

## 290 Watt POLYCRYSTALLINE SOLAR MODULE



### Features



#### High module conversion efficiency

Module efficiency up to 14.9% achieved through advanced cell technology and manufacturing capabilities



#### Self-cleaning & anti-reflective

Higher module efficiency from anti-reflective, hydrophobic layer with higher light absorption and minimal surface dust



#### Positive tolerance

Guaranteed positive tolerance of up to 5% delivers higher outputs



#### Excellent weak light performance

Excellent performance under low light conditions



#### Extended wind and snow load tests

Module certified to withstand extreme wind (3800 Pascal) and snow loads (5400 Pascal) \*



#### Suntech current sorting process

System output maximized by reducing mismatch losses up to 2% with modules sorted & packaged by amperage

Certifications and standards: UL1703, conformity to CE



### Trust Suntech to Deliver Reliable Performance Over Time

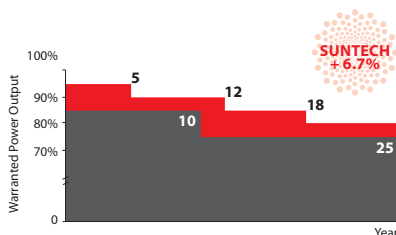
- World's no.1 manufacturer of crystalline silicon photovoltaic modules
- Unrivaled manufacturing capacity and world-class technology
- Rigorous quality control meeting the highest international standards: ISO 9001: 2008 and ISO 14001: 2004
- Tested for harsh environments (salt mist and ammonia corrosion testing: IEC 61701, DIN 50916:1985 T2)\*\*



### New, Improved Frame Design

Suntech's new rigid and reliable hollow chamber frame provides additional grounding options for increased design flexibility and easier installation. Anti-counterfeit mark assures product authenticity.

### Industry-leading Warranty Based on Nominal Power



- Based on nominal power (P<sub>nom</sub>)
- 25-year transferrable power output warranty: 5 years/95%, 12 years/90%, 18 years/85%, 25 years/80% \*\*\*
- Warrants 6.7% more than the market standard over 25 years
- 10-year material and workmanship warranty



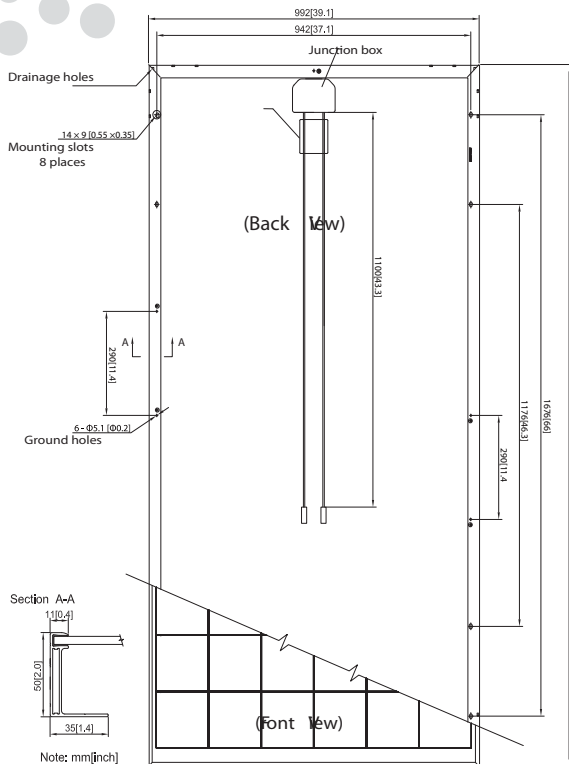
### Durable IP67 Rated Junction Box

Supports installations in multiple orientations. High performance, low resistance connectors ensure maximum output for the highest energy production.

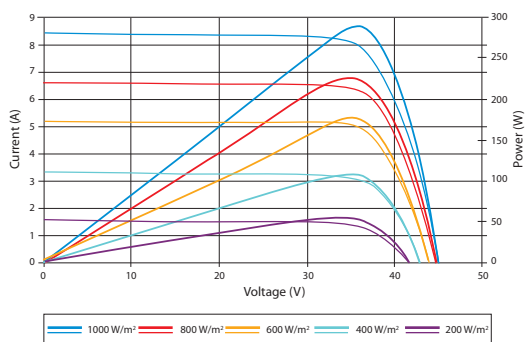
\* Please refer to Suntech Standard Module Installation Manual for details.

\*\* Please refer to Suntech Product Near-coast Installation Manual for details.

\*\*\* Please refer to Suntech Product Warranty for details.

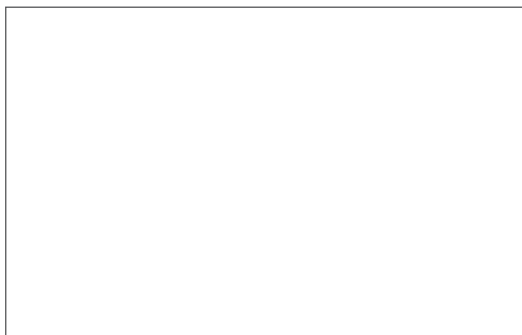


Current-Voltage & Power-Voltage Curve (290-24)



Excellent performance under weak light conditions: at an irradiance intensity of 200 W/m<sup>2</sup> (AM 1.5, 25 °C), 95.5% or higher of the STC efficiency (1000 W/m<sup>2</sup>) is achieved

### Dealer information



Specifications are subject to change without further notification

### Electrical Characteristics

STC	STP290-24/Vd
Optimum Operating Voltage (Vmp)	35.6 V
Optimum Operating Current (Imp)	8.15 A
Open Circuit Voltage (Voc)	45.0 V
Short Circuit Current (Isc)	8.42 A
Maximum Power at STC (Pmax)	290 W
Module Efficiency	14.9%
Operating Module Temperature	-40 °C to +85 °C
Maximum System Voltage	1000 V DC (IEC) / 600 V DC (UL)
Maximum Series Fuse Rating	20 A
Power Tolerance	0/+5 %

STC: Irradiance 1000 W/m<sup>2</sup>, module temperature 25 °C, AM=1.5; Sun simulation measure tolerance(class AAA Flasher): +/- 3%

NOCT	STP290-24/Vd
Maximum Power at NOCT (Pmax)	211 W
Optimum Operating Voltage (Vmp)	32.2 V
Optimum Operating Current (Imp)	6.56 A
Open Circuit Voltage (Voc)	41.2 V
Short Circuit Current (Isc)	6.80 A

NOCT: Irradiance 800 W/m<sup>2</sup>, ambient temperature 20 °C, AM=1.5, wind speed 1 m/s; Sun simulation measure tolerance(class AAA Flasher): +/- 3%

### Temperature Characteristics

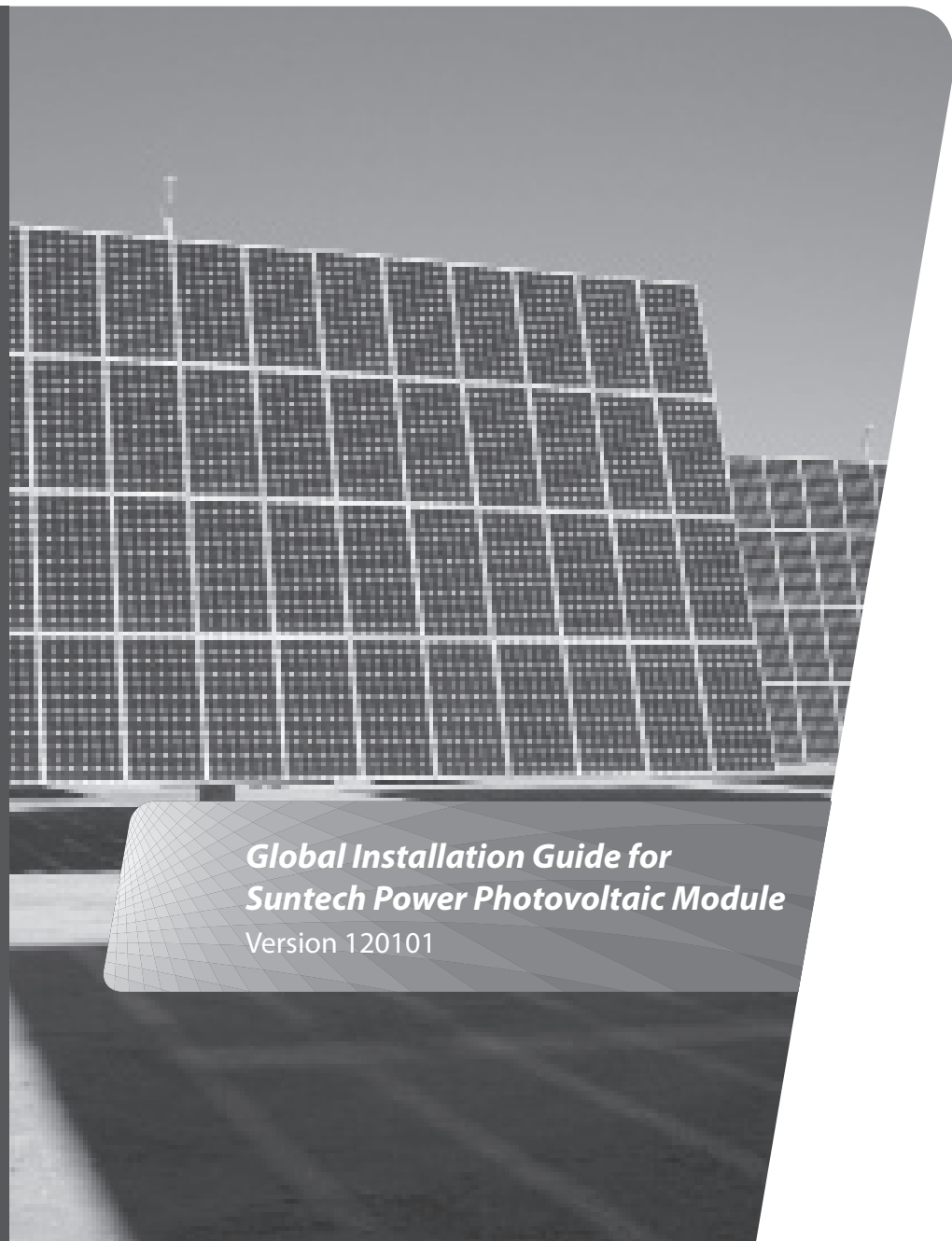
Nominal Operating Cell Temperature (NOCT)	45±2°C
Temperature Coefficient of Pmax	-0.44 %/°C
Temperature Coefficient of Voc	-0.33 %/°C
Temperature Coefficient of Isc	0.055 %/°C

### Mechanical Characteristics

Solar Cell	Polycrystalline silicon 156 × 156 mm (6 inches)
No. of Cells	72 (6 × 12)
Dimensions	1956 × 992 × 50mm (77.0 × 39.1 × 2.0 inches)
Weight	27.0 kgs (59.5 lbs.)
Front Glass	4.0 mm (0.16 inches) tempered glass
Frame	Anodized aluminium alloy
Junction Box	IP67 rated (3 bypass diodes)
Output Cables	TUV (2Pfg1169:2007), UL 4703, UL44 4.0 mm <sup>2</sup> (0.006 inches <sup>2</sup> ), symmetrical lengths (-) 1100mm (43.3 inches) and (+) 1100 mm (43.3 inches)
Connectors	H4 connectors(MC4 connectable)

### Packing Configuration

Container	20' GP	40' GP	40' HC
Pieces per pallet	20	20	20
Pallets per container	5	12	24
Pieces per container	100	240	480



***Global Installation Guide for  
Suntech Power Photovoltaic Module***

Version 120101

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## Purpose of this guide

- This guide contains information regarding the installation and safe handling of Suntech Power Co., Ltd photovoltaic module (hereafter referred to as “module”). Suntech Power Co., Ltd referred to as “Suntech”.
- Installers must read and understand this guide prior to installation. For any questions, please contact Suntech's Global Quality & Customer Support department or our local representatives for more detailed information. Installers should follow all safety precautions described in this guide as well as local codes when installing a module.
- Before installing a solar photovoltaic system, installers should familiarize themselves with its mechanical and electrical requirements. Keep this guide in a safe place for future reference (care and maintenance) and in case of sale or disposal of the modules.
- Suntech modules are tested and certified for installation worldwide. Different regions may have different regulations for solar PV installations. In this guide, hereafter "IEC Only" is used to refer to regions where IEC standard applies, e.g. Europe, Middle East, most of Asia Pacific countries; " UL Only " is used to refer to regions where UL standard applies, e.g. United States, Canada; all other references are global.

### General safety

- Modules that fall under this application class may be used in system operation at more than 50V DC or 240W, where general contact access is anticipated. Modules qualified for safety under IEC 61730-2 and within this application class are considered to meet the requirements for Safety Class II. (IEC Only)
- Installing solar photovoltaic systems requires specialized skills and knowledge. Installation should only be performed by qualified personnel.
- Installers should assume all risks of injury that might occur during installation, including, but not limited to, the risk of electric shock.
- One single module may generate more than 30V DC when exposed to direct sunlight. Contact with a DC voltage of 30V or more is potentially hazardous.
- Do not disconnect under load.
- Photovoltaic solar modules convert light energy to direct current electrical energy. They are designed for outdoor use. Modules can be ground mounted, mounted on rooftops, vehicles or boats. The proper design of support structures lies within the responsibility of the system designers and installers.
- When installing the system, abide to all local, regional and national statutory regulations. Obtain a building permit if necessary.
- The electrical characteristics are within  $\pm 10$  percent of the indicated values of  $I_{sc}$ ,  $V_{oc}$  and  $P_{max}$  under standard test conditions (irradiance of  $100 \text{ mW/cm}^2$ , AM 1.5 spectrum, and a cell temperature of  $25^\circ\text{C}$  ( $77^\circ\text{F}$ )).
- Only use equipment, connectors, wiring and support frames suitable for solar electric systems.

## Purpose of this guide

- Do not use mirrors or other magnifiers to concentrate sunlight onto the modules.
- Always use fall protection equipment when working from heights of 6 feet (183cm) or above. Follow Occupational Safety and Health Act (OSHA) or local governing safety regulations regarding Fall Protection. (UL Only)

### Handling safety

- Do not lift the module by grasping the module's junction box or electrical leads.
- Do not stand, step or walk on any side of the module.
- Do not drop the module or allow objects to fall on the module.
- Do not place any heavy objects on the module.
- Be cautious when placing the module down onto a surface, particularly when placing it in a corner.
- Inappropriate transport and installation may break the module and void the warranty.
- Do not attempt to disassemble the modules, and do not remove any attached nameplates or components from the modules.
- Do not apply paint or adhesive to the module top surface or backsheet.
- To avoid damage to the backsheet, do not scratch, dent or hit the backsheet.
- Do not drill holes in the frame. This may compromise the frame strength, cause corrosion of the frame and void the warranty.
- Do not scratch the anodized coating of the frame (except for grounding connection). It may cause corrosion of the frame or compromise the frame strength.
- A panel with broken glass or torn backsheet cannot be repaired and must not be used since contact with any panel surface or the frame can cause an electric shock.
- Work only under dry conditions, and use only dry tools. Do not handle panels under wet conditions unless wearing appropriate protective equipment.
- When storing uninstalled panels outdoors for any period of time, always cover the panels and ensure that the glass faces down on a soft flat surface to prevent water from collecting inside the panel and causing damage to exposed connectors.

### Installation safety

- Never open electrical connections or unplug connectors while the circuit is under load.
- Contact with electrically charged parts of the panels, such as terminals, can result in burns, sparks and lethal shock whether or not the panel is connected.
- 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.
- Do not work in the rain, snow or in windy conditions.
- Avoid exposing cables to direct sunlight in order to prevent insulation degradation.
- Use only insulated tools that are approved for working on electrical installations.

## Purpose of this guide

- Keep children well away from the system while transporting and installing mechanical and electrical components.
- Completely cover the module with an opaque material during installation to prevent electricity from being generated.
- Do not wear metallic rings, watchbands, earrings, nose rings, lip rings or other metallic objects while installing or troubleshooting photovoltaic systems.
- Follow the safety regulations for all other system components, including wires and cables, connectors, charging regulators, inverters, storage batteries, rechargeable batteries, etc.
- Under normal conditions, a photovoltaic module is likely to experience conditions that produce more current and/or voltage than reported at standard test conditions. Accordingly, the values 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 size of controls connected to the PV output.
- Only use same or connectable connectors to connect modules to form a string, or connect to another device. Removing the connectors will void the warranty.

### Fire Safety

- Consult your local authority for guidelines and requirements for building or structural fire safety.
- Roof constructions and installations may affect the fire safety of a building; improper installation may create hazards in the event of a fire.
- Use components such as ground fault circuit breakers and fuses as required by local authority.
- Do not use panels near equipment or in places where flammable gases may be generated.
- The modules have been rated Fire Class C, and are suitable for mounting on to a Class A roof.

## Product identification

Each module has three labels providing the following information:

**1. Nameplate:** describes the product type; rated power, rated current, rated voltage, open circuit voltage, short circuit current, all as measured under standard test conditions; weight, dimensions etc.; the maximum system voltage is 600 volts DC for UL standard and 1000 volts DC for IEC standard.

**2. Current Sorting and Quality label:** three different marks are shown on this sticker. "QC Pass" assures that the module has passed the quality control examination. "HIPOT"

means that it has passed the insulation test. Finally modules are sorted out according to their output current, referred as a corresponding symbol "Ix" attached, in which x takes the value 1, 2 or 3. To get optimal performance out of a string of modules it is recommended to connect only modules of the same "Ix" class (for example only I2 modules) in one given string.



Current Sorting and Quality label

**3. Barcode:** each individual module has a unique serial number. The serial number has 18 digits. The 15th and the 16th digits are the week code, and the 17th and the 18th digits are the year code. For example, STP xxxxxxxxxxxxxx4411 means the module was assembled and tested in the 44th week of 2011. Each module has only one bar code. It is permanently attached to the interior of the module and is visible from the top front of the module. This bar code is inserted prior to laminating.



Typical serial number barcode label

**Do not remove any labels. Removing a label will make the Suntech warranty void.**

## Mechanical Installation

### Selecting the location

- Select a suitable location for installing the modules.
- The modules should face south in northern latitudes and north in southern latitudes.
- For detailed information on the best installation angle, refer to standard solar photovoltaic installation guides or consult a reputable solar installer or systems integrator.
- Modules should not be shaded at any time. If a module is shaded or even partially shaded, it will fail to perform at ideal conditions and result in lower power output.

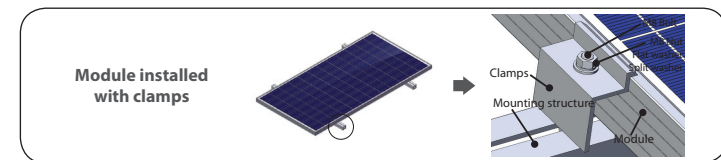
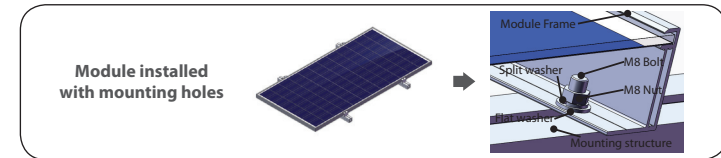
- In general, we do not recommend to install the PV system with a distance of less than 500 meters close to the coastline. If you plan to do so, please contact Suntech's Global Customer Service Department or our regional representatives and/or refer to the Near-coast Installation Guide for Suntech Power Photovoltaic Module.
- Do not use modules near equipment or in locations where flammable gases may be generated or collected.

### General Installation

- The module mounting structure must be made of durable, corrosion-resistant and UV-resistant material.
- In regions with heavy snowfall in winter, select the height of the mounting system so that the lowest edge of the module is not covered by snow for any length of time. In addition, ensure that the lowest portion of the module is placed high enough so that it is not shaded by plants, trees or damaged by ground soil moved by or through the air.
- For ground mounting systems, the minimum distance we recommend from the ground to the bottom of the module is at least 24 inches (60cm).
- Modules must be securely attached to the mounting structure. For Clamping System installation methods, the recommended maximum compression for each clamp is 2900 PSI (20 Mpa) in order to avoid potential damages to module frames.
- Provide adequate ventilation under the modules in conformity to your local regulations. A minimum distance of 10 cm between the roof plane and the frame of the module is generally recommended.
- Always observe the instructions and safety precautions included with the module support frames.
- Before installing modules on a roof, always ensure the roof construction is suitable. In addition, any roof penetration required to mount the module must be properly sealed to prevent leaks.
- Dust building up on the surface of the module can impair with the module performance. Suntech recommends installing the modules with a tilt angle of at least 10 degrees, making it easier for dust to be removed by rain.
- Observe the linear thermal expansion of the module frames (the recommended minimum distance between two modules is 2 cm).
- Always keep the backsheet of the panel free from foreign objects, plants and vegetation, structural elements, which could come into contact with the panel, especially when the panel is under mechanical load.
- When installing a module on a pole, select a pole and module mounting structure that will withstand the anticipated winds for the area.
- Ensure panels are not subject to wind or snow loads exceeding the maximum permissible loads, and are not subject to excessive forces due to the thermal expansion of the support structures: Refer to the following installation methods for more detailed information.

### Installation methods

- Modules can be installed on the frame using mounting holes, clamps\* or an insertion system. Modules must be installed according to the following examples. Not mounting the modules according to these instructions may void the warranty.



\* The minimum recommended length for each clamp is 50 mm.

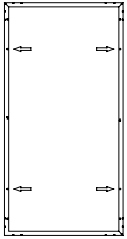

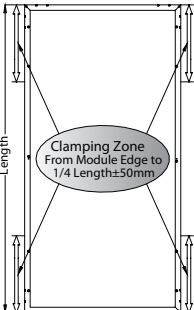
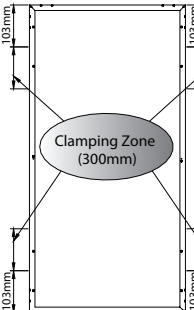
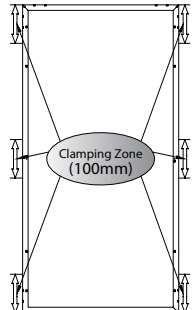
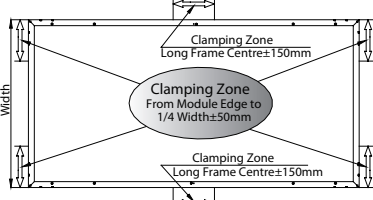
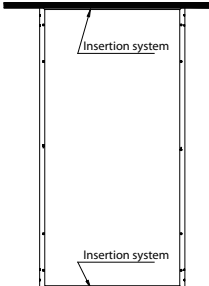
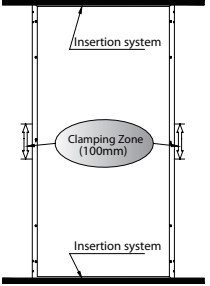
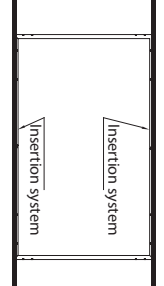
- Module can be installed in both landscape and portrait modes.
- The modules must be properly secured to their support so that they can withstand live load conditions, including wind uplift, to the pressure they have been certified for. It is the installer's responsibility to ensure that the clamps used to secure the modules are strong enough.

### Attachment guidelines

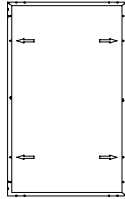
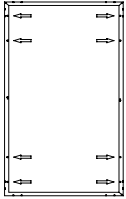
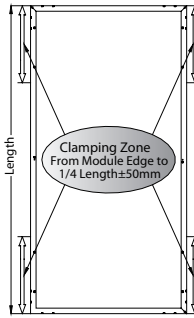
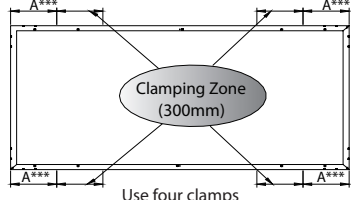
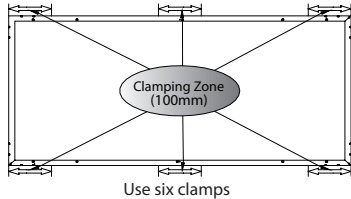
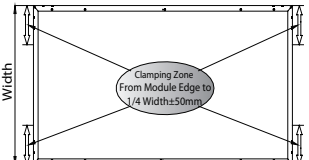
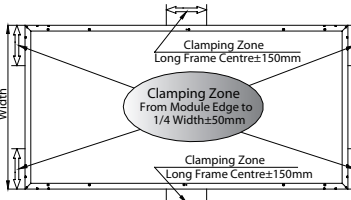
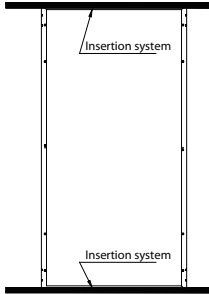
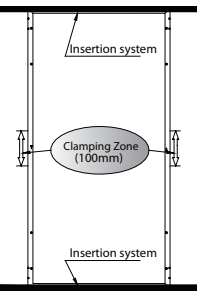
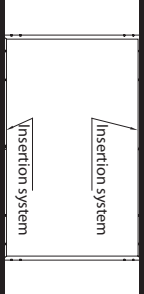
- Select the proper installation method depending on the load(See below for more detailed information).
- With different installation methods, the modules have been tested to withstand the loads of 2400 Pa, 3800 Pa and 5400 Pa according to IEC 61215 standard, equivalent of 1600 Pa, 2500 Pa and 3600 Pa respectively under UL 1703 standard.
- The diagrams in the tables below are designed for illustration purpose. For each installation, modules can be installed either in portrait or landscape mode.

Suntech Module Type	Module Dimension Length×Width×Thickness
A Series	1580 mm×808 mm×35 mm
W Series	1640 mm×992 mm×50 mm
V Series	1956 mm×992 mm×50 mm
Vdx ( V landscape series)	1930 mm×998 mm×50 mm

## Suntech A series module

	2400 Pa Load * 2400 Pa Wind Load 2400 Pa Snow Load	3800 Pa Load * 3800 Pa Wind Load 3800 Pa Snow Load	5400 Pa Load * 5400 Pa Snow Load 3800 Pa Wind Load
<b>Mounting system</b>			
		Use four mounting holes	Use eight mounting holes
<b>Clamping system **</b> Attachment to the long frame			
	Use four clamps	Use four clamps	Use six clamps
<b>Clamping system **</b> Attachment to the short frame			
		Use four clamps on the short frame and two clamps at the center of each long frame	
<b>Insertion System</b>			
	Use insertion system on short frame	Use insertion system on a short frame and two clamps at the center of each long frame	Use an insertion system on a long frame

## Suntech W series, V series, Vdx (V landscape series) module

	2400 Pa Load * 2400 Pa Wind Load 2400 Pa Snow Load	3800 Pa Load * 3800 Pa Wind Load 3800 Pa Snow Load	5400 Pa Load * 5400 Pa Snow Load 3800 Pa Wind Load
<b>Mounting system</b>			
		Use four mounting holes	Use eight mounting holes
<b>Clamping system **</b> Attachment to the long frame			
	Use four clamps	Use four clamps	Use six clamps
<b>Clamping system **</b> Attachment to the short frame			
	Use four clamps on short frame	Use four clamps on the short frame and two clamps at the center of each long frame	
<b>Insertion System</b>			
	Use insertion system on short frame	Use insertion system on a short frame and two clamps at the center of each long frame	Use an insertion system on a long frame



\* The loads of 2400 Pa, 3800 Pa and 5400 Pa are under IEC standard. The installation methods applicable for 5400 Pa are also relevant for 3800 Pa and 2400 Pa. The installation methods applicable for 3800 Pa are also relevant for 2400 Pa.

\*\* The module clamps must not come into contact with the front glass or deform the frame in any way. Avoid shading effects from the module clamps and insertion systems. Drainage holes in the module frame must not be closed or obscured by the clamps.

\*\*\* Measurement A stands for the distance from the module edge to the clamping zone. Measurement A is 108 mm for W series and 127 mm for V series (including Vdx).

## Electrical Installation

### General installation

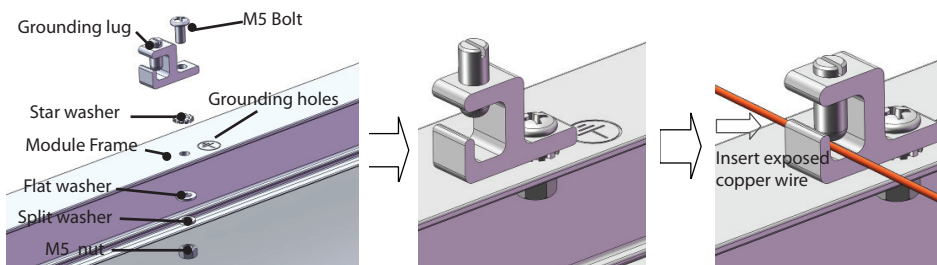
- Any hardware used must be compatible with the mounting structure material to avoid galvanic corrosion.
- It is not recommended to use modules with different configurations (grounding, wiring) in the same system.
- Excessive cables must be organized or fixed in an adequate way, e.g. attached to the mounting structure by using non-metallic cable ties.
- For applications requiring high operating voltage several modules can be connected in series to form a string of modules; the system voltage is then equal to the sum of the voltage of each module.
- For applications requiring high operating currents several strings of modules can be connected in parallel; the system current is then equal to the sum of the current of each string of modules.
- The maximum system voltage is 600 volts DC according to UL standards. However products are rated for use up to 1000V where UL standards do not apply. (UL Only)
- The maximum number of series connected modules depends on system design, the type of inverter used and environmental conditions.
- Based on the maximum series fuse rating of module and local electrical installation code, always make sure Suntech PV modules with more than three strings in parallel for connection need to be assembled with the appropriate string fuse for circuit protection.
- There is no limitation on the number of modules that can be connected in parallel, the number of modules is determined by system design parameters such as current or power output.
- To prevent the cables and the connectors from overheating, the cross section of the cables and the capacity of the connectors must be selected to suit the maximum system short circuit current. The recommended cable is PV wire with a cross section of at least 4mm<sup>2</sup>.

- Please refer to local regulations to determine the system wires size, type and temperature.
- Suntech modules are supplied with connectors used for system electrical connections. The recommended connectors are H&S Radox™ connectors, Amphenol H4, Multi Contact MC4 or equivalent, of which Amphenol H4 and Multi Contact MC4 are connectable.
- To ensure reliable electric connection and to prevent possible intrusion of humidity, H&S Radox™ integrated twist locking connectors have to be fully mated together and then manually twisted clockwise as far as it will go, while Amphenol H4 and Multi Contact MC4 connectors must be mated and locked together until a click can be heard.
- Long-term exposure to wet environments may cause connectors' poor connectivity, resulting in current leakage and poor conductivity. Suntech recommends proper connector/cable/wire management to prevent moisture intrusion. Depending on the amount of humidity, Suntech recommends periodic inspections of the installation system to maintain optimal module performance.
- The DC current generated by photovoltaic systems can be converted into AC and fed into a public Grid. As local utilities' policies on connecting renewable energy systems to the Grids vary from region to region. Always seek the advice from a qualified system designer or integrator. Building permits, inspections and approvals by the local utility are generally required.

### Grounding

- For grounding and bonding requirements, please refer to regional and national safety and electricity standards. If grounding is required, use a recommended connector type for the grounding wire.
- For grounding, this guide refers to module frame grounding. If grounding is required, make sure module frames (metal exposed to touch) are always grounded.
- System grounding is not mandatory for Suntech modules, however negative system grounding may be required by local authorities and can therefore be recommended. In practice, Suntech has observed certain installations with a positive impact on system performance due to implementation of negative system grounding.
- If grounding is required, the grounding wire must be properly fastened to the module frame to assure adequate electrical connection.
- Suntech recommends the lay-in lug (Cat. No. GBL-4DBT (Supplier: ILSCO)) when grounding. Please refer to appropriate connector specifications for instructions.
- When using the GBL-4DBT grounding lug, assemble the grounding lug to the aluminum frame using stainless steel M5 screw and hardware as shown below. The star washer is fitted directly under the grounding lug and makes electrical contact by penetrating the anodized coating of the aluminum frame; the screw assembly is further

fitted with a flat washer, then a split lock washer and finally a nut to secure the entire assembly (see the pictures below). Recommended M5 screw assembly torque is 1.5 N·m. Next, insert the ground wire (10-12AWG exposed copper wire is recommended) to the feet of the lug, and screw down the slotted screw. Be careful not to damage the wire core.



## Maintenance

To ensure optimum module performance, Suntech recommends the following maintenance measures:

- Clean the glass surface of the module when required. Always use clean water and a soft non-abrasive sponge or cloth for cleaning. A mild, non-abrasive cleaning agent may be used to remove stubborn dirt.
- Check the electrical, grounding and mechanical connections every six months to verify that they are clean, secure, undamaged and free of corrosion.
- If any problem arises, consult a professional solar service providers for suggestions.
- Caution: observe solar manufacturers' maintenance instructions for all components used in the system, such as support frames, charging regulators, inverters, batteries etc.

## A series - 1580 mm×808 mm×35 mm

Module	Optimum Operating Voltage (Vmp) at STC, (V dc)	Optimum Operating Current (Imp) at STC, (A dc)	Open Circuit Voltage (Voc) at STC, (V dc)	Short Circuit Current (Isc) at STC, (A dc)	Maximum Power (Pmax) at STC, (Watts)	Maximum System Voltage (IEC/UL)	Maximum Series Fuse Rating
STP200S-24/Ad+	36.7	5.45	45.5	5.81	200	1000/600	15
STP195S-24/Ad+	36.6	5.33	45.4	5.69	195	1000/600	15
STP190S-24/Ad+	36.6	5.20	45.2	5.62	190	1000/600	15
STP185S-24/Ad+	36.4	5.09	45.0	5.43	185	1000/600	15
STP180S-24/Ad+	36.0	5.00	44.8	5.29	180	1000/600	15
STP175S-24/Ad+	35.8	4.90	44.7	5.23	175	1000/600	15
STP190S-24/Adb+	36.6	5.20	45.2	5.62	190	1000/600	15
STP185S-24/Adb+	36.4	5.09	45.0	5.43	185	1000/600	15
STP180S-24/Adb+	36.0	5.00	44.8	5.29	180	1000/600	15
PLUTO200-Ade	36.6	5.48	45.4	5.80	200	1000/600	15
PLUTO195-Ade	36.4	5.36	45.3	5.67	195	1000/600	15
PLUTO190-Ade	36.3	5.24	45.1	5.55	190	1000/600	15

**W series - 1640 mm×992 mm×50 mm**

Module	Optimum Operating Voltage (Vmp) at STC, (V dc)	Optimum Operating Current (Imp) at STC, (A dc)	Open Circuit Voltage (Voc) at STC, (V dc)	Short Circuit Current (Isc) at STC, (A dc)	Maximum Power (Pmax) at STC, (Watts)	Maximum System Voltage (IEC/UL)	Maximum Series Fuse Rating
STP245-20/Wd	30.5	8.04	37.3	8.52	245	1000/600	20
STP240-20/Wd	30.2	7.95	37.2	8.43	240	1000/600	20
STP235-20/Wd	30.2	7.79	37.0	8.35	235	1000/600	20
STP230-20/Wd	29.8	7.72	36.8	8.25	230	1000/600	20
STP225-20/Wd	29.6	7.61	36.7	8.15	225	1000/600	20
STP220-20/Wd	29.5	7.46	36.6	8.05	220	1000/600	20
STP215-20/Wd	29.2	7.37	36.5	7.95	215	1000/600	20
STP210-20/Wd	29.0	7.25	36.4	7.86	210	1000/600	20
STP250S-20/Wd	30.7	8.15	37.4	8.63	250	1000/600	20
STP245S-20/Wd	30.5	8.04	37.3	8.52	245	1000/600	20
STP240S-20/Wd	30.2	7.95	37.2	8.43	240	1000/600	20
STP250S-20/Wdb	30.7	8.15	37.4	8.63	250	1000/600	20
STP245S-20/Wdb	30.5	8.04	37.3	8.52	245	1000/600	20
STP240S-20/Wdb	30.2	7.95	37.2	8.43	240	1000/600	20
STP235S-20/Wdb	30.2	7.79	37.0	8.35	235	1000/600	20
PLUTO250-Wdm	30.0	8.34	37.4	8.63	250	1000/600	20
PLUTO245-Wdm	29.8	8.23	37.2	8.55	245	1000/600	20
PLUTO240-Wdm	29.6	8.11	36.9	8.46	240	1000/600	20
PLUTO235-Wdm	29.4	8.00	36.4	8.42	235	1000/600	20
PLUTO230-Wdm	29.2	7.88	36.2	8.27	230	1000/600	20
PLTUO245-Wde	29.8	8.23	37.2	8.55	245	1000/600	20
PLUTO240-Wde	29.6	8.00	36.9	8.46	240	1000/600	20
PLUTO235-Wde	29.4	8.00	36.4	8.42	235	1000/600	20
PLUTO230-Wde	29.2	7.88	36.2	8.27	230	1000/600	20

**V series (Vdx) - 1956 mm×992 mm×50 mm (1930 mm×998mm×50 mm)**

Module	Optimum Operating Voltage (Vmp) at STC, (V dc)	Optimum Operating Current (Imp) at STC, (A dc)	Open Circuit Voltage (Voc) at STC, (V dc)	Short Circuit Current (Isc) at STC, (A dc)	Maximum Power (Pmax) at STC, (Watts)	Maximum System Voltage (IEC/UL)	Maximum Series Fuse Rating
Superpoly STP300-24/Vd	36.1	8.32	45.2	8.65	300	1000/600	20
Superpoly STP295-24/Vd	35.7	8.27	45.1	8.57	295	1000/600	20
Superpoly STP290-24/Vd	35.6	8.15	45.0	8.42	290	1000/600	20
Superpoly STP285-24/Vd	35.4	8.06	44.9	8.37	285	1000/600	20
Superpoly STP280-24/Vd	35.2	7.95	44.8	8.33	280	1000/600	20
STP300-24/Vd	36.1	8.32	45.2	8.65	300	1000/600	20
STP295-24/Vd	35.7	8.27	45.1	8.57	295	1000/600	20
STP290-24/Vd	35.6	8.15	45.0	8.42	290	1000/600	20
STP285-24/Vd	35.4	8.06	44.9	8.37	285	1000/600	20
STP280-24/Vd	35.2	7.95	44.8	8.33	280	1000/600	20
STP275-24/Vd	35.1	7.84	44.7	8.26	275	1000/600	20
STP270-24/Vd	35.0	7.71	44.5	8.20	270	1000/600	20
STP260-24/Vd	34.8	7.47	44.0	8.09	260	1000/600	20
STP280-24/Vdx	35.2	7.95	44.8	8.33	280	1000/600	20
STP275-24/Vdx	35.1	7.84	44.7	8.26	275	1000/600	20
STP270-24/Vdx	35.0	7.71	44.5	8.20	270	1000/600	20
STP260-24/Vdx	34.8	7.47	44.0	8.09	260	1000/600	20
PLUTO295-Vdx	36.5	8.09	45.3	8.57	295	1000/600	20
PLUTO290-Vdx	36.3	7.99	45.1	8.52	290	1000/600	20
PLUTO285-Vdx	36.1	7.90	44.9	8.46	285	1000/600	20
PLUTO280-Vdx	35.5	7.89	44.4	8.41	280	1000/600	20
PLUTO295-Vdm	36.5	8.09	45.3	8.57	295	1000/600	20
PLUTO290-Vdm	36.3	7.99	45.1	8.52	290	1000/600	20
PLUTO285-Vdm	36.1	7.90	44.9	8.46	285	1000/600	20
PLUTO280-Vdm	35.5	7.89	44.4	8.41	280	1000/600	20

## TRACKER

SINGLE-AXIS DESIGN FOLLOWS THE PATH OF THE SUN

### BENEFITS

#### Higher Energy Delivery

Delivers more energy per land area than competing systems

#### Patented Single-Axis Design

Fewer moving parts and motors means more reliability and lower operating and maintenance costs

#### No Panel Shading

Sophisticated backtracking algorithms avoid panel shading while increasing energy production

#### Efficient Use of Land

Requires ½ the land area of conventional solar tracking systems

#### Fully Scalable

Scales easily from small to large multi-megawatt installations

#### Reliable and Robust Design

Galvanized, corrosion-resistant steel frame provides superior strength



**The SunPower Tracker is today's most reliable and proven solar tracking technology.** This revolutionary product's single-axis design enables solar panels to automatically track the sun's movement throughout the day. This increases sunlight capture by up to 25% over traditional fixed-tilt systems, while significantly reducing land use requirements.



Bavaria Solar Park - 10 MW - Bavaria, Germany

### Specifications and Details

Attribute	Specification
Tracking Type	Single-Axis (with backtracking)
Tilt Angle	0 Degrees
kW per Drive Motor	Up to 250 kWp
Drive Type	Linear Actuator
Operation	Grid-Connected
Warranty	Full System Warranty with On-Site Service



### SunPower Tracker vs. Conventional Solar Tracking Systems: A 1MW System Comparison

Unlike conventional solar tracking systems that require wide array spacing, SunPower Tracker minimizes shading and thereby enables tighter spacing, requiring half the land area of conventional systems.

At low sun angles, SunPower Tracker employs its exclusive backtracking feature to prevent shading and to optimize energy production. In conventional systems, backtracking is generally much less effective and yields inconsistent results.



Parameter	SunPower T-0 Tracker	Conventional Tracker
Motors per 1MW	4	200
Land Area Required per 1MW	1.8 to 2.4 Hectares	4 to 6 Hectares
Operating Wind Resistance	Up to 145 Km/h	Up to 80 Km/h
Energy Gain vs. Fixed Tilt Systems (kWh/kW)	Up to 25% More	Up to 35% More
Self Shading on Panels	None	Partial Shading
Solar Tracking Method	GPS Controller Tracking	Active Solar Sensing

SunPower Tracker technology is protected by US Patent 6,058,930.  
International Patents 1169604 (France, Portugal, Spain and UK) and 60015950.7 (Germany).  
Other US and/or international patents issued or pending may apply.

### About SunPower

SunPower designs, manufactures and delivers high-performance solar electric technology worldwide. Our high-efficiency solar cells generate up to 50 percent more power than conventional solar cells. Our high-performance solar panels, roof tiles and trackers deliver significantly more energy than competing systems.



## MV POWER PLATFORM 1.0 / 1.25 / 1.4 / 1.5 / 1.6 MW



### Turnkey

- Modular power solution allows for rapid field deployment
- Conversion, distribution and control functions included
- Customizable service options

### Innovative

- Based on award-winning SMA Sunny Central technology
- Leading grid management functions available

### Secure

- Renowned SMA manufacturing standards ensure long term operation
- Diverse service options address project-specific needs

### Flexible

- Available as an open platform, with a canopy shade or as a full steel enclosure
- Can be installed on a concrete slab, piers or vault

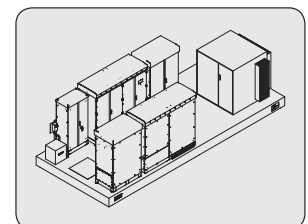
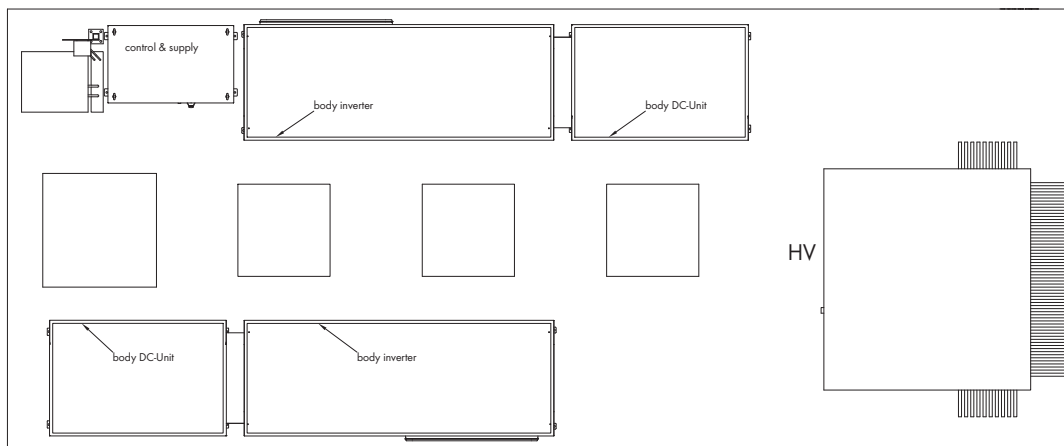
## MV POWER PLATFORM 1.0 / 1.25 / 1.4 / 1.5 / 1.6 MW

### Modular utility-scale power solution

The SMA MV Power Platform—available as an open, shaded or enclosed structure—provides the most cost-effective way to modularly install large-scale PV power converters. These 1.0–1.6 megawatt medium-voltage turnkey power solutions include two Sunny Central inverters; a medium-voltage transformer; optional DC or AC/DC disconnect cabinets; and a control and supply panel for power distribution to local loads and (optionally) field tracker motors. They also feature easy integration with installer SCADA equipment; a modular, steel base with all component interconnection cabling; and a convenient plug-and-play installation scheme. Designed for Seismic Zone D applications, all configurations can be deployed for temperatures down to -40 °C. Each configuration can also be installed on a concrete slab, vault or piers for maximum flexibility.

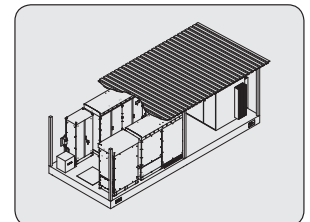
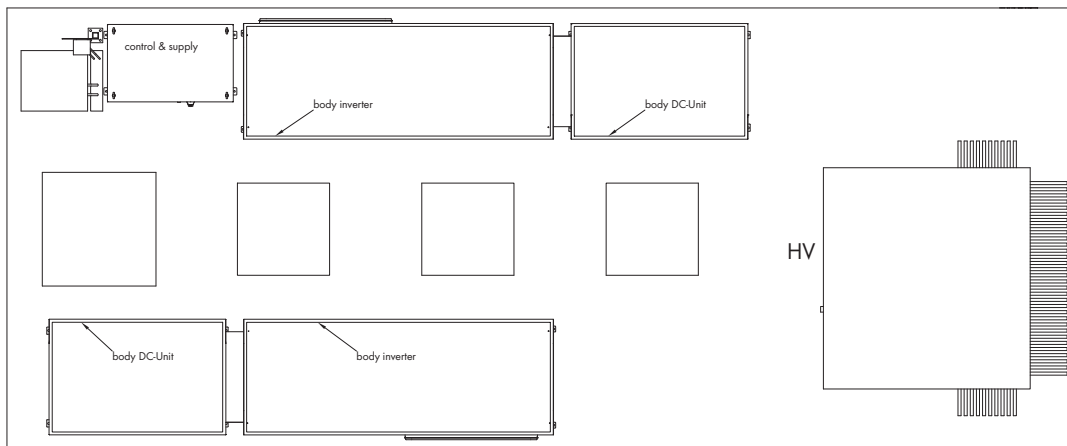
Technical data	SAMPLE CONFIGURATIONS			
	MVPP 1.0 MW		MVPP 1.5 MW	MVPP 1.6 MW
	600 V DC	1000 V DC	1000 V DC	1000 V DC
<b>Input (DC)</b>				
Max. DC power	1013 kW	1120 kW	1796 kW	1796 kW
MPP voltage range (@77°F/122°F at 60Hz)	330 V ... 600 V / 330 V ... 600 V <sup>a)</sup>	449 V ... 820 V / 436 V ... 820 V <sup>a)</sup>	609 V ... 820 V / 554 V ... 820 V <sup>a)</sup>	641 V ... 820 V / 583 V ... 820 V <sup>a)</sup>
Rated input voltage	380 V	480 V	595 V	620 V
Max. DC voltage	600 V	1000V / 1100 V <sup>b)</sup>	1000V / 1100 V <sup>b)</sup>	1000V / 1100 V <sup>b)</sup>
Max. DC input current	3200 A	2500 A	2800 A	2800 A
Number of independent MPP inputs	2	2	2	2
Number of fused DC inputs	18	18 / 64 (Optiprotect)	18 / 64 (Optiprotect)	18 / 64 (Optiprotect)
<b>Output (AC)</b>				
Nominal AC power	1000 kVA @113 °F	1000 kVA @122 °F	1500 kVA @122 °F	1600 kVA @122 °F
Maximum AC power	1000 kVA @113 °F	1100 kVA @77 °F	1650 kVA @77 °F	1760 kVA @77 °F
Nominal AC voltage options	12.47 kV; 13.8 kV; 20.6 kV; 24.9 kV; 27.6 kV; 34.5 kV	12.47 kV; 13.8 kV; 20.6 kV; 24.9 kV; 27.6 kV; 34.5 kV	12.47 kV; 13.8 kV; 20.6 kV; 24.9 kV; 27.6 kV; 34.5 kV	12.47 kV; 13.8 kV; 20.6 kV; 24.9 kV; 27.6 kV; 34.5 kV
Total Harmonic Distortion of grid current	< 3 % @ nominal power	< 3 % @ nominal power	< 3 % @ nominal power	< 3 % @ nominal power
Grid frequency	60 Hz	50 Hz / 60 Hz	50 Hz / 60 Hz	50 Hz / 60 Hz
Power factor (adjustable)	0.90 <sub>lead</sub> - 0.90 <sub>lag</sub>	0.90 <sub>lead</sub> - 0.90 <sub>lag</sub>	0.90 <sub>lead</sub> - 0.90 <sub>lag</sub>	0.90 <sub>lead</sub> - 0.90 <sub>lag</sub>
Transformer vector group	Dy1y1	Dy1y1	Dy1y1	Dy1y1
Transformer no load taps	±2.5 % & ±5.0 %	±2.5 % & ±5.0 %	±2.5 % & ±5.0 %	-5.0 %; -2.5 %; +3.5 %; +7.0 %; +10.5 %; +14.0 % <sup>c)</sup>
Transformer cooling type	KNAN	KNAN	KNAN	KNAN
<b>Power consumption</b>				
Internal consumption in operation (inverter + MV-transformer)	< 3400 VA + < 12 kVA	< 3000 VA + < 12 kVA	< 3000 VA + < 19.2 kVA	< 3000 VA + < 19.2 kVA
Standby consumption (inverter + MV-transformer)	< 220 VA + < 1500 VA	< 200 VA + < 1500VA	< 200 VA + < 2200 VA	< 200 VA + < 2200 VA
Supply via	○ / ○ / ●	○ / ○ / ●	○ / ○ / ●	○ / ○ / ●
internal PV power /external power supply / green power				
External auxiliary supply voltage	208 V; 480 V; 600 V	208 V; 480 V; 600 V	208 V; 480 V; 600 V	208 V; 480 V; 600 V
<b>Efficiency</b>				
Max. efficiency / European efficiency / CEC efficiency inverter	98.60% / 97.90% / 98.00%	98.60% / 98.40% / 98.50%	98.60% / 98.40% / 98.50%	98.60% / 98.40% / 98.50%
Max. efficiency / European efficiency / CEC efficiency transformer	TBD / TBD / TBD	TBD / TBD / TBD	TBD / TBD / TBD	TBD / TBD / TBD

## OPEN CONFIGURATION



Technical data	SAMPLE CONFIGURATIONS			
	MVPP 1.0 MW		MVPP 1.5 MW	MVPP 1.6 MW
	600 V DC	1000 V DC	1000 V DC	1000 V DC
<b>Protection rating and ambient conditions</b>				
Protection rating	NEMA 3R	NEMA 3R	NEMA 3R	NEMA 3R
Operation temperature range @ nominal power	-13 °F ... +113 °F	-4°F ... +122°F	-4°F ... +122°F	-4°F ... +122°F
Storage temperature standard / low temperature option	-13°F ... +140°F / -40°F ... +140°F	-4°F ... +140°F / -40°F ... +140°F	-4°F ... +140°F / -40°F ... +140°F	-4°F ... +140°F / -40°F ... +140°F
Relative humidity	15 % ... 95 %	15 % ... 95 %	15 % ... 95 %	15 % ... 95 %
Snow load (psf)	>40	>40	>40	>40
Wind load (mph)	>110	>110	>110	>110
Fresh air consumption (CFM)	3531.6	3531.6	3531.6	3531.6
Max. altitude above sea level (m)	2000	2000	2000	2000
Design lifetime (years)	>20	>20	>20	>20
<b>Compliance and certificates</b>				
Seismic rating according UBC sec. 1632 and IBC sec. 1613 <sup>d)</sup>	Site class D, Ss =2.0g, S1=1.0g	Site class D, Ss =2.0g, S1=1.0g	Site class D, Ss =2.0g, S1=1.0g	Site class D, Ss =2.0g, S1=1.0g
NEC 2011 / OSHA 1910	● / ●	● / ●	● / ●	● / ●
PE certificate on mechanical, electrical, seismic for California / other state	● / ○	● / ○	● / ○	● / ○
<b>Features</b>				
Disconnect Unit	○	○	○	○
AC circuit breakers located in inverter / Disconnect Unit	● / ○	● / ○	● / ○	● / ○
Project specific power supply for tracker motors etc.	○	○	○	○
Auxiliary power fusible disconnect switch / overvoltage protection	● / ○	● / ○	● / ○	● / ○
Customer SCADA system compartment <sup>e)</sup>	34" x 30" x 12", Supply: 120V/60Hz/max 250W	34" x 30" x 12", Supply: 120V/60Hz/max 250W	34" x 30" x 12", Supply: 120V/60Hz/max 250W	34" x 30" x 12", Supply: 120V/60Hz/max 250W
On platform	2x 120V/ max. 250W each	2x 120V/ max. 250W each	2x 120V/ max. 250W each	2x 120V/ max. 250W each
Transformer alarm contacts: Thermo / Pressure / Fluid level	● / ○ / ○	● / ○ / ○	● / ○ / ○	● / ○ / ○
Transformer oil containment	○	○	○	○
Delivery FCA/on site	● / ○	● / ○	● / ○	● / ○

## CANOPY CONFIGURATION

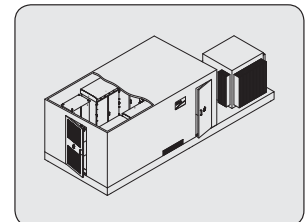
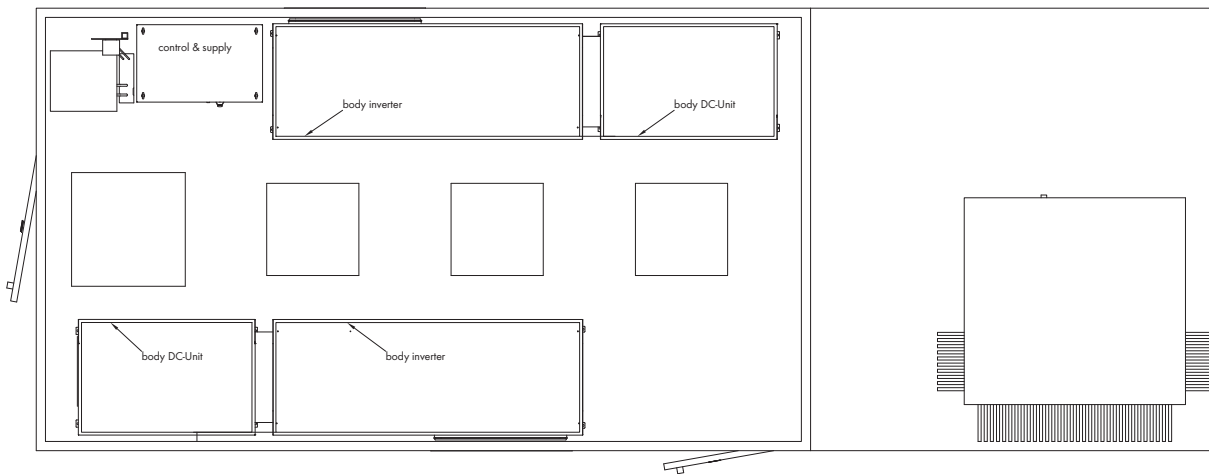




Technical data	SAMPLE CONFIGURATIONS			
	MVPP 1.0 MW		MVPP 1.5 MW	MVPP 1.6 MW
	600 V DC	1000 V DC	1000 V DC	1000 V DC
<b>Platform design</b>				
Open including Disconnect Units				
Width / Height / Depth	29' / 8'9" / 12'	29' / 8'9" / 12'	29' / 8'9" / 12'	29' / 8'9" / 12'
Weight (lb)	<39,000	<39,000	<39,000	<39,000
Open excluding Disconnect Units				
Width / Height / Depth	24' / 8'9" / 12'	24' / 8'9" / 12'	24' / 8'9" / 12'	24' / 8'9" / 12'
Weight (lb)	<34,000	<34,000	<34,000	<34,000
Canopy including Disconnect Units				
Width / Height / Depth (roof)	31' / 10'6" / 14'	31' / 10'6" / 14'	31' / 10'6" / 14'	31' / 10'6" / 14'
Weight (lb)	<42,000	<42,000	<42,000	<42,000
Canopy excluding Disconnect Units				
Width / Height / Depth (roof)	26' / 10'6" / 14'	26' / 10'6" / 14'	26' / 10'6" / 14'	26' / 10'6" / 14'
Weight (lb)	<37,000	<37,000	<37,000	<37,000
Enclosure including Disconnect Units				
Width / Height / Depth	32' / 10'6" / 12'	32' / 10'6" / 12'	32' / 10'6" / 12'	32' / 10'6" / 12'
Weight (lb)	<48,000	<48,000	<48,000	<48,000
Enclosure excluding Disconnect Units				
Width / Height / Depth	27' / 10'6" / 12'	27' / 10'6" / 12'	27' / 10'6" / 12'	27' / 10'6" / 12'
Weight (lb)	<43,000	<43,000	<43,000	<43,000
● Standard features   ○ Optional features   – Not available				
Type designation	MV-1000HE-US	MV-1000CP-10	MV-1500CP-10	MV-1600CP-10

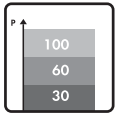
- a) @ 1.05  $U_{ACnom}$  and  $\cos \varphi = 1$
- b) Standard: 1000 V DC, optional 1100 V DC with a start-up < 1000 V DC
- c) Reduction from 1600 kVA to 1400 kVA in 40 kVA steps possible to balance module degradation
- d) Pier height 3 ft max., mounting via wedge anchors included in delivery
- e) Suitable to -13 °F ... +140 °F, has to include buffer module

## ENCLOSED CONFIGURATION



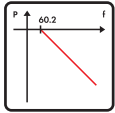
# SMART GRID MANAGEMENT INCLUDED

SMA inverters in the MV Power Platform can fulfill the following grid management specifications with:



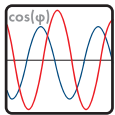
## Power limitation peak shaving / grid safety management

In order to avoid short-term grid overload, the grid operator presets a nominal active power value which the inverter will implement within 60 seconds. The nominal value is transmitted to the inverters via a ripple control receiver in combination with the SMA Power Reducer Box. Typical limit values are 100, 60, 30, or 0 percent of the nominal power.



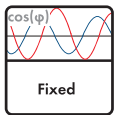
## Frequency-dependent control of active power

Starting at a defined grid frequency, the inverter will automatically reduce the fed-in active power along a preset characteristic curve, which stabilizes grid frequency.



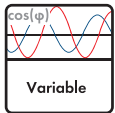
## Grid support through reactive power

In order to keep the grid voltage constant, SMA inverters supply leading or lagging reactive power to the grid. For this, there are three options:



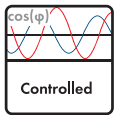
### a) Fixed presetting of the reactive power by the grid operator

The grid operator presets a fixed reactive power value or a fixed phase shift between  $\cos(\varphi)$   $_{\text{leading}} = 0.9$  and  $\cos(\varphi)_{\text{lagging}} = 0.9$ .



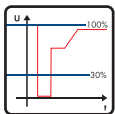
### b) Dynamic presetting of the reactive power by the grid operator

The grid operator presets a dynamic phase shift - any value between  $\cos(\varphi)_{\text{leading}} = 0.9$  and  $\cos(\varphi)_{\text{lagging}} = 0.9$ . It is transmitted either through a communication unit or via a standardized current signal ( $I = 4 \dots 20$  mA) in accordance with IEC.



### c) Control of the reactive power through a characteristic curve

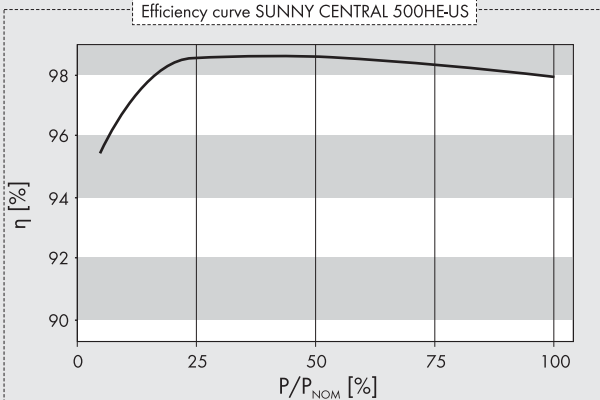
Either the reactive power or the phase shift is controlled by a pre-defined characteristic curve - depending on the fed-in active power or grid voltage.



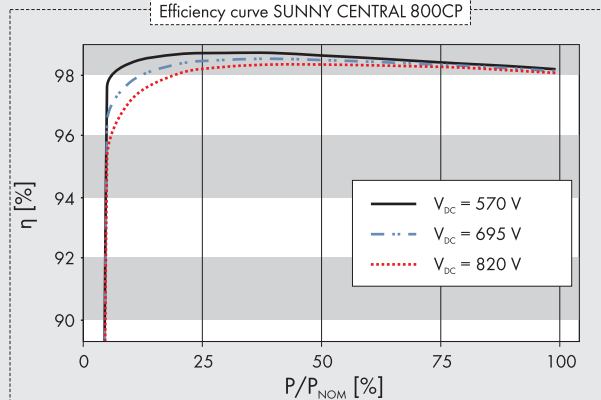
## LVRT (Low Voltage Ride-Through) 1000V ONLY

Until now, PV systems have had to disconnect from the grid immediately even during short grid voltage losses. Using the monitored dynamic grid support, SMA inverters can feed in immediately after short-term voltage losses—as long as the nominal voltage exceeds fixed values.

Efficiency curve SUNNY CENTRAL 500HE-US



Efficiency curve SUNNY CENTRAL 800CP



# SERVICE FOR POWER PLANT SOLUTIONS

With a PV plant's expected service life exceeding 20 years, careful consideration must be given to not just the technologies used but also the reliability and durability of a system's components. Likewise, a comprehensive plan must be in place for the maintenance and operation of the plant. SMA Service for PV power plants addresses these needs and ensures optimum inverter availability—providing integrators, investors and utilities with the greatest security possible.

SMA also understands that every PV power plant is different and requirements vary. That's why we developed a modular service approach specifically designed for large power plants. This allows our customers to define individual service packages that best meet their needs. Approaching 100 service locations worldwide, SMA Service guarantees outstanding local customer support through a variety of customizable packages.



## Maintenance

To optimize system performance, SMA performs controls, cleaning and parts replacement at regular intervals. This preventative maintenance is important for long term operation.



## Spare parts warranty

Whether electronic or mechanical, we guarantee the availability of all components over the duration of the complete system life cycle. Our customers can be confident that even as technologies evolve, SMA's support will be constant. This guarantee also provides additional cost security for the operational life of the inverter solution.



## Diagnostics and repair

Beginning with remote service, which often eliminates on-site assistance, to First Level, (diagnostics and small repairs), or Second Level Support, (comprehensive repairs), SMA offers the proper service plan for our customers' needs. Customers can optionally administer First Level Support themselves. With local staff to assist, SMA Service quickly provides the appropriate response to any situation.



## Inverter availability

SMA inverters lead the industry. Our customers know our world-class manufacturing and high-quality components result in a superior solution. To fully protect investment security, SMA offers two inverter uptime guarantees: 98 or 99 percent. With these guarantees, we will reimburse the customer for the difference between the actual and agreed-upon inverter uptime. With warranty periods up to 25 years in length, SMA can also guarantee our solution's performance for the life of the PV plant.

## Need more information?

Call SMA Power Plant Solutions at +1 888 476 2872 to hear more.