


# OPTIMUM Module Installation Manual



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## Table of Contents

- 1 INTRODUCTION
- 2 PERMIT
- 3 CLIMATE CONDITION
- 4 STRUCTURE
- 5 SITE SELECTION
- 6 MODULE TILT ANGLE
- 7 MOUNTING AND NOTES
- 8 GROUNDING
- 9 BYPASS DIODES AND BLOCKING DIODES
- 10 WARNING AND NOTES 
- 11 MODULE WIRING
- 12 MAINTENANCE
- 13 CLASS APPLICATION

## 1 INTRODUCTION

➤ Perlight Solar modules consist of a series of electrically interconnected crystalline silicon solar cells, which are permanently encapsulated between a tempered glass superstrate and substrate. Perlight has some special non-aluminum frame modules, suitable for roof and other buildings

➤ this instruction is suitable for following types :

### **PV Modules with 6" Mono-crystalline Silicon Solar Cells:**

14 cells: PLM-\*\*\*M-14 (\*\*\*) = 50,55)

14 cells: PLM-\*\*\*MA-14 (\*\*\*) = 50,55)

14 cells: PLM-\*\*\*MB-14 (\*\*\*) = 50,55)

14 cells: PLM-\*\*\*M-14F (\*\*\*) = 50,55)

14 cells: PLM-\*\*\*MA-14F (\*\*\*) = 50,55)

14 cells: PLM-\*\*\*MB-14F (\*\*\*) = 50,55)

"A" means with black backsheet, black frame, black silica gel and black tape stick on internal wiring.

## 2 PERMIT

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

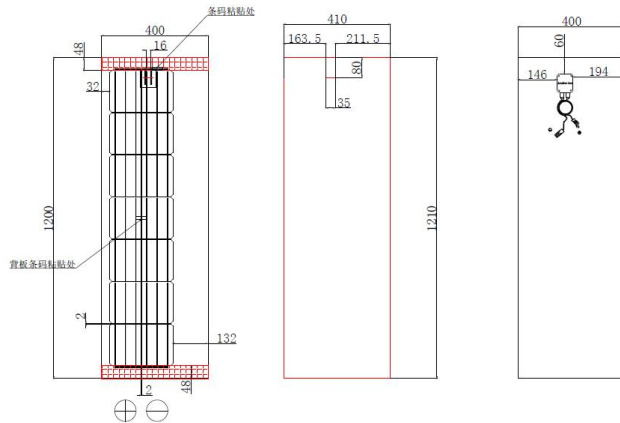
## 3 CLIMATE CONDITION

Install the Perlight Solar series modules in the following conditions:

- Ambient temperature: -20°C to +40°C.
- Operating temperature: -40°C to +85°C.
- Storage temperature: -40°C to +40°C,
- Humidity: below 85RH%
- Wind pressure: below 50.12lb / ft<sup>2</sup> (2400Pa).
- Corrosion resistance: Except for corrosive salt area and sulfurous area.



## 4 STRUCTURE



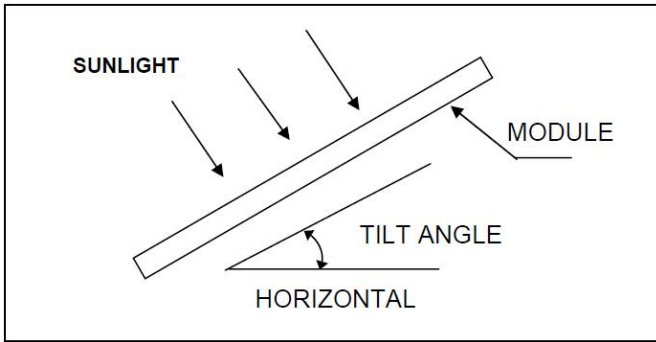
## 5 SITE SELECTION

Because the modules use in the roofs and other architectural aspects. Please take into account the sunrise and the area without shading.

## 6 MODULE TILT ANGLE

Perlight 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.

Perlight Solar modules produce the most power when they are pointed directly at the sun. For installations where the Perlight Solar modules are attached to a permanent structure, the Perlight 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 (Figure.1). Optimal tilting of Perlight Solar module is almost the same as the latitude of installation location.



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°

Chart 1: Installation angle

## 7 MOUNTING AND NOTES

The roof modules uses a specially tailored fixture, first installs the fixture on the roof, and then fixes the modules on the fixture, as illustrated by the picture Type 1

metal battens fixed in position using Senco Weatherex 51mm x 28mm ring shank nails  
Battens set at even gauge (307mm ± 7mm)  
1st batten set 314mm from back of fascia to front of batten  
Eave batten set behind fascia

End tab of link channel can be adjusted to ensure a secure fit of the link channel into the batten  
Push top end of the channel into the batten  
Insert top flange of the batten into slot on the link channel

The ceramic slate is carefully lowered into place  
ceramic slate is positioned into the hook on the spring clip  
The head of the slate is secured by the over-lapped link channel

ceramic slate  
link channel  
Underlay  
metal batten  
Over fascia eaves tray  
314.5mm

## 8 BYPASS DIODES AND BLOCKING DIODES

Partial shading of an individual module can cause a reverse voltage across the shaded PERLIGHT 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 PERLIGHT 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 PERLIGHT 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 PERLIGHT SOLAR 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 PERLIGHT SOLAR modules. Fall of modules from high place will cause death, injury or damage.

The PERLIGHT SOLAR module has a pair of male and female waterproof connectors. For a series electrical connection, connect positive (+) connector of first PERLIGHT 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 PERLIGHT SOLAR



PERLIGHT

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 Isc and Voc 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 PERLIGHT SOLAR output. Refer to Section 690-8 of the National Electrical Code for an additional multiplying factor of 1.25 which may also be applicable.

The installation in Canada shall be in accordance with CSA C22.1, Safety Standard for Electrical Installations, Canadian Electrical Code, Part 1.

PV modules can be wired in series to increase voltage as shown in below figure. the maximum quantity in series is 21 pieces of modules. PV modules can be wired in parallel to in increase the current. The maximum PV modules in parallel are three groups of maximum PV modules in series.

## 10 MODULE WIRING

Each module has two TUV 2 PfG 1169 1×4mm<sup>2</sup>, L=300-900mm standard 90°C sunlight resistant output cables each terminated with plug & ply connectors. This cable is suitable for applications where wiring is exposed to the direct rays of the Sun. We recommend that all wiring and electrical connections comply with the National Electrical Code (NEC).

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 PERLIGHT SOLAR module glass 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. PERLIGHT 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.

Changed PERLIGHT SOLAR module must be the same kind and type. 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 PERLIGHT SOLAR module by an opaque or other material when repairing. The PERLIGHT SOLAR modules when exposed to sunlight generate high voltage and are dangerous.

## 12 CLASS APPLICATION

The 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).