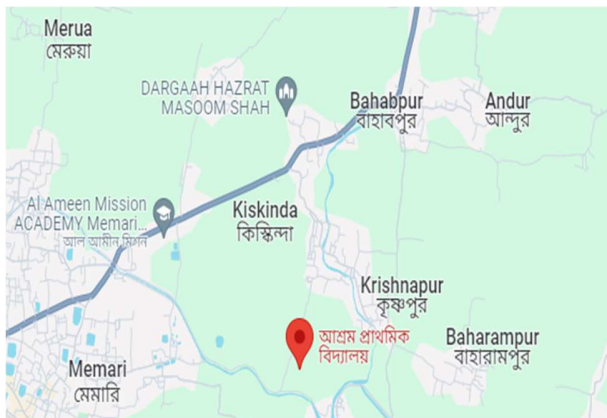


**DRINKING WATER SCHEME OPERATED BY SOLAR POWER UNDER 15TH FC
TIED FUND AT DIFFERENT BLOCKS UNDER PURBA BARDHAMAN ZILLA**



Khayerpur Ashram, Memari II Block, PBZP



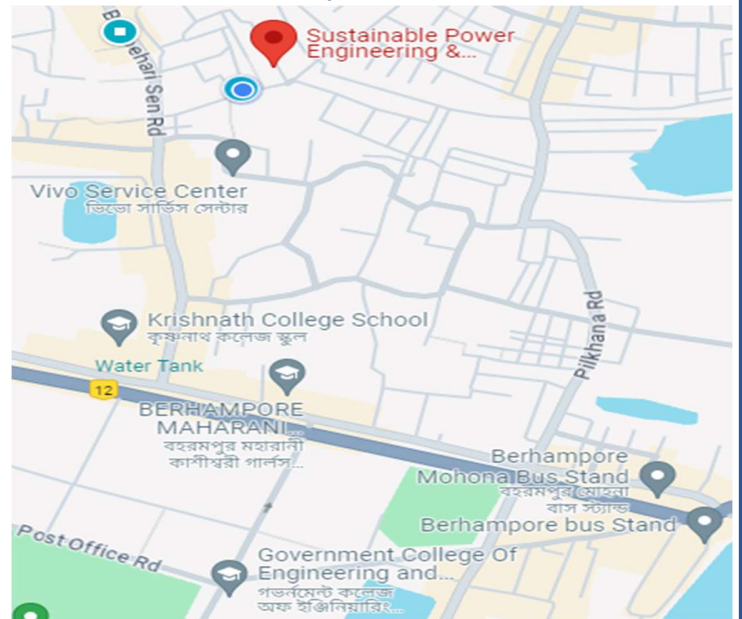
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DRINKING WATER SCHEME WITH SOLAR

15th Finance Commission is a constitutional body, that determines the method and formula for distributing the tax proceeds between the Centre and states, and among the states as per the constitutional arrangement and present requirements. This grant is fully sponsored by Government of India. Present 15th Finance Commission will cover a period of five years from the year 2021-22 to 2025-26.

The Basic Untied Grants and can be used by the local bodies for location felt needs, except of Salary or other establishment expenditure. It includes the following:

- *Immunization of children.*
- *Construction, repair and maintenance of roads within / inter Gram Panchayat(s).*
- *Construction, repair and maintenance of footpath within / inter Gram Panchayat(s).*
- *Construction, repair and maintenance of LED street lights and solar lighting within / inter Gram Panchayat(s).*
- *Construction, repair and maintenance of crematorium and acquisition of land for crematorium grounds, upkeep of dead body burial ground.*
- *Providing sufficient and high bandwidth Wi-Fi digital network services within GP.*

The Basic Tied Grants and can be used by the local bodies for location felt needs, except of Salary or other establishment expenditure. It includes the following:

- ❖ *Sanitation and maintenance of open defecation free (ODF) status.*
- ❖ *Supply of drinking water, rain water harvesting and water recycling.*
- ❖ *Storm Water Drainage and water logging management.*

The 15th CFC Grant allotted to the 3-Tier PRI bodies in the following manner:

- ✓ *Zilla Parishads - 15% Of Total Grant*
- ✓ *Panchayat Samities - 15% Of Total Grant*
- ✓ *Gram Panchayats - 70% Of Total Grant*

DETAILS OF DEPARTMENT

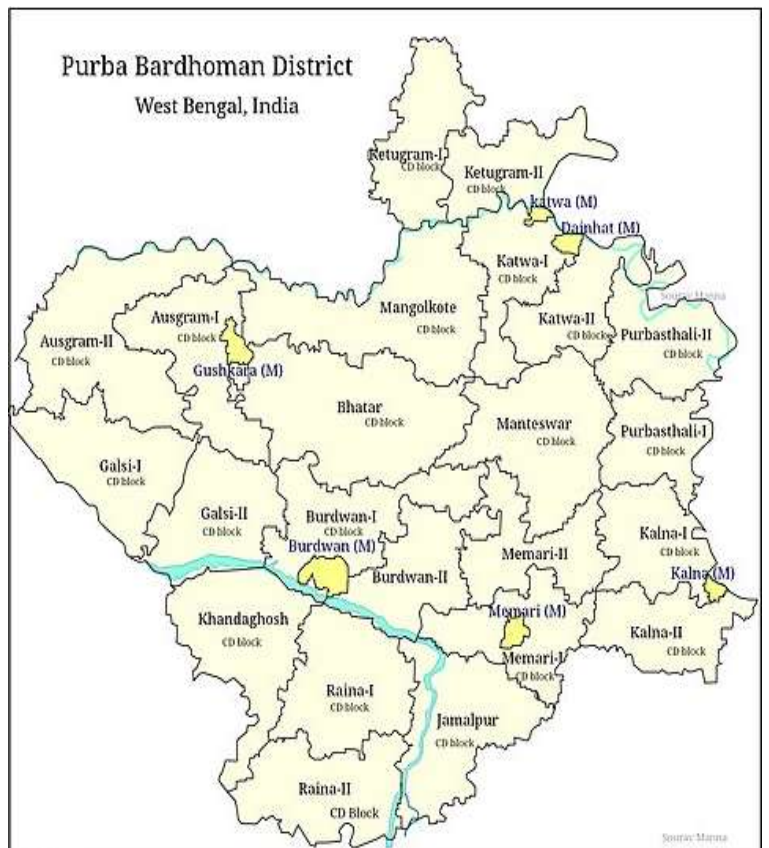
Bardhaman which was also called Burdwan, having a major communications Centre located on the banks of the Damodar River, the town Bardhaman is the district headquarter of Purba Bardhaman. It was named after the 24th Jain monk, Tirthankar Bardhaman Mahavir. Burdwan also played an important role in the Gupta age and during the rule of the Sen kings. During the later Muslim and Mughal period Burdwan was an important administrative headquarters under West Bengal. The building of Purba Bardhaman Zilla Parishad is situated at Court Compound which is near of Curzon Gate (Bijoy Toron), heart of the town as well as in district. The complete address of the location is Burdwan District Court Compound, Kachhari Road, Kalibazar, Bardhaman, West Bengal 713103.

There are 4 Nos of Sub-Divisions, 23 Nos Blocks & 215 No. of Gram Panchayats under this Zilla Parishad. It was formed on 7 April 2017 after the division of the previous Bardhaman district.



The district comprises four subdivisions:

- 1) **Kalna subdivision** consists of one municipality at Kalna and five CD blocks: Kalna I, Kalna II, Manteswar, Purbasthali I and Purbasthali II.
- 2) **Katwa subdivision** consists of two municipalities at Katwa and Dainhat and five CD blocks: Katwa I, Katwa II, Ketugram I, Ketugram II and Mongakote.
- 3) **Bardhaman Sadar North subdivision** consists of two municipalities at Bardhaman and Guskara and seven CD blocks: Ausgram I, Ausgram II, Bhatar, Burdwan I, Burdwan II, Galsi I and Galsi II.
- 4) **Bardhaman Sadar South subdivision** consists of one municipality at Memari and six CD blocks: Khandaghosh, Raina I, Raina II, Jamalpur, Memari I, Memari II, Raina I and Raina II.



PROJECT DETAILS

Installation of Solar Submersible Pump at different places under Monteswar, Memari-I, Memari-II, Ketugram-I, Ketugram-II Blocks out of XV FC Tied Fund under Purba Bardhaman Zilla Parishad.

The above mentioned work belongs to the Tied Fund of XV FC. The grants are to be utilized for basic facilities, specifically for drinking water and sanitation. The 15th Finance Commission used the following criteria while determining the share of states:

- I. 45% for the income distance
- II. 15% for the population in 2011
- III. 15% for the area
- IV. 10% for forest and ecology
- V. 12.5% for demographic performance and
- VI. 2.5% for tax effort.

Out of the total grants for health through Local Governments of Rs 70,051 crore, Rs 43,928 Crore has been allocated as tied grants for the 28 states through Rural Local Bodies (RLBs) and Rs. 26,123 Cr has been allocated as tied grants for Urban local bodies (ULBs).

Grants to local bodies: The total grants to local bodies will be Rs 4.36 lakh crore (a portion of grants to be performance-linked) including:

- A. Rs 2.4 lakh crore for rural local bodies
- B. Rs 1.2 lakh crore for urban local bodies, and
- C. Rs 70,051 crore for health grants through local governments.

The 73rd Constitutional Amendment Act of 1992 added Part IX to the Constitution of India, i.e., 'The Panchayats' and also added the 'Eleventh Schedule', the later consists of 29 subjects wherein the Panchayats are given administrative control. This was one of the important steps in strengthening the local self-governments and developing a 'responsible and responsive' leadership at village level. Under the 'Eleventh Schedule', two important subjects are 'drinking water' and 'health and sanitation, including hospitals, primary health centers and dispensaries'.

Potable drinking water, improved sanitation and hygiene hold the key to public health. To improve the lives of people living in rural areas and reduce the drudgery of women and girls in fetching water, often from afar, the Government of India in partnership with the States is implementing.

The State Governments (Finance Department) should transfer each instalment of the Tied grant received from the Government of India to all the concerned entities (GP/ BP/ ZP/ excluded areas, if

any) **without any deduction** through their nodal department as per the share worked out in Step-I and Step-II **within ten working days of receipt from the Union Government.**

KEY MATERIALS USED WITH DETAILS

■ SOLAR PANELS (POLY CRYSTALLINE SOLAR MODULE): -

To implement this project, we vastly used the top manufactures modules with its bench mark quality & efficiency.

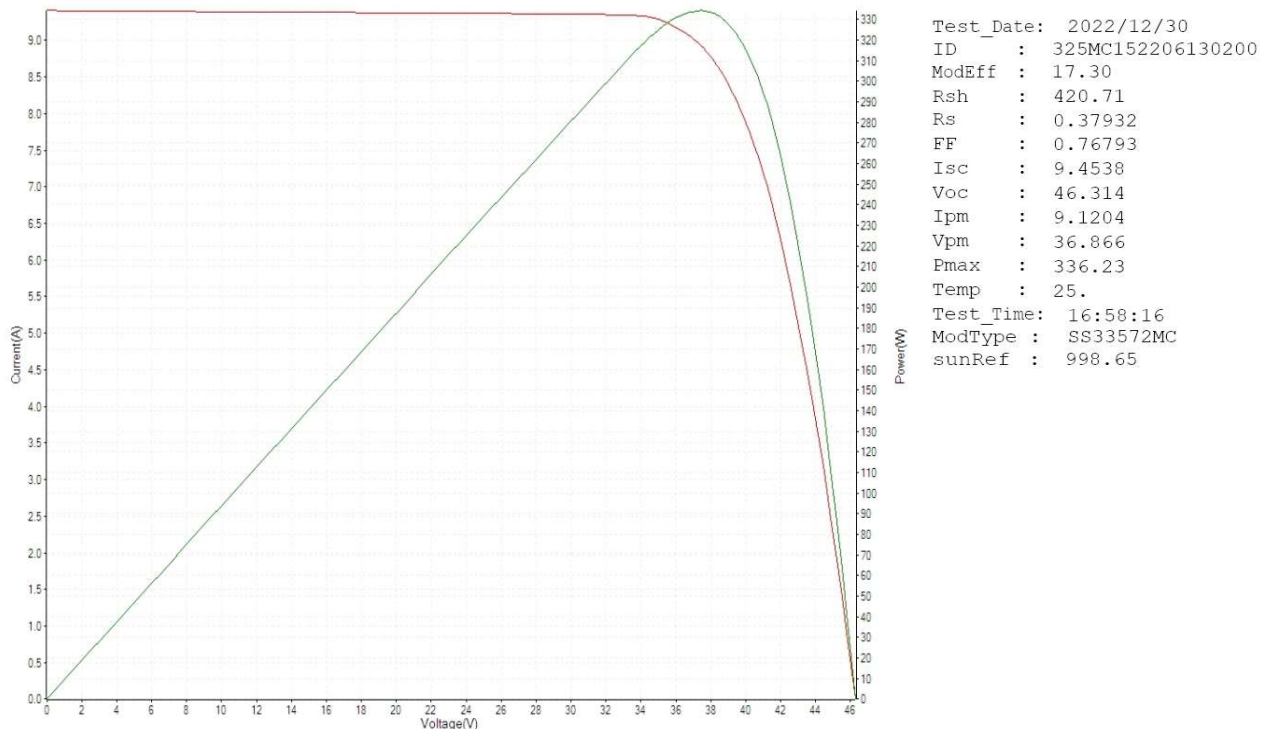
In this project we used the quality material with its genuine certificated affiliated by the MNRE, Govt. of India / IEC. The Solar Module of multi crystalline cell with min. efficiency of 15% and fill factor more than 70%, laminated between sheet of Ethylene Vinyl Acetate (EVA) and high transmissivity 3.2 mm tempered glass, framed in anodized aluminum frame.

The power output of individua PV modules used in the PV array, under STC. A minimum of 300-Watt peak with adequate provision for measurement tolerances. Modules supplied with the Spy system having certificate as per IEC61215 specification or equivalent National or International standards. Modules qualified the IEC 61730 part I and part II for safety qualification testing and Salt Mist Corrosion Testing as per IEC61701/IS 61701.

Having warranty for output wattage, which should not be less than 90% at the end of 10 years and 80% at the end of 25 years.

Here we used 4 nos of Solar Modules which each has a capacity of 335 wp. Total 1340 wp module used in each of the project. Total 200 nos 335 wp Solar polycrystalline modules used in this entire project. Total 200 X 335= 67000 wp / 67 kwp module used regarding this project.

The current voltage curves (IV Curve) which located the quality of the generation of the used module with its complete date to optimize the project.





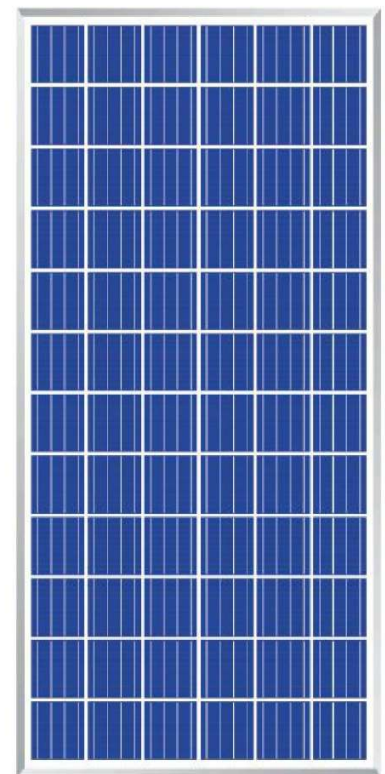
ENERGISING THE FUTURE...



SS33572MC

335wp

- Excellent Power Output with +ve Tolerance upto **4.99Wp**
- 12 Years** Limited Product Warranty
- 25 Years** of Linear Power Guarantee
- Online **EL** Testing (Pre & Post Lamination) for ensuring defect free modules
- All products are **PID**, Ammonia & Salt mist corrosion resistant
- Excellent performance at low **Light** condition
- Excellent **Temperature** coefficients and performance



- The panels are constructed with Anti Reflective Coating (ARC) toughened low iron, textured high light transmission glass
- Multi layer composite Film and Fast Cure, PID resistant EVA
- Reinforced anodized Aluminum Frame with Twin Wall Profile
- Pre-drilled frame for easy mounting
- IP68 rated Junction Box connector
- Solar MC4 compatible connector

APPLICATION

- On-grid system
- BIPV
- Solar Farms
- Standalone (off-grid)
- Systems
- Battery Charging
- Solar Water Pumping

CONSTRUCTIONAL CHARACTERISTICS

- Glass
- EVA
- Cells
- EVA
- Back Sheet
- Frame

CERTIFICATION

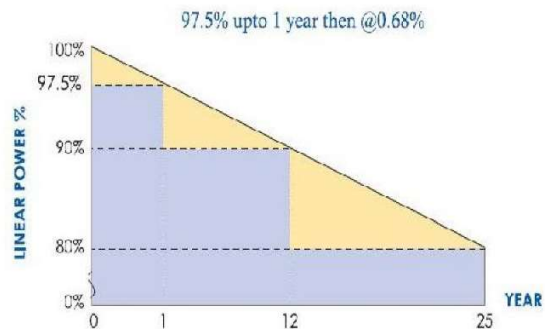
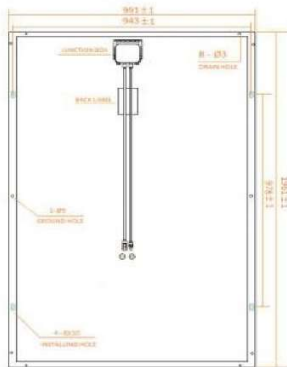
- IEC 61215
- IS 14286
- IEC/IS 61730 Part I & II
- IEC 62804 (PID)
- IEC 62716
- IEC 61701
- IS 16170
- OSHAS 18001-2007



SS33572MC

335wp

SPECIFICATIONS	SS33572MC
	Multi Crystalline Solar Cell
Electrical Characteristics	
Open Circuit Voltage (Voc)	46.42 V
Optimum Operating Voltage (Vmp)	36.87V
Short Circuit Current (Isc)	9.41A
Optimum Operating Current (Imp)	9.10 A
Power at STC (Pmax)	335 W
Module Efficiency (n) %	17.24%
Operating Conditions	
	-40°C to +85°C at 85% RH
Temperature Co-efficient for Voc/°C (β)	-0.25%
Temperature Co-efficient for Isc/°C (α)	0.076%
Temperature Co-efficient for power/°C (γ)	-0.277%
NOCT	45°C ± 2°C
Mechanical Characteristics	
Weight	21.3Kg
Module Dimension (L) X (W) X (D)	1961X 991 X 40 mm
Mounting Hole (Oblong)	8 X 10 mm
Mounting Hole CTC distance - vertical	978 mm
Mounting Hole from corner (h)	491.5mm
Mounting Hole CTC distance - horizontal	943 mm



* SUBJECT TO AVAILABILITY OF CELLS

DLF GALLERIA, Office No. DGK 917, 9th floor, Block No. BG-8, AA-IB, New Town, Kolkata 700 156, West Bengal, India.
Ph. +91 33 4008 2772 | Fax: +91 33 4006 2773 | E-mail: sales@sovasolar.com



www.sovasolar.com

■ SUBMERSIBLE WATER PUMP & MOTOR SET (1 HP 3Φ): -

The water pump motor takes water from any available water source, including from underground or another water source, that can be used for irrigation, household, or other purposes. Here we used the pump motor set to satisfy the Drinkable water requirement of the communities as per the requirement.

100 mm Borewell submersible motors which is commonly known as **V4** motor are pre-filled with non-toxic liquid for best performance in low voltage and high efficiency. The pump is firmly coupled to a submersible electric motor which operates submerged beneath the surface of water. The optimal design of impeller and diffuser enables the best possible hydraulic efficiency. Built-in check valve prevents back flow and reduces the risk of water hammering.

Salient Features of the material are the Motor portion covered with corrosive resistance Stainless steel (SS 304) shell which is more durable and hygiene with high operating efficiency. The material is specially designed for angular contact bearing to withstand high axial thrust load & easy removal of stator ensures service feasibility. These pump set designed for wide voltage operation. Non-toxic pre filled liquid motor ensures low voltage performance.

MATERIAL OF CONSTRUCTION - PUMP

Part Name	Material
Suction housing	Cast iron
Impeller	Noryl / Delrin
Diffuser chamber	Cast Iron / Noryl / SS 304
Pump shaft	SS 410 / SS 431 / SS 304
Check valve housing	Cast iron
Check valve	Delrin
Outer shell	SS 304
Counter thrust pad	SS 304 / Hylem
Intermediate bearing (Sleeve / Bush)	SS 304 / NBR / LTB 4 (Gun metal with rubber)
Coupling	SS 304 / 410

MATERIAL OF CONSTRUCTION - MOTOR

Part Name	Material
Shaft seal	Nitrile butyl rubber / Mechanical seal
Rotor shaft	SS 410 / SS 431
Stator shell	SS 304
Bearing	SS Ball Bearing & SS Angular contact bearing
Diaphragm	High Nitrile Butyl rubber

Detailed specification of the pump is here with:

✓ Power range	0.37 kW - .75 kW (0.5 HP - 1 HP)
✓ Speed	2850 RPM
✓ Version	Three phase 415V, 50Hz, AC Supply
✓ Maximum head	40 meter
✓ Maximum flow rate	7 lps (25.2 m ³ /h)
✓ Maximum outer diameter	98 mm
✓ Nominal outlet size	32 & 40 mm
✓ Degree of protection	IP 58
✓ Direction of rotation	Counter clockwise from driving end
✓ Thrust load	0.37kW - 0.75kW - 650 lbs
✓ Minimum cooling flow	0.15 m/sec
✓ Type of duty	S1 (Continuous)
✓ Method of starting	1Ph - CSCR/ CSR
✓ Maximum starts per hour	20 times

APPLICATIONS: -

- ❖ Domestic and municipal water supply
- ❖ Rural water supply (Drinking Water)
- ❖ Sprinkler system
- ❖ Pressure boosting units
- ❖ Fire fighting system
- ❖ Industrial and mining application
- ❖ Fountains

Here is the detailed test report with its adequate performance graph of the pump certifying the quality of the material.



C.R.I. PUMPS

C.R.I.PUMPS PRIVATE LIMITED, Unit: Ransar Industries-II

Coimbatore - 641 107

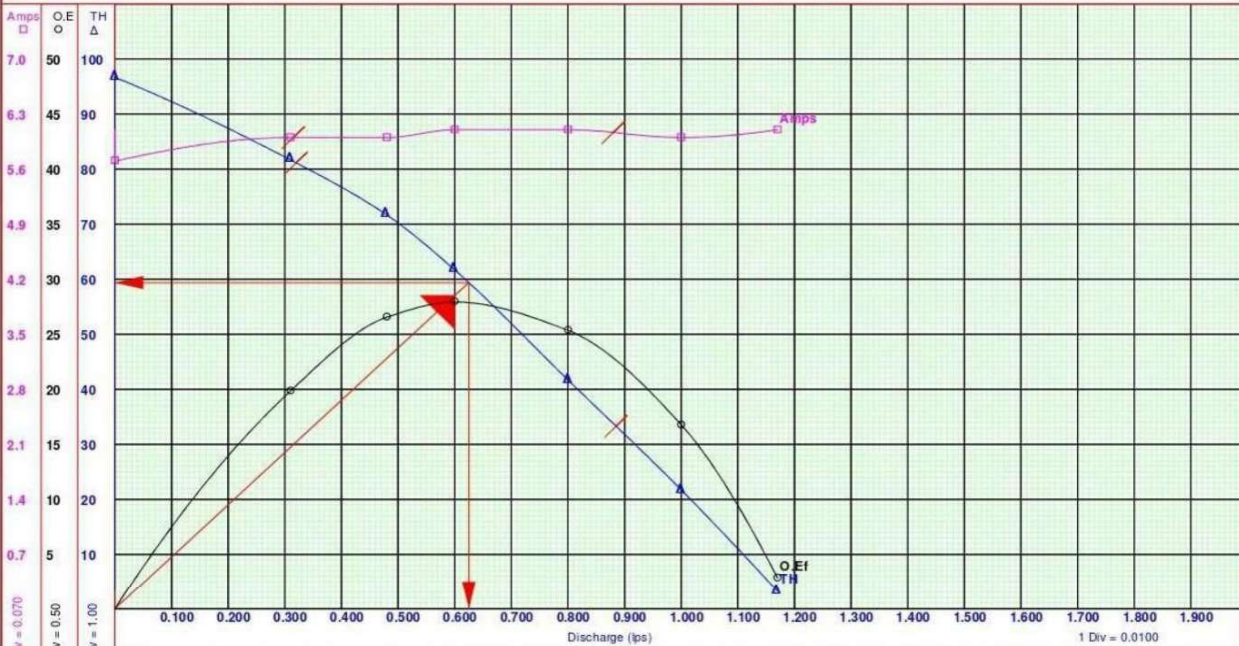
IS:8034



SUBMERSIBLE PUMPSET PERFORMANCE TEST REPORT AS PER IS:8034 - 2018

PUMP TYPE : CRI4R-2N-13S	MOTOR RATING (kW/HP): 0.75/1.0	SPEED (rpm) : 2850.0	TOTAL HEAD (m) : 57.00
PUMP SL.NO. : 10322L18336	MOTOR SL.NO. : 10322L18336	FREQUENCY (Hz) : 50.0	DISCHARGE (lps) : 0.60
DELIVERY SIZE (mm): 32.00	VOLTAGE (v) : 110	MOTOR TYPE : WET	OVERALL EFFICIENCY (%) 23.500
MIN.BORE SIZE (mm): 100	PHASE : 3	CORRECTION HEAD (m) : 1.65	HEAD RANGE (m) : 33.00 / 81.00
NO. OF STAGES : 14	MAX CURRENT (A) : 8.10	METER CONSTANT W1/W28	CONNECTION TYPE : CSCR

Sl.No	Frequency Hz	Total Head (m)			Discharge (lps)		Motor Power Inputs			Performance at Rated frequency 50.0 Hz					
		Delivery Head m	V.H. m	Total Head m	Flow Meter Reading	Discharge lps	Current A	Watt 1 w	Watt 2 w	Motor input kW	Discharge lps	Total Head m	Motor input kW	Pump output kW	Overall Eff. %
1	50.0	1.50	0.108	3.26	1.17	1.17	6.10	161	0	1.288	1.17	3.26	1.288	0.037	2.87
2	50.0	20.00	0.079	21.73	1.00	1.00	6.00	159	0	1.272	1.00	21.73	1.272	0.213	16.77
3	50.0	40.00	0.050	41.70	0.80	0.80	6.10	161	0	1.288	0.80	41.70	1.288	0.327	25.35
4	50.0	60.00	0.028	61.68	0.60	0.60	6.10	162	0	1.296	0.60	61.68	1.296	0.363	27.92
5	50.0	70.00	0.018	71.67	0.48	0.48	6.00	159	0	1.272	0.48	71.67	1.272	0.337	26.54
6	50.0	80.00	0.008	81.66	0.31	0.31	6.00	156	0	1.248	0.31	81.66	1.248	0.248	19.84
7	50.0	95.00	0.000	96.65	0.00	0.00	5.70	149	0	1.192	0.00	96.65	1.192	0.000	0.00



PUMP STD - IS:8034-2018	Type : CRI4R-2N-13S	Duty Point	Q (lps)	T.Head (m)	O.A Ef (%)	Max in Head range(A)
The Pump has valid IS standards	Sl.No. : 10322L18336	Declared	0.60	57.00	23.50	8.10
Head Range : 33.00/81.00	Del.Size : 32.0 mm	Actual	0.62	59.37	27.89	6.10
DATE : 19.12.2022	Frequency : 50.0 Hz	Results	Pass	Pass	Pass	Pass

Date : _____ Tested by _____ Approved by _____

● **PUMP CONTROLLERS / VOLTAGE FREQUENCY DRIVE: -**

A photovoltaic solar powered pump system has three parts:

Pump » Controller » Solar Panels

The size of the PV-system is directly dependent on the size of the pump, the amount of water that is required (m³/d) and the solar irradiance available.

The purpose of the controller is twofold. Firstly, it matches the output power that the pump receives with the input power available from the solar panels. Secondly, a controller usually provides a low voltage protection, whereby the system is switched off, if the voltage is too low or too high for the operating voltage range of the pump. This increases the lifetime of the pump thus reducing the need for maintenance.

Traditional DC motors not being suitable for submersible pumps because of maintenance implications. Hence a converter which converts DC generated by PV cells into variable frequency AC is more suitable for AC motors, which are more reliable.

VFD or Controller regulate the water pump and allow it to be turned on and off as per its program. They can increase the life of the water pump by protecting it from electrical irregularities or motor damage if it keeps running when a water source runs dry. That is the major reason to call it's a HEART of the system. A typical solar pumping system contains a solar array, which converts sunlight into electricity. The controllers, which control the array and the pump synchronously. An electric motor, which drives the pump and a water pump, which moves water to where it is required.

VFDs allow solar PV to be used for standard AC industrial motors, doing away with the need for dedicated DC solar pumps that are a more specialized and expensive product. AC induction motors are usually easier and cheaper to maintain or replace. Using VFDs it is also possible to operate motors in a changeover configuration, with solar PV used in combination with either diesel generators or the commercial electric grid.

VFDs offer high efficiency conversion from DC to AC power with very little electrical loss and is therefore the ideal control solution for any application isolated from the commercial grid where variable motor speed can be tolerated. Controllers also maximize the water delivery & provide complete protection to the pump. A proportional-integral-derivative (PID) allows a VFD to get feedback from a flow or level sensor in order to maintain a desired flow rate from a pump. This provides a reliable, closed loop control system.

Hardware Design

Compact design and user-friendly interface

Removable Keypad

Press to remove; supports remote operation away from drive



5 digits 7 segments LED display, frequency knob, Up and Left/Down function keys

Removable RFI Jumper

Applicable for different application needs



MS 300 IP 66

Built-in USB Port

Easy and fast programming setting, update and real-time monitoring and tuning

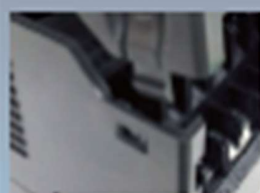


Specified Product Label

Input/output current, voltage and protection rating

Screwless Top Cover Design

Press on both side tabs to remove the cover



Removable Fan

Easy to replace and maintain for a longer lifetime

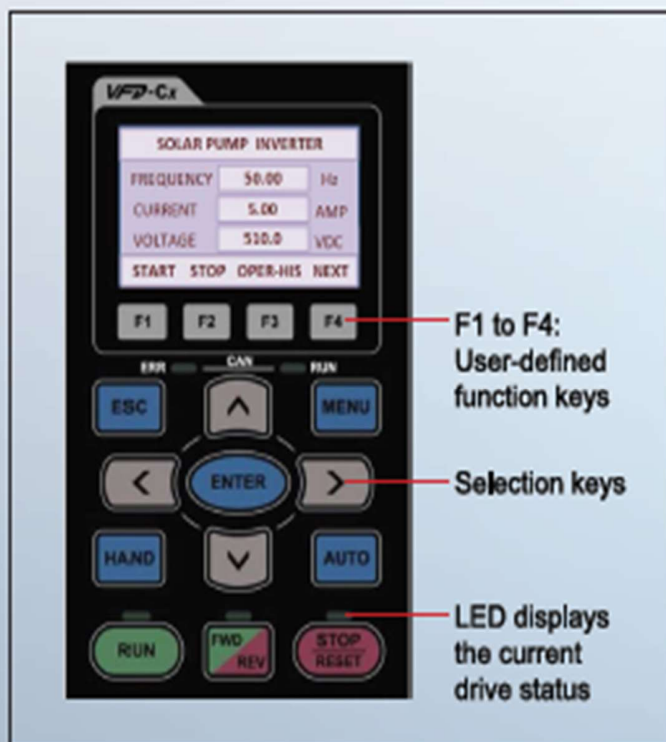


Quick and Easy Parameters Setting via the LCD Keypad

- Multi-column display for the drive status
- Simple and intuitive operation
- User-defined parameter groups
- Real Time Clock and calendar function
- Language selection for display
- Copy function saves parameters and PLC programs to the keypad memory for later transfer to another drive
- IP66 protection level

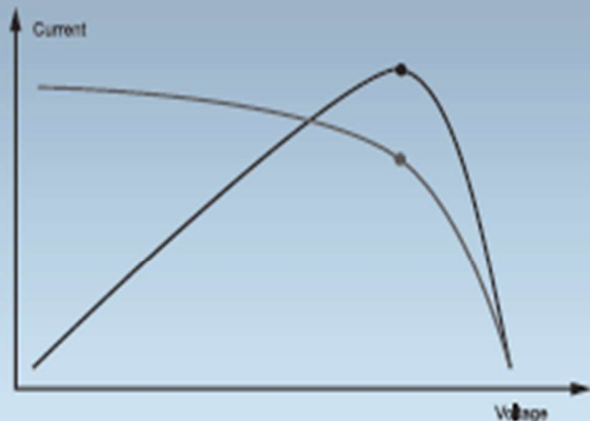
Special Functions

- Low frequency
- Dry run
- Over current of pump
- Minimum power
- PQ curve
- Dormancy

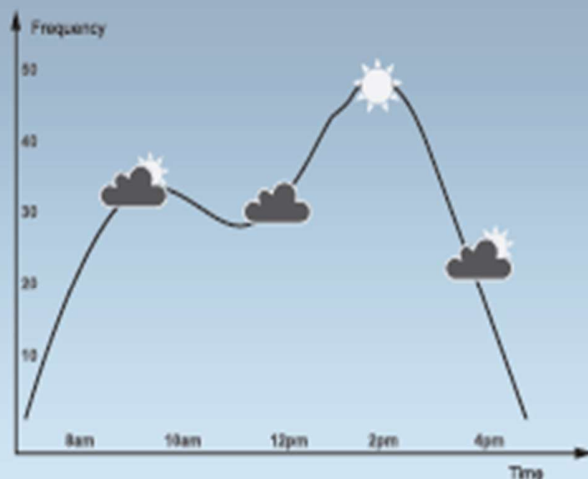


Advanced MPPT Technology

MPPT efficiency up to 99.99%



Auto-track at any daytime

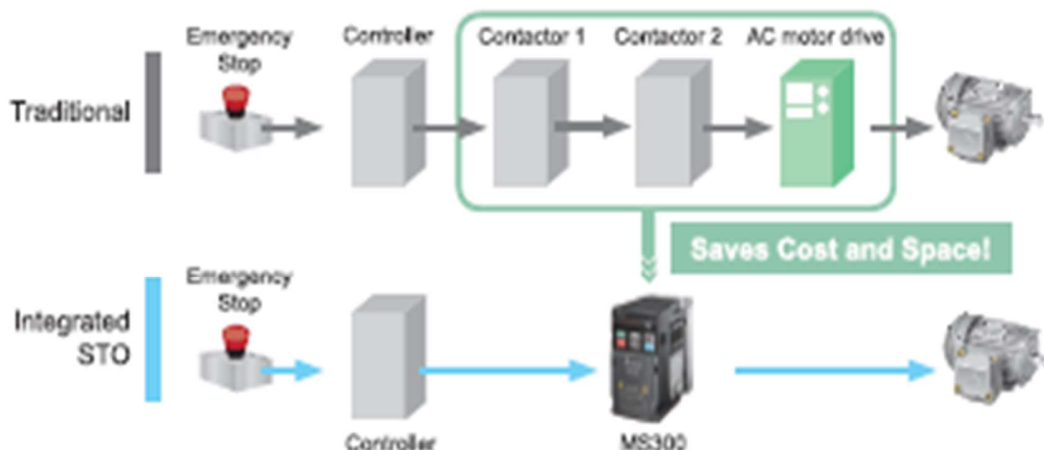


Safety Standard

Integrated Safe Torque Off (STO), compliance with:

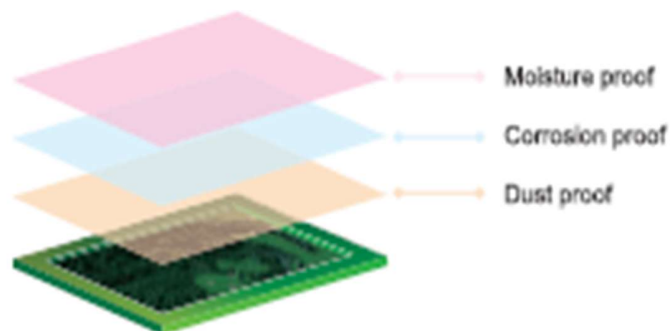
- ▶ ISO 13849-1:2015 Category 3 PL d
- ▶ EN 61508 SIL2

- ▶ EN 60204-1 Category 0
- ▶ EN 62061 SIL CL 2



PCB Coating

100% PCB coating (IEC 60721-3-3 class 3C2 standard) ensures drive operation stability and safety in critical environments



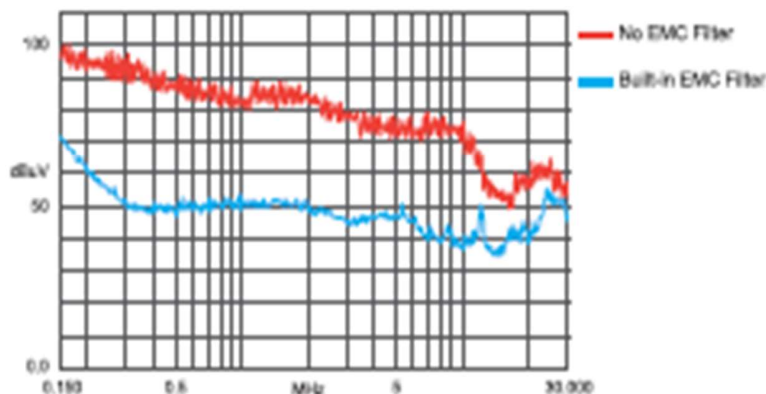
IP40 Models

Strengthened fan coating and concealed air vent prevent dust and other particles from entering the drive, suitable for critical environment applications



Built-in EMC Filter

Built-in Class A (C2) standard EMC filter; saves on additional procurement cost and wiring time, and provides more cabinet space for other devices to use





Complete data sheet with its test results which indicates the efficiency of the drive issued in this project.

3-phase 460 V (Models with Built-in EMC Filter)													
Frame			B			C		D		E		F	
Applicable Motor Output (kW)			0.4	0.75	1.5	2.2	3.7/4	5.5	7.5	11	15	18.5	22
Applicable Motor Output (HP)			1/2	1	2	3	5	7.5	10	15	20	25	30
Inverter Output	Heavy Duty	Rated Output Current (A)	1.5	2.7	4.2	5.5	9	13	17	25	32	38	45
	Normal Duty	Rated Output Current (A)	1.8	3	4.6	6.5	10.5	15.7	20.5	28	36	41.5	49
Input	Rated Voltage / Frequency		3-Phase AC 380V~480V (-15%~+10%), 50/60Hz										
	Mains Input Voltage Range		323~528V										
	Mains Frequency Range		47~63Hz										
Carrier Frequency (kHz)			2~15 (default 4)										
Brake Chopper			Built-in										
DC Reactor			Optional										
AC Reactor			Optional										
Cooling Method			Fan cooling										
Size: WxH (mm)			72 × 142			87 × 157		109 × 207		130 × 250		175 × 300	
Size: D (mm)			159			179		187		219		244	

Power Conditioning Unit including MPPT, Data logger and IP54 protected enclosure
 Inverter Unit qualified the IEC 61683, Efficiency measurement and IEC 600682 Environment Standard, Safety standard suitable for 1-Phase A.C. motor, IGBT based high voltage switching inverter with MPPT Technology, to take care of the variation of Sun light and will be suitably mounted inside the metal enclosure. Inverter has protection against Dry run Over Current, Under current, Over voltage, Under Voltage Short circuit etc. System is able to run at low sunshine and minimum 7 to 8 Hours a day run during normal sunshine condition. The VFD having auto start for any short trip off due to low light / cloudy situation except for dry run. The VFDs provided with a display to show the various parameter by the user such as Voltage, Current, Solar panel DC voltage inverter IGBT temperature, output AC voltage, output frequency. Pump flow (direct or calculated method), irradiation etc. The system is capable to store the data at a set interval and transfer it in a pen drive through USB port. It also monitors and save total run time, total water pumped etc. The controller having AC-DC changeover switch of current 25Amp.

Test certificate of VFD IEC and CE certificate are here :

Prüfbericht - Nr.: <i>Test Report No.:</i>	19675611 001	Seite 1 von 9 <i>Page 1 of 9</i>			
Auftraggeber: <i>Client:</i>	Delta India Electronics Pvt. Ltd. Plot No.43, Sector-35, HSIIDC, Gurgaon-122001, Haryana (India)				
Gegenstand der Prüfung: <i>Test item:</i>	VFD				
Bezeichnung: <i>Identification:</i>	VFD022E21A	Serien-Nr.: <i>Serial No.:</i>	022E21A7W16330384		
Wareneingangs-Nr.: <i>Receipt No.:</i>	1803177289	Eingangsdatum: <i>Date of receipt:</i>	07.11.2016		
Prüfört: <i>Testing location:</i>	TÜV Rheinland (India) Pvt. Ltd. Plot No. 328, Udyog Vihar, Phase – IV, Gurgaon – 122015, Haryana, India.				
Prüfgrundlage: <i>Test specification:</i>	IEC 60068-2-1, IEC 60068-2-2, IEC 60068-2-14, IEC 60068-2-30 (As per customer`s specifications)				
Prüfergebnis: <i>Test Result:</i>	Refer section " Summary of testing"				
Prüflaboratorium: <i>Testing Laboratory:</i>	TÜV Rheinland (India) Pvt. Ltd. Plot No. 328, Udyog Vihar, Phase – IV, Gurgaon – 122015, Haryana, India.				
geprüft/ tested by:		kontrolliert/ reviewed by:			
01.12.2016 Mukesh Kumar/Engineer		01.12.2016 Satender Rana/Asst. Manager			
Datum <i>Date</i>	Name/Stellung <i>Name/Position</i>	Unterschrift <i>Signature</i>	Datum <i>Date</i>	Name/Stellung <i>Name/Position</i>	Unterschrift <i>Signature</i>
					
Sonstiges/Other Aspects:					
This report consists of 9 pages.					
Abkürzungen:		P(ass) = entspricht Prüfgrundlage	Abbreviations:		P(ass) = passed
F(ail) = entspricht nicht Prüfgrundlage		F(ail) = failed			
N/A = nicht anwendbar		N/A = not applicable			
N/T = nicht getestet		N/T = not tested			
Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens.					
<i>This test report relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any safety mark on this or similar products.</i>					



TEST REPORT	
ENVIRONMENTAL TESTING	
Report reference No	19675611 001
Tested by (printed name and signature)	(see cover page)
Approved by (printed name and signature)	(see cover page)
Date of issue	(see cover page)
Testing Laboratory Name	TÜV Rheinland (India) Pvt. Ltd.
Address	Plot No. 328, Udyog Vihar, Phase – IV, Gurgaon – 122015, Haryana, India.
Applicant's Name	Delta India Electronics Pvt. Ltd.
Address	Plot No.43, Sector-35, HSIIDC, Gurgaon-122001, Haryana (India)
Test specification	
Standard	IEC 60068-2-1, IEC 60068-2-2, IEC 60068-2-14, IEC 60068-2-30 (As per customer`s specifications)
Test procedure	QMA 36.201.01
Non-standard test method	N/A
Test Report Form No.	TUVR_ENV_R2
TRF originator	TUVR
Master TRF	2009.08.20
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Test item description	VFD
Manufacturer	Delta Electronics Inc.
Model and/or type reference	VFD022E21A
Serial number	022E21A7W16330384
Rating(s)	Input: U1→ 1PH, 200 – 240V AC 50/60Hz 24.0A /150 - 400V DC Output: U2→ 3PH, 0 - 240V, I2→ 11A, 4.2KVA, 2.2kW/3HP f2→ 0.1 - 599Hz



Environmental Testing

Copy of marking plate:



General product information:

EUT under test is a VFD.

Summary of testing:

This report covers Environmental Tests undertaken as per customer's specifications with reference to the listed standards.

EUT continues to work after each test and no physical damages were observed.

Particulars: test item vs. test requirements

Operating condition: OFF during testing

Condition of the equipment at the time of receipt.....: Good

Test case verdicts

Test case does not apply to the test object ...: N/A

Test item does meet the requirement: P(Pass)

Test item does not meet the requirement: F(Fail)

Testing

Date of receipt of test item: 07.11.2016

Date(s) of performance of test: 08.11.2016 to 15.11.2016

General remarks

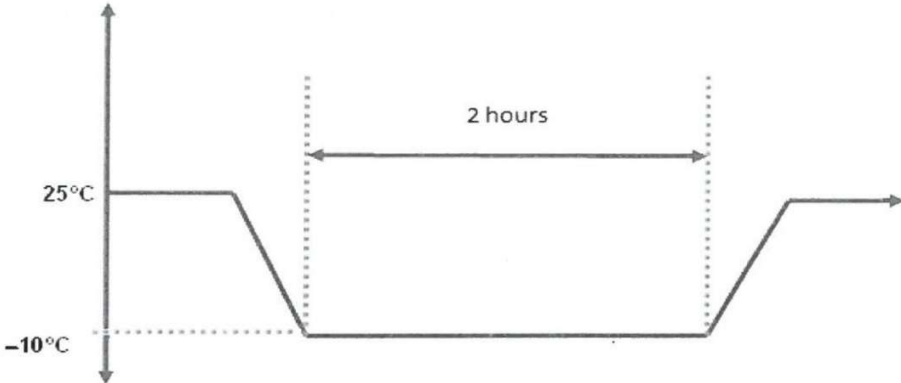
The test result presented in this report relate only to the object(s) tested.
This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.

"(see appended table)" refers to a table appended to the report.

Throughout this report a point is used as the decimal separator.

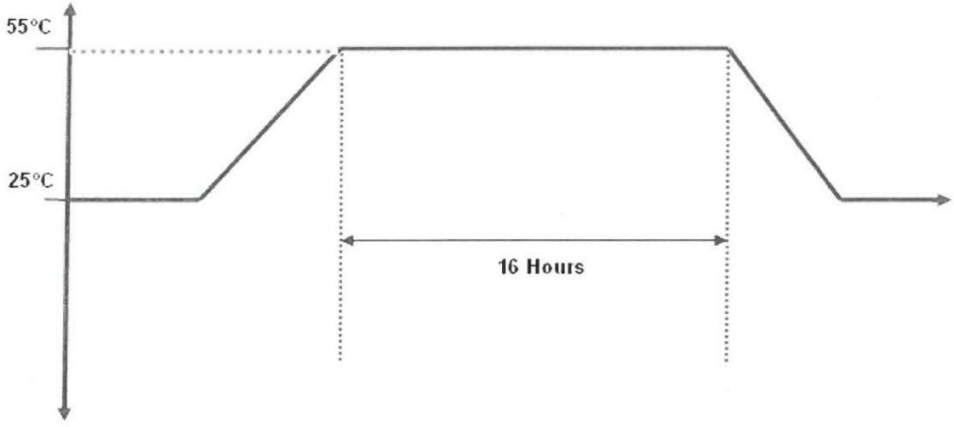


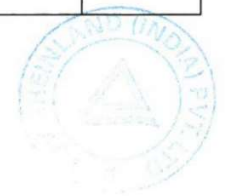
Environmental Testing

1	Cold Test		P
1.1	Cold Test specification		
 <p>The graph shows a temperature profile starting at 25°C, which remains constant for a short period before decreasing linearly to -10°C. A horizontal double-headed arrow above the -10°C line indicates a 2-hour duration at this temperature. After the 2-hour period, the temperature increases linearly back to 25°C and remains constant.</p>			
1.1.1	EUT Operating Condition	Powered OFF	-
1.1.2	Test Temperature	- 10°C	-
1.1.3	One Cycle duration	2 hours	-
1.1.4	No. of cycles	1 cycle	-
1.2	Post check: Examination after environmental conditioning		P
1.2.1	Physical damages	No physical damages observed	P
1.2.2	EUT working condition	Rated: Input: 1PH, 200 – 240V AC 50/60Hz 24.0A /150 -400V DC Output: 3PH, 0-240VAC, 11A, 4.2kVA, 2.2kW/3HP 0.1-599Hz. Measured Without load: Input: 340VDC Output: U-V- 241.3VAC U-W- 241.4VAC V-W- 241.6VAC Frequency: 50Hz	P

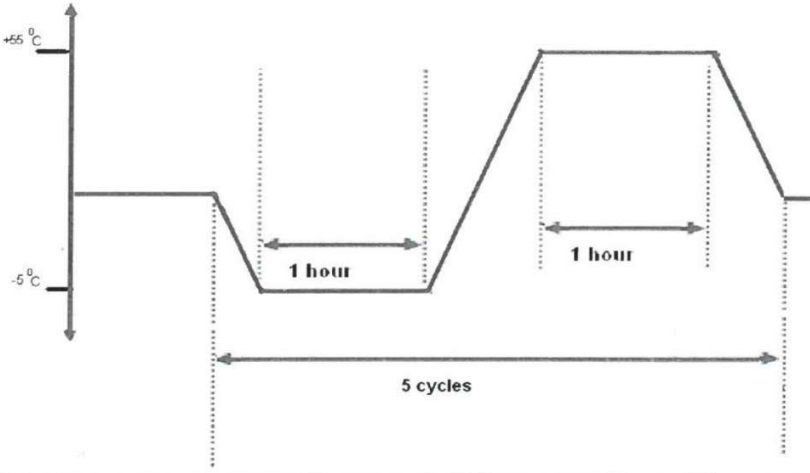


Environmental Testing

2	Dry Heat Test	P
2.1	Dry Heat Test specification	
		
2.1.1	EUT Operating Condition	Powered OFF
2.1.2	Test Temperature	+55°C
2.1.3	One Cycle duration	16 hours
2.1.4	No. Of cycles	1 cycle
2.2	Post check: Examination after environmental conditioning	
2.2.1	Physical damages	No physical damages observed
2.2.2	EUT working condition	P
		Rated: Input: 1PH, 200 – 240V AC 50/60Hz 24.0A /150 -400V DC Output: 3PH, 0-240VAC, 11A, 4.2kVA, 2.2kW/3HP 0.1- 599Hz.
		Measured Without load: Input: 340VDC Output: U-V- 241.3VAC U-W- 241.2VAC V-W- 241.4VAC Frequency: 50Hz

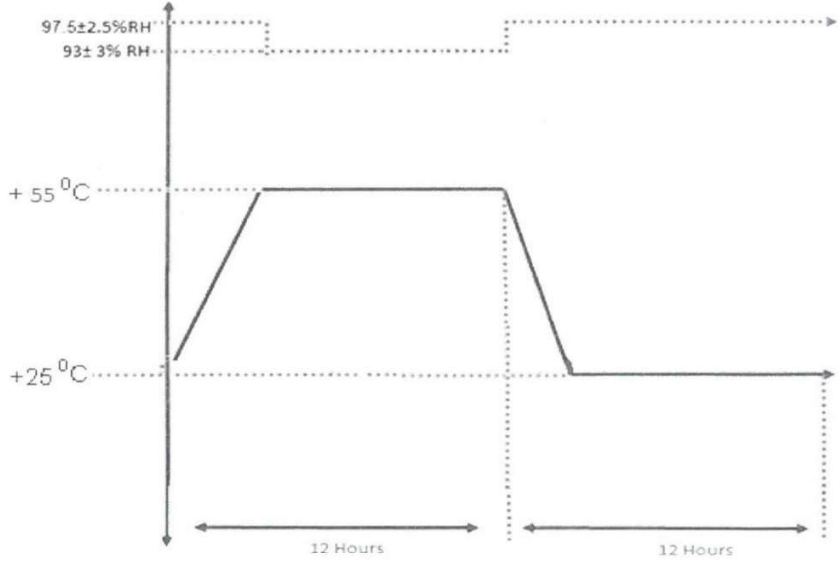


Environmental Testing

3	Change Of Temperature		P
3.1	Change Of Temperature Test specification		
Graph:			
			
3.1.1	EUT Operating Condition	Powered OFF	-
3.1.2	Test Temperature	Upper: +55° C Lower: -5°C	-
3.1.3	Rate of change of temperature	3°C/min	-
3.1.4	Dwell Time	1 Hr. at each temperature	-
3.1.5	No. of cycles	5 cycle	-
3.2	Post check: Examination after environmental conditioning		P
3.2.1	Physical damages	No physical damages observed	P
3.2.2	EUT working condition	Rated: Input: 1PH, 200 – 240V AC 50/60Hz 24.0A /150 -400V DC Output: 3PH, 0-240VAC, 11A, 4.2kVA, 2.2kW/3HP 0.1-599Hz. Measured Without load: Input: 340VDC Output: U-V- 241.3VAC U-W- 241.2VAC V-W- 241.4VAC Frequency: 50Hz	P



Environmental Testing

4	Damp Heat cyclic		P
4.1	Damp Heat Cyclic Test specification		
			
4.1.1	EUT Operating Condition	Powered OFF	-
4.1.2	Ramp –up / -down time	3 Hrs.	-
4.1.3	One Cycle duration	12 hours +12 hours	-
4.1.4	No. of cycles	2 cycle	-
4.1.5	Total Test Duration	48 Hrs.	-
4.2	Post check: Examination after environmental conditioning		P
4.2.1	Physical damages	No physical damages observed	P
4.2.2	EUT working condition	Rated: Input: 1PH, 200 – 240V AC 50/60Hz 24.0A /150 -400V DC Output: 3PH, 0-240VAC, 11A, 4.2kVA, 2.2kW/3HP 0.1-599Hz Measured Without load: Input: 340VDC Output: U-V- 241.6VAC U-W- 241.3VAC V-W- 241.4VAC	P



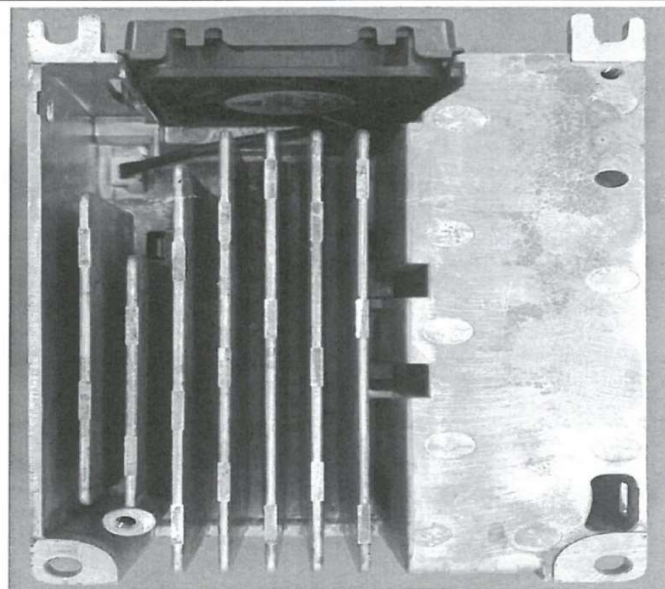
Environmental Testing

Frequency: 50Hz

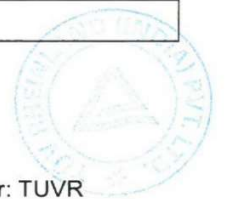
Photo Document



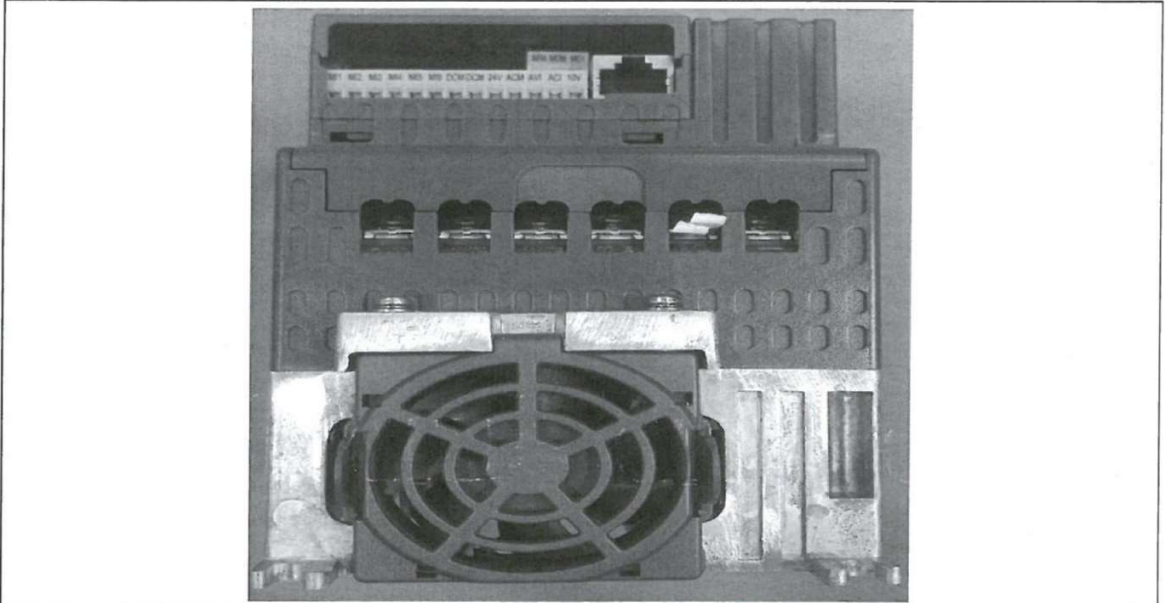
Front View



Back View



Environmental Testing



Terminals

*** End of Report ***



■ CIVIL CONSTRUCTION: -

As per work estimate & PWD schedule the work is executed with the parameters mentioned on the work estimate proved by the department with its highest possible quality & perfection.

It's the most important part of this scheme to inspect the site before start any Excavation or Foundation work. Because total scheme depends on Sun light, without this the work can't be completed successfully. So, for this reason it's very much important to select site where you get available sunlight maximum time of the day.

After select the appropriate site now it's the time to excavation of earth. As per the Govt. estimate 4 nos of pocket excavate of 4' / 1220 mm X 4' / 1220 mm X 4' / 1220 mm (Length/ Breadth/ Height).

After completion of digging & ramming work, Sand filling with adequate quantity has been work done after brick soling done over the sand filling area. This is for filling the gaps with sand and brick.

After sand filling and brick flat soling work 3" / 80 mm PCC done for each pocket. PCC, or Plain Cement Concrete, is a construction material used in engineering for various applications. Some of its common uses including foundation of the construction. PCC is used as a base material for the foundation of buildings and structures. It provides a strong, stable, level surface for constructing the superstructure.

To cast a concrete column, it is necessary to prepare the formwork, place the reinforcement, pour and compact the concrete, remove the formwork, and finally, properly cure the column to ensure its strength and durability. One day rest after the PCC work, Rod cutting, Ring binding work done for 4 nos Column casting purposes. The maximum height of the column 12 foot and of 10-inch casting work done. But this casting work, shuttering work take 2-3 days, because it requires rest period as well as water cure periods.

A tie beam which is a horizontal member or beam that is used to connect and support two or more vertical members, such as columns or posts, in a structure. It is typically employed in this construction to provide lateral stability to a building or structure. In between 4 nos column casting, Tie beam work also done at GL level. For this purposes rod cutting and stirrup binding, casting & concrete work executed. After the wok a rest period and water cure process done periodically.

Roofing slab casting is the process of laying and placing concrete mix horizontally over brickwork. The cast of roof slab reinforcement main bar and the crossbar is distributed over shuttering areas of the roof slab, followed by pouring a concrete mix of M20 grade of concrete with a mixture ratio of cement, sand and aggregate is 1:1.5:3. For this Cutting of rods and binding of rings work simultaneously in progress. Then after Centering and Shuttering work casting of roof work done. After completion of Roof casting work, 21 days rest period and water curing period are taken.

Brick and Floor work achieved by using vibrators or by manually agitating the concrete with tools such as trowels or rakes. Ensure that the concrete is uniformly compacted to achieve maximum strength and durability. Once the concrete is consolidated, it needs to

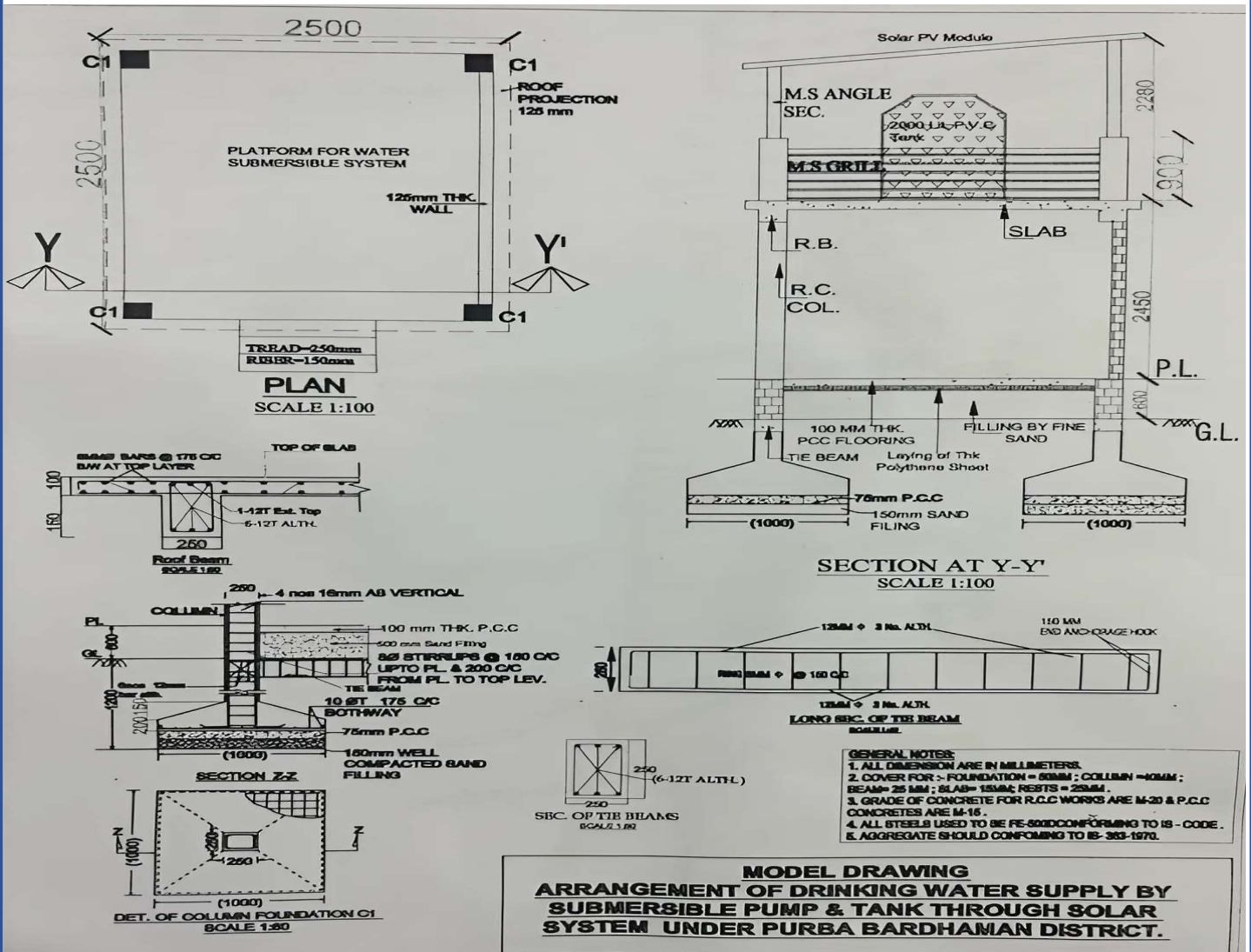
be finished to achieve the desired surface texture and appearance. After 21 days de-shuttering work done and Floor casting and brick work done as per Govt. estimate. Boring guard and pedestal work also done in this scheme.

As we know Plastering is a process of applying one or more coats of mortar to a concrete surface, brick works, and stone masonry. It must be durable such that it resists the penetration of moisture and should be able to resist weather conditions uniformly. It should also be pleasing in appearance. After floor casting and Brick work the plastering work done in all aspect.

After execution of above mention work Tile and stone setters install pieces of ceramic, marble, granite, glass, or other materials. After plastering work, Floor tiles, Wall tiles work and pedestal tiles work done.

Pigments provide color and hide, while binders work to "bind" the pigment together and create the paint film. Solvents are the liquids that suspend the ingredients and allow you to place the paint on the surfaces, and additives are ingredients that provide specific paint properties such as mildew resistance. At the end of this scheme, paint work done with proper procedure.

Here is the schematic & model drawing of construction details provided by the department



MODEL DRAWING
ARRANGEMENT OF DRINKING WATER SUPPLY BY
SUBMERSIBLE PUMP & TANK THROUGH SOLAR
SYSTEM UNDER PURBA BARDHAMAN DISTRICT.

• **BORING & ITS DETAILS: -**

PVC Well Casing Screen Pipes For deep, medium and shallow borewell as per IS 12818-2010 / ASTM D-1785 / DIN 4925. Appropriate medium for getting clean water from deep and shallow borewell e Threaded terminals, thus easy to join and economical. Can be installed even in deep bore well due to good elastic joints Rust free, chemical resistant and long-lasting Nontoxic parts ensure unaltered taste of water Strong, thus are chances of bore well sinking in the ground Weighs five times less than steel pipe. Hence, easy to transport at lesser cost Easy to cut and install. Here we used 5" or 125 mm casing pipe followed by the 3" or 80 mm blank pipe & 3" or 80 mm Jacket Ribbed Filter pipe.

In this project we used (Minimum):

a) 5" / 125 mm Cashing Pipe-	120 Ft / 36 Mtr
b) 3" / 80 mm Cashing Pipe-	90 Ft / 27 Mtr
c) 3" / 80 mm Ribbed Strainer Pipe-	30 Ft / 9 Mtr

Also used Nipple, Plug Cutter, Reducing Socket & others essential material of adequate size to complete the boring with good quality water layer for drinking water.

uPVC Column Pipes used for lighting the water through submersible pump. PVC pipes are light in weight hence transportation and installation become much easier. As uPVC is immune to galvanic and electrolytic erosion, both pipe and water passing through it is not affected and hence water is not contaminated. Mirror-smooth inside surface of pipe and corrosion resistance property prevents scale formation which ensures high flow rate resulting in substantial power saving. They installed in all types of acidic or alkaline medium which badly affect metal pipes. Column pipes are manufactured with latest technology under stringent quality control. Specially imported additives are used for higher strength and trouble-free long service life. High tensile load capacity. Specially designed square threads (male and female) are manufactured to provide smooth fitment / refitment. The design of threads along with the pipe material makes it strong enough to take high tensile loads. Leakproof joints sealing rings are made from best quality rubber which ensures long service life, absorption of pump vibration and leak proof joints. Overall economy in addition to the above benefits.



■ WATER TANK (2000 LITER): -

The water pumping system will often include a water tank to store water that may be used when sunshine isn't available.

Here we used 2000 Liter 2 Layer Black Tank made of Shyam Sundar Polymers firmly known as PENGUIN. The details of the Material are mentioned below:

Model: PNCVT - BK2 & CL2

This PENGUIN TANK model consists of a double layer polymer construction, with dark pigmented UV protected outer layer and food grade aqua colour layer inside, for better visibility. This is the most economically viable long-term solution to store water in a healthy manner.

Dimensional specification of cylindrical vertical tank in cm-

Tank size	Model No.	Height	Width	Manhole	Tank size	Model No.	Height	Width	Manhole
225	PNCVT 22.5	71.5	65.0	28.5	1500	PNCVT 150	113.0	130.0	39.0
330	PNCVT 33	84.0	75.0	39.0	2000	PNCVT 200	150.0	136.0	39.0
500	PNCVT 50	88/87/90/91	87/86/85/86	39.0	3000	PNCVT 300	180.0	145.0	39.0
750	PNCVT 75	110/109/108/108	95/97/97/97	39.0	5000	PNCVT 500	219.0	198.0	39.0
1000	PNCVT 100	117/117/118/117	107/104/105/106	39.0	10000	PNCVT 1000	248.0	255.0	39.0



▪ EARTHING & LIGHTING PROTECTION: -

Earthing with 50 mm dia GI pipe 3.64 mm thick X 3.04 Mts long and 1 X 4 SWG GI (hot dip) were (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) properly filled with bitumen partly under the ground level and partly above ground level driven to and average depth of 3.65 Mts below the ground level.

Lighting protection (Pole mounted); Lighting protection with 3 "X 1.5" GI pipes of 4 Mts height with base flange in S & F Lighting Conductor Air Terminal made of 20 mm dia 100 mm long GI pipe (ISI medium) having five discharge prongs of 4 SWG GI (hot dip) were at top duly soldered with 7/16 standard GI (hot dip) were an 85 mm dia 6 mm thick GI base plate at bottom including necessary holes etc. Earthing with 50 mm dia GI pipe (medium) 3.0 Mtr long and 1 X 19/10 standard GI (hot dip) wire (4 Mtr long) bolt, double nuts, double washer including socketing at both ends off standard GI (hot dip) crimping socket/ thimbles and S & F 40 mm Dia GI pipes (ISI-Medium) protection (3 Mtr long) to be filled with bitumen partly under the ground level and partly above the ground level to an average depth of 3.65 Mtr.



BENEFITS OF SOLAR-POWERED WATER PUMPS

Solar-powered water pumps have many benefits. They are:

ECO-FRIENDLY

There is no emission of toxins or any carbon particle in air during solar energy production. This is the safest & cleanest production of electricity in our over populated country. For that reason, solar-powered water pumps are considered clean energy sources.

USEFUL IN REMOTE AREAS

Since the sun provides the energy, an external power source isn't necessary, which means a solar-powered water pump will work in remote places and areas without access to a power grid. Here is the main relief of electricity bills which have to pay for govt projects & in earlier we saw it creates too much burden to departments.

EASY TO MAINTAIN

Solar-powered water pumps have very few mechanical parts, which lessens the chances of components needing repairs. They can last for many years without requiring any periodical maintenance.

INCREASING PRODUCTIVITY

Water collection is grueling for those in developing countries. It can require walking for several hours in each direction. Solar-powered water pumps save time from not having to collect water, improving health, and making time for other productive activities.

RELIABLE

Solar-powered water pumps provide a reliable water source because it doesn't require any standard grid electricity. Its only depends on the environment & We used float switch in tank which is acting like a sensor to auto start & stop method of the pumps. That we can use only required water & it will not waste water regarding over flow from tanks.

REMARKS

Still now we have done over 50 nos Solar Submersible project under Purba Bardhaman Zilla parishad. All of the projects have successfully completed on 2023-2024 financial year under District engineer of ZP. All those projects fully run successfully without any disturbance and no complain still not received from the consumers or local authority.

PHOTO GALLERY OF THE PROJECT WORK







• **Bibliography & references:** - i) www.google.com, ii) www.wikipedia.com, iii) www.crigroups.com, iv) www.deltaacdrives.com, v) www.sovasolar.com, vii) www.penguintank.com, viii) www.utkarshindia.in, etc.