

*Installation Manual*

*Global version (A)*

# **BIPV and Applications**

Building-integrated Photovoltaic Module

# Table of Contents



<b>1. Introduction</b> .....	<b>2</b>
<b>1.1 Safety</b> .....	<b>2</b>
1.1.1 General Safety .....	2
1.1.2 Handling Safety .....	3
1.1.3 Installation Safety .....	3
<b>1.2 Storage</b> .....	<b>4</b>
<b>1.3 WEEE Information</b> .....	<b>4</b>
<b>1.4 Disclaimer of Liability</b> .....	<b>4</b>
<b>2. Installation</b> .....	<b>5</b>
<b>2.1 General Information</b> .....	<b>5</b>
<b>2.2 Wiring</b> .....	<b>5</b>
2.2.1 Series Wiring .....	6
2.2.2 Parallel Wiring .....	6
<b>2.3 Cable Selection</b> .....	<b>7</b>
<b>2.4 Bypass Diodes</b> .....	<b>7</b>
<b>2.5 Grounding</b> .....	<b>7</b>
<b>2.6 Inverter Requirement</b> .....	<b>7</b>
<b>3. Maintenance</b> .....	<b>8</b>
<b>3.1 Cleaning Instructions</b> .....	<b>8</b>
<b>3.2 System Inspection</b> .....	<b>8</b>

# 1. Introduction


Thank you for choosing NexPower PV Module (Photovoltaic Module). Please read this manual carefully before the installation. It provides important safety and instructions for installation and maintenance of this PV Module. Please refer to product specification for all electrical and mechanical characteristics of the NexPower PV Module.

**Failure to follow the requirements and instructions in this manual will invalidate the warranty for PV Modules provided by NexPower.**


## 1.1 Safety


 <b>Risk of electric shock</b>	 <b>Caution</b>	 <b>Prohibit</b>
---	--	---


### 1.1.1 General Safety

 PV module converts sunlight to electricity, when sunlight or light other source illuminates the module surface. PV modules can produce high voltage and current which may cause serious injury or even death. Extra attention is required to avoid “Electric Shocks” during usage.


 Do NOT work under rain, snow, or windy conditions.


 Protect plug contacts against soiling and do NOT use soiled plug contacts to make any plug connections.


 Do NOT disassemble the PV module or remove any component or label from the module.

 Do NOT drill holes on the glass of PV module.

 Do NOT artificially concentrate sunlight onto the PV module.

 Do NOT use chemicals in cleaning the surface of PV module. Do NOT let water remain on the glass surface of PV modules for an extended period of time.

 Do NOT hang or carry PV module by the cable.

 Do NOT pull the cable, resulting in loose or damaged the junction box during handing and installing process.

### BIPV and Applications

## 1.1.2 Handling Safety

---



The manual handling process must be made by two people. If the PV module damaged (fault, crack or break) is caused by improper handling process, it will be deemed negligent construction work.



Do NOT store or move the modules with the cables connected.



Do NOT use PV modules near equipments or locations where flammable gases can be generated.



Do NOT stand or step on the PV module, cables, connectors, or end caps.



Do NOT drop the PV module or allow objects to fall on PV module.

## 1.1.3 Installation Safety

---



Always wear electrical insulating gloves, protective head gear, suitable eye protection, and safety shoes while working on systems. Use only insulated tools during installation.



Do NOT touch the junction box or the output cables connectors with bare hands during installation, regardless whether the PV module is connected to or disconnected from the system.



When connecting cables, push the plus and minus connectors against each other while twisting them until they are fully engaged.



Junction box, cables and connectors should not be stressed in any circumstances.



Do not set up PV module higher than the local laws and regulations in place by the wind pressure limit.




Do NOT connect the NexPower PV module mixed with other brand or NexPower's different product models.




Do NOT pull or bend the cable using excessive force during wiring.



Do NOT cut the cable attached on PV module then connect to another type of cable or connector.

 When installing PV modules, the recommended process must be followed to prevent modules from falling. NexPower will not be liable to any damages caused by inappropriate installations.

 When mounting PV modules please avoid damage the back glass.

## 1.2 Storage

---

Please refer to the warranty document for storing condition.

## 1.3 WEEE Information

---

For EU (European Union) member users:

According to the WEEE directive, do not dispose of the photovoltaic panels to be mixed with general waste. Waste electrical and electronic equipment should be appropriately collected and recycled as required by practices established for your country. For further details of your nearest designated collection point, please contact your local authority.

WEEE website of European Commission (<http://ec.europa.eu/environment/waste/weee>)

## 1.4 Disclaimer of Liability

---

NEXPOWER EXPRESSLY DISCLAIMS THE LIABILITY FOR ANY LOSS, DAMAGES, OR EXPENSE ARISING OUT OF OR IN ANY WAY CONNECTED WITH THE INSTALLATION, OPERATION, USE, OR MAINTENANCE OF THE PV MODULE(S). NEXPOWER WILL NOT BE LIABLE FOR ANY CLAIM THAT THE PV MODULE(S) INFRINGE(S) ANY THIRD PARTY'S PATENT, COPYRIGHT, AND/OR OTHER INTELLECTUAL PROPERTY RIGHT(S). NEXPOWER may, at its sole discretion, modify the specifications of the product and the terms of this installation manual from time to time if necessary without sending the prior written notice to the client or any other parties.

## 2. Installation

### 2.1 General Information

- The supporting materials (e.g. mounting structure or sealing glue, etc.) used to secure the position of module should not cover more than **20mm** from the edge on each side of the module to prevent covering on active area. (Fig. 1)

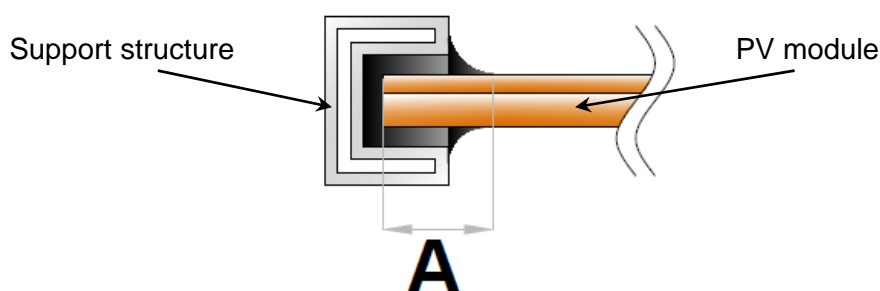


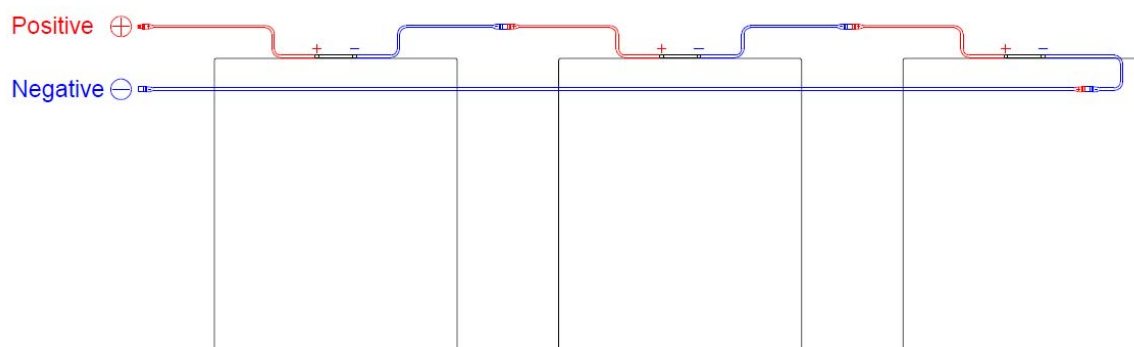
Fig. 1: Cover area,  $A < 20\text{mm}$

- The supporting structure of modules needs to be able to withstand high winds and the strength of it has to meet the requirements of local regulations.
- The applications of PV modules on buildings need to comply with the design guides of local regulations. Moreover, as for the curtain walls or window applications etc., the tests for airtight, watertight and wind resistance should be passed.
- It is not permitted to modify the module under any circumstances.
- Make sure the installation location and its surroundings are free from corrosive matters. (Ex. sea water, chemical factory, domestic animals hut, hot spring or volcano area emitting hydrogen sulfide or ammonia gas).

### 2.2 Wiring

- The PV module has two sunlight resistant output cables, and each is terminated with a Multi-Contact compatible connector. The positive terminal has a female connector, and the negative terminal has a male connector.
- Connecting PV modules in series would increase voltage, while connecting in parallel would increase current. In order to design an adequate PV system, PV modules should be connected in series and/or in parallel depending on specifications of inverters or other pertinent equipments.
- While connecting several strings in parallel, it is necessary to keep equivalent quantity of PV modules to each parallel string. If connected incorrectly, PV modules will become damaged.
- All system wiring must conform to local electrical codes.

## 2.2.1 Series Wiring



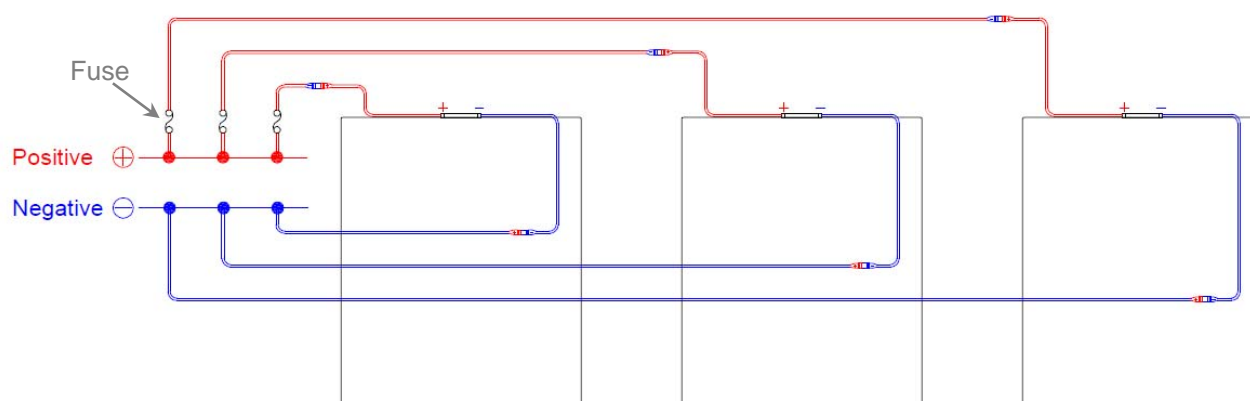
*Fig. 2: Series wiring*

- PV modules can be wired in series to increase voltage. Connect cables from the positive(+)/ negative(-) terminal of one module to the negative(-)/ positive(+) terminal of the next module.
- When several PV modules are connected in series, the voltage and current are as below:  

$$V_{\text{total}} = V_1 + V_2 + \dots + V_n$$

$$I_{\text{total}} = I_1 = I_2 = \dots = I_n$$
 n : number of PV modules
- It is recommended to multiply the  $V_{oc}$  listed on the module label by a factor of **1.25**, and make sure the system voltage must not exceed a maximum of **1000V**.

## 2.2.2 Parallel Wiring



*Fig. 3: Parallel wiring*

- PV modules can be wired in parallel to increase current. Connect cables from the positive(+)/ negative(-) terminal of one module to the positive(+)/ negative(-) terminal of the next module.
- When several PV modules are connected in parallel, the voltage and current are as below:  

$$V_{\text{total}} = V_1 = V_2 = \dots = V_n$$

$$I_{\text{total}} = I_1 + I_2 + \dots + I_n$$
 n : number of PV modules

- Please be noted that the short-circuit current of system is calculated by multiplying the  $I_{sc}$  listed on the module label by the number of source circuits operating in parallel. Use this value and multiply by **1.56** to determine the conductor capacities and fuse sizes connected to the module output.
- Ensure the system design prevents a reverse current of no more than specification will flowing through the PV module.
- Parallel configuration is not limited in case of taking proper measure (e.g. fuse for protection of module and cable from over current, and/or blocking diode for prevention of unbalanced strings voltage) to block the reverse current flow.

## 2.3 Cable Selection

---

- The cables should use **2.5mm<sup>2</sup>** or upper grade copper wires.
- It is very important to use the proper cable with a minimum wire gauge approved for usage at the maximum short circuit current. Smaller gauge cables and connectors can become overheated under high currents.
- The cables selected should have a temperature rating higher than 90°C.
- Series and parallel wiring should use compatible connectors as of the PV modules.

## 2.4 Bypass Diodes

---

- Buildings, trees, or obstructions around PV modules can cast shadows on PV modules. Current forced through shaded part of PV modules causes additional heating and severe loss of power.
- In order to avoid this condition which may impair PV module, NexPower PV Module is equipped with factory-installed bypass diodes.

## 2.5 Grounding

---

- Grounding method must comply with laws or electrical regulations. Please confirm electrical codes in the region where the PV system is installed.
- Support structure must apply grounding.

## 2.6 Inverter Requirement

---

- For NexPower module requirement, **it is essential to select transformer type inverters with DC negative pole grounding function.**
- For more details or specific recommendations, please contact your PV system dealer or module provider.



## 3. Maintenance

---

### 3.1 Cleaning Instructions

---

- When dirt accumulates on the surface of PV module and becomes excessively built-up, power output may decline. When this situation occurs, it is a good manner to use only lots of water to flush the dirt away.
- Moreover, cleaning the module surface is proper but only with a soft cloth and water.
- Before washing, please wear electrical insulation gloves to avoid electrical accidents.
- Protect yourself against any possibility from accidents during maintenance.
- If cleaning the back of the module is required, take utmost care to avoid penetrating the back side materials.
- During the cleaning process, do NOT cause any partial shading parallel to the longitudinal direction of the module.
- It is recommended to shut down the system before the cleaning process or to clean the modules under low irradiance condition (e.g. at dawn or nightfall).

### 3.2 System Inspection

---

- The PV modules are designed to last for extended period of time thus require very little maintenance.
- Check annually and carefully to ensure for fixed mounting hardware and tightened wiring. Any loose connections or parts may cause damages in modules or arrays.
- If any problem is found, please contact your local PV system dealer for professional service.