

AC Solar Pumping Systems



ANY AC SUBMERSIBLE OR SURFACE PUMPS (upto 110kW)

AC Solar Pump Controller (inverter to Operate AC Pumps)



VFD CUM INVERTER

C.R.I. AC Solar Pump Controller is used to convert DC Power generated from the PV Modules to 3Phase AC Power that drives any AC 3Phase Submersible or Surface Pumps.

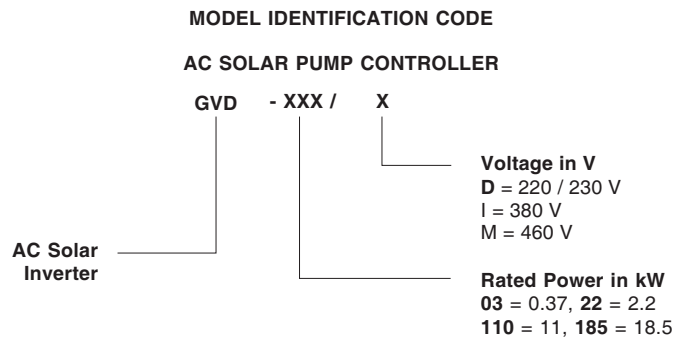
It consists of an efficient, programmed drive which acts as an inverter to change the DC power generated from the solar modules to AC power and operates the pump. In addition it gives complete protection to the pump connected to the system & controls its functions. The MPPT (max. power point tracking) function of the controller improves the overall system efficiency.

FEATURES

- Both DC & 3Ph AC input - with manual / Auto change over switch
- Can run both 50Hz & 60Hz pumps
- Maximum power point tracking (MPPT) function to improve the system efficiency
- Self diagnostic & protection
- Auto start / stop based on solar light intensity
- Water level sensors for storage tank
- Protects from dry run, high / low voltage, over / under load operations, phase failures, etc.
- Indicators for faulty operations
- Output filter
- Battery Charging & backup provision (upto 2.2kW - Optional)

APPLICATIONS

These solar pump controllers are used to operate regular AC pumps using solar power in • Residential • Irrigation • Live stock farms • Public water supply • Small farms • De-watering • Industries • Golf course, etc.,



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SPECIFICATIONS

Power range	0.37 - 7.5 kW - 220V output controller 1.1 - 18.5 kW - 380V output controller
Versions	3Ph - 220V / 230V in both 50 & 60Hz 3Ph - 380V in both 50 & 60Hz 3Ph - 460V in 60Hz
Input variants	DC input from PV Modules & 3Ph - AC input from Generator / Grid
Degree of Protection	IP 42
Ambient Temperature	-10 to +40°C

CONTROLLER INPUT REQUIREMENTS

For 220 / 230 V Pumps - 50 / 60Hz

Model	Controller Specification					Recommended PV Module Specification							PV Module Output	
	Rated Power in kW	Rated Amps (A)	Input DC Power (W)	Input DC Voltage range (Vmp)	Voc	Pmax (W)	Vmp	Voc	Imax (A)	Isc (A)	Panel Qty.	No. of Array	Power (W)	Voltage (V DC)
GVD - 03D	0.37	3.5	810	270 - 370	400	90	35.2	44	2.56	2.74	9	1	810	316.8
GVD - 05D	0.55	4.7	810	270 - 370	400	90	35.2	44	2.56	2.74	9	1	810	316.8
GVD - 07D	0.75	6.7	1190	270 - 370	400	70	18	22.5	3.89	4.16	17	1	1190	302.9
GVD - 11D	1.1	7.5	1620	270 - 370	400	90	35.2	44	2.56	2.74	18	2	1620	316.8
GVD - 15D	1.5	9.8	2430	270 - 370	400	90	35.2	44	2.56	2.74	27	3	2430	316.8
GVD - 22D	2.2	13.3	3060	270 - 370	400	170	35.2	44	4.83	5.17	18	2	3060	316.8
GVD - 30D	3	17.6	4590	270 - 370	400	170	35.2	44	4.83	5.17	27	3	4590	316.8
GVD - 40D	4	24.4	5310	270 - 370	400	295	36.4	45	8.10	8.87	18	2	5310	327.6
GVD - 55D	5.5	31	7560	270 - 370	400	280	35.8	44.4	7.82	8.37	27	3	7560	322.2
GVD - 75D	7.5	46.2	10080	270 - 370	400	280	35.8	44.4	7.82	8.37	36	4	10080	322.2

* Optional AC Input Voltage = 3Ph, 200 - 240V ±10%

For 380 V Pumps - 50 / 60Hz

Model	Controller Specification					Recommended PV Module Specification							PV Module Output	
	Rated Power in kW	Rated Amps(A)	Input DC Power (W)	Input DC Voltage range (Vmp)	Voc	Pmax (W)	Vmp	Voc	Imax (A)	Isc (A)	Panel Qty.	No. of Array	Power (W)	Voltage (V DC)
GVD - 11I	1.1	4.1	1620	500-650	800	90	35.2	44	2.56	2.74	18	1	1620	633.6
GVD - 15I	1.5	5.6	2380	500-650	800	70	18	22.5	3.89	4.16	34	1	2380	598.4
GVD - 22I	2.2	7.3	3300	500-650	800	110	18	22.5	6.11	6.54	30	1	3300	540
GVD - 30I	3	8.8	4420	500-650	800	130	18	22.3	7.22	8.12	34	1	4420	612
GVD - 40I	4	12.5	5440	500-650	800	170	35.2	44	4.83	5.17	32	2	5440	563.2
GVD - 55I	5.5	15.6	7480	500-650	800	110	18	22.5	6.11	6.54	68	2	7480	612
GVD - 75I	7.5	23.1	10080	500-650	800	280	35.8	44.4	7.82	8.37	36	2	10080	644.4
GVD - 110I	11	31	15120	500-650	800	280	35.8	44.4	7.82	8.37	54	3	15120	644.4
GVD - 150I	15	38	20160	500-650	800	280	35.8	44.4	7.82	8.37	72	4	20160	644.4
GVD - 185I	18.5	44	25200	500-650	800	280	35.8	44.4	7.82	8.37	90	5	25200	644.4

* Optional AC Input Voltage = 3Ph, 380 - 480V ±10%

The above recommended PV module specifications can be changed on availability at installation place, provided the total operating DC input power & voltage (Pmax, Vmp, Voc) are nearest to the above given values.

**PV module selection details for higher rating inverter (above 18.5 kW) can be provided on request.
60Hz for 460V 3Ph solar controllers can also be supplied on request.**

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Terminal Connection Diagram

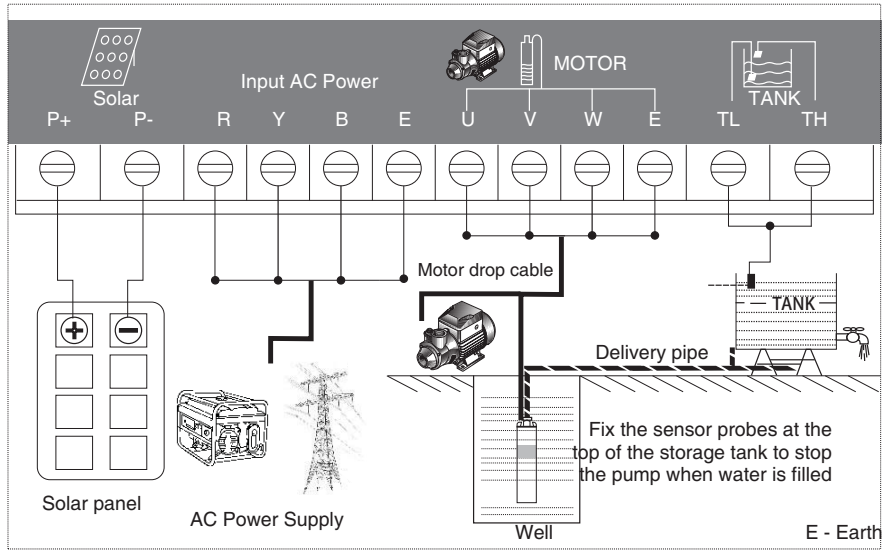


FIG 2

- Connect the required DC Power from the PV Modules to the DC Input terminals (P+, P-).
- To operate the pump when low / No sun light, connect 3Ph AC supply from generator or AC grid to the AC input terminals (R,Y,B & E).
- Select the desired input power (DC / AC) using the rotary manual selector switch. (Not applicable for auto changeover models)
- Connect the 3Ph motor cable leads to the AC output terminals (U, V, W & E).
- Connect the float switch cable to the tank level control terminals (TL, TH) to control the water level in the storage tank.
- In case of dry run, the system will trips off automatically and restart after every one hour interval.
- In case of any faulty operation Indications, reset the system with Reset button or by switching OFF & ON.
- For installation above 75mts, an output filter (choke) need to be provided.

Solar Photo Voltaic (PV) Modules



THE POWER OF SUN IS ABUNDANT. LET'S HARNESS IT FOR PRODUCTIVE USAGE FOR ALL.

Solar energy produced by PV Modules is well known as a clean and reliable source of green energy without polluting our environment. C.R.I. offers high-quality, efficient Photo Voltaic modules for all solar needs.

PV Modules collect solar radiation from the sun and actively convert that energy to electricity. PV Modules are comprised of several individual solar cells and function similarly to large semiconductors and utilize a large-area p-n junction diode. When the solar cells are exposed to sunlight, the p-n junction diodes convert the energy from sunlight into usable electrical energy.

The energy generated from photons striking the surface of the PV Module allows electrons to be knocked out of their orbits and released, and electric fields in the solar cells pull these free electrons in a directional current (D.C.), from which metal contacts in the solar cell can generate electricity. The more solar cells in a PV Module and the higher the quality, the more total electrical output the PV Module can produce. The conversion of sunlight to usable electrical energy is otherwise known as the Photovoltaic Effect. The photovoltaic effect arises from the properties of the p-n junction diode, as such there are no moving parts in a PV Module.

Factors that affect the output of PV Modules are weather conditions, shade caused by obstructions to direct sunlight, and the angle and position at which the PV Module is installed. PV Modules delivers the best output when placed in direct sunlight, away from obstructions that might cast shade, and in areas with high regional solar insolation ratings. PV Module efficiency can be optimized by using dynamic mounts that follow the position of the sun in the sky and rotate the PV Module to get the maximum amount of direct exposure during the day as possible.

Features

- High quality solar cells - Polycrystalline & Monocrystalline.
- Modules ranging from 35 Wp to 300 Wp
- Strong aluminium alloy frame, tempered glass and water proof lamination result in rugged protection against hostile conditions & withstand high levels of ultra violet radiation & moisture.
- Junction box with IP 65 protection.
- IEC 61215 certified Solar PV Modules.
- Bypass diodes to avoid partial shading.

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Solar Module Specifications

Model	GPP-35/18	GPP-45/18	GPP-50/18	GPP-65/18	GPP-70/18	GPP-80/18	GPP-85/18	GPP-90/36
Power (Pmax)	35W	45W	50W	65W	70W	80W	85W	90W
Max. Power Voltage (Vmax)	17.6V	17.6V	18.0V	17.6V	18.0V	17.6V	18.0V	35.2V
Max. Current (Imp)	1.99A	2.56A	2.78A	3.69A	3.89A	4.55A	4.72A	2.56A
Open Circuit Voltage (Voc)	22.0V	22.0V	22.5V	22.0V	22.5V	22.0V	22.5V	44.0V
Short Circuit Current (Isc)	2.13A	2.74A	2.97A	3.95A	4.16A	4.86A	5.05A	2.74A
Max. System Voltage	600V	600V	600V	600V	600V	600V	600V	600V
Series Fuse rating	10A	10A	10A	10A	10A	10A	10A	10A
Temp. Co-efficient Voltage	-60.8mV/°C	-60.8mV/°C	-60.8mV/°C	-60.8mV/°C	-60.8mV/°C	-60.8mV/°C	-60.8mV/°C	-60.8mV/°C
Temp. Co-efficient Current	2.2mA/°C	2.2mA/°C	2.2mA/°C	2.2mA/°C	2.2mA/°C	2.2mA/°C	2.2mA/°C	2.2mA/°C
Cell efficiency	16.40%	15.89%	17.65%	15.30%	16.40%	15.30%	16.20%	15.80%
Number of cells	36	36	36	36	36	36	36	72
Max. Power tolerance	5%	5%	5%	5%	5%	5%	5%	5%
Dimension	508*508 *25	668*541 *35	668*541 *35	760*670 *35	760*670 *35	900*668 *35	900*668 *35	1020*670 *35
Weight	3.5kg	5.0kg	5.0kg	7.0kg	7.0kg	8.3kg	8.3kg	9.5kg
Mounting holes Pitch (Y-mm)	254	493	493	380	380	450	450	510
Mounting holes Pitch (X-mm)	471	334	334	622	622	620	620	622

Model	GPP-95/36	GPP100/18	GPP-105/18	GPP-110/18	GPP-120/18	GPP-125/18	GPP-130/18	GPP-135/18
Power (Pmax)	95W	100W	105W	110W	120W	125W	130W	135W
Max. Power Voltage (Vmax)	36.0V	17.6V	17.8V	18.0V	17.6V	17.8V	18.0V	17.8V
Max. Current (Imp)	2.64A	5.68A	5.9A	6.11A	6.82A	7.02A	7.22A	7.58A
Open Circuit Voltage (Voc)	45.0V	22.0V	22.3V	22.5V	22.0V	22.3V	22.5V	22.3V
Short Circuit Current (Isc)	2.82A	6.08A	6.31A	6.54A	7.30A	7.51A	7.73A	8.12A
Max. System Voltage	600V	600V	600V	600V	600V	600V	600V	600V
Series Fuse rating	10A	10A	10A	10A	10A	10A	10A	10A
Temp. Co-efficient Voltage	-60.8mV/°C	-60.8mV/°C	-60.8mV/°C	-60.8mV/°C	-60.8mV/°C	-60.8mV/°C	-60.8mV/°C	-60.8mV/°C
Temp. Co-efficient Current	2.2mA/°C	2.2mA/°C	2.2mA/°C	2.2mA/°C	2.2mA/°C	2.2mA/°C	2.2mA/°C	2.2mA/°C
Cell efficiency	16.70%	15.40%	16.70%	17.00%	15.40%	16.50%	16.70%	16.70%
Number of cells	72	36	36	36	36	36	36	36
Max. Power tolerance	5%	5%	5%	5%	5%	5%	5%	5%
Dimension	1020*670 *35	1100*670 *35	1100*670 *35	1100*670 *35	1320*670 *35	1320*670 *36	1320*670 *37	1390*670 *36
Weight	9.5kg	10.2kg	10.2kg	10.2kg	12.2kg	12.2kg	12.2kg	12.8kg
Mounting holes Pitch (Y-mm)	510	550	550	550	660	660	660	695
Mounting holes Pitch (X-mm)	622	622	622	622	622	622	622	622

All above specification are at standard test condition - 25°C cell temperature & 1000 W / m² irradiance.

Note: Cables and connectors are optional, IP-65 Junction Box, Mc4 compatible M/F connectors along with 1 meter cables shall be provided against request.

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Solar Module Specifications

Model	GPP-140/18	GPP-145/18	GPP-150/36	GPP-155/36	GPP-160/36	GPP-165/36	GPP-170/36	GPP-175/36
Power (Pmax)	140W	145W	150W	155W	160W	165W	170W	175W
Max. Power Voltage (Vmax)	18.0V	18.0V	35.2V	35.6V	36.0V	36.0V	35.2V	35.6V
Max. Current (Imp)	7.78A	8.06A	4.26A	4.35A	4.44A	4.58A	4.83A	4.92A
Open Circuit Voltage (Voc)	22.5V	22.5V	44.0V	44.6V	45.0V	45.0V	44.0V	44.6V
Short Circuit Current (Isc)	8.32A	8.62A	4.56A	4.66A	4.76A	4.90A	5.17A	5.26A
Max. System Voltage	600V	600V	600V	600V	600V	600V	600V	600V
Series Fuse rating	10A	15A	10A	10A	10A	10A	10A	10A
Temp. Co-efficient Voltage	-60.8mV/°C	-60.8mV/°C	-60.8mV/°C	-60.8mV/°C	-60.8mV/°C	-60.8mV/°C	-60.8mV/°C	-60.8mV/°C
Temp. Co-efficient Current	2.2mA/°C	2.2mA/°C	2.2mA/°C	2.2mA/°C	2.2mA/°C	2.2mA/°C	2.2mA/°C	2.2mA/°C
Cell efficiency	17.00%	17.60%	16.10%	16.50%	17.00%	16.40%	16.20%	16.40%
Number of cells	36	36	72	72	72	72	72	72
Max. Power tolerance	5%	5%	5%	5%	5%	5%	5%	5%
Dimension	1390*670*37	1475*665*35	1110*982*35	1110*982*35	1110*982*35	1186*982*35	1258*982*35	1258*982*35
Weight	12.8kg	13.5kg	15kg	15kg	15kg	16.0kg	17.0kg	17.0kg
Mounting holes Pitch (Y-mm)	695	737.5	555	555	555	593	629	629
Mounting holes Pitch (X-mm)	622	617	934	934	934	934	934	934

Model	GPP-180/36	GPP-185/36	GPP-190/36	GPP-185/24	GPP-190/24	GPP-195/24	GPP-205/36	GPP-210/36
Power (Pmax)	180W	185W	190W	185W	190W	195W	205W	210W
Max. Power Voltage (Vmax)	36.0V	35.6V	36.0V	24.0V	24.2V	24.6V	35.2V	35.6V
Max. Current (Imp)	5.00A	5.20A	5.28A	7.71A	7.85A	7.93A	5.82A	5.90A
Open Circuit Voltage (Voc)	45.0V	44.6V	45.0V	29.5V	29.7V	30.0V	44.0V	44.6V
Short Circuit Current (Isc)	5.35A	5.56A	5.65A	8.25A	8.40A	8.48A	6.23A	6.31A
Max. System Voltage	600V	600V	600V	600V	600V	600V	600V	600V
Series Fuse rating	10A	10A	10A	15A	15A	15A	10A	10A
Temp. Co-efficient Voltage	-60.8mV/°C	-60.8mV/°C	-60.8mV/°C	-60.8mV/°C	-60.8mV/°C	-60.8mV/°C	-60.8mV/°C	-60.8mV/°C
Temp. Co-efficient Current	2.2mA/°C	2.2mA/°C	2.2mA/°C	2.2mA/°C	2.2mA/°C	2.2mA/°C	2.2mA/°C	2.2mA/°C
Cell efficiency	17.20%	16.40%	16.90%	16.30%	16.70%	17.20%	16.20%	16.60%
Number of cells	72	72	72	48	48	48	72	72
Max. Power tolerance	5%	5%	5%	5%	5%	5%	5%	5%
Dimension	1258*982*35	1318*982*35	1318*982*35	1324*982*35	1324*982*35	1324*982*35	1475*982*45	1475*982*45
Weight	17.0kg	17.8kg	17.8kg	17.9kg	17.9kg	17.9kg	19.0kg	19.0kg
Mounting holes Pitch (Y-mm)	629	659	659	662	662	662	737.5	737.5
Mounting holes Pitch (X-mm)	934	934	934	934	934	934	919	919

All above specification are at standard test condition - 25°C cell temperature & 1000 W / m² irradiance.

Note: Cables and connectors are optional, IP-65 Junction Box, Mc4 compatible M/F connectors along with 1 meter cables shall be provided against request.

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Solar Module Specifications

Model	GPP-205/ 24	GPP-210/ 24	GPP-215/ 24	GPP-220/ 24	GPP-230/ 30	GPP-235/ 30	GPP-240/ 30	GPP-245/ 30	GPP-250/ 36
Power (Pmax)	205W	210W	215W	220W	230W	235W	240W	245W	250W
Max. Power Voltage (Vmax)	26.2V	26.4V	24.6V	26.8V	29.6V	29.8V	30.0V	30.2V	35.6V
Max. Current (Imp)	7.81A	7.95A	8.08A	8.21A	7.77A	7.89A	8.00A	8.11A	7.02A
Open Circuit Voltage (Voc)	32.96V	33.2V	33.5V	33.8V	36.63V	36.8V	37.0V	37.2V	44.2V
Short Circuit Current (Isc)	8.36A	8.51A	8.65A	8.78A	8.31A	8.44A	8.56A	8.68A	7.51A
Max. System Voltage	600V	600V	600V	600V	600V	600V	600V	600V	600V
Series Fuse rating	15A	15A	15A	15A	15A	15A	15A	15A	10A
Temp. Co-efficient Voltage	-60.8mV/ °C	-60.8mV/ °C	-60.8mV/ °C	-60.8mV/ °C	-60.8mV/ °C	-60.8mV/ °C	-60.8mV/ °C	-60.8mV/ °C	-60.8mV/ °C
Temp. Co-efficient Current	2.2mA/°C	2.2mA/°C	2.2mA/°C	2.2mA/°C	2.2mA/°C	2.2mA/°C	2.2mA/°C	2.2mA/°C	2.2mA/°C
Cell efficiency	16.00%	16.40%	16.80%	17.20%	16.20%	16.40%	16.80%	17.30%	16.00%
Number of cells	54	54	54	54	60	60	60	60	72
Max. Power tolerance	5%	5%	5%	5%	5%	5%	5%	5%	5%
Dimension	1475*983 *45	1475*983 *45	1475*983 *45	1475*983 *45	1640*982 *45	1640*982 *45	1640*982 *45	1640*982 *45	1798*982 *50
Weight	19.0kg	19.0kg	19.0kg	19.0kg	20.0kg	20.0kg	20.0kg	20.0kg	23kg
Mounting holes Pitch (Y-mm)	737.5	737.5	737.5	737.5	820	820	820	820	899
Mounting holes Pitch (X-mm)	919	919	919	919	919	919	919	919	909

Model	GPP- 255/36	GPP- 260/36	GPP- 265/36	GPP- 270/36	GPP- 275/36	GPP- 280/36	GPP- 285/36	GPP- 290/36	GPP- 295/36
Power (Pmax)	255W	260W	265W	270W	275W	280W	285W	290W	295W
Max. Power Voltage (Vmax)	35.8V	36.0V	36.2V	36.0V	36.2V	35.8V	36.0V	36.2V	36.4V
Max. Current (Imp)	7.12A	7.22A	7.32A	7.50A	7.60A	7.82A	7.92A	8.01A	8.10A
Open Circuit Voltage (Voc)	44.4V	44.6V	44.8V	44.6V	44.8V	44.4V	44.6V	44.8V	45.0V
Short Circuit Current (Isc)	7.62A	7.73A	7.83A	8.03A	8.13A	8.37A	8.47A	8.57A	8.67A
Max. System Voltage	600V	600V	600V	600V	600V	600V	600V	600V	600V
Series Fuse rating	10A	10A	10A	10A	10A	15A	15A	15A	15A
Temp. Co-efficient Voltage	-60.8mV/ °C	-60.8mV/ °C	-60.8mV/ °C	-60.8mV/ °C	-60.8mV/ °C	-60.8mV/ °C	-60.8mV/ °C	-60.8mV/ °C	-60.8mV/ °C
Temp. Co-efficient Current	2.2mA/ °C	2.2mA/ °C	2.2mA/ °C	2.2mA/ °C	2.2mA/ °C	2.2mA/ °C	2.2mA/ °C	2.2mA/ °C	2.2mA/ °C
Cell efficiency	16.40%	16.70%	17.00%	16.70%	17.00%	16.40%	16.70%	17.00%	17.40%
Number of cells	72	72	72	72	72	72	72	72	72
Max. Power tolerance	5%	5%	5%	5%	5%	5%	5%	5%	5%
Dimension	1798*982 *50	1798*982 *50	1798*982 *50	1870*982 *50	1870*982 *50	1956*982 *50	1956*982 *50	1956*982 *50	1956*982 *50
Weight	23kg	23kg	23kg	24kg	24kg	25kg	25kg	25kg	25kg
Mounting holes Pitch (Y-mm)	899	899	899	935	935	978	978	978	978
Mounting holes Pitch (X-mm)	909	909	909	909	909	909	909	909	909

All above specification are at standard test condition - 25°C cell temperature & 1000 W / m² irradiance.

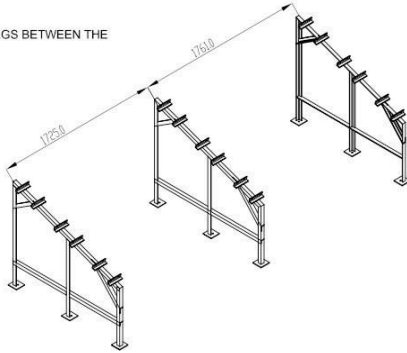
Note: Cables and connectors are optional, IP-65 Junction Box, Mc4 compatible M/F connectors along with 1 meter cables shall be provided against request.

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Solar PV Module Mounting Structures - (Fixed Type)

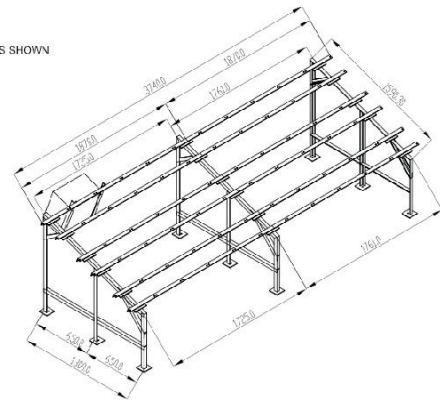
STEP -1

FIX THE STRUCTURE LEGS BETWEEN THE MENTIONED DISTANCE



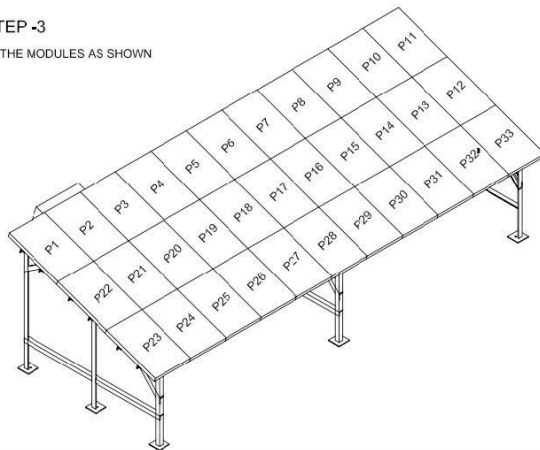
STEP -2

FIX THE L ANGLES AS SHOWN



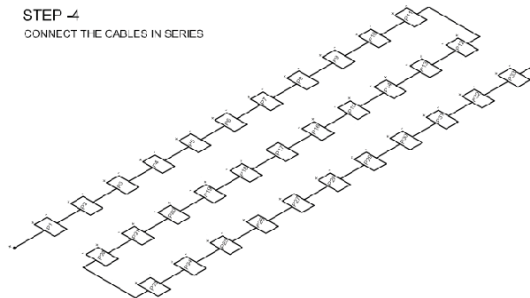
STEP -3

FIX THE MODULES AS SHOWN



STEP -4

CONNECT THE CABLES IN SERIES



The above solar PV module structures are indicative only and are designed with the dimensions of the 20 Wp Solar PV modules with a quantity of 33 nos.

The design, dimensions and structure may vary according to the requirement and site conditions. While installing the solar PV module structures it can be inclined by 10 to 20 angle at towards North-South direction.

Appropriate tracking systems (optional) shall be used to increase the efficiency of the solar PV modules power output. The place of the mounting structures should be a plain floor, concreted, shadow free from trees or buildings location.

The mounting structures are designed to withstand a wind speed of 150 km per hour. Appropriate protections systems should be in place for protecting the PV Modules against wind & any other exhaust climatic conditions.

In view of continuous developments, the information / descriptions / specifications / illustrations are subject to change without notice.