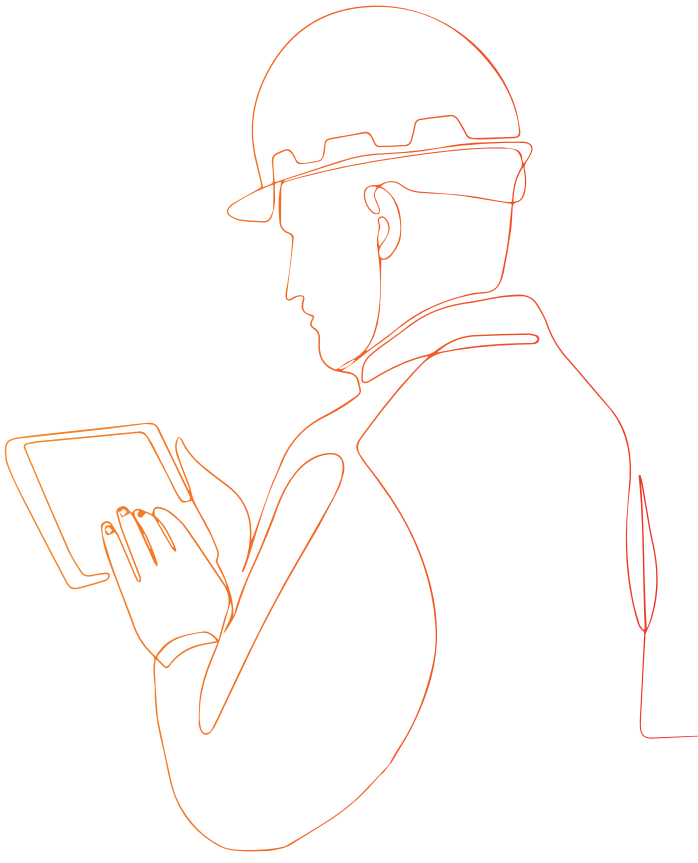
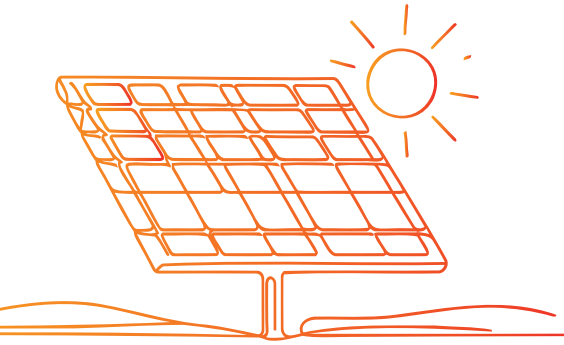
Installation Manual

Solar PV Modules

DOCUMENT NUMBER	DOCUMENT ISSUE DATE
ISL/IM/ENG/IM/02	01 April 2025





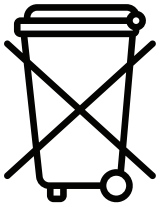
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1. Overview

Thank you for choosing Inox Solar PV modules. This manual provides essential information on the installation, handling, and safe use of our modules. Since solar PV modules generate electricity when exposed to sunlight, it is important to follow proper safety guidelines to prevent accidents and ensure long-term performance.

Please read this manual carefully before installing or operating the modules.

1.1 Meaning of crossed – out wheeled dustbin



Do not dispose of electrical appliances as unsorted municipal waste, use separate collection facilities. Contact your local government for information regarding the collection systems available. If electrical appliances are disposed of inland fills or dumps, hazardous substances can leak into the groundwater and get into the food chain, damaging your health and well-being. When replacing old appliances with new ones, the retailer is legally obligated to take back your old appliance for disposals at least free of charge

2. Laws and Regulations

The installation of photovoltaic modules—both electrical and mechanical—must comply with all applicable local and national regulations, including:

- Electrical laws
- Building/construction laws
- Electrical connection requirements

These requirements may vary depending on:

- Installation site (ground, rooftop, vehicle, etc.)
- System voltage (DC or AC applications)

Please consult local authorities or licensed professionals for specific legal and regulatory requirements.

Directing external or artificially concentrated sunlight onto the front or back surface of the PV module is strictly prohibited.

3. General Information

3.1. Module Identification

Each Inox Solar PV module is equipped with three labels carrying important information:

Back label (Rating label)

- Product model / type
- Module electrical data (Power, Voc, Isc, Impp, Vmpp)
- Certification logo and certification number
- Maximum overload protection current
- Maximum system voltage
- Manufacturing address
- Safety symbols

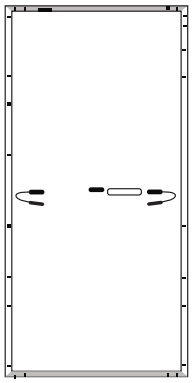
Current binning label (Rated working label)

- High
- Low

Module Serial Number

- Every module has a unique serial number.
- One serial number is embedded inside the laminate.
- Two additional serial numbers are affixed on the substrate and frame for identification.





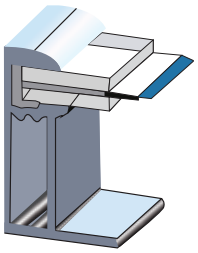
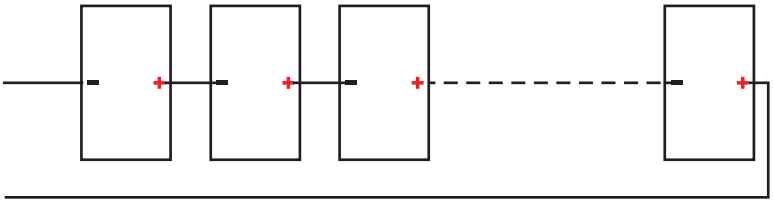
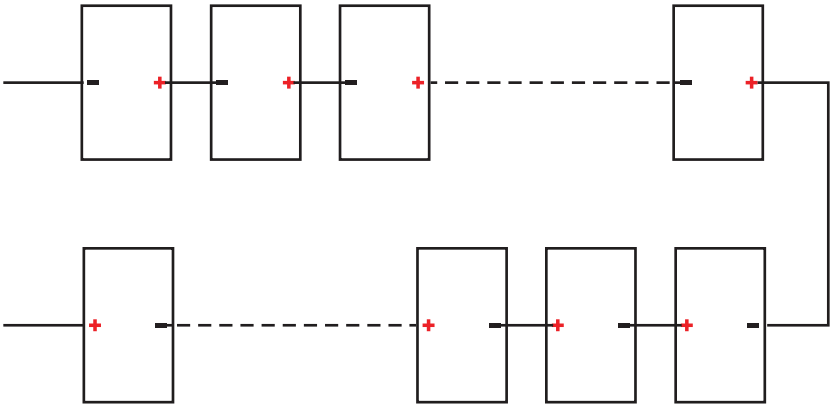
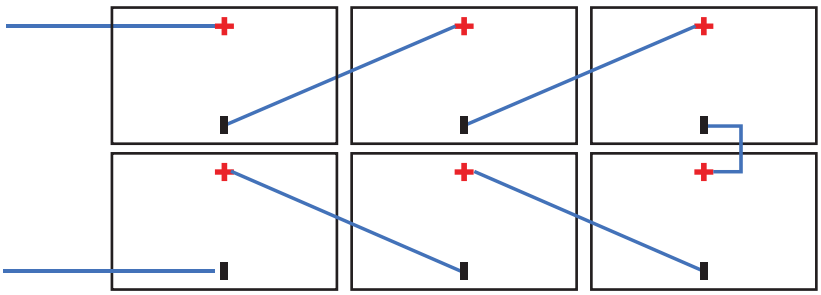


Figure 1 : Module (with frame)

3.2. Wiring Methodology

If your required cable connection method is not listed in the table provided, please confirm the appropriate cable type and length with an Inox Solar sales representative.

Orientation	Recommended wiring connection
Portrait (1P)	 An extension cord is required at the last module
Portrait (2P)	

Landscape	 Required cable length will be mentioned in the product datasheet

3.3. Electrical Performance Safety

- Inox Solar PV modules generate direct current (DC) when exposed to sunlight or strong artificial light. Direct contact with live parts such as terminals may cause serious injury or death, regardless of whether the module is connected to external equipment.
- Even when not connected to a load or circuit, modules can still produce voltage. Always use insulated tools and wear protective rubber gloves when handling modules in sunlight.
- PV module operation can only be stopped by:

  Covering them with an opaque board or UV-resistant material, or

  Placing them face-down on a smooth, non-scratch surface.
- Do not disconnect modules under load to avoid electric arcs or shocks.
- Keep connectors clean, dry, and in good working condition.
- Broken glass (front or back) creates electrical hazards and fire risks — such modules must be removed and replaced immediately.
- If edge-sealing material is damaged, the module should be isolated and replaced.
- Never handle wet modules unless wearing PPE. Follow the cleaning guidelines in this manual when cleaning modules.

3.4. Operation Safety

- Do not damage or drop packaged modules.
- Respect the maximum stacking limit on cartons. Store cartons in dry, ventilated, waterproof areas.
- If stored outdoors or in uncontrolled conditions, limit storage to 3 months and protect connectors from moisture/sunlight with end caps.
- Stacks must not exceed 12 modules and frames should remain aligned.
- Do not place heavy loads on modules, twist frames, or block drainage holes.
- Do not stand, walk, or sit on modules.
- Never lift modules by junction box cables, ropes, or carry them on your head/back.
- Avoid drilling holes, painting, scratching, or applying adhesives to modules.
- Do not insert conductive materials into connectors.
- Junction boxes and connectors meet IP68 standards but must still be protected from direct sunlight, immersion, and corrosive substances (alcohol, gasoline, lubricants, herbicides, etc.).
- Do not attempt to repair damaged modules yourself.3.5. Fire Safety
- Always comply with local fire safety codes and building standards.
- The fire rating of Inox Solar modules is IEC Class C.
- Use proper accessories (fuses, circuit breakers, grounding connectors).
- Do not install modules near flammable gases or explosive environments.

4. Installation Conditions

4.1. Installation Safety

- Always wear safety helmets, insulated gloves, and rubber shoes during installation.
- Avoid wearing metal items (rings, watches) that could cause electrical contact.
- Keep modules packaged until ready for installation. If not connected immediately, cover connectors with protective caps.
- Glass surfaces and frames may be hot under sunlight — risk of burns. Use only insulated tools.
- Do not work in rain, snow, or strong winds. Avoid handling modules with wet terminals.
- Connect only modules of the same size and specification in series.
- Ensure connectors are locked, dry, and secured with cable ties to prevent rubbing against the backsheet.
- Maintain clearance for thermal expansion: ≥10 mm between standard modules, ≥20 mm between dual-glass modules.
- Maintain at least 10 cm clearance behind the module for ventilation.
- During installation, removal, or maintenance, ensure the pulling force on connectors does not exceed 60N.

4.2. Climatic Condition

The recommended weather conditions for installing modules are:

- Humidity: ≤ 85% RH
- Operating temperature range: -40°C to +85°C
- Ambient air temperature range: -40°C to + 50°C
- Module [T98]max [°C]: 70°C

For installations above 2000m altitude or in extreme climates, please consult Inox Solar technical support. Ensure wind and snow loads do not exceed maximum rated values.

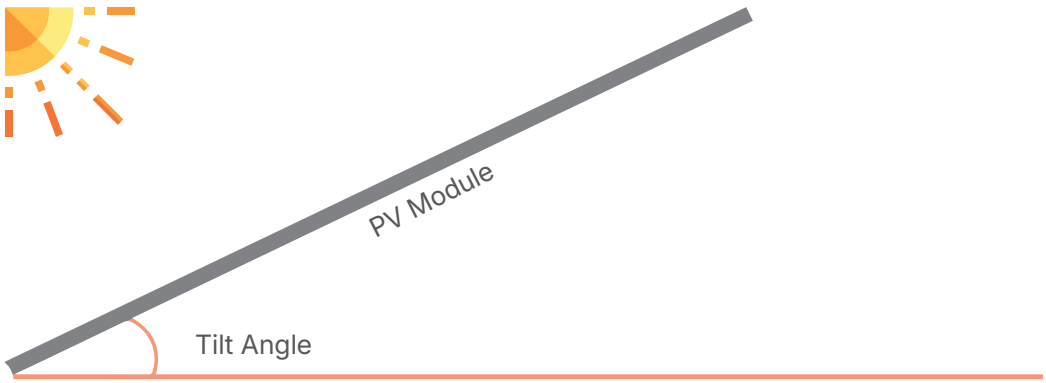
4.3. Site and tilt angle selection

4.3.1. Site Selection

- Install modules where they receive maximum sunlight year-round.
- Avoid shade from trees, chimneys, or buildings — even partial shading reduces output.
- Do not install in flood-prone areas or areas exposed to corrosive gases/chemicals.
- Provide lightning protection in storm-prone regions.
- Near coastal areas (50–500m from sea), use corrosion-resistant materials and apply anti-corrosion treatment.

4.3.2. Tilt Angle Selection

- Tilt angle = angle between module surface and horizontal plane.
- For best output:
  North-facing in southern hemisphere
  South-facing in northern hemisphere
- Inox Solar recommends a tilt of ≥10° to allow rainwater to wash away dust and prevent water pooling.
- All modules in a string should be installed with the same tilt and orientation to avoid mismatch losses.



Tilt Angle of PV Module

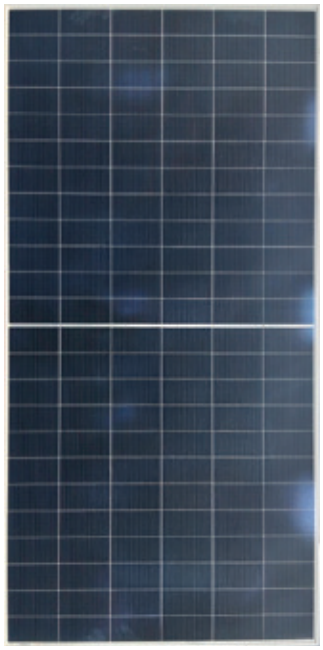
5. Mechanical Installation

5.1. General Requirements

- Ensure mounting structures can withstand local wind and snow loads, verified by third-party testing.
- Use durable, corrosion-resistant, UV-proof brackets.
- For heavy snow regions, mount modules higher to prevent snow coverage.
- Avoid contact between backsheet and sharp/ abrasive surfaces.
- Maximum static load (with a safety factor 1.5):

  Downforce: 5400 Pa (design load: 3600 Pa)

  Uplift: 2400 Pa (design load: 1600 Pa)
- Install modules horizontally or vertically, ensuring drain holes remain unobstructed.

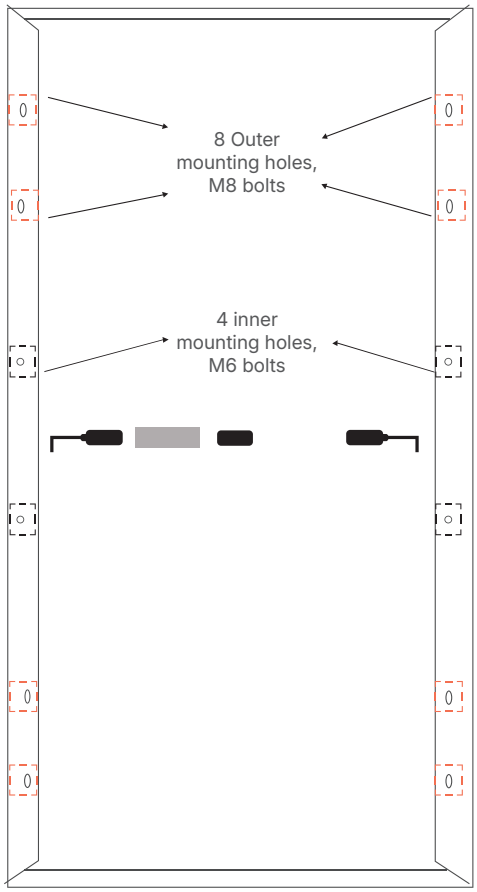


Solar Module: front view



Solar Module: back view

5.2. Bolt Mountings



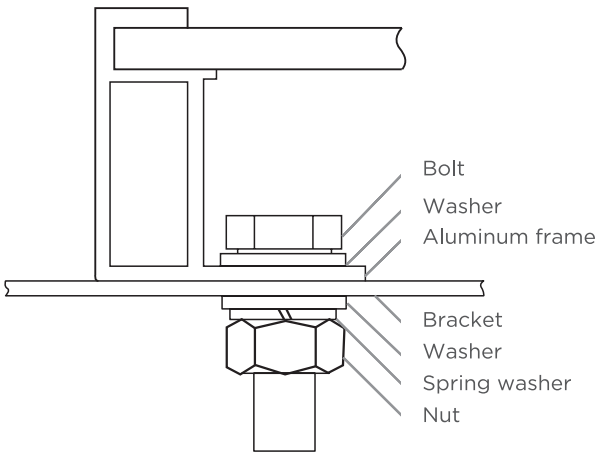


Figure 3: Mounting with bolt

Mounting Hole	Bolt SizeBolt Size	Tightening Torque
14mm x 9mm	M8	22-30 N*M
10mm x 7mm	M6	9-12 N*M9-12 N*M

Table 1: Bolts for different mounting holes

The reference value of tightening torque for M8 bolt is 22-30 N*M, and for M6 bolt is 9-12 N*M. If special mounting system or special installation method is required, please reconfirm with the supplier of the racking system regarding the torque value.

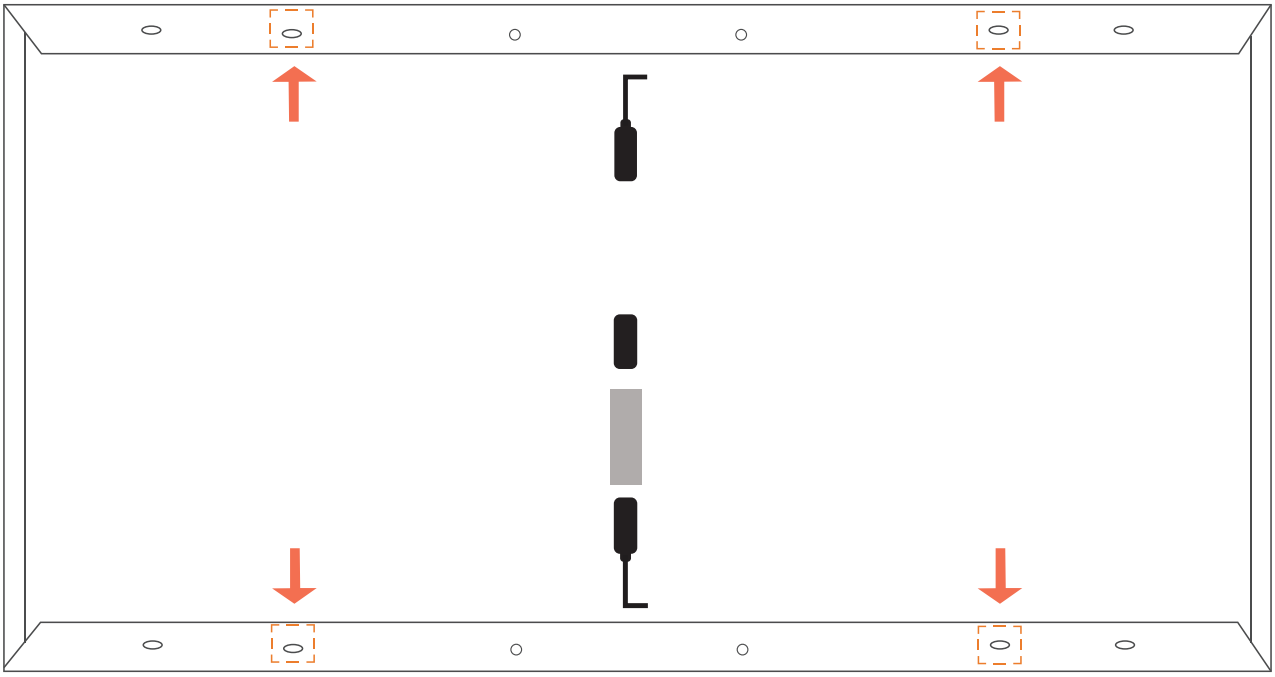


Figure 4: Mounting hole position of bolt mounting for 2400Pa

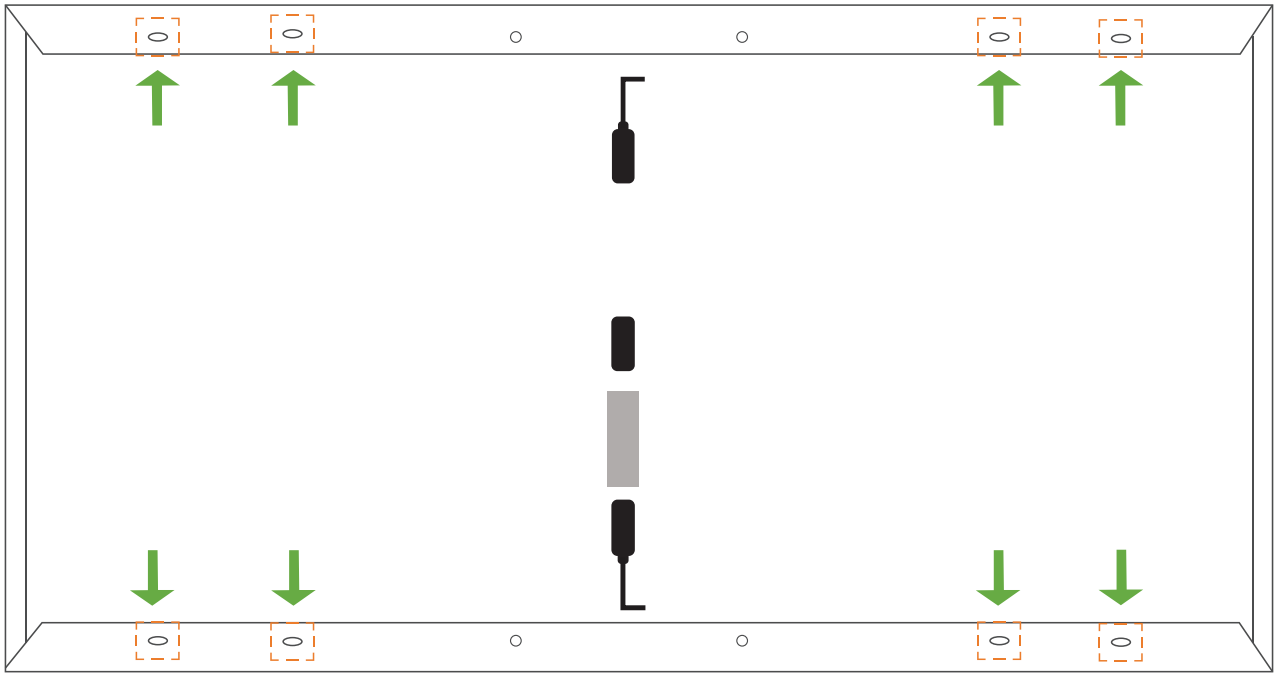


Figure 5: Mounting hole position of bolt mounting for 5400Pa

Applicable Model	Module Dimension		Mounting Pitch		
	Length(mm)	Width(mm)	X-Pitch (mm)	Y-Pitch (mm)	
ISL 144 NM10RXXX	2278	1134	1094	1000	1400
ISL 156 NM10RXXX	2465	1134	1094	1000	1400
ISL 132 NG12RXXX	2382	1134	1094	1000	1400

Table 2: Mounting hole position for applicable module

6. Electrical Installation

6.1. Electrical Performance

The reported performance measurements are subject to ±5% uncertainty at STC/BSTC (1000W/m² Irradiance, a cell temperature of 25°C and an AM1.5 spectrum) for voltage, current and ±3% power, where standard test conditions (1000 W/m2, (25 ± 2)°C, AM 1.5 according to IEC 60904-3) and BSTC (AM 1.5, T = 25°C, Irradiance = 1000W/m2 + φ*135W/m2), φ is the bifaciality factor of module mentioned on the rating label.

Maximum allowable system voltage for Inox Solar PV modules is 1500V, Class for protection against electrical shock, in accordance with Clause 4 of IEC 61730:2023 is CLASS II.

When modules are in series connection, the string voltage is sum of individual modules in one string.

When modules are in parallel connection, the current is sum of the individual string current. Modules with different electric performance models cannot be connected in one string.

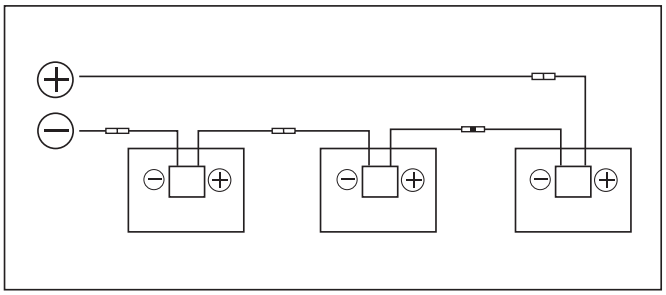


Figure 6: Series String Connection

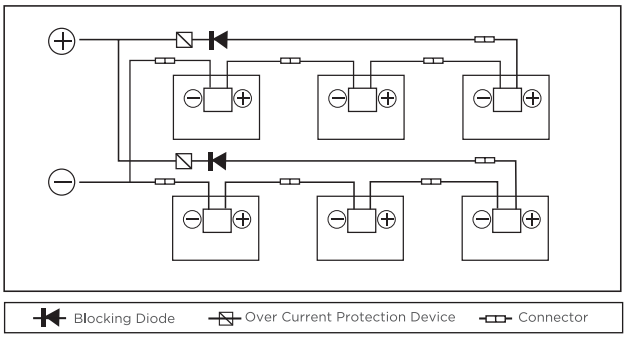


Figure 7: Parallel Connection

The maximum allowed quantity of modules in string connection shall be calculated according to relative regulations. The open circuit voltage value under the expected lowest temperature shall not exceed the maximum system voltage value allowed by modules and other values required by DC electric parts.

a) If modules are connected in series, the total voltage is equal to the sum of individual voltages. The recommended system voltage is as below,

System voltage ≥ $N*V_{oc}[1+T_cV_{oc}* (T_{min}-25)]$

Where:
N - module numbers in series
V_{oc} - Open circuit voltage (refer to product datasheet)
T_cV_{oc} - Temperature coefficient of open circuit voltage (refer to product datasheet)
T_{min} - Minimum ambient temperature

b) If the modules are connected in parallel, the recommended number of modules in parallel is maximum series fuse rating/I_{sc}+1

Under certain conditions, a module may produce more current or voltage than under its Standard Test Condition's rated power. As a result, the module short-circuit current under STC should be multiplied by 1.25. Depending on your local regulations, an additional 1.25 multiplier for the short-circuit current (giving a total multiplier of 1.56) may be applicable when sizing conductors and fuses.

If there is reverse current exceeding the maximum fuse current flowing through the module, use overcurrent protection device with the same specifications to protect the module; if parallel connection is more than 2, there must be an overcurrent protection device on each string of module. Below table indicates advisable maximum overcurrent rating:

Applicable Model	Module Type	Maximum Overcurrent Protection Rating
ISL 144 NM10RXXX	Bifacial	30A
ISL 156 NM10RXXX	Bifacial	30A
ISL 132 NG12RXXX	Bifacial	30A

Table 3 : Maximum overcurrent protection rating for applicable model

The module is considered to be in compliance with this standard only when the module is mounted in the manner specified by the mounting instructions. A module with exposed conductive parts is considered to be in compliance with this standard only when it is electrically grounded in accordance with the instructions and the requirements of the National Electrical Code, ANSI/NFPA 70 (2014-2017)

6.2. Cables and Wiring

- Junction boxes and connectors meet IP68 protection standards.
- Use single-wire cables (2.5–16 mm², 90°C rated, EN50618 approved).
- Protect cables from UV and mechanical stress using UV-resistant ties/clamps.
- Minimum cable bending radius: 43 mm.
- All wiring must comply with local Electrical Codes.

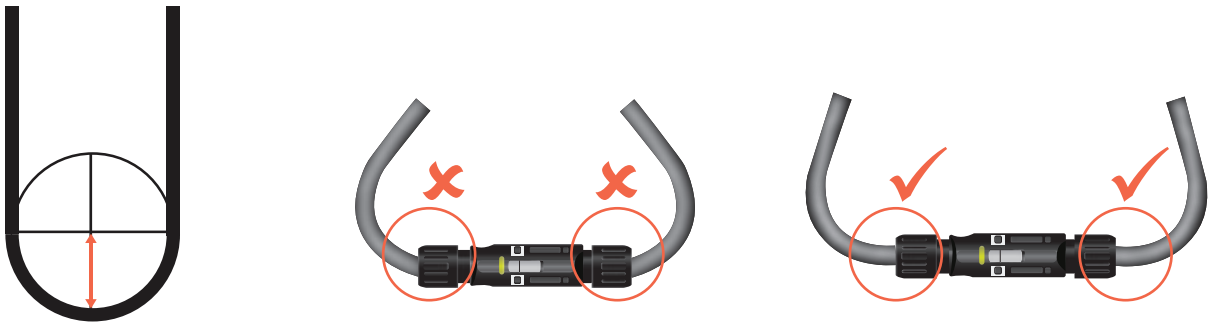


Figure 8: Routing of cable

6.3. Connectors

- Keep connectors clean, dry, and properly capped.
- Only use compatible connectors (same vendor/model).
- Ensure connectors are fully locked to prevent arcs or shocks.

Each module comes with a permanently attached Junction Box with cables 1×4.0mm², ambient temp -40 to +70°C, rated voltage 1500 VDC, certified against IEC 62930, type 131 , fitted with below mentioned connector, and contains 3 Schottky diode:
*Cable length can vary as per customer requirement

Model series	PV Connector Manufactured by	Male Connector Model No.	Female Connector Model No.	Mating Connector
"ISL 144 NM10RXXX (xxx= 570-595Wp in step of 5) ISL 156 NM10RXXX (xxx= 610-645Wp in step of 5)"	Dhash PV Technologies Limited	DS01	DS01	Same manufacturer and model of connector
"ISL 144 NM10RXXX (xxx= 570-595Wp in step of 5) ISL 156 NM10RXXX (xxx= 610-645Wp in step of 5)"	Zhejiang Zhonguan Sunter PV Technology Co., Ltd	PV-ZH202B	PV-ZH202B	Same manufacturer and model of connector
"ISL 132 NG12RXXX (xxx= 600-625Wp in step of 5)"	Dhash PV Technologies Ltd	DS01	DS01	Same manufacturer and model of connector

6.4. Bypass Diode

- Junction box contains bypass diodes to protect cells from hot-spot damage.
- Diodes are not overcurrent protection devices.
- If faulty, contact Inox Solar technical support — do not open the junction box yourself.

Model series	PV Connector Manufactured by	Junction Box Model No.	Diode Model No.
"ISL 144 NM10RXXX (xxx= 570-595Wp in step of 5) ISL 156 NM10RXXX (xxx= 610-645Wp in step of 5)"	Dhash PV Technologies Limited	DSJB12c	DS5045T
"ISL 144 NM10RXXX (xxx= 570-595Wp in step of 5) ISL 156 NM10RXXX (xxx= 610-645Wp in step of 5)"	Zhejiang Zhonguan Sunter PV Technology Co., Ltd	PV-ZH011C-5M	MK5045
"ISL 132 NG12RXXX (xxx= 600-625Wp in step of 5)"	Dhash PV Technologies Limited	DSJB12c	DS5045T

7. Grounding

- Module frames must be grounded for lightning and static protection.
- Use grounding holes marked with the IEC grounding symbol only.
- Grounding wire: 4–16 mm² solid bare copper, torque 3–7 Nm.
- Grounding must be installed by a licensed electrician.

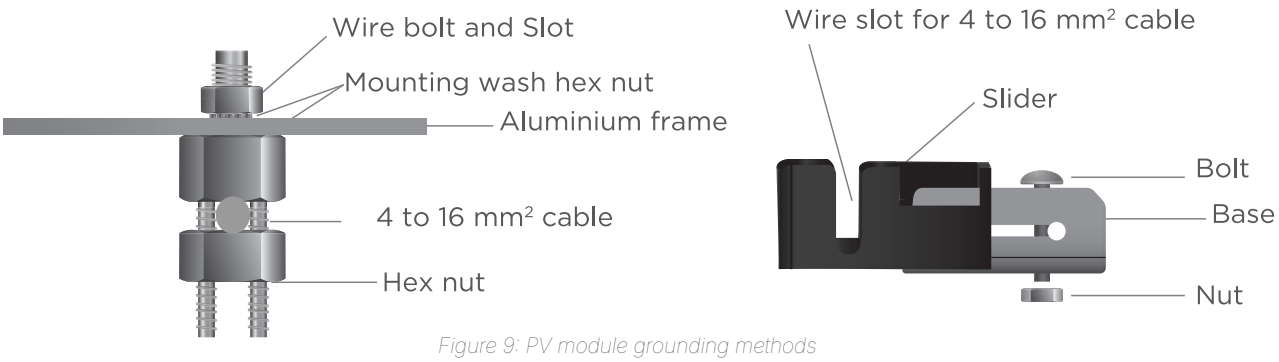


Figure 9: PV module grounding methods

Holes provided for this purpose are identified with a grounding symbol (IEC61730-1).
Grounding connections should be installed by a qualified electrician. Connect module frames together using adequate grounding cables: Grounding wire size (4-16 mm²/12-6 AWG solid bare copper) should be selected and installed underneath the wire binding bolt.

The electrical contact is made by penetrating the anodized coating of the aluminum frame and tightening the mounting screw (together with the star washer) to the proper torque of 3-7 N*M.

8. Operation and Maintenance

8.1. Cleaning

- Clean modules at least once a year (more in dusty conditions)
- Use soft cloth/sponges and neutral water (pH 5–7)
- Clean when modules are cool (before sunrise/after sunset)
- Avoid sudden temperature shocks (water-glass temp difference < 8°C)
- Dust/leaves: wipe with dry cloth
- Organic stains (bird droppings, sap): use mild soap and rinse with low-pressure water (<35 bar)
- Required for water quality:
  - PH: 5 to 7
  - Chloride and Salinity: 0 - 3000 mg/L
  - Turbidity: 0-30 NTU
  - Conductivity: 1500~3000 µs/cm
  - Total dissolved solids (TDS): < 1000 mg/L
  - Water hardness (calcium and magnesium ions): 0-40 mg/L
- Do not use acid and alkaline detergents to clean modules
- Do not use tools with rough surfaces to clean in any case

8.2. Cleaning Precautions

- Do not use high-pressure water, chemicals, or abrasive tools.
- Do not spray water on broken modules.
- Always wear gloves.
- Do not stand on panels during cleaning.

8.3. Module Appearance Inspection

Inspect modules regularly for:

- Glass cracks or damage
- Signs of corrosion, burn marks, or sealant gaps
- Connector and cable integrity
- Loose/damaged screws on mounting systems
- Obstructions or shading
- Rodent or environmental damage

Report any serious defects to Inox Solar within 2 weeks during warranty period.

9. Product Electrical Parameters

Type name or model no.	ISL 144 NM10RXXX (xxx= 570-595Wp in step of 5)	ISL 156 NM10RXXX (xxx= 610-645Wp in step of 5)	ISL 132 NG12RXXX (xxx= 600-625Wp in step of 5)
Nominal maximum output power at STC [W]	570-595 in step of 5	610-645 in step of 5	600-625 in step of 5
Nominal short-circuit current at STC [A]	14.16-14.56	14.27-14.58	15.66 - 15.96
Nominal open-circuit voltage at STC [V]	51.16-51.81	54.90-56.30	48.78 - 49.78
Tolerance of rating at STC (Pmax/Isc/ Voc) [%]	±3/±5/±5	±3/±5/±5	±3/±5/±5
Temperature coefficient for Pmax/Isc/ Voc [%/°C]	-0.28/+0.04/-0.24	-0.28/+0.04/-0.24	-0.28/+0.04/-0.24
Nominal maximum output power at BNPI [W]	632-659	675-715	665-692
Nominal short-circuit current at BNPI [A]	15.68-16.13	15.80-16.15	17.34-17.68
Nominal open-circuit voltage at BNPI [V]	51.16-51.81	54.90-56.30	48.78-49.78
Tolerance of rating at BNPI (Pmax/Isc/ Voc) [%]	±10/±10/±10	±10/±10/±10	±10/±10/±10
Bifaciality coefficient (φIsc, φVoc, φPmax)	80 ± 5%	80 ± 5%	80 ± 5%
Dimensions (L x W x H) [mm]	2278×1134×30	2465×1134×30	2382×1134×30
Module area [m^2]	2.58	2.80	2.70
Class (IEC 61730-1:2016)	Class II	Class II	Class II
Maximum system voltage [VDC]	1500	1500	1500
Pollution degree	PD2	PD2	PD2
Qualified as cemented joint design	No	No	No
Over-current protection rating [A]	30	30	30
Defined min. clearance distance [mm]	15	15	15
Max. operational altitude [masl]	≤2000	≤2000	≤2000
Design load – downwards [Pa]	3600	3600	3600
Design load – upwards [Pa]	1600	1600	1600
Safety factor for mechanical load	1.5	1.5	1.5
Number of solar cells	144	156	132
Connection of cells (S,SP,PS)	SP	SP	SP
Number if diodes	3	3	3
Cells per diode	48	52	44

Table 5: Electrical parameters of bifacial product

Kindly refer to respective product datasheets for the final electrical parameters

10. Disclaimer of liability

The information provided in this manual is subject to change by Inox Solar without prior notice.

Inox Solar makes no warranty, expressed or implied, regarding the completeness or accuracy of the information contained herein. In case of any inconsistency between different language versions of this document, the English version shall prevail.

Inox Solar shall not be held liable for any damages of any kind — including, without limitation, bodily injury or property damage — arising from the handling of PV modules, system installation, or from compliance or non-compliance with the instructions contained in this manual.

Annexure 1 : List of Applicable Models

Model	Condition	Maximum Power, Pmax (Wp)	Open Circuit Voltage, Voc (V)	Short Circuit Current, Isc (A)	Maximum Power Voltage, Vmp (V)	Maximum Power Current, Imp (A)
Model : ISL 144 NM10R 570	STC	570.00	51.16	14.16	42.44	13.44
	NOCT	431.00	48.32	11.42	39.83	10.83
	BNPI	632.00	51.16	15.68	42.44	14.88
Model : ISL 144 NM10R 575	STC	575.00	51.29	14.24	42.56	13.52
	NOCT	435.00	48.44	11.48	39.95	10.89
	BNPI	637.00	51.29	15.77	42.56	14.97
Model : ISL 144 NM10R 580	STC	580.00	51.42	14.32	42.68	13.59
	NOCT	438.00	48.53	11.55	40.21	10.89
	BNPI	642.00	51.42	15.86	42.68	15.05
Model : ISL 144 NM10R 585	STC	585.00	51.55	14.4	42.79	13.68
	NOCT	441.00	48.64	11.61	40.30	10.95
	BNPI	648.00	51.55	15.95	42.79	15.15
Model : ISL 144 NM10R 590	STC	590.00	51.68	14.48	42.91	13.76
	NOCT	447.00	48.80	11.68	40.34	11.08
	BNPI	654.00	51.68	16.04	42.91	15.24
Model : ISL 144 NM10R 595	STC	595.00	51.81	14.56	43.03	13.82
	NOCT	450.00	48.92	11.74	40.42	11.14
	BNPI	659.00	51.81	16.13	43.03	15.31
Model : ISL 156 NM10R 610	STC	610.00	54.90	14.27	45.08	13.53
	NOCT	455.00	52.56	11.63	43.07	10.74
	BNPI	675.00	54.90	15.80	45.08	14.98
Model : ISL 156 NM10R 615	STC	615.00	55.10	14.31	45.26	13.59
	NOCT	461.00	52.75	11.67	43.24	10.78
	BNPI	681.00	55.10	15.85	45.26	15.05
Model : ISL 156 NM10R 620	STC	620.00	55.30	14.35	45.44	13.65
	NOCT	464.00	52.94	11.71	43.41	10.82
	BNPI	687.00	55.30	15.89	45.44	15.12
Model : ISL 156 NM10R 625	STC	625.00	55.50	14.40	45.62	13.70
	NOCT	468.00	53.13	11.74	43.57	10.87
	BNPI	692.00	55.50	15.95	45.62	15.17
Model : ISL 156 NM10R 630	STC	630.00	55.70	14.44	45.80	13.76
	NOCT	472.00	53.32	11.78	43.76	10.91
	BNPI	698.00	55.70	15.99	45.80	15.24

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Model	Condition	Maximum Power, Pmax (Wp)	Open Circuit Voltage, Voc (V)	Short Circuit Current, Isc (A)	Maximum Power Voltage, Vmp (V)	Maximum Power Current, Imp (A)
Model : ISL 156 NM10R 635	STC	635.00	55.90	14.49	45.98	13.81
	NOCT	476.00	53.51	11.82	43.93	10.95
	BNPI	703.00	55.90	16.05	45.98	15.29
Model : ISL 156 NM10R 640	STC	640.00	56.10	14.53	46.16	13.87
	NOCT	479.00	53.70	11.85	44.10	10.99
	BNPI	709.00	56.10	16.09	46.16	15.36
Model : ISL 156 NM10R 645	STC	645.00	56.30	14.58	46.34	13.92
	NOCT	483.00	53.90	11.89	44.27	11.04
	BNPI	715.00	56.30	16.15	46.34	15.42
Model : ISL 132 NG12R 600	STC	600.00	48.78	15.66	40.31	14.89
	NOCT	451.00	45.88	12.60	37.51	12.03
	BNPI	665.00	48.78	17.34	40.31	16.49
Model : ISL 132 NG12R 605	STC	605.00	48.98	15.72	40.51	14.93
	NOCT	454.00	46.08	12.64	37.61	12.08
	BNPI	670.00	48.98	17.41	40.51	16.53
Model : ISL 132 NG12R 610	STC	610.00	49.18	15.78	40.71	14.98
	NOCT	460.00	46.28	12.73	37.91	12.13
	BNPI	675.00	49.18	17.48	40.71	16.59
Model : ISL 132 NG12R 615	STC	615.00	49.38	15.84	40.91	15.03
	NOCT	464.00	46.48	12.78	38.11	12.17
	BNPI	681.00	49.38	17.54	40.91	16.65
Model : ISL 132 NG12R 620	STC	620.00	49.58	15.90	41.11	15.07
	NOCT	467.00	46.68	12.82	38.21	12.22
	BNPI	686.00	49.58	17.61	41.11	16.69
Model : ISL 132 NG12R 625	STC	625.00	49.78	15.96	41.25	15.15
	NOCT	472.00	46.88	12.87	38.41	12.28
	BNPI	692.00	49.78	17.68	41.25	16.78



sales@inoxsolar.com | www.inoxsolar.com

INOX SOLAR LIMITED

Building B-500, Indospace Industrial and Logistics Park, Vil Kerala, Tal: Bavla, Ahmedabad,
Gujarat - 382240 | Call : +87655 43281/50 | Email: sales@inoxsolar.com | Website: inoxsolar.com