplied. For detail information please see Cl. no. 2.1 of technical specification .</p> <p>a) For 1 HP Off-grid Solar Water Pumping System with Monocrystalline/ Monocrystalline PERC/bifacial SPV modules - 900 - 1200 Wp.</p> <p>b) For 2 HP Off-grid Solar Water Pumping System with Monocrystalline/ Monocrystalline PERC/bifacial SPV modules - 2150- 2400 Wp.</p> <p>c) For 3 HP Off-grid Solar Water Pumping System with Monocrystalline/ Monocrystalline PERC/bifacial SPV modules - 3200-3400 Wp.</p> <p>d) For 5 HP Off-grid / On-grid Solar Water Pumping System with Monocrystalline/ Monocrystalline PERC/bifacial SPV modules - 5400-5800 Wp.</p> <p>e) For 7.5 HP Off-grid / On-grid Solar Water Pumping System with Monocrystalline/ Monocrystalline PERC/bifacial SPV modules - 8000-9000 Wp.</p> <p>f) For 10 HP Off-grid / On-grid Solar Water Pumping System with Monocrystalline/ Monocrystalline PERC/bifacial SPV modules - 10800 - 11400 Wp.</p> <p>g) For 15 HP Off-grid / On-grid Solar Water Pumping System with Monocrystalline/ Monocrystalline PERC/bifacial SPV modules - 16000 - 18000 Wp.</p> <p>h) For 17.5 HP Off-grid / On-grid Solar Water Pumping System with Monocrystalline/ Monocrystalline PERC/bifacial SPV modules - 18000 - 20000 Wp.</p> <p>i) For 20 HP Off-grid / On-grid Solar Water Pumping System with Monocrystalline/ Monocrystalline PERC/bifacial SPV modules - 22600 - 25200 Wp.</p>	WP	32.29
2	<p>Module Mounting Structure (For 1 HP, 2HP, 3HP, 5HP and 10 HP Solar Water Pumping System): Supply , transportation & installation of G.I manual tracking / Fixed structure made of MS hollow sections, pipes, plates, angles etc as per IS:4923, IS:1161/1239, IS:1079/2062, to hold min 300 Wp SPV Module as per drawing and technical specification. The steel structure is to be protected with minimum 80 micron galvanisation(hot dip) and provided with fixed arrangement or dual axis manual tracking arrangement for three times in a day and seasonal tilting to face the sun optimally.</p> <p>The approximate weight of the Module Mounting Structure given in Clause no.5.1 should be followed.</p>	Kg	157.00

3	Power conditioning unit with enclosure : Supply , transport , installation and commissioning of Solar Power conditioning Unit consisting of following components and features: 1) Variable frequency Drive with inbuilt MPPT, voltage range suitable for operating pump-motor set of 1HP to 20 HP, detail mentioned in Cl.6.1 2) Power input : DC source for 1HP, 2HP and 3HP. 3) Power input : AC / DC source or hybrid for 5HP and above. 4) Incomer: DC MCB 2 Pole 16 amp upto 5 HP, 25 amp for 7.5HP and 10 HP, 40 amp for 15 to 20 HP as per IS/IEC 60947-2 5) Incomer: AC MCB 4 pole 16 amp for 5.0 HP, 25 amp for 7.5HP and 10 HP, 40 amp for 15 to 20 HP as per IS/IEC 60947-2 6) Type II DC SPD of 40 KA. 7) Type II AC SPD of 40 KA for AC/ DC or Hybrid input. 8) Dual input (solar/Grid) 25 amp changeover switch for 5HP and 7.5 HP, 40 amp for 10 HP, 63 amp for 15 to 20 HP 9) Reverse protection diode 1600 VDC with heat sink. 10) Data Logger. 11) Remote monitoring system. 12) Should have built –in EMC filters . 13) IP 65 glands for cable in and out. 14) Min. IP 54 enclosure. For detail features, protections, RMS, Communication architecture, Security, Data storage, tolerance of various parameters, standards to be qualified, etc. please refer to Cl. 6.1 of technical qualification. Note: AC SPD, AC MCB and Selector switch to be provided only for item no. 3(f) to 3(l).		
	a) For 1 HP capacity Pump-motor set with DC input	Set	19056.00
	b) For 2 HP capacity Pump-motor set with DC input	Set	32097.00
	c) For 3 HP capacity Pump-motor set with DC input	Set	40250.00
	d) For 5 HP capacity Pump-motor set with DC input	Set	56882.00
	e) For 7.5 HP capacity Pump-motor set with DC input	Set	71300.00
	f) For 10 HP capacity Pump-motor set with DC input	Set	80155.00
	g) For 5 HP capacity Pump-motor set with AC / DC or hybrid input	Set	66381.00
	h) For 7.5 HP capacity Pump-motor set with AC / DC or hybrid input	Set	85687.50
	i) For 10 HP capacity Pump-motor set with AC / DC or hybrid input	Set	89655.00
	j) For 15 HP capacity Pump-motor set with AC / DC or hybrid input	Set	116915.00
	k) For 17.5 HP capacity Pump-motor set with AC / DC or hybrid input	Set	123125.00
	l) For 20 HP capacity Pump-motor set with AC / DC or hybrid input	Set	127725.00
4	Cable and Accessories : Supplying, fitting and fixings of UV rated Copper Cable laid inside HDPE conduit and other accessories as per followings with necessary connection with the Solar PV Module, MPPT etc. i. 4.0 Sq mm single core multi studs - 5m(for 1HP/2HP/3HP) & 20m(for 5/7.5/10/15/17.5/20 HP) ii. Lugs, HDPE Pipe, Flexible Pipe, Saddle, Cable tie etc		
	a) For 1 HP/2 HP/3HP per structure	Each	1134.00
	b) For 5 HP per structure	Each	3434.00
	c) For 7.5/10 / 15 / 17 .5 / 20 HP per structure	Each	3434.00

5	<p>Earthing: Earthing with 50 mm dia GI pipe 3.64 mm thick x 3.04 Mts. long and 1 x 4 SWG GI (Hot Dip) wire (4 Mts. long), 13 mm dia x 80 mm long GI bolts, double nuts, double washers incl. S & F 15 mm dia GI pipe protection (1 Mts. long) to be filled with bitumen partly under the ground level and partly above ground level driven to an average depth of 3.65 Mts. below the ground level as below:</p> <p>By ISI-Medium GI pipe including excavation of soil for installation of Earth Electrode and filling & ramming and connecting to individual structure to earth electrode including S&F 20 mm x 3 mm galvanised (Hot Dip) MS flat on wall/floor with GI saddles as required and connection to equipments incl. drilling holes, with bolts, nuts, washers etc.</p>	Each Set	2661.00
6	<p>a) Lighting System at Scheme: (with lighting Pole) : Dusk to dawn lighting arrangement of at 4 mts height above ground level, with Hot dip galvanised 80 mm x 50 mm , medium duty pipe, with 12 V, 15Ah 2-in-1 Lithium ion/ Ferro- Phosphate battery with in-built 7-11watt LED lamp , 50 Wp solar panel (min 19% Eff.) to cover the scheme area. The lighting system should be warranted for 5years from the date of installation.</p>	Set	19030.00
	<p>b) Lighting System at Scheme: (Mounted on Pump House wall) : Dusk to dawn lighting arrangement fitted with 40mm G.I pipe properly clamped on pump house wall, with 12 V, 15Ah, 2-in-1 Lithium ion/ Ferro- Phosphate battery with in-built 7-11 watt LED lamp , 50 Wp solar panel (min 19% eff.) to cover the scheme area. The lighting system should be warranted for 5years from the date of installation.</p>	Set	14219.00
7	<p>a) Lightning protection (Pole mounted): Lightning protection with 1.5" G.I pipe of 4 mts + 0.75 mts height with base flange in proper RCC foundation and S & F Lightning Conductor Air Terminal made of 20 mm dia 1000 mm long GI pipe (ISI Medium) having five discharge prongs of 4 SWG GI (Hot Dip) wire at top duly soldered with 7/16 stranded GI (Hot Dip) wire and 85 mm dia 6 mm thick GI base plate at bottom incl. necessary holes etc. Earthing with 65 mm dia GI pipe (Medium) 3.0 Mts. long and 1 x 19/10 stranded GI (Hot Dip) wire (4 Mts. long), 20 mm dia x 125 mm long galvanized bolt, double nuts, double washers including socketing at both ends of stranded GI (Hot Dip) wire by crimping sockets/ thimbles and S & F 65 mm dia GI pipe (ISI-Medium) protection (3 Mts. long) to be filled with bitumen partly under the ground level and partly above ground level to an average depth of 3.65 Mts. (Provision of one lightning protection for each structure)</p>	Each	6725.00
	<p>b) Lightning protection (Pole mounted): Lightning protection with 3" X 1.5" G.I pipe of 6m + 1 m height with base flange in proper RCC foundation and S & F Lightning Conductor Air Terminal made of 20 mm dia 1000 mm long GI pipe (ISI Medium) having five discharge prongs of 4 SWG GI (Hot Dip) wire at top duly soldered with 7/16 stranded GI (Hot Dip) wire and 85 mm dia 6 mm thick GI base plate at bottom incl. necessary holes etc. Earthing with 65 mm dia GI pipe (Medium) 3.0 Mts. long and 1 x 19/10 stranded GI (Hot Dip) wire (4 Mts. long), 20 mm dia x 125 mm long galvanized bolt, double nuts, double washers including socketing at both ends of stranded GI (Hot Dip) wire by crimping sockets/ thimbles and S & F 65 mm dia GI pipe (ISI-Medium) protection (3 Mts. long) to be filled with bitumen partly under the ground level and partly above ground level to an average depth of 3.65 Mts. including connection to earth electrodes with 25 X 6mm G.I strip. (Provision of one lightning protection for each scheme as per drawing)</p>	Each	10683.00
8	<p>Supply and installation of 3 phase AC electromotor pump-motor set with speed of 3000 r.p.m(synchronous speed) suitable for Solar applications and shall have 60 months guarantee for the following conditions including loading, unloading, transportation etc.:- (Refer technical specification for more detail)</p>		
	<p>a) 1 HP 3 phase AC surface mounted Monoblock Pump-motor set as per IS 9079 with with discharge of 4.0 -5.0 Lps at 8 mts. total head with , required quantity of flexible delivery pipe(10m), clamps , cable and all other accessories to complete connection of suction and delivery side .</p>	Set	18155.00

	b) 2 HP 3 phase Monoblock Pump-motor having discharge at required head as below:-		
	i) 2 HP 3 phase AC surface mounted Monoblock Pump-motor set as per IS 9079 with 2.60 - 2.78 Lps discharge at 26 mts. total head suitable for 2.0 Ha CCA Sprinkler / Drip operation with foot valve, required quantity of flexible suction pipe(15m), clamps, bend, footvalves and all other accessories to complete connection of suction and delivery side .	Set	28284.00
	ii) 2 HP 3 phase AC Open well submersible pump set with external part made of stainless steel of grade 304 or higher as per IS 6911 and IS 3444, for PDW with discharge of 5.0 -6.0 Lps at 16 mts. total head with , required quantity of flexible delivery pipe(20m), clamps , cable and all other accessories to complete connection of suction and delivery side . The pump motor should be tested as per IS 14220.:2018(first revision)	Set	29838.00
	c) 3 HP 3 phase AC surface mounted Monoblock Pump-motor having discharge at required head as below:-		
	i) Surface Pump-motor set for STW, as per IS: 9079 with discharge of 6.50-7.14 Lps at 16 mts. total head with foot valve, required quantity of flexible suction pipe(15m), clamps, bend, footvalve and all other accessories to complete connection of suction and delivery side .	Set	40233.00
	ii)Surface mounted Monoblock Pump-motor set, as per IS: 9079 with 3.8 Lps discharge at 28 mts. total head suitable for 2.6/ 3.0 Ha CCA Sprinkler / Drip operation with foot valve, required quantity of flexible suction pipe(15m), clamps, bend, footvalves and all other accessories to complete connection of suction and delivery side .	Set	41493.00
	iii) Open well submersible pump set with external part made of stainless steel of grade 304 or higher as per IS 6911 and IS 3444, for PDW with discharge of 6.50-7.14 Lps at 18 mts. total head with required quantity of flexible delivery pipe(15m), clamps, bend, footvalves and all other accessories to complete connection of suction and delivery side. The pump motor should be tested as per IS 14220.:2018(first revision)	Set	39011.00
	d) 5 HP 3 phase AC Pump-Motor set having discharge at required head as below:-		
	i) Monoblock Surface Pump-motor set as per IS: 9079 for mini RLI scheme with discharge of 13.8 Lps at 18 mts. total head with 100/80 mm dia. reinforced PVC suction pipe (20m) and delivery pipe(10mts), foot valve, nipple, priming bend Cable and all other required accessories to complete connection of suction and delivery side .	Set	62406.00
	ii) Open well submersible pump set with external part made of stainless steel of grade 304 or higher as per IS 6911 and IS 3444, for PDW with discharge of 13.8 Lps at 18 mts. total head with 100/75 mm dia. reinforced PVC delivery pipe(15mts), nipple, priming bend Cable and all other required accessories to complete connection of suction and delivery side. The pump motor should be tested as per IS 14220.:2018(first revision)	Set	50239.00
	iii) Submersible Pump-motor set for LDTW with external part made of stainless steel of grade 304 or higher as per IS 6911 and IS 3444, with discharge of 7.5 Lps- 5.83 Lps at 30 mts.-35 mts. total head with cable(3m), cover plate, Socket, Flanged Nipple, Rubber Insertion, Nuts& bolts and all other accessories including transportation of Bend, Column Pipes, cable, sluice valve, lay flat hose pipe etc. from Deptt. Store to site within 100km. The pump motor should be tested as per IS 8034:2048(third revision)	Set	46339.00
	iv) Monoblock surface Pump-Motor set as per IS: 9079 for Drip & Sprinkler irrigation with discharge of 5.80 Lps at 35 mts. total head with PVC reinforced suction pipe(20m) & delivery pipe(10m), foot valve, nipple, priming bend, Cable and all other required accessories. to complete connection of suction and delivery side of the sprinkler system.	Set	57490.00



	e) 7.5 HP ISI marked 3 phase 415V AC pump-Motor set having discharge at required head as below:-		
	i) Monoblock Surface Pump-motor set as per IS: 9079 for mini RLI scheme with discharge of 13.88 Lps at 24 mts. total head with 100/80 mm dia. reinforced PVC suction pipe (20m) and delivery pipe(10mts), foot valve, nipple, priming bend Cable and all other required accessories to complete connection of suction and delivery side .	Set	83688.00
	f) 10 HP 3 phase AC pump-Motor set having discharge at required head as below:-		
	i) Monoblock Surface Pump-motor set as per IS: 9079 for mini RLI scheme with discharge of 24 Lps at 18 mts. total head with 100/80 mm dia. reinforced PVC suction pipe (20m) and delivery pipe(10mts), foot valve, nipple, priming bend Cable and all other required accessories to complete connection of suction and delivery side .	Set	92524.00
9	Testing and commissioning of scheme after completion of all work	Item	2000.00
10	a) Supply, fitting and Fixing of Pump-motor shed of height 0.85m(as per drawing) with Hot dip Galvanised ISA 25X25x3 & 1.5mm MS sheet including foundation Base of 0.95m x 0.65m for Pump Unit (BFS, .075mm 1:2:4 PCC, 100mm 1:1.5:3 CC) - For 2HP and 3HP surface pump.	Each	4965.00
	b) Supply fitting and fixing of Hot dip Galvanised (min 80 micron) / Powder Coat painted / Galvanised M.S Kiosk Box of 800(L) X 500(W) X 650(H) and total height with legs is 950mm (above ground) including foundation(as per drawing) for mounting of motor-pump set including transportation, - For 5 HP surface pump.	Each	14157.00
11	Cleaning and washing of modules once in month with clear water to remove deposited dust and dirt on the module surface and keep the modules clean throughout the year. The activity to be performed for eight months in a year excluding four monsoon months. A log book should be maintained at the site for the said purpose.	Each structure/ Month	300.00
	Comprehensive maintenance charges for 5 years (which cover monthly inspection, Yearly training to WUA, to attend breakdown within 3 days and to keep the scheme in operation without lapse of time)		
	a) For 2 HP both for Submersible & Surface pump	Wp	4.00
	b) For 3 HP both for Submersible & Surface pump	Wp	4.00
	c) For 5 HP both for Submersible & Surface pump	Wp	3.00
	d) For 7.5/10 / 15 / 17.5 / 20 HP both for Submersible & Surface pump	Wp	3.00
12	Note:1 Total comprehensive maintenance charge is to be withheld in addition to Security Deposit. Comprehensive maintenance charges will be released @ i) Rs 0.80 for 2 HP, ii) Rs.0.80 for 3 HP, iii) Rs.0.60 for 5 HP / 7.5/ 10 HP / 15HP / 17.5HP and 20 HP Submersible & Surface per Wp per year at the end of each maintenance period i.e.at the end of 1st year, 2nd year, 3rd year, 4th year& 5th year. In case the "Bidder" does not provide service during the warranty & comprehensive maintenance period, the amount so held up will be forfeited .		

13	Remote monitoring for 5 years: Provision for remote monitoring for the pumps must be made in the pump controller through an integral arrangement having following basic functions: a. Controller must be assigned with a unique serial number and its live status must be observed remotely on online portal through login credentials. b. Live status must indicate whether controller is ON/ OFF. The parameters i.e. the water output, water flow rate, in fault condition, array input voltage/ current, power and motor frequency should at logged at an interval of 10 minutes c. Controller must have a back up to store the data locally (at least for 1 year) supply & installation of GSM/GPRS based Data Transmitter or Modem and to provide remote monitoring service to transmit the parameters to central server from the solar pumping system with time stamp at user-defined interval and report generation at the buyer end. (Refer Technical Spec.)	Item	21850.00
14	Insurance @ 2% for Item No. 1, 3, 6a/6b, and 8 for a period of 5 years.	Item	
	Note:2 1st year's Insurance charge is to be paid on production of Original Receipt of premium payment. Remaining 4 years Insurance payment is to be withheld which will be released during 2nd, 3rd , 4th & 5th year on production of Original Receipt of premium payment.		
	Note 3: (i) Extra rate for difficult/Reverine Areas connected by river route and/or ferry crossing as applicable as per current PWD Schedule of Rates (Building Works) for item no. 2 & 3. (ii) Extra rate for transportation @ 2% for item no. 1 & 2 as applicable for the district of Malda, Uttar Dinajpur, Dakshin Dinajpur , Jalpaiguri, Cooch Behar, Alipurduar and Siliguri Mahakuma Parishad (SMP) area.		

Add: GST, Labour Cess & Contingency as per provision of the SOR of WRI&DD.

N.B.1.0: For preparation of estimate, the maximum Watt peak(Wp) as specified in Sl.no.1 shall be taken into consideration, while payment shall be made as per actual Watt peak installed. N.B.2.0: Suitable and stable reinforced cement concrete foundation for module mounting structure shall be constructed as per approved drawing and for preparation of estimate of foundation current PWD SOR should be followed. For this structure extra rate for difficult/Reverine Areas connected by river route and/or ferry crossing as applicable as per current PWD Schedule of Rates (Building Works)

Chief Engineer - II, WRDD

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Chairman, Schedule Revision Committee, WRI&DD