



# Installation Guide

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## Solar PV Modules NS Series



 Caution: read safety and installation instructions before using this product

# 1. INTRODUCTION

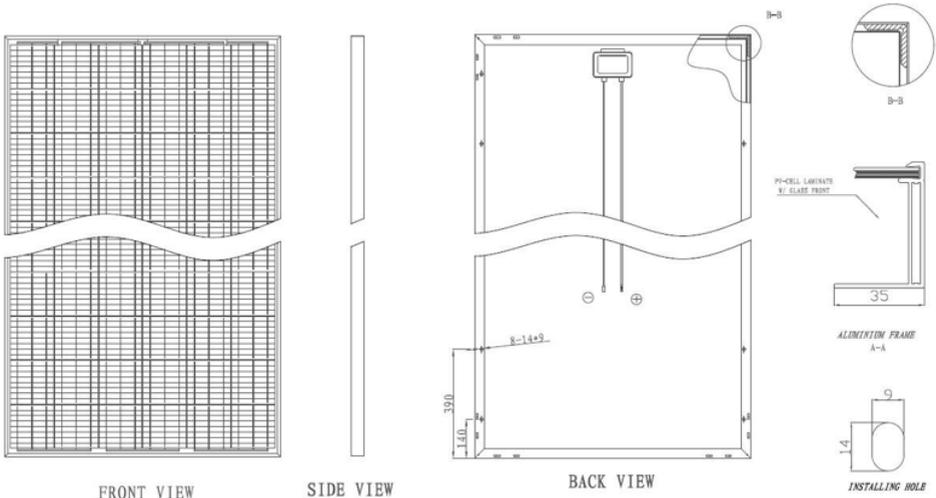
NEOSUN Energy Solar PV Modules consist of a series of electrically interconnected crystalline silicon solar cells, which are permanently encapsulated between a tempered glass superstrate and substrate. The entire laminate is secured within an anodized aluminum frame for structural strength; ease of installation and to protect the cells from the most severe environmental conditions.

NEOSUN Energy solar modules are a highly reliable, virtually maintenance-free direct current (DC) power source, designed to operate most efficiently in sunlight. NEOSUN Energy modules are ideal to power remote homes, recreational vehicles, water pumps, telecommunication systems and many other applications either with or without the use of storage batteries.

# 2. PERMIT

Before installing your system, contact local authorities to determine the necessary permit, installation and inspection requirements.

# 3. STRUCTURE



## 4. SITE SELECTION

In most applications, NEOSUN Energy modules should be installed in a location where they will receive maximum sunlight throughout the year.

When choosing a site, avoid trees, buildings or obstructions, which could cast shadows on the solar photovoltaic modules especially during the winter months when the arc of the sun is lowest over the horizon. Shading causes loss of output, even though the factory fitted bypass diodes of the NEOSUN Energy module will minimize any such loss. Do not install solar modules near naked flame or flammable materials. Do not install solar modules in a location where it would be immersed in water or continually exposed to water from a sprinkler or fountain etc.

## 5. MODULE TILT ANGLE

Solar modules connected in series should be installed at same orientation and angle. Different orientation or angle may cause loss of output power due to difference of amount of sunlight exposed to the module.

NEOSUN Energy solar PV modules produce the most power when they are pointed directly at the sun. For installations where the solar modules are attached to a permanent structure, the solar modules should be tilted for optimum winter performance. As a rule, if the system power production is adequate in winter, it will be satisfactory during the rest of the year. The module tilt angle is measured between the solar modules and the ground. Optimal tilting of NEOSUN Energy module time is almost the same as the latitude of installation location.

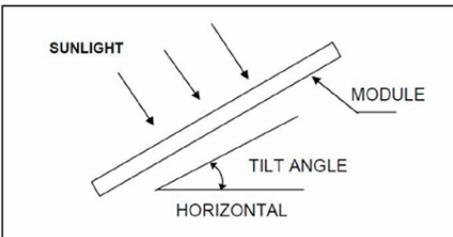


Chart 1: Installation angle

Degrees of Latitude	Tilting Angle
0° ~ 15°	15°
15° ~ 25°	Same as Latitude
25° ~ 30°	Latitude + 5°
30° ~ 35°	Latitude + 10°
35° ~ 40°	Latitude + 15°
40° +	Latitude + 20°

## 6. MOUNTING AND NOTES

Systems should be installed by qualified personnel only. It involves electricity, and can be dangerous if the personnel are not familiar with the appropriate safety procedures.

The module frame is made of anodized aluminum, and therefore corrosion can occur if the module is subject to a salt water environment with contact to a rack of another type of metal (Electrolysis Corrosion). If required, PVC or stainless steel washers can be placed between the solar module frame and support structure to prevent this type of corrosion. Module support structures that are to be used to support solar modules at correct tilt angles should be wind and snow load rated for use by the appropriate local and civil codes prior to installation.

The frame of each module has 4 mounting holes (12mm\*9mm) used to secure the modules to supporting structure. The module frame must be attached to a supporting structure using M8 stainless steel hardware together with spring washers and flat washers in four places. The applied torque is about 8 Newtonmeters.

The module clamps must not come into contact with the front glass and must not deform the frame. Avoid shadowing effects from the module clamps and the insertion systems. It is not permitted to modify the module frame under any circumstances. Recommended distance between 2 Solar modules is 5mm considering linear thermal expansion of the module frames.

Clearance between the module frame and mounting surface may be required to prevent the junction box from touching the surface, and to circulate cooling air around the back of the module.

The modules are not designed for integral mounting as part of a roof or wall. The mounting design may have an impact on the fire resistance. If the modules are to be installed on the roof or wall of a building, the fire resistance of roof covering or wall should be rated for the application. Here the standoff method or the rack method is recommended. The modules are supported parallel to surface of the building wall or roof. Clearance between the module frames and surface of the wall or roof is required to prevent wiring damage and to allow air to circulate behind the module. The recommended stand-off height is 115mm. Do not mount solar module in such way that the drain holes of solar module are intended to block up.

Do not step on the module, although NEOSUN Energy modules are quite rugged, the glass can be broken (and the module will no longer work properly) if it is dropped or hit by tools or other objects.



## 8. BYPASS DIODES AND BLOCKING DIODES

Partial shading of an individual module can cause a reverse voltage across the shaded solar module. Current is then forced through the shaded area by the other modules.

When a bypass diode is wired in parallel with the series string, the forced current will flow through the diode and bypass the shaded solar module, thereby minimizing module heating and array current losses.

In system utilizing a battery, blocking diodes are typically placed between the battery and the solar module output to prevent battery discharge at night.

Diodes that are used as blocking diodes must: Have a Rated Average Forward Current [IF(AV)] above maximum system current at highest module operating temperature. Have a Rated Repetitive Peak Reverse Voltage [VRRM] above maximum system voltage at lowest module operating temperature.

## 9. WARNING AND NOTES

The NEOSUN Energy modules generate electricity when exposed to light. Array of many modules can cause lethal shock and burn hazards. Only authorized and trained personnel should have access to these modules. To reduce the risk of electrical shock or burns, modules maybe covered with an opaque material during installation to avoid shocks or burns. Do not touch live terminals with bare hands. Use insulated tools for electrical connections.

Use appropriate methods to mount solar modules. Fall of modules from high place will cause death, injury or damage.

The NEOSUN Energy solar module has a pair of male and female waterproof connectors. For a series electrical connection, connect positive (+) connector of first solar module to negative (-) connector of the following module.

Do not short the positive and the negative. Do not disconnect under load. Be sure connector no gap between the insulators. In case there is a gap, a fire and/or an electrical shock may occur.

Artificially concentrated sunlight shall not be directed on the solar module. The electrical characteristics are indicated value of Pmax under standard test conditions (Irradiance of 1000W/m<sup>2</sup>, AM 1.5 spectrum, and cell temperature of 25°C).

Under normal conditions, a solar photovoltaic module is likely to experience conditions that produce more current and/or voltage than reported at standard test conditions. Accordingly the value 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, fuse sizes, and sizes of controls connected to the solar module output.

The solar modules are qualified for application class A: Hazardous voltage (IEC 61730: higher than 50V DC; EN 61730: higher than 120V), hazardous power applications (higher than 240W) where general contact access is anticipated (Modules qualified for safety through EN IEC 61730-1 and -2 within this application class are considered to meet the requirements for Safety Class II).

## 10. MODULE WIRING

Each module has two TUV 2 PFG 1169 1×4mm<sup>2</sup>, L=900mm standard 90°C sunlight resistant output cables each terminated with plug & play connectors. This cable is suitable for applications where wiring is exposed to the direct rays of the Sun.

For field connections, use the minimum No. #12 AWG copper wires insulated for a minimum of 90°C and Sunlight resistant as well. The minimum and maximum outer cable diameters of the cable are 5 to 7mm.

## 11. MAINTENANCE

Under most weather conditions, normal rainfall is sufficient to keep the solar module surface clean. If dirt build-up becomes excessive, clean the glass only with a soft cloth using mild detergent and water. USE CAUTION WHEN CLEANING THE BACK SURFACE OF THE MODULE TO AVOID PENETRATING THE SUBSTRATE MATERIALS. Solar modules that are mounted flat (0° tilt angle) should be cleaned more often, as they will not “self-clean” as effectively as modules mounted at a 15° tilt or greater.

Once a year, check the tightness of terminal screws and the general condition of the wiring. Also, check to be sure that mounting hardware is tight. Loose connections will result in damage for array. Do not touch live parts of cables and connectors. Use appropriate safety equipment (insulated tools, insulating gloves, etc.), when touching them.

Cover the front surface of the solar module by an opaque or other material when repairing. The NEOSUN Energy solar modules when exposed to sunlight generate high voltage and are dangerous.

# Contacts

If you have any questions about NEOSUN Energy Solar PV Modules, please call service support hotline: +85258087160.

Please keep following information to better our service for you. (Please note and advise below information to us before inquiry for better service).

- a. PV Modules' Model.
- b. PV Modules' Serial No..

## NEOSUN International Ltd.

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