

PAHAL

SOLAR

AI Powered Solar PV Module Manufacturer

Pahal Installation Manual

(For all Models of PV Modules)

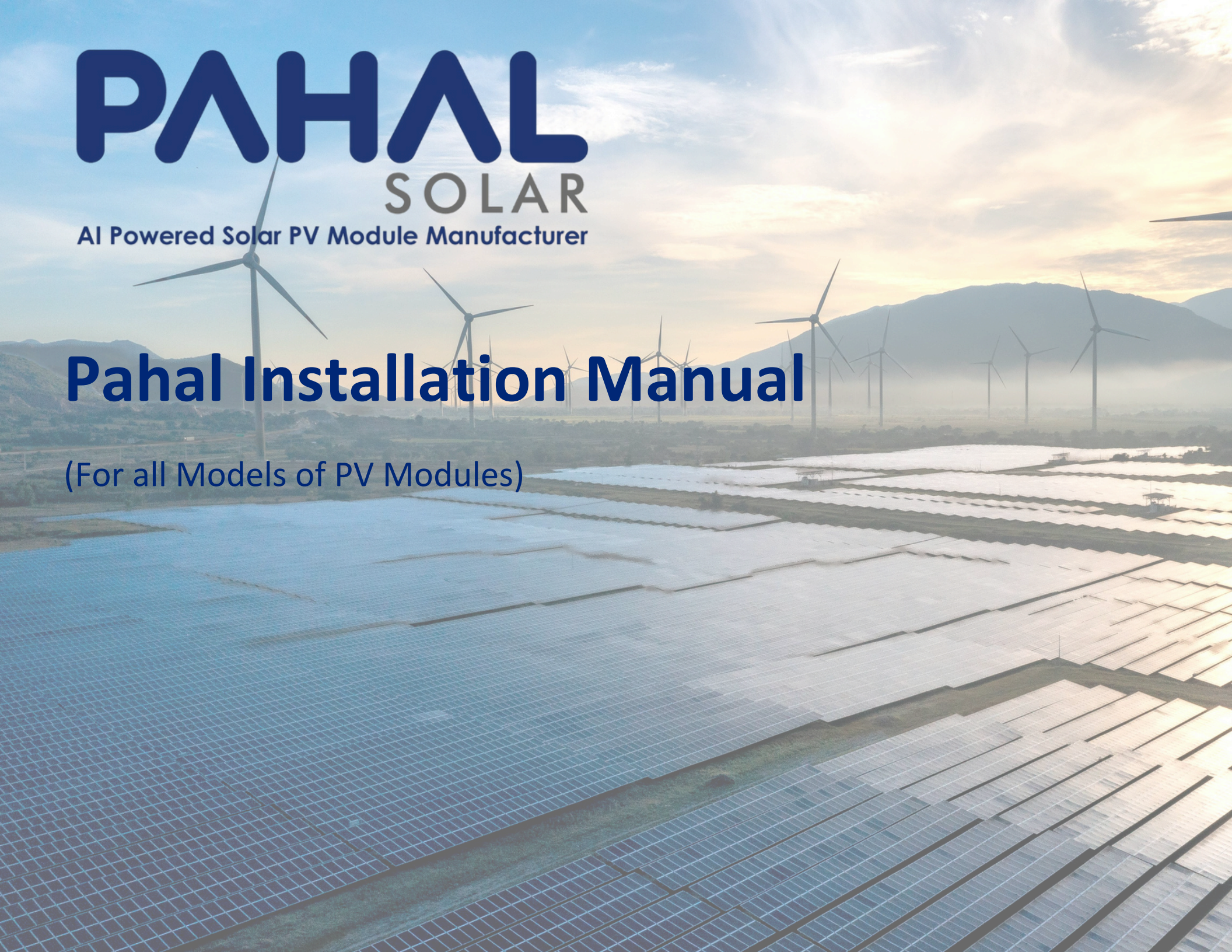


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1. INTRODUCTION

This document provides information for the safe installation and operation of our PAHAL SOLAR PVT LTD photovoltaic modules (Glass to Glass Type). Carefully read this entire instruction sheet prior to product installation. Information about system sizing, design, safety, and operation are available from your respective distributor. Determine local permit, installation and inspection requirements before installation.

The installation manual is applicable for Glass to Glass type 1500V series modules. It is recommended to check & get a confirmation from the manufacturer on the rated system voltage of the product before using the panels.

2. SAFETY MEASURES



!! WARNING !!

Before installing, wiring, operating, or maintaining modules, you should read and understand all safety precautions. Direct current (DC) is generated when the battery surface of the module is exposed to direct sunlight or other light sources, and direct contact with the live parts of the module, such as terminals, may result in injury / death of personnel whether connected to the module or not. PAHAL SOLAR PVT LTD will not be held responsible for any accidents occurring due to negligence in handling modules.

Modules with Broken Front or Rear glass must not be used in the system and should be disposed at a safe location. Broken Module disposal will be responsibility or project owner or installation agency.

3. GENERAL INFORMATION

PAHAL SOLAR PVT LTD modules convert the energy of light directly into continuous / direct current (DC) by the photovoltaic effect. The Power Generation directly depends on position of sun, time of exposure, cleanliness of module and tilt angle of module w.r.t. geo-location. Only Experienced professional and trained persons are allowed for handling and installing panels. PAHAL Glass-Glass series consists of different modules in the sense of cell number, cell efficiency and module size.

PAHAL SOLAR PVT LTD
INSTALLATION MANUAL FOR SOLAR PV MODULES.

3.1 MODEL NAMING OVERVIEW:

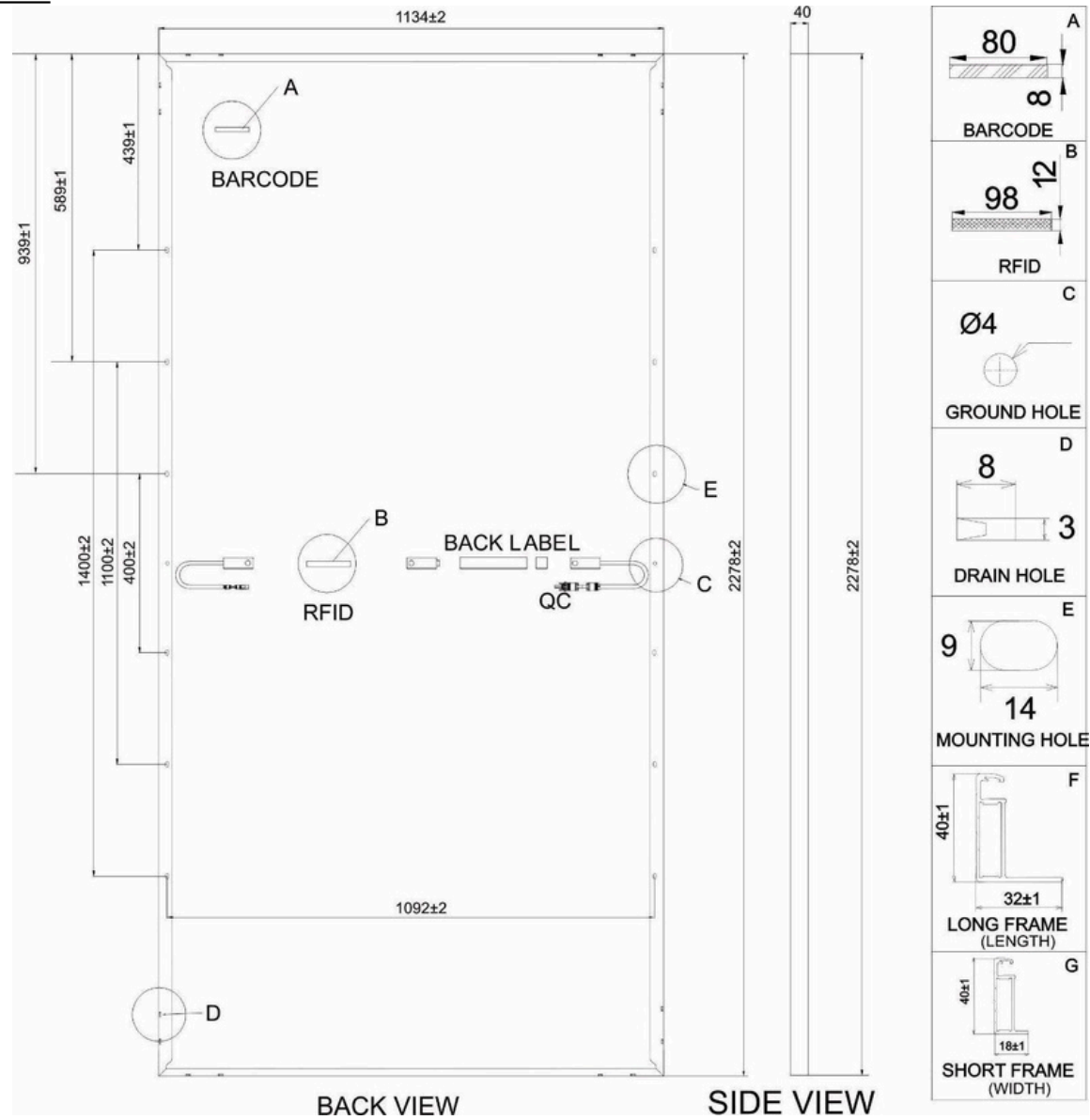
PV Module Model Name	Open Circuit Voltage @ STC. (Voc)	Rated Voltage @ STC/Vmp (V dc)	Maximum System Voltage. (V dc)	Rated Current @ STC/Imp (A)	Short Circuit Current @ STC/Isc (A)	Rated Maximum Power at STC. (Watts)	Module Eff (%)	Module Fill Factor (%)	Maximum Series Fuse. (A)	Module Weight (Kg)	Module Matrix	Module Dimension (mm)			Total No. of Cells
Family Name (144 Half-cell)															
PSN_GB620	55.14	46.76	1500	13.27	13.97	620	24.00	80.55	30	33.10	2' (12'6)	2278	1134	40	144
PSN_GB615	54.98	46.57	1500	13.21	13.92	615	23.81	80.41	30	33.10	2' (12'6)	2278	1134	40	144
PSN_GB610	54.82	46.38	1500	13.16	13.87	610	23.61	80.27	30	33.10	2' (12'6)	2278	1134	40	144
PSN_GB605	54.66	46.19	1500	13.10	13.82	605	23.42	80.13	30	33.10	2' (12'6)	2278	1134	40	144
PSN_GB600	54.50	46.00	1500	13.05	13.77	600	23.23	79.98	30	33.10	2' (12'6)	2278	1134	40	144
PSN_GB595	54.34	45.81	1500	12.99	13.72	595	23.03	79.84	30	33.10	2' (12'6)	2278	1134	40	144
PSN_GB590	54.18	45.62	1500	12.94	13.67	590	22.84	79.69	30	33.10	2' (12'6)	2278	1134	40	144
PSN_GB585	54.02	45.43	1500	12.88	13.62	585	22.65	79.55	30	33.10	2' (12'6)	2278	1134	40	144
PSN_GB580	53.86	45.24	1500	12.83	13.57	580	22.45	79.40	30	33.10	2' (12'6)	2278	1134	40	144
PSN_GB575	53.70	45.05	1500	12.77	13.52	575	22.26	79.25	30	33.10	2' (12'6)	2278	1134	40	144
PSN_GB570	53.54	44.86	1500	12.72	13.47	570	22.07	79.10	30	33.10	2' (12'6)	2278	1134	40	144
PSN_GB565	53.38	44.67	1500	12.66	13.42	565	21.87	78.95	30	33.10	2' (12'6)	2278	1134	40	144
PSN_GB560	53.22	44.48	1500	12.61	13.37	560	21.68	78.80	30	33.10	2' (12'6)	2278	1134	40	144
Family Name (132 Half-cell)															
PSN_GC560	48.08	40.66	1500	13.78	14.40	560	23.61	80.89	30	30.40	2' (11'6)	2092	1134	40	132
PSN_GC555	47.88	40.45	1500	13.72	14.35	555	23.39	80.78	30	30.40	2' (11'6)	2092	1134	40	132
PSN_GC550	47.68	40.25	1500	13.67	14.30	550	23.18	80.70	30	30.40	2' (11'6)	2092	1134	40	132
PSN_GC545	47.48	40.05	1500	13.61	14.25	545	22.97	80.55	30	30.40	2' (11'6)	2092	1134	40	132
PSN_GC540	47.28	39.84	1500	13.55	14.20	540	22.76	80.44	30	30.40	2' (11'6)	2092	1134	40	132
PSN_GC535	47.08	39.64	1500	13.50	14.15	535	22.55	80.32	30	30.40	2' (11'6)	2092	1134	40	132
PSN_GC530	46.88	39.44	1500	13.44	14.10	530	22.34	80.21	30	30.40	2' (11'6)	2092	1134	40	132
PSN_GC525	46.68	39.24	1500	13.39	14.05	525	22.13	80.09	30	30.40	2' (11'6)	2092	1134	40	132
PSN_GC520	46.48	39.03	1500	13.33	14.00	520	21.92	79.97	30	30.40	2' (11'6)	2092	1134	40	132
PSN_GC515	46.28	38.83	1500	13.28	13.95	515	21.71	79.86	30	30.40	2' (11'6)	2092	1134	40	132
PSN_GC510	46.08	38.63	1500	13.22	13.90	510	21.50	79.74	30	30.40	2' (11'6)	2092	1134	40	132
PSN_GC505	45.88	38.42	1500	13.17	13.85	505	21.29	79.62	30	30.40	2' (11'6)	2092	1134	40	132
Family Name (120 Half-cell)															
PSN_GD510	43.32	37.29	1500	13.70	14.43	510	23.57	81.73	30	27.72	2' (10'6)	1908	1134	40	120
PSN_GD505	43.12	37.08	1500	13.64	14.37	505	23.34	81.61	30	27.72	2' (10'6)	1908	1134	40	120
PSN_GD500	42.92	36.86	1500	13.58	14.31	500	23.11	81.50	30	27.72	2' (10'6)	1908	1134	40	120
PSN_GD495	42.72	36.65	1500	13.52	14.25	495	22.88	81.39	30	27.72	2' (10'6)	1908	1134	40	120
PSN_GD490	42.52	36.43	1500	13.46	14.19	490	22.65	81.27	30	27.72	2' (10'6)	1908	1134	40	120
PSN_GD485	42.32	36.22	1500	13.40	14.13	485	22.42	81.15	30	27.72	2' (10'6)	1908	1134	40	120
PSN_GD480	42.12	36.00	1500	13.34	14.07	480	22.18	81.04	30	27.72	2' (10'6)	1908	1134	40	120
PSN_GD475	41.92	35.79	1500	13.28	14.01	475	21.95	80.92	30	27.72	2' (10'6)	1908	1134	40	120
PSN_GD470	41.72	35.57	1500	13.22	13.95	470	21.72	80.80	30	27.72	2' (10'6)	1908	1134	40	120
PSN_GD465	41.52	35.36	1500	13.16	13.89	465	21.49	80.68	30	27.72	2' (10'6)	1908	1134	40	120
PSN_GD460	41.32	35.14	1500	13.10	13.83	460	21.26	80.55	30	27.72	2' (10'6)	1908	1134	40	120

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PV Module Model Name	Open Circuit Voltage @ STC. (Voc)	Rated Voltage @ STC/Vmp (V dc)	Maximum System Voltage. (V dc)	Rated Current @ STC/Imp (A)	Short Circuit Current @ STC/Isc (A)	Rated Maximum Power at STC. (Watts)	Module Eff (%)	Module Fill Factor (%)	Maximum Series Fuse. (A)	Module Weight (Kg)	Module Matrix	Module Dimension (mm)			Total No. of Cells
Family Name (108 Half-cell)															
PSN_GE460	38.88	33.53	1500	13.73	14.45	460	23.56	81.94	30	25.02	2' (9*6)	1722	1134	40	108
PSN_GE455	38.68	33.30	1500	13.67	14.39	455	23.30	81.79	30	25.02	2' (9*6)	1722	1134	40	108
PSN_GE450	38.48	33.07	1500	13.61	14.33	450	23.04	81.63	30	25.02	2' (9*6)	1722	1134	40	108
PSN_GE445	38.28	32.85	1500	13.55	14.27	445	22.79	81.48	30	25.02	2' (9*6)	1722	1134	40	108
PSN_GE440	38.08	32.62	1500	13.49	14.21	440	22.53	81.32	30	25.02	2' (9*6)	1722	1134	40	108
PSN_GE435	37.88	32.39	1500	13.43	14.15	435	22.28	81.17	30	25.02	2' (9*6)	1722	1134	40	108
PSN_GE430	37.68	32.17	1500	13.37	14.09	430	22.02	81.01	30	25.02	2' (9*6)	1722	1134	40	108
PSN_GE425	37.48	31.94	1500	13.31	14.03	425	21.76	80.84	30	25.02	2' (9*6)	1722	1134	40	108
PSN_GE420	37.28	31.71	1500	13.25	13.97	420	21.51	80.68	30	25.02	2' (9*6)	1722	1134	40	108
PSN_GE415	37.08	31.49	1500	13.19	13.91	415	21.25	80.52	30	25.02	2' (9*6)	1722	1134	40	108
Family Name (96 Half-cell)															
PSN_GF410	37.06	31.71	1500	12.94	13.59	410	23.51	81.49	30	22.35	2'(8*6)	1538	1134	40	96
PSN_GF405	36.86	31.46	1500	12.88	13.53	405	23.22	81.27	30	22.35	2'(8*6)	1538	1134	40	96
PSN_GF400	36.66	31.21	1500	12.82	13.47	400	22.93	81.04	30	22.35	2'(8*6)	1538	1134	40	96
PSN_GF395	36.46	30.96	1500	12.76	13.41	395	22.65	80.82	30	22.35	2'(8*6)	1538	1134	40	96
PSN_GF390	36.26	30.71	1500	12.70	13.35	390	22.36	80.59	30	22.35	2'(8*6)	1538	1134	40	96
PSN_GF385	36.06	30.46	1500	12.64	13.29	385	22.07	80.36	30	22.35	2'(8*6)	1538	1134	40	96
PSN_GF380	35.86	30.21	1500	12.58	13.23	380	21.79	80.12	30	22.35	2'(8*6)	1538	1134	40	96
PSN_GF375	35.66	29.96	1500	12.52	13.17	375	21.50	79.89	30	22.35	2'(8*6)	1538	1134	40	96
PSN_GF370	35.46	29.71	1500	12.46	13.11	370	21.21	79.65	30	22.35	2'(8*6)	1538	1134	40	96
Family Name (84 Half-cell)															
PSN_GG355	30.37	26.17	1500	13.58	14.30	355	23.15	81.83	30	19.64	2'(7*6)	1352	1134	40	84
PSN_GG350	30.17	25.88	1500	13.54	14.24	350	22.83	81.53	30	19.64	2'(7*6)	1352	1134	40	84
PSN_GG345	29.97	25.59	1500	13.49	14.18	345	22.50	81.23	30	19.64	2'(7*6)	1352	1134	40	84
PSN_GG340	29.77	25.30	1500	13.45	14.12	340	22.18	80.92	30	19.64	2'(7*6)	1352	1134	40	84
PSN_GG335	29.57	25.01	1500	13.40	14.06	335	21.85	80.61	30	19.64	2'(7*6)	1352	1134	40	84
PSN_GG330	29.37	24.72	1500	13.36	14.00	330	21.52	80.29	30	19.64	2'(7*6)	1352	1134	40	84
PSN_GG325	29.17	24.43	1500	13.31	13.94	325	21.20	79.96	30	19.64	2'(7*6)	1352	1134	40	84
PSN_GG320	28.97	24.14	1500	13.27	13.88	320	20.87	79.63	30	19.64	2'(7*6)	1352	1134	40	84
Family Name (72 Half-cell)															
PSN_GI305	26.32	22.79	1500	13.39	14.10	305	23.03	82.23	30	16.97	2' (6*6)	1168	1134	40	72
PSN_GI300	26.12	22.49	1500	13.35	14.04	300	22.65	81.85	30	16.97	2' (6*6)	1168	1134	40	72
PSN_GI295	25.92	22.19	1500	13.30	13.98	295	22.27	81.46	30	16.97	2' (6*6)	1168	1134	40	72
PSN_GI290	25.72	21.89	1500	13.26	13.92	290	21.89	81.07	30	16.97	2' (6*6)	1168	1134	40	72
PSN_GI285	25.52	21.59	1500	13.21	13.86	285	21.52	80.66	30	16.97	2' (6*6)	1168	1134	40	72
PSN_GI280	25.32	21.29	1500	13.17	13.80	280	21.14	80.25	30	16.97	2' (6*6)	1168	1134	40	72
PSN_GI275	25.12	20.99	1500	13.13	13.74	275	20.76	79.83	30	16.97	2' (6*6)	1168	1134	40	72

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3.2 DIMENSIONS (in mm):



3.3 ELECTRICAL SPECIFICATIONS:

The performance and all photovoltaic parameters of the modules are measured under two different conditions:

(1) Standard Test Conditions (STC): (Based on Front side)

Under Irradiance = 1000W/m²

Cell Temperature = 25 °C, AM = 1.5 Test Condition

(2) Nominal Module Operating Temperature (NMOT): (Based on Front side)

Under Irradiance = 800W/m²

Ambient Temperature = 20 °C

Average NOCT = 45 ± 2°C

AM = 1.5 Test Condition

Wind Speed = 1 m/s based on Front side.

Detailed electrical characteristics for all PV modules are presented in our product's DATASHEET at site: www.pahalsolar.com

4. DISCLAIMER OF LIABILITY

Information contained in this instruction manual is based on PAHAL SOLAR PVT LTD's Information and expertise.

PAHAL SOLAR PVT LTD shall not be held responsible for any damages including bodily injury or damage to property in connection with handling PV modules, system installation, or non-compliance with the instructions set forth in this manual.

The company can change this manual and specification without giving any prior information. PAHAL SOLAR PVT LTD has rights to amend this document any time including PV module specification without prior notification.

5. LIMITED WARRANTY

Please refer to PAHAL SOLAR PVT LTD WARRANTY DOCUMENT of Sale for details of the module's limited warranty. Failure to comply with this Safety and Installation Manual would void PAHAL SOLAR PVT LTD's Warranty for the PV modules as stated in the General Terms and Conditions of Sale. Detailed warranty terms are mentioned on page 10.



PAHAL SOLAR PVT LTD assumes no responsibility for any infringement.

6. MODULE SPECIFICATION

Module Specification varies for different models of Modules. Please refer to the appropriate DATASHEETS for electrical performance data and mechanical installation information.

7. PANEL WILL BE VOID OF WARRANTY UNDER FOLLOWING CIRCUMSTANCES (FOR ALL MODELS OF MODULES):

1. SHADOW ISSUE:

EFFECTS:

Low Generation, Hotspot, Cell-Heating, Back-sheet burn / bubble formation / degradation, Cell Efficiency loss, JB Diode fail/burn.

CAUSE:

Permanent shadow due to Building, Tree, LA, Sprinkler, Flags, Railings or other obstructions.

Sharp shadows due to Bird-dropping, leaves deposit, flags or other obstructions (Irregular Cleaning).

Dust deposit at lower portion of frame due to inefficient sprinkler system.

Hard water stains due to water collection at lower portions of frame.

Dust deposit due to partial or irregular cleaning.

CAUTION (TO DO):

Proper Shadow analysis should be done before installation.

Shift shadow-affected panels to shadow-free location.

Proper row to row spacing should be done depending on location.

Make sure to remove excess water on lower frames to avoid hard water deposit.

Clean twice a week to avoid dust, dropping or other deposits and bird droppings.



2. ON SITE DAMAGE:

EFFECTS:

Glass Crack, Water ingress, De-lamination, Cell Crack, Hotspot due to permanent crack shadow, Low Generation, Electrical shock, Earth Leakage, Connector burn.

CAUSE:

Walking / Weight on broken glass during or after installation.

Dropping sharp objects during or after installation causing glass Damage.

Transportation damage (Transportation on installer's personal vehicle).

Drilling holes in frame or any other modifications without taking permission from PAHAL SOLAR PVT LTD.

Spraying or applying unknown chemicals on glass / frame / back-sheet without notifying PAHAL SOLAR PVT LTD.

Changing / Modifying JB cable or connector without notifying PAHAL SOLAR PVT LTD.

Opening JB Cover or any modification without notifying PAHAL SOLAR PVT LTD.

Back-sheet scratch, accidental or intentional.

J-Bolt or any clamp touching panel back-sheet.

DC Cable damage due to SS Cable-Tie or other reasons causing DC Earth Leakage.

CAUTION (TO DO):

By-pass the damaged module from healthy system.

Avoid walking or climbing on broken panel.

Avoid using module for other applications.

Dispose broken module out of reach of children and use Gloves for safe handling.

NOTE: Damage caused during Transportation by third-party and onwards, will not be considered for any replacement.



**BROKEN PANELS ARE BEYOND REPAIR AND ITS DISPOSAL
WILL BE RESPONSIBILITY OF INSTALLER OR END USER.**



3. IMPROPER INSTALLATION:

EFFECTS:

Generation Loss, Difficulty cleaning, Non-accessibility in service, Hotspots due to shadow.

CAUSE:

Incorrect Slope (East-West or West-East or North facing slope in Northern hemisphere and vice-versa in southern hemisphere).

Connecting different slope panels in same String or same MPPT input.

Connecting different capacities panels in same series.

Connecting series of different number of panels parallel in same MPPT input.

Incorrect tilt angle according to latitude.

Panels at far corners not accessible for cleaning.

Sprinkler nozzles or pipes running over solar cells.

Water deposit due to lower tilt angles.

Installation on permanent shadow location.

Cables and connectors hanging and touching ground.

Unacceptable clamp distancing, drilling extra holes on frame or any modification risking frame structure stability.

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CAUTION (TO DO):

Hire Professional installation team with core knowledge in solar industry.

Design system such that all panels are accessible.

Calculate tilt angles according to location.

Proper grouping of panels with different tilt angles should be done.

Water drain use or proper wiping should to be done with lower tilt angle sites.

Proper, clean and firm cabling should be done.

Use of conduit pipes should be done where cables are exposed to direct sunlight.



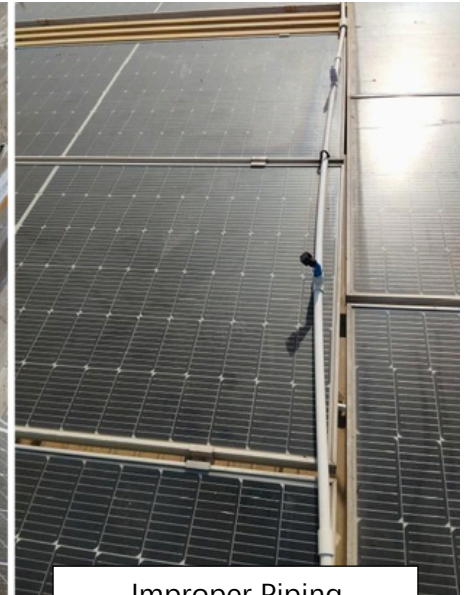
Panels Not Accessible



Improper Cabling



Permanent Shadow Issue



Improper Piping

ANY UNAUTHORIZED MODIFICATIONS SHOULD NOT BE DONE TO MODULES WITHOUT INFORMING OR NOTIFYING OR TAKING PERMISSION FROM PAHAL SOLAR PVT LTD'S OFFICIALS. ANY DAMAGES ACCOUNTING TO THESE MODIFICATIONS WILL VOID THE MODULES OF WARRANTY.

4. FORCE MAJEURE:

- PAHAL SOLAR PVT LTD will not be liable in any way to the customer or any 3rd party for any non-performance or damage due to:

Acts of God, earthquakes and other natural calamities, war, riots, strikes, warlike conditions, plague and other epidemics, fire, flood, or any other similar cause or circumstances beyond the reasonable control of PAHAL SOLAR PVT LTD.

Above mentioned causes are beyond control of PAHAL SOLAR PVT LTD and PAHAL SOLAR PVT LTD are not liable for any damage of material no warranty will be provided for same.

No warranty or Services will be provided for such conditions.

-----THE END-----