

INSTALLATION MANUAL

FOR

LATITUDE SOLAR PHOTOVOLTAIC MODULES, Latitude P6/60

INTRODUCTION

The installation of PV modules requires a great degree of skill and should only be performed by qualified licensed professionals, including licensed contractors and licensed electricians.

This Installation Manual contains essential information for electrical and mechanical installation that you must know before installing LATITUDE SOLAR photovoltaic (PV) modules. It also contains safety information you need to be familiar with, before you attempt to install, wire, operate or maintain the PV module. Please make sure that you completely understand the information described in this Installation Manual.

At commissioning, this manual is to be handed over to the customer, and the installer is obliged to inform the customer on how to maintain and operate the system.

GENERAL INFORMATION

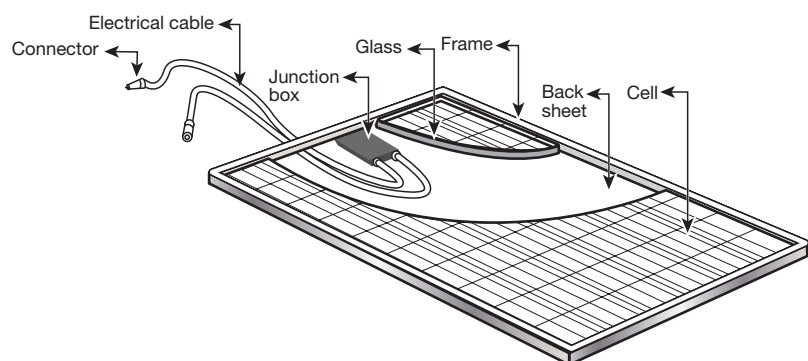
Please be aware that there is a serious risk of various types of injury occurring during the installation, including the risk of electric shock.

This Manual does not constitute a warranty, expressed or implied. LATITUDE SOLAR does not assume responsibility and expressly disclaims liability for loss, damage, or expense arising out of or in any way connected with installation, operation, use or maintenance of PV modules. No responsibility is assumed by LATITUDE SOLAR for any infringement of patents or other rights of third parties that may result from use of PV modules. LATITUDE SOLAR reserves the right to make changes to the product, specifications or Installation Manual without prior notice.

PV MODULE COMPONENTS

Latitude P6/60

- 1000 – Volt insulation
- Hardened glass surface
- Back sheet
- Hollow-chamber aluminum frame
- Junction box with by-pass diodes
- Permanently attached PV cable assembly (do not require special assembly).





SITE SELECTION

PV modules should be installed in a location where there is no shading throughout the year. In the northern hemisphere, PV modules should typically face south, and in the southern hemisphere, PV modules should typically face north.

Please make sure that there are no obstructions in the surroundings of the site of installation.

Take proper steps in order to maintain reliability and safety in case the PV modules are installed in areas that have heavy snow / extreme cold / strong winds / installations over, or near, water and areas where installations are prone to salt water exposure or on small islands or in desert areas.

TILT ANGLE SELECTION

The tilt angle of the PV module is measured between the surface of the PV module and a horizontal ground surface. The PV module generates maximum output power when it faces the sun directly. For grid-connected installations where the PV modules are attached to a permanent structure, PV modules should be tilted so that the energy production from the PV modules will be maximized on an annual basis.

ELECTRICAL INSTALLATION

To ensure proper system operation and to maintain the warranty, take care to observe the correct cable connection polarity when connecting the modules to other modules. If not connected correctly, the bypass diodes could be destroyed. All PV modules must be grounded by electrical connection of the module frames to ground. Care must be taken to arrange the system ground so that the removal of one module from the circuit will not interrupt the grounding of any of the other modules.

MAINTENANCE

LATITUDE SOLAR PV modules are designed for long life and require very little maintenance. If the angle of the PV module is 15 degrees or more, normal rainfall is usually sufficient to keep the module glass surface clean under most weather conditions. If dirt build-up becomes excessive, clean the glass surface only with a soft cloth using water. If cleaning the back of the module is required, take utmost care not to damage the back side materials. In order to ensure proper operation of the system, please check all wiring connections and the condition of the wire insulation periodically.



GENERAL WARNING

1. PV modules are heavy. Handle with care.
2. Contact with electrically active parts of a PV module such as terminals can result in burns, sparks and lethal shock, regardless of whether the PV modules are connected or not.
3. PV modules produce electricity when sufficient sunlight or other light source illuminates the module. When modules are connected in series, voltage is cumulative. When modules are connected in parallel, current is cumulative. PV systems can produce high voltage and current which could present an increased hazard and may cause serious injury or death.

GENERAL SAFETY

1. Consult local codes and applicable laws concerning required permits and regulations concerning installation and inspection requirements.
2. Install PV modules, ground frames and other metal components in accordance with applicable codes and regulations.
3. Only PV modules with the same article number should be connected in series.
4. PV modules should be installed and maintained by qualified personnel. Only installation/service personnel should have access to the PV module installation site.
5. Roof mounted PV modules are to be mounted over a fire resistant roof.
6. When PV modules are installed on roofs or any other structures above ground, appropriate safety practices should be followed and appropriate safety equipment should be used in order to avoid possible safety hazards. Note that the installation of PV modules on some roof types may require the addition of fireproofing, as required by local building/fire codes.
7. Follow all safety precautions of other components used in the system.
8. In order to avoid risk of injury or electrical shock, do not allow anyone to handle damaged PV modules if the person is unqualified or has limited knowledge of PV modules.
9. Avoid uneven shade on the PV module surface. Shaded cells may become hot ("hot spot" phenomenon) which may result in permanent damage to the module (e.g., solder joints may peel off).
10. Do not clean the glass surface with chemicals. Do not let water stay on the glass surfaces of PV modules for a long time. This creates a risk of permanent damage to the glass, such as white efflorescence, otherwise known as 'glass disease,' which may cause reduced power output.
11. To avoid dirt accumulation or white efflorescence due to water accumulation, do not install PV modules horizontally (flat). Recommended minimum tilt angle is 15° from horizontal.
12. Do not cover the water drain holes of the frame. There is a risk of frost damage when the frame is filled with water.
13. Do not expose PV modules to sunlight concentrated with mirrors, lenses or other means.
14. Should any problem occur, turn off inverters and circuit breakers immediately.
15. A defective PV module or module with broken glass may generate power even if it is removed from the system. It may be dangerous to handle the defective PV module while exposed to sunlight. Place defective PV modules in cartons so PV cells are completely shaded.
16. The maximum open circuit voltage must not be greater than the specified maximum system voltage. Voltage is proportional to the number of PV modules in series and is affected by weather conditions. For strings connected in parallel take proper measures to block reverse current flow.
17. Keep children away from PV modules.



HANDLING SAFETY

1. Do not hit or put excessive load on the glass or on the back sheet. PV cells may break.
2. To avoid damage to the back sheet, do not scratch or hit the back sheet.
3. To avoid damage to the terminal box, do not hit the terminal box, and do not pull the cables
4. Do not expose the PV module to excessive loads on the surface of the PV module or twist the frame. The glass may break.
5. Do not stand or step on the PV module. The glass may be slippery, and there is a risk of injury or electric shock if glass is broken.
6. Do not drop the PV module, or allow objects to fall on the PV module.
7. Do not lift the PV module by only one side. The frame may bend. Always use two hands to lift and carry the PV module on the long side of the frame.
8. Never touch the end of output cables with bare hands when the module is illuminated. Cover the surface of module with cloth or other sufficiently opaque material to block the module from incident light and handle the wires with insulated gloved hands to avoid electric shock.
9. Do not scratch the output cable or bend it with force. The insulation of the output cable may break which may result in electricity leakage or shock.
10. Do not pull the output cable excessively. The output cable connection may become loose and cause electricity leakage or shock.
11. Do not drill holes in the frame. It may compromise the frame strength and cause corrosion of the frame.
12. Do not scratch the insulation coating of the frame (except for grounding connection). It may cause corrosion of the frame or compromise the frame strength.
13. Do not touch the PV module with bare hands. The frame of the PV module has sharp edges and may cause injury. Wear suitable gloves, such as leather gloves with padding in the palm and finger areas.



INSTALLATION SAFETY

1. Keep the PV module packed in the carton until installation.
 2. Always wear protective head gear, insulating gloves and safety shoes (with rubber soles).
 3. Do not work alone (always work as a team of 2 or more people).
 4. Insert module-to-module connectors fully and correctly. Check all connections.
 5. Do not damage the back sheet of PV modules when fastening the PV modules to a support.
 6. When installing PV modules, do not drop any objects (e.g., PV modules or tools).
 7. Do not unplug a connector if the system circuit is connected to an operating load.
 8. Due to the risk of electrical shock, do not perform any work if the terminals of the PV module are wet.
 9. Always use insulated tools.
 10. Do not use wet tools.
 11. Do not work in rain, snow or windy conditions.
 12. Do not wear metallic jewelry which may conduct electricity and enable electric shock during installation.
 13. Do not touch the PV module unnecessarily during installation. The glass surface and the frame may be hot. There is a risk of burns and electric shock.
 14. Make sure flammable gases are not generated or present near the installation site.
 15. Do not touch the terminal box and the end of the output cables (connectors) with bare hands during installation or under sunlight, regardless of whether the PV module is connected to or disconnected from the system.
 16. Cables shall be located so that they will not be exposed to direct sunlight in order to prevent degradation of cables.
 17. Wear a safety harness when working above the ground.
 18. Use UV resistant cable ties or other wire management hardware to secure cables. Drooping cables may cause various problems, such as electricity leakage.
19. In the case of replacing a PV module, make sure not to damage the surrounding PV modules or mounting structure.
 20. In case the glass is broken, wear gloves and take other proper measures to prevent damage to surrounding PV modules and other equipment.

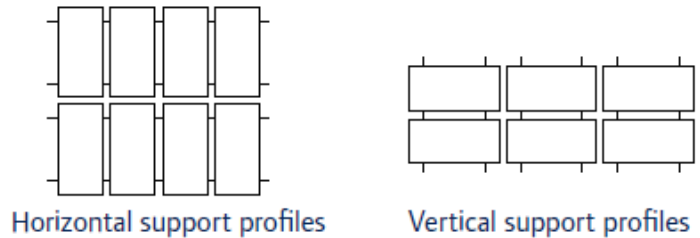
ELECTRICAL RATINGS

(Approximate)

Name plate power	P_{mpp}^*	225	230	235	240	245	250
Power sorting range		225,0 - 229,9	230,0 - 234,9	235,0 - 239,9	240,0 - 244,9	245,0 - 249,9	250,0 - 254,9
Peak power voltage	U_{mpp}	29,01	29,19	29,37	29,55	29,73	29,91
Peak power current	I_{mpp}	7,76	7,88	8,00	8,12	8,24	8,36
Open circuit voltage	U_{oc}	36,36	36,56	36,78	36,96	37,15	37,35
Short circuit current	I_{sc}	8,16	8,27	8,38	8,49	8,60	8,72
Module efficiency		13,8%	14,1%	14,4%	14,7%	15,0%	15,3%

MECHANICAL INSTALLATION

There are several approved ways to mount LATITUDE SOLAR modules to a support profiles. Modules can either be installed in portrait on horizontal support profiles or landscape on vertical support profiles.

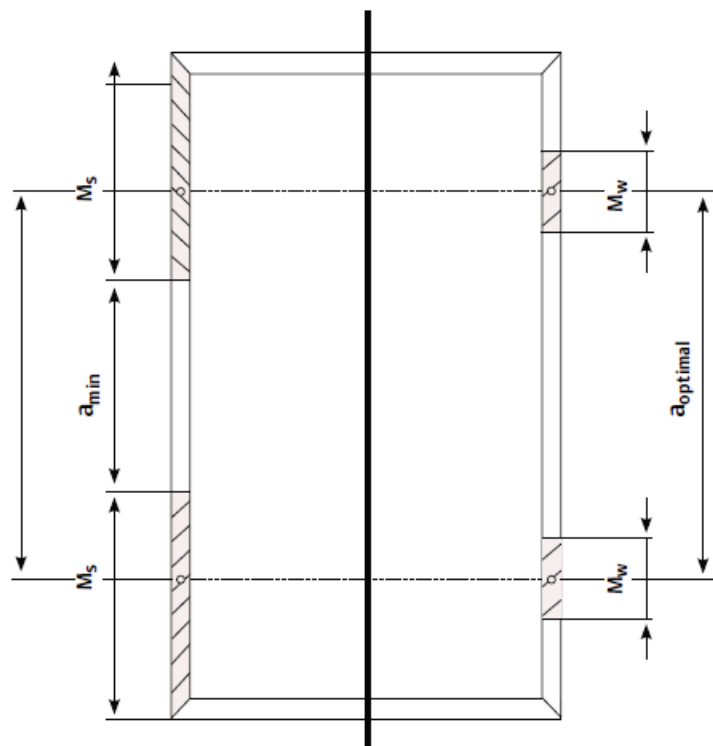


The module frame must be fastened torsion-free to the substructure rails (support profiles) at four points in the required areas for attachment and support described with “Ms” and “Mw” in the drawing. The module must not be attached via the short side bars under any circumstances.

The area described “Ms” is called the “Maximum support and fastening area”.

The area described “Mw” is called the “Optimal support and fastening area”.

The installation methods shown here are approved up to the specified maximum resulting load carrying capacity of the surface in kilograms per square meter of module surface area. This value must not be exceeded.



The maximum resulting loads that should not be exceeded are:

1. Portrait configuration of modules (on horizontal support profiles):
 - When using “Ms” area: $\leq 125\text{kg/m}^2$
 - When using “Mw” area: $\leq 155\text{kg/m}^2$
2. Landscape configuration of modules (on vertical support profiles):
 - When using “Mw” area: $\leq 125\text{kg/m}^2$