

Introduction

This manual provides safety and installation instructions for GH Solar photovoltaic (PV) modules. Carefully read the entire instruction manual before installing, wiring or operating the PV modules. Save this **GH Solar** Safety and Installation Manual at all times.

Disclaimer of Liability

Failure to follow these instructions will invalidate the **GH Solar** Limited Warranty for PV modules. The conditions and methods of installation, operation, use and maintenance of the PV modules is beyond company control. **GH Solar** is thus not liable for any damage or loss caused by improper use or incorrect installation, operation, use or maintenance.

Module limited warranties are described in **GH Solar** warranty certificates.

Safety Instructions prerequisites

- The installation should be done by qualified personnel only.
- Make sure to remove all jewellery from your hands and wrists before installing this product.
- PV Modules generate direct current (DC) when exposed to any amount of light. Direct current can arc when improperly connected or disconnected in a connected string of modules, and may cause injury or death.
- Do not connect or disconnect a PV module when current might flow through one of the modules, the main grid, or an external source.
- Make sure that the cable connections are in perfect condition and are not deformed in any way.
- Do not insert any electrically conducting part into one of the connectors.
- Do not install or connect modules when the module or one of its components, are wet.
- Do not install visually damaged modules (e.g. broken glass, broken junction box, broken connectors). Immediately contact **GH Solar** for disposal or replacement instructions.
- Do not disassemble or remove any part of the module. Do not attempt to repair any part of the module either.
- Ensure that the modules are used for their intended purpose only. All installations must be done in accordance with regional regulations and policies.
- Keep away from children.

Storing and unpacking instructions

Modules should be unpacked in a dry environment only. Avoid any direct contact with rain or other types of moisture. Leave the modules packed until right before installation. Modules must be stored in their original packing a dry and ventilated place. While unpacking, make sure the modules are not exposed to any direct light source.

Preparation before installation

Always perform a visual inspection of the packaging material before unpacking. After unpacking the module, make sure that no irregularities or deformities are present on the panel or one of its components. Measure the Voc of every module while exposed to direct sunlight (irradiance $>600\text{W/m}^2$), and make sure the measured Voc value does not equal or approach zero Volts. If any of these requirements is not met, do not install the module, and immediately contact **GH Solar**.

Installation and Operation

During installation of the modules, following guidelines should be taken into account:

- Installation should be executed by qualified personnel only.
- Solely use insulated and dry tools.
- Ensure that any other components used in the project are compatible with the modules.
- Do not apply excessive pressure or step on the modules. Be aware that sharp edged objects can inflict permanent damage to the module.
- Make sure the used support structure meets the maximal load requirements of the modules. In regions with high possibility of snow or strong wind, always make sure that the support structure and its mounting design are able to withstand the local environmental forces.
- Do not install modules during periods of strong wind or other unusual weather conditions.
- To reduce the risk of electrical shock or burns while installing the module, it is advised to cover the module with an opaque cloth in order to keep the module in its inactive state.
- Do not expose the modules to concentrated light, excessive water exposure or submerging, sources of corrosive chemicals or salty environments.
- Provide adequate ventilation to the back side of the modules to avoid heating of the module. Insufficient ventilation may cause significant yield losses, and eventually cause permanent damage to the module.
- Always minimize shade caused by obstacles near the PV system. Shade will dramatically affect and reduce the global PV system performance, and may eventually cause permanent damage to the module.
- When installed on a roof, the roof covering should be rated for fire-resistant capabilities. Do not install modules on locations where flammable gas may be present at some point in time.
- It is recommended to position the module in a gradient angle facing the sun in order to ensure maximum irradiation and to avoid damage caused by flooding and other unpredictable events, such as heavy hail impacts.

Mounting instructions

Modules can be mounted in portrait or in landscape. Use appropriate corrosion proof fastening materials.

Framed module mounting instructions

Each module must be securely fastened, using at least 4 symmetrically chosen contact points.

Modules can be mounted using mounting holes, if any, or using pressure clamps that compress the frame from the top to the mounting rail. Four M6 (1/4") stainless steel bolts, with nuts, washers, and lock washers are recommended per module for long-term security.

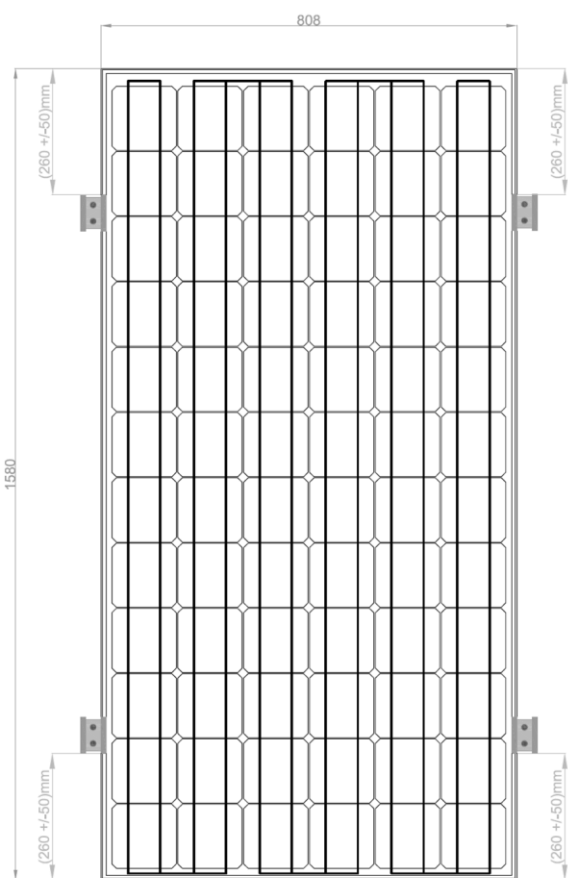
When using pressure clamps, mount the clamps in accordance to the environmental forces the module is exposed to. The clamping area of the washer must cover at least 130 mm². Use a torque wrench and tighten at 20 Nm.

Always respect the mounting parameters and tolerances for each module type, as shown below.

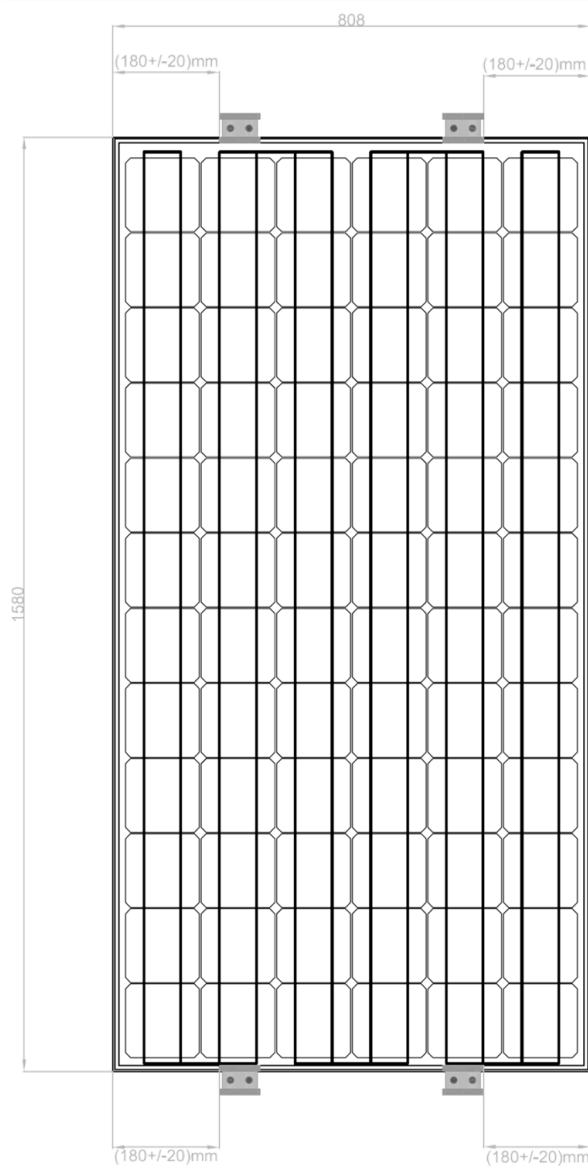
Module Type: 6x12 5inch cells -- typical dimensions: 1580x808x35mm

Product types: GH175M125, GH180M125, GH185M125, GH190M125, GH195M125, GH200M125

Mounting on long sides

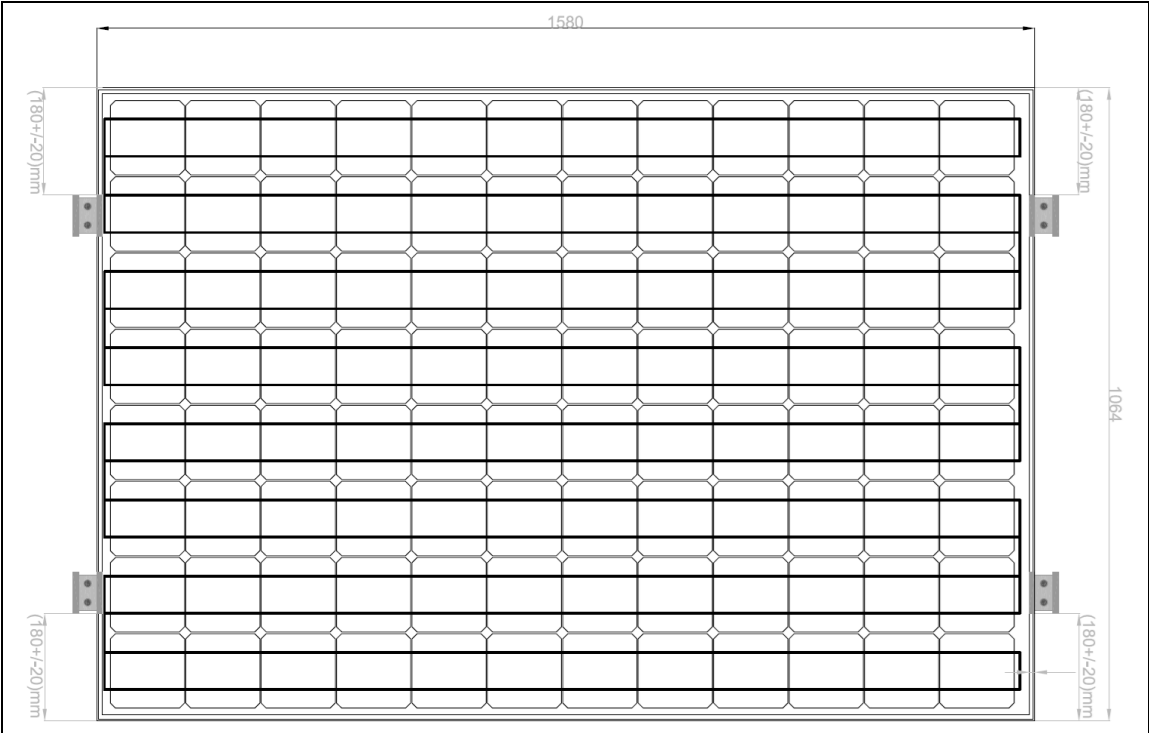
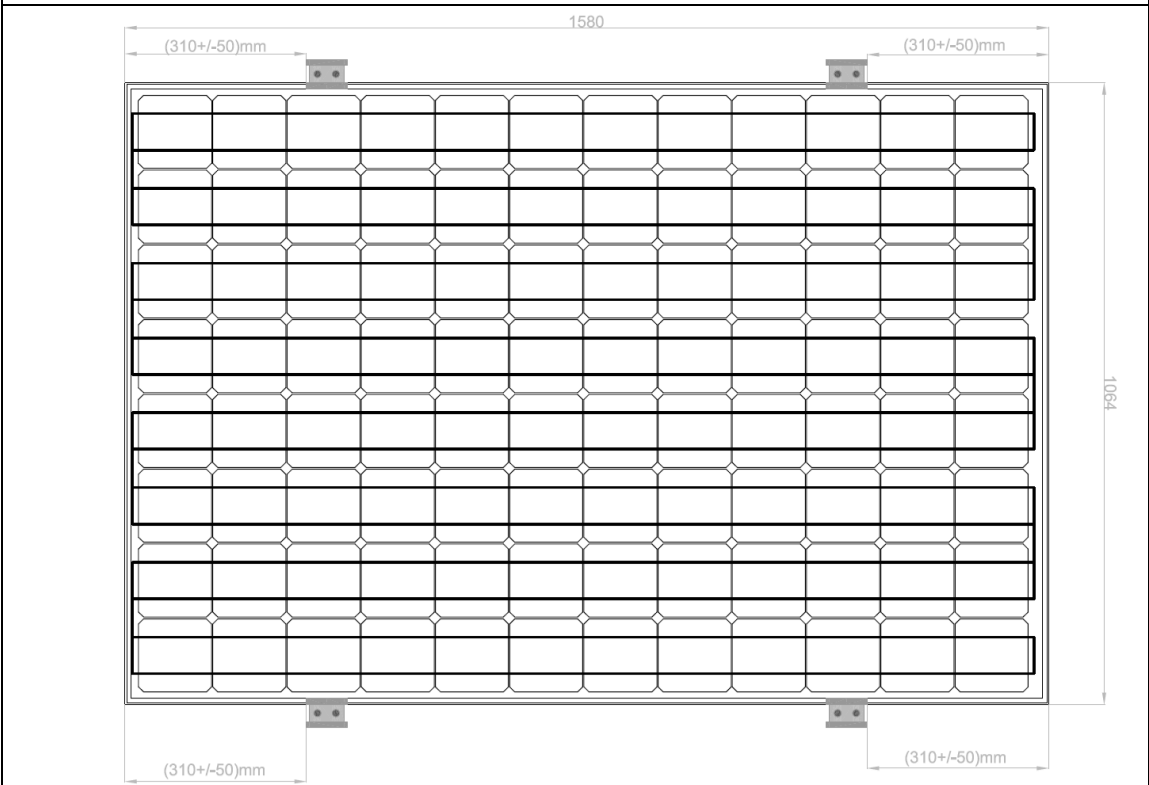


Mounting on short sides



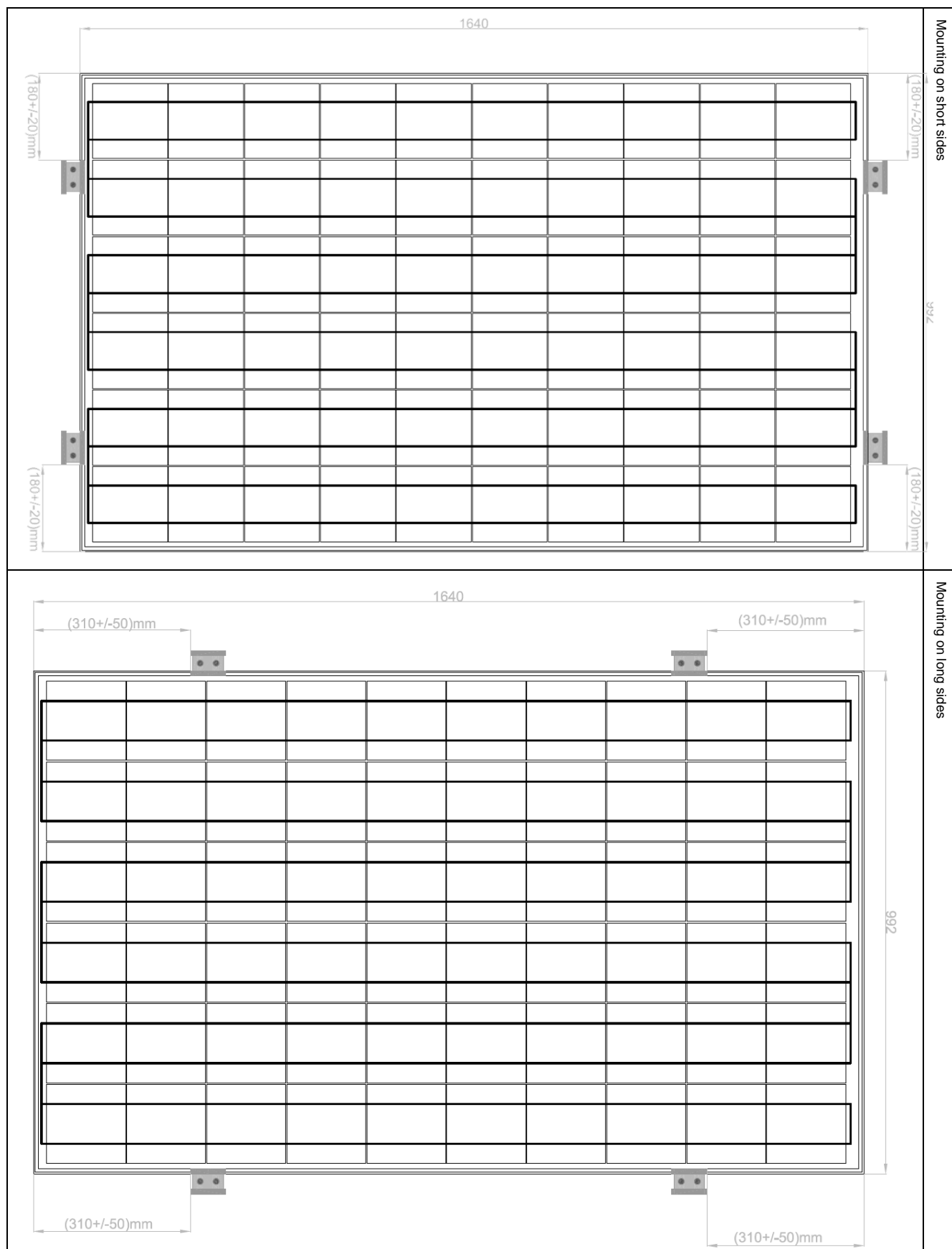
Module Type: 8x12 5 inch cells -- typical dimensions: 1580x1064x46mm

Product types: GH235M125, GH240M125, GH245M125, GH255M125, GH260M125, GH260M125

	Mounting on short sides
	Mounting on long sides

Module Type: 6x10 6 inch cells -- typical dimensions: 1640x992x46mm

Product types: GH235P156, GH240P156, GH240M156, GH250M156, GH255M156



Frameless module mounting instructions

Mounting clamps or insertion rails can be used for mounting the module. When using clamps, at least 2 clamps per module side should be used. For modules with an extended width (>800mm), 3 clamps per module side must be used. The clamp area must be at least 70mm per clamp.

Clamps or insertion rails must be equipped with rubber to protect the module against shock and dilation of system components. Direct contact between the back side, the front side or the edge of the module and the mounting clamps or insertion rail must be avoided at all times.

Only use mechanical fixtures for mounting the modules. Do not use adhesives or adhesive tapes for fastening the laminates, unless they have been explicitly approved by **GH Solar**.

Please note that the module edges are particularly sensitive to impact. When mounted in harsh environment conditions, supplementary protection on each side of the module should be provided.

Mounting the modules in excessive environmental temperatures should be avoided at all times. Dilation of all system materials should be carefully considered prior to mounting the modules. **GH Solar** cannot be held responsible in case of module breakage due to dilation of system components.

In case of any doubt regarding the mounting system, **GH Solar** should be contacted.

Table: module mounting instructions per module type

	# of clamps	Typical GH Solar products	Long side mounting and tolerance	Short side mounting and tolerance
6x12 5inch cells framed module	4	GH175M125, GH180M125, GH185M125, GH190M125, GH195M125, GH200M125	(260 +/-50)mm	(180 +/-20)mm
8x12 5inch cells framed module	4	GH235M125, GH240M125, GH245M125, GH255M125, GH260M125, GH260M125	(310 +/-50)mm	(180 +/-20)mm
6x10 6inch cells framed module	4	GH235P156, GH240P156, GH240M156, GH250M156, GH255M156	(310 +/-50)mm	(180 +/-20)mm

Wiring

- The desired electrical output can be obtained by connecting modules in series and/or in parallel. Make sure that the maximum system voltage is not exceeded. Limits of both junction box voltage rating and maximal DC input voltage of the inverter (or other appliance) should be respected at all times. Exceeding these limits will inflict irreversible damage to the whole PV system.
- PV modules connected in series should have similar current. PV modules connected in parallel should have similar voltage.
- Please note that all electrical module parameters are defined under Standard Test Conditions (STC) of 1.000 W/m² irradiance with AM 1.5 spectrum and a cell temperature of 25°C. Modules may produce more or less voltage and/or current than reported at STC. Accordingly, the values of Isc and

Voc marked on the module should be multiplied by a factor of 1.25 when determining voltage ratings, conductor current ratings, fuse sizes, and size of other system components.

- Always respect the polarity of the connectors when stringing modules, and make sure the connectors are tightly connected. Do not install or wire modules when the connectors are wet.

Grounding

Grounding of the modules needs to be done in accordance with the applicable regional regulations about grounding PV arrays and mounting frames.

Maintenance

- Screw tightness and corrosion at the mounting points, as well as wiring connectivity should be regularly inspected.
- Periodic cleaning of modules is recommended, but is not required. Rainfall will give the module its self-cleaning capabilities. Please note that GH Solar is not responsible for any yield losses due to pollution on the panel, caused by a too small slope.
- Modules may be cleaned by potable, non-heated water. Normal water pressure is sufficient. No cleaning products are to be used and heavily sticking impurities are to be removed by a soft cleaning tool like a sponge or cleaning cloth. Use of cleaning chemicals or sharp instruments to clean the modules will damage the module, and therefore invalidate the product warranty.