



MODULE INSTALLATION AND USER MANUAL

MSI10-xxxHT4G SERIES
MSI10-xxxHN4G SERIES
MSI10-xxxHN5G SERIES
MSI10-xxxHT4T SERIES
MSI10-xxxHN5W SERIES
MSI10-xxxHN4W SERIES
MSI10-xxxHN5B SERIES
MSI10-xxxHN4B SERIES

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1.0 GENERAL INFORMATION

This manual contains information regarding the installation and safe handling of the MSI photovoltaic module (hereafter is referred to as "module").

Installers must read and understand the manual before installation. Any questions, please contact the sales or customer service personnel of MSI for further explanations. The installer should conform to all safety precautions in the manual and local laws & regulations when installing module; before installing a solar photovoltaic system, installers should become familiar with the mechanical and electrical requirement for such a system. MSI has the right to refuse to compensate for the product damage due to construction or design defects of the solar photovoltaic system.

Keep this manual in a safe place for future reference (care and maintenance) and in case of sale or disposal of the modules.

2.0 DISCLAIMER OF LIABILITY

Customers shall strictly abide by the requirements of this manual when installing the modules of MSI. If the conditions or methods of the installation, handling, use and maintenance of the customer are beyond the range specified in this manual and cause damage, MSI does not assume responsibility for any loss, damage or expense thus caused.

No responsibility is assumed by MSI for any infringement of patent right or other rights of third parties, which may result from the customer's use of the MSI modules. No patent license or patent rights is granted to customer, express or implied, due to its use of MSI modules.

The information in this manual is based on MSI best knowledge and experience and is believed to be reliable but is subject to change (without limitations) without prior notice.

Notification is needed while the modules are being reinstalled.

3.0 SAFETY PRECAUTION

3.1 GENERAL SAFETY

- When installing the modules, it should be abided by the relevant local laws and regulations. It may be necessary to obtain required certificates in advance, such as the building permit.
- Under normal conditions, a photovoltaic module is likely to experience conditions that produce more current and/or voltage than reported at standard test conditions. Accordingly, the values of I_{sc} and V_{oc} marked on this module should be multiplied by a factor of 1.25 when determining component voltage ratings, conductor current ratings and size of controls connected to the PV output.
- Installing solar photovoltaic systems require specialized skills and knowledge. Installation should be performed only by qualified persons. Installers should assume the risk of all injuries that might occur during installation, such as electric shock.
- Photovoltaic modules are designed for outdoor use. Modules may be mounted on ground, rooftops, vehicles or boats. Proper design of support structures is the responsibility of the system designers or installers. Mounting holes or clamp range and numbers suggested in this manual shall be used.
- A single module may produce the direct current (hereafter is referred to as DC) voltage of above 30V in direct sunlight, which is extremely dangerous to make contact with. Do not touch or lean on an operating module.
- Do not disconnect under load or apply paint or adhesive to module surface.
- Keep all electrical contacts clean and dry. Do not change the wiring of the bypass diodes. Do not disassemble the modules or remove any attached nameplates or components from the modules.
- Do not use mirrors or other magnifiers to artificially concentrate sunlight onto the modules. Do not expose the backside of modules directly to sunlight for a long time.

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- Modules should be stored in a dry and ventilated environment. In the storage and handling process, in case of inclement weather (rain, snow, wind, etc.), cover the packing boxes with materials such as plastic film and waterproof cloth.
- During normal work, do not cover the glass surface of modules with materials such as plastic film and waterproof cloth.
- Do not unpack modules while in transport. Do not unpack stacked boxes of modules.
- Artificially concentrated sunlight shall not be directed on the module or panel.
- The irradiance reflected on the rear of the bifacial solar modules shall not exceed 300W/m².

3.2 HANDLING SAFETY

- Keep children and unauthorized persons away from the modules while transporting and installing them. Improper transportation and placing may lead to glass breakage or power loss of the modules, resulting in the loss of the use value of modules.
- Handle modules with care. Lift and put down modules gently. Do not drop modules or drop objects on the modules. Pay special attention not to collide, scratch or press the module backside when transporting and installing the modules. The double glass module should be handled more carefully. Non-slip gloves are required when handling and during installation.
- Do not pull the junction box or cables when carrying or lifting the modules. Carry a module by its edges with two or more persons. Additional person(s) is required to lift and support the middle section of a non-frame module.
- Do not stack the modules for transportation. Do not set the modules down on any hard and uneven surface as it may cause the cells to break.
- To avoid module damage, do not place heavy objects or tools on the modules, and do not stand or step on the modules.
- Inappropriate transport and installation may damage the module. Control the vehicle speed when road condition is relatively poor.

3.3 INSTALLATION SAFETY

- Abide by the safety regulations for all other components used in the system, including wiring and cables, connectors, solar charge controller, inverters, storage batteries, etc. Use suitable equipment, connectors, wiring and mounting system for a PV system. Use the same module type and ensure color grade is consistent as much as possible in one system.
- MSI modules hold Class II safety rating.
- Do not install or handle the modules when they are wet or during strong winds.
- Modules are constructed with tempered glass, which shall be handled with care. Improper handling or operation may cause the tempered glass to break. If the front glass is broken or if the backsheet is burned-out, contact with any module surface or the aluminum frame can produce electrical shock, particularly when the module is wet. Broken or damaged modules must be disposed of properly.
- The maximum system voltage is indicated on the nameplate. During system installation, the maximum open circuit voltage in series cannot exceed the maximum system voltage.
- Completely cover the module with an opaque material during installation to keep electricity from being generated. The material component of the glass surface shall not cause pollution, such as rubber glue splotch, oil, printing and dyeing, etc. Do not touch the module's glass surface with bare hand.
- Do not place the glass surface or the backsheet surface of the modules directly on the ground at the installation site (i.e. mud, sandy land, grass etc.).
- Unused modules during installation must be packaged in accordance with the manufacturer's packing guidelines prior to transporting and storing.
- Do not wear metallic jewelry, metallic body accessories such as watches and any other metallic devices while installing or troubleshooting photovoltaic systems. Use insulated tools that are approved for working on electrical installations and always keep them dry.

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- The triangle hole punched on the backside frame of the module is the drain hole which cannot be blocked.
- When interconnecting the modules, properly secure the connecting cables onto to the mounting system. Ensure that the cables are restricted from excessive movement.
- Conform to the allowable minimum bending radius of cables (Definition: Minimum bending radius is 12 times the cable's external diameter). For junction box cables, the allowable minimum bending radius is 10 times the OD (diameter). For all other cables, please seek help from a professional installer to determine minimum bending radius.
- Always protect the wire with conduit where animals or children can touch it.
- Please use the connector which is specially designed for photovoltaic system and assemble it with the tools recommended or specified by the manufacturer. In the case that the connector applicable to the solar photovoltaic system is required, please contact the local supplier.
- Make sure that the polarity is correct when connecting the module to the inverter, storage battery or combiner box to avoid the damage of bypass diodes in the modules due to incorrect polarity.

4.0 PRODUCT IDENTIFICATION

Each module has labels providing the following information:

- **Nameplate:** Describes the product type, rated power, rated current, rated voltage, open circuit voltage, short-circuit current; all are measured at STC. Weight, dimension, maximum system voltage and the fuse rating that specify on the nameplate.
- **Barcode:** Each module has a unique serial number. It contains the relevant production information of the module.

5.0 ELECTRICAL PROPERTY PARAMETERS OF MODULES

- The performance of solar modules is defined on the standard test conditions (STC). These conditions define performance at an incident sunlight of $1,000 \text{ W/m}^2$, a module temperature of $25 \pm 2^\circ\text{C}$ and AM of 1.5 (AM = Air Mass) as per IEC60904-3.
- Under normal outdoor conditions, a module is likely to produce different current and voltage than the values measured under STC in the specification of MSI module products. Therefore, when determining the parameters related to the power output of the module, for example, nominal voltage, conductor capacity, fuse capacity and controller capacity, etc., refer to the values of short-circuit current and open circuit voltage of the modules and take 125% of those values during design and installation.
- The maximum nominal voltage for all module series is 1000V or 1500V according to IEC standards. Please refer to the module's nameplate.

6.0 INSTALLATION INSTRUCTIONS

6.1 INSTALLATION ENVIRONMENT

- In most applications, PV modules should be installed in a location where they will receive maximum sunlight throughout the year.
- Select a suitable location for installing the modules (Altitude is less than 2000m).
- The module shall be installed in a place where the sunshine is adequate. The module should not be shaded at any time during its operation. During installation, the module surface shall not be partly shaded by clothes, tools, packaging materials, etc.
- Install the module in well ventilated place and guarantee that adequate natural air heat dissipation channels are provided at the back and sides of the module to ensure that the heat generated during operation is radiated in time.

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- Never place the module in locations where flammable gases may be easily generated or collected.
- MSI suggests installing the module in dry areas where the climate is moderate. In case of special installation environments such as the seaside, farm, high humidity environment and sandstorm environment, contact the local dealer for professional support and confirmation.
- Modules connected in series should be at the same tilt and azimuth. Differing orientations or angles may cause a loss of power output due to differing amount of sunlight exposure for each module. Typically, the optimal tilt for a module is roughly the same as the latitude of the installation location.
- When unpacking, the modules should be installed as soon as possible and connected to the combiner box to avoid connection failure. Protective covers are advised to be used if modules are installed in the site with heavy sand or salt mist.
- MSI recommends to install modules at the temperature from -40°C to 40°C , and the relative humidity should be less than 85RH%.
- The irradiance reflected on the rear of the bifacial solar modules shall not exceed $300\text{W}/\text{m}^2$.

6.2 SELECTION OF MOUNTING STRUCTURE

- Always conform to the instruction manual and safety rules attached to the mounting system.
- The entire PV system consisting of modules must be able to withstand anticipated mechanical pressure which comes from local wind force, snow load, etc.
- Drilling holes on the surface of module glass will void the warranty.
- Drilling additional mounting holes on module frames will void the warranty.
- The mounting system structure must be made of durable, corrosion-resistant and UV-resistant materials.
- Forces generated during thermal expansion and contraction of the mounting system structure shall not influence the performance and use of the module.
- The bearing surface of the mounting structure must be smooth without any twist or deformation, and the connected support frames shall be at the same height.

6.3 MOUNTING TYPES

(A) ROOF MOUNTING

- It is necessary to provide a special support frame for the roof mounting. When installing a module on a roof or building, ensure that it is securely fastened and cannot fall or be damaged as a result of strong winds or heavy snows. During roof mounting, check the building codes being used to ensure that the building and its structure where the module is installed have adequate bearing capacity. The roof needs to be penetrated during module installation and fixing shall be sealed to avoid rainwater seepage.
- To be suitable for operation, reduce steam condensation and facilitate the ventilation & heat dissipation of the module during tile installation. The module shall be parallel to the wall or roof surface of the building, and the clearance between module and surface of the wall or roof shall be at least 115mm to prevent wiring damage and to allow air circulation, ventilation and heat dissipation behind the module. During stacking type installation, the module shall be installed on the fire-resistant roof. The Fire Resistance Rating of the modules is Class C, and the modules are suitable for mounting on an above Class A roof. Do not install modules on a roof or building during strong winds.

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(A) POLE MOUNTING

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- When installing a module on a pole, choose a pole and module mounting structure that will withstand the anticipated wind power in the local area. The support rod must be constructed on a solid foundation.

(B) GROUND MOUNTING

- Select an appropriate mounting system height that prevents the lowest edge of the module from being covered by snow for a long time in winter areas that experience heavy snowfalls. The module shall be installed on the mounting system with appropriate height instead of being directly laid on the ground. In addition, assure the lowest portion of the module is placed high enough, that it is not shaded by plants or trees, and the module is not damaged by sand and stone driven by wind, or the module surface is not shaded rain water splashed mud.

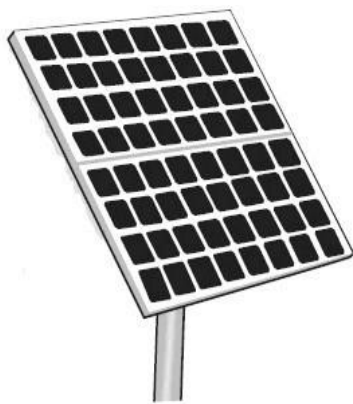
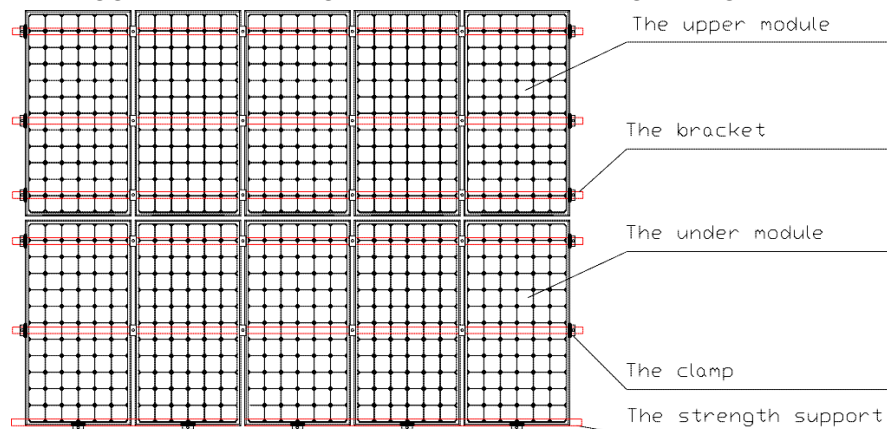


Figure 2: Pole mounting



Figure 3: Ground mounting

- For a roof system installed in an area that experiences relatively heavy snowfall or snow cover, the customer shall reinforce the mounting system at the lower frame of the module, in order to prevent the lower frame from being pressed and damaged by the falling snow, and avoid the module damage due to melted snow freezing in daytime. MSI suggests to selecting the support reinforcing configuration shown in Figure 4.

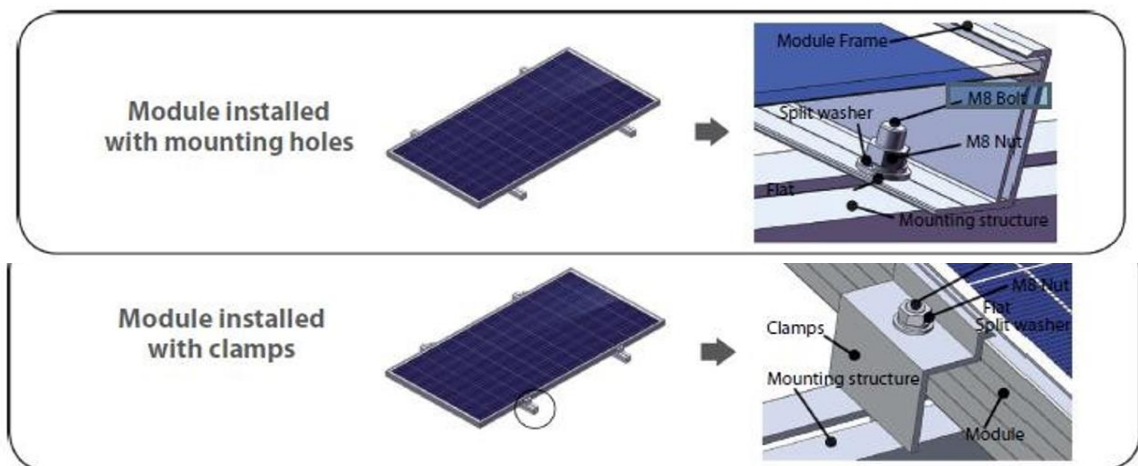


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Figure 4: Schematic diagram of reinforcement mounting of module

6.4 INSTALLATION METHOD

- Framed modules shall be installed using mounting holes, clamps* or an insertion system with recommended torque of 20Nm-25Nm. Modules must be installed according to the following examples. Not mounting the modules according to these instructions may void the warranty.
- The modules have been evaluated by IEC61215 standard for mechanical load design (testing load).
- According to the requirement of IEC61215, a 1.5 times safety factor should be considered while calculating corresponding maximal design load.
- Normal loads are suitable for most environmental conditions: The design static load for the obverse side is 3600Pa; the design static load for the reverse side is 1600Pa.
- The mounting system and other various goods & materials required (such as a screw) shall be made of durable, corrosion-resistant and UV-resistant materials.
- It is the installer's responsibility to ensure that the clamps used to secure the modules are strong enough.



* The minimum recommended length for each clamp is 50 mm.

(A) SCREW FITTING

- Use corrosion-proof screws (M8) in the existing installation holes in the module frame. The range of torque is from 16-20N.M while tightening the screw.
- Do not attempt to drill holes in the glass surface or for additional mounting.
- Each long-side module frame has four (4) mounting holes. As shown in Figure 5, four (4) mounting holes are required for normal use. For larger 72-type modules and for higher wind and snow loads, all eight mounting holes shall be used.
- The module frame must be attached to the mounting system using M8 stainless steel hardware together with spring washers and flat washers in four places symmetrical to the module (as shown in Figure 6).

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Figure 5: Mounting holes

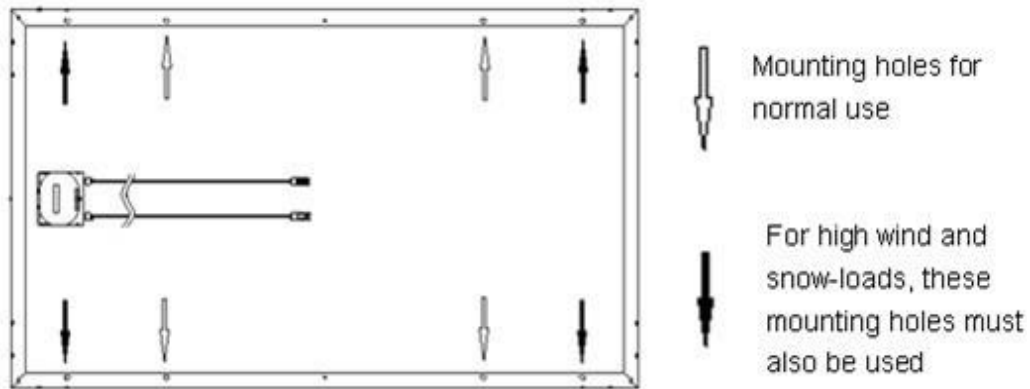
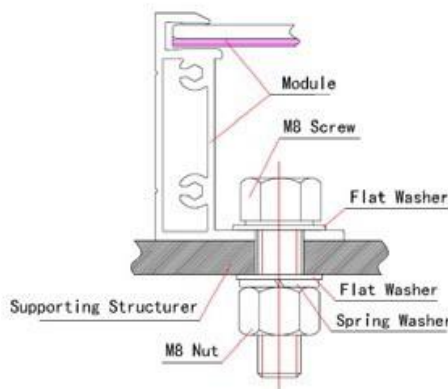


Figure 6: Screw Fitting Method



* NOTES:

MSI limited warranty will be void in cases where improper clamps or installation methods deviating from this manual are used. When installing inter-modules or end type clamps, take measures to ensure:

- Not to bend the module frame.
- Clips used touches only the frame part. Do not allow contact between clip and glass.
- Not to damage the surface of the frame.
- The module's drain holes are not blocked when mounting.

For matters concerning installation not mentioned in this section, contact the local dealer for professional support.

(B) CLAMP FITTING

- Use a certain number of clamps to fix the modules on the mounting rail.
- The module clamps should not come into contact with the front glass and must not deform the frame. Be sure to avoid shadowing effects from the module clamps.
- The module frame is not to be modified under any circumstances.
- The applied torque should be 8 Newton-meters.

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Figure 7: PV module installed in portrait orientation with Clamp fitting method

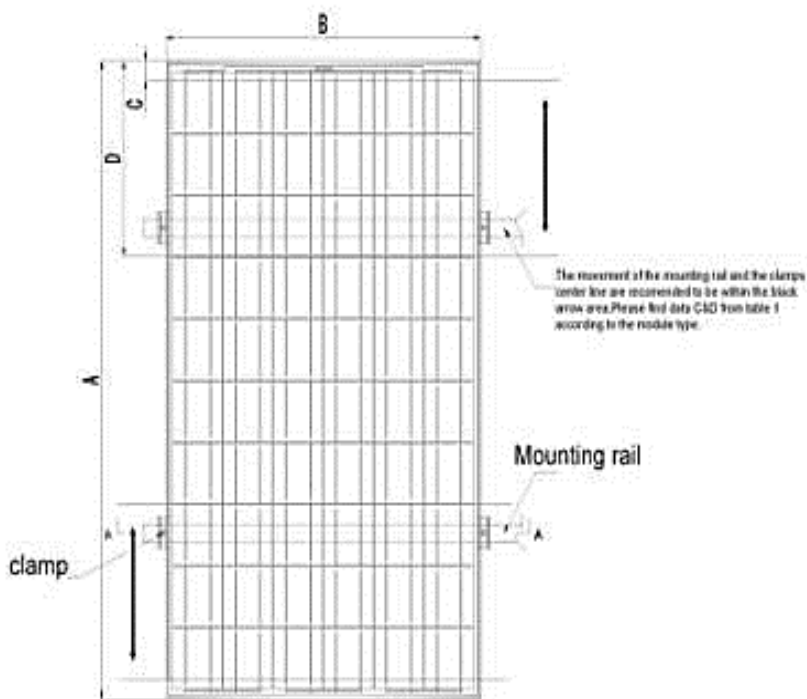
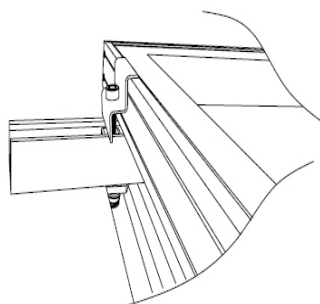
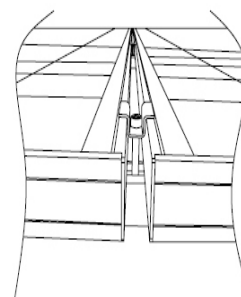
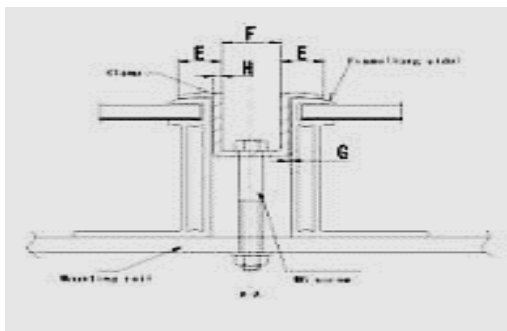


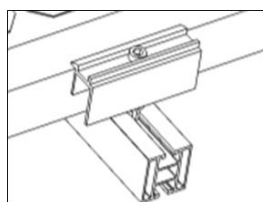
Figure 8: Mechanical dimensions when modules are installed in portrait orientation with Clamp fitting method



Fringe Module Installation



Middle Module Installation



END-CLAMP

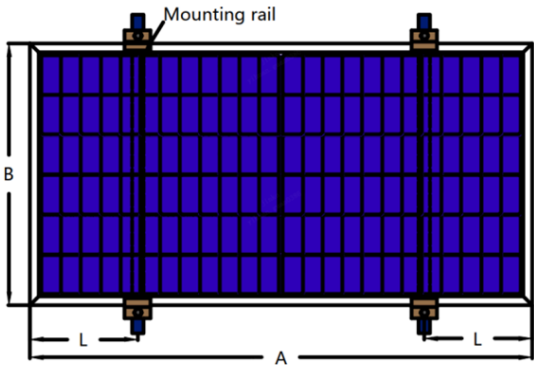
Notes:

- PV 60 cells module is used here as an example.
- Dimension "G" represents the distance between clamp and frame.
- Dimension "H" represents the thickness of clamp.

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6.5 RECOMMENDED MOUNTING METHOD

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Mounting method	Mechanical load	Installation location	Module type
4-clamp installation	<p>Design load</p> <p>Positive: 3600Pa</p> <p>Negative: 1600Pa</p> <p>Safety factor: 1.5</p>	 <p style="text-align: center;">Note: $L = A/4 \pm 50\text{mm}$ A: Module long frame size L: distance between edge of module and middle of clamp location</p>	MSI10-xxxHT4G MSI10-xxxHN4G MSI10-xxxHN5G MSI10-xxxHT4T MSI10-xxxHN5W MSI10-xxxHN4W MSI10-xxxHN5B MSI10-xxxHN4B

- The module clamps must not make contact or shade the front glass or deform the frame in any way. Drainage holes in the module frame shall not be blocked by the clamps.
- The mounting holes are reserved for tracker mounting system with special accessories. The length of module is over 2 meters, whose load value with tracker needs to be confirmed by module supplier respectively.
- Module dimensions

	Long side (mm)	Short side (mm)	Height (mm)
MSI10-xxxHT4G	2278	1134	30
MSI10-xxxHN4G	2278	1134	30
MSI10-xxxHN5G	2384	1134	30
MSI10-xxxHT4T	2278	1134	35
MSI10-xxxHN5W	2384	1134	35
MSI10-xxxHN4W	2278	1134	35
MSI10-xxxHN5B	2384	1134	35
MSI10-xxxHN4B	2278	1134	35

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7.0 ELECTRICAL INSTALLATION

7.1 GENERAL ELECTRICAL INSTALLATION

- Try to use the modules with the same configuration in the same photovoltaic system. If the modules are connected in series, the total voltage is the sum of voltages of all the modules, and the maximum number of the series modules (N)= $V_{max}(\text{System}) / [1.25 \cdot V_{oc}(\text{at STC})]$.
- If the system requires the installation of high current, several photovoltaic modules can be connected in parallel, and total current is the sum of current of all the modules. The maximum number of the parallel module strings (N)= $I_{max}(\text{fuse rating}) / 1.25 \cdot I_{sc}$.
- When connecting modules, make sure that the connectors of the same series module come from the same manufacturer or are completely compatible with each other. The same requirements apply to the connection terminals of module end and system end. Connectors from different manufacturers may not be compatible with each other, which easily leads to mismatch risk.
- The cross section area and connector capacity of the cable selected must satisfy the maximum short-circuit current of the system (It is recommended that the cross section area of the cable used for the single module is 4mm², and the rated current of the connector is greater than 10A. Please note that the upper temperature limit of the cable and connector is 85°C and 105°C respectively).
- When installing the module, place the module end with the junction box side tilted upwards and try to avoid the rain.
- Do not carry out installation in rainy weather as humidity will void the insulation protection, thus causing safety accidents.
- The module can only be used in an area at which the height is below 2000 meters.

7.2 GROUNDING

- A module with exposed conductive parts (i.e. aluminum frame) is considered to be in compliance with UL 61730 only when it is electrically grounded in accordance with the instructions below and the requirements of the National Electrical Code. Earth grounding the module frame is highly recommended in all other regions, even where not required by local electrical code. Size the equipment grounding conductor in accordance with NEC, CEC or local electrical code
- All module frames and mounting racks must be properly grounded. The grounding wire must be properly fastened to the module frame to assure good electrical contact. Use the recommended type, or an equivalent connector for this wire.
- If the mount system is made of metal, the surface of the structure must be electroplated and have excellent conductivity.
- Proper grounding is achieved by connecting the module frame(s) and structural members contiguously using a suitable grounding conductor. The grounding system must fulfill the local corrosion protection requirements to withstand the long life cycle of operation.
- The grounding conductor must make a connection to earth using a suitable earth ground electrode. MSI recommends using the ground wire accessories (lugs) connected to ground Cable. Weld ground cable onto the jack of lugs, and then with the M4 screws inserted into the wiring nose ring and the grounding hole of the module frame, fasten with nuts. Star spring washers should be used to prevent the screws from loosening which leads to poor grounding (as shown in Figure 9).
- MSI recommends to install modules at a temperature ranging from -40°C to 40°C, and with relative humidity of less than 85RH%. If the modules are used in high-temperature and high-humidity environment, MSI requires the customer to ground the negative end of the inverter (as shown in Figure 10). Offset Box or PID Box can also be used instead to apply a positive voltage to the module arrays at night to avoid PID.

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Figure 9: a) Grounding hole

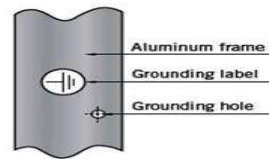


Figure 9: b) Grounding method

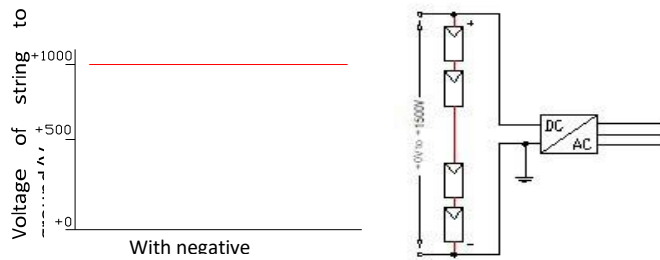
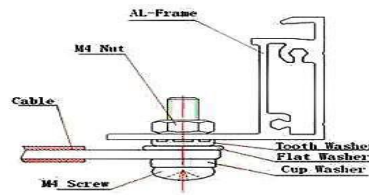


Figure 10: Schematic diagram for grounding potential of the inverter

7.3 WIRE

- The junction box on each PV module has two wires that terminate in a male and a female connector. When the modules are to be connected in series, the male connector should be plugged into the female connector of the neighboring module while the female connector should be plugged into the male connector of the other neighboring module.
- When connecting parallel module's strings to the distribution box, use proper third-party PV system connectors with suitable cable which are qualified for EN50618(or IEC62852). All field wiring cables must have large enough cross-sectional areas approved for use at the maximum short-circuit current of the PV module. MSI recommends that installers use only sunlight resistant cables for direct current (DC) wiring in PV systems. The recommended minimum wire size should be 4 mm²(12AWG) and must be subject to the local national codes and regulations.
- The connecting cables must not cross each other and must be kept away from direct sunlight, heat source and any static pool of water. The cables should be secured by the modules mounting structure and should maintain a distance of at least 25 mm from one another with no possibility of coming into contact.

7.4 CONNECTORS

- The connectors should be kept dry and clean. Do not attempt to make electrical connections with wet, soiled connectors which lead to faulty connections. Faulty connections can result in electrical shock and arc.
- Only compatible connectors can be mated, i.e., from the same vendor and model shall be used.

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CONNECTOR MODEL NAME	MANUFACTURER	RATED VOLTAGE
PV-KST4/6II-UR(male), PV-KBT4/6II-UR (female)	STAUBLI ELECTRICAL CONNECTORS ESSEN GMBH	1500V
PV-KST4-EVO2/6II-UR(male), PV-KBT4-EVO2/6II-UR (female)	STAUBLI ELECTRICAL CONNECTORS ESSEN GMBH	1500V
PV-KST4-EVO2/6I-UR(male), PV-KBT4-EVO2/6I-UR (female)	STAUBLI ELECTRICAL CONNECTORS ESSEN GMBH	1500V
PV-KST4-EVO2/xy-UR(male), PV-KBT4-EVO2/xy-UR (female)	STAUBLI ELECTRICAL CONNECTORS ESSEN GMBH	1500V
PV-JK03M/xy(male), PV-JK03M/xy (female)	Jiangxi Jinko PV Material Co.,Ltd	1500V
PV-JK03M1/xyz	Jiangxi Jinko PV Material Co., Ltd	1500V
PV-JK03M2/xyz	Jiangxi Jinko PV Material Co., Ltd	1500V

7.5 BYPASS DIODES

- MSI module junction boxes contain bypass diode which is parallel connection with the PV cell strings. If hot spot occurred, the diode will come into operation to stop the main current from flowing through the hot spot cells in order to prevent module over-heated and performance loss. Notice, bypass diode is not the overcurrent protection device. If the diode is suspected to be defective, the installer or system providers shall contact MSI. Please do not try to open the junction box by yourself.
- Each junction has 3 bypass diodes.

MANUFACTURER	TYPE	MAX. PEAK REVERSE VOLTAGE (V DC)	MAX. AVERAGE FORWARD CURRENT (A)	MAX. JUNCTION TEMPERATURE
Changshu Friends Connector Technology Co., LTD.	LNM2545B	45	25	200°C
Hangzhou Silan Microelectronics Co., Ltd.	SBT30UL45S	45	30	200°C
JIANGXI JINKO PV MATERIAL CO LTD	TPA3045	45	30	200°C
	TPA4050S-2	50	25	200°C
	TPA4050S-3	50	30	200°C
	TPA4050S-4	50	30	200°C
JIANGSU WEIERFU ELECTRONIC TECHNOLOGY CO LTD	GF3045	45	20	200°C
	GF5545	45	30	200°C
SUZHOU UKT NEW ENERGY TECHNOLOGY CO., LTD	UKTH5045-12	45	30	200°C
	TM3045-30	45	30	200°C

MSI = Mission Solar International

8.0 MAINTENANCE AND CARE

- Clean the glass surface on a regular basis. Avoid hotspots due to bird droppings, leaves and dead insects covering the glass surface.
- In general, use water and a soft sponge or cloth for cleaning. A mild, non-abrasive cleaning agent can be used to remove stubborn dirt.
- Avoid applying too much pressure on any part of the while module cleaning (i.e. pressure washing, use of water torch). The strength on the module is less than 690 kPa and applying too much pressure may cause glass damage, cell damage and service life reduction. Remove snow cover from the module regularly to prevent accumulation and freezing of melted snow that may cause damage to the module. Frequently remove plants and sundries surrounding the modules to prevent shading that can influence its properties.
- Examine the PV module for signs of deterioration. Check all wiring for possible rodent damage, weathering and ensure that all connections are tight and corrosion free. Check for electrical leakage into the ground. Check screws and mounting brackets, adjust and tighten as necessary.
- Never clean the electrical connectors including cable, junction box and connector with cleaning agents that contain organic matters such as alkane.
- If any problem arises, have it investigated by a competent specialist.

** If there are maintenance measures not included in this manual, please contact the local dealer for professional support.*

9.0 PV RECYCLING



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 in landfills or dumps, hazardous substances can leak into the groundwater and get into the food chain, damaging your health and well-being.

A. APPENDIX

A.1 MODULE ELECTRICAL RATING

Type	MSI10-xxxHT4G							
Size(mm)	2278*1134*30							
Power(W)	520	525	530	535	540	545	550	555
Effi.(%)	20.15	20.34	20.53	20.73	20.92	21.12	21.31	21.50
Vmp(V)	41.05	41.2	41.35	41.5	41.65	41.8	41.95	42.09
Imp(A)	12.68	12.75	12.82	12.9	12.97	13.04	13.11	13.18
Voc(V)	48.9	49.05	49.2	49.35	49.5	49.65	49.8	49.95
Isc(A)	13.59	13.65	13.71	13.78	13.85	13.92	13.99	14.02

MSI = Mission Solar International

Type	MSI10-xxxHN4G						MSI10-xxxHN5G					
Size(mm)	2278*1134*30						2465*1134*30					
Power(W)	560	565	570	575	580	585	605	610	615	620	625	630
Effi. (%)	21.68	21.87	22.07	22.28	22.47	22.67	21.66	21.84	22.02	22.20	22.38	22.56
Vmp(V)	41.81	41.92	42.07	42.22	42.37	42.52	45.48	45.59	45.69	45.82	45.92	46.02
Imp(A)	13.39	13.48	13.55	13.62	13.69	13.76	13.31	13.38	13.46	13.54	13.61	13.69
Voc(V)	50.43	50.6	50.74	50.88	51.02	51.18	54.75	54.93	55.08	55.25	55.4	55.55
Isc(A)	14.18	14.23	14.31	14.39	14.47	14.51	14.12	14.17	14.25	14.3	14.35	14.39

Type	MSI10-xxxHT4T							
Size(mm)	2278*1134*35							
Power(W)	520	525	530	535	540	545	550	555
Effi. (%)	20.15	20.34	20.53	20.73	20.92	21.12	21.31	21.50
Vmp(V)	41.05	41.2	41.35	41.5	41.65	41.8	41.95	42.09
Imp(A)	12.68	12.75	12.82	12.9	12.97	13.04	13.11	13.18
Voc(V)	48.9	49.05	49.2	49.35	49.5	49.65	49.8	49.95
Isc(A)	13.59	13.65	13.71	13.78	13.85	13.92	13.99	14.02

Type	MSI10-xxxHN4W						MSI10-xxxHN5W					
Size(mm)	2278*1134*35						2465*1134*35					
Power(W)	560	565	570	575	580	585	605	610	615	620	625	630
Effi. (%)	21.68	21.87	22.07	22.28	22.47	22.67	21.66	21.84	22.02	22.20	22.38	22.56
Vmp(V)	41.81	41.92	42.07	42.22	42.37	42.52	45.48	45.59	45.69	45.82	45.92	46.02
Imp(A)	13.39	13.48	13.55	13.62	13.69	13.76	13.31	13.38	13.46	13.54	13.61	13.69
Voc(V)	50.43	50.6	50.74	50.88	51.02	51.18	54.75	54.93	55.08	55.25	55.4	55.55
Isc(A)	14.18	14.23	14.31	14.39	14.47	14.51	14.12	14.17	14.25	14.3	14.35	14.39

A.2 TEMPERATURE COEFFICIENTS

Type	MSI10-xxxHT4G	MSI10-xxxHN4G MSI10-xxxHN5G	MSI10-xxxHT4T	MSI10-xxxHN4W MSI10-xxxHN5W
NMOT	43.2°C ± 2°C	44.2°C ± 2°C	43.1°C ± 2°C	42°C ± 2°C
Voc [%/°C]	-0.277	-0.248	-0.286	-0.260
Isc [%/°C]	0.036	0.044	0.0402	0.046
Pmp [%/°C]	-0.335	-0.307	-0.3368	-0.320

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