



CONERGY

Conergy ON Series

Installation manual



1 Introduction

1.1 Short description

Conergy ON modules are solar modules for installation in photovoltaic systems.

1.2 About this manual

1.2.1 Subject of this manual

The subject of this manual is the installation and electrical connection of the Conergy ON module in a photovoltaic system. This manual applies to the following modules:

| Conergy ON XXXP-60, where XXX = 220-240

1.2.2 User group

The manual is intended to be used by the system owner and by qualified persons possessing technical skills and basic electrical, electronic and mechanical knowledge related to photovoltaic systems. Please retain this manual for future reference.

1.2.3 Symbols



Start of a step-by-step procedure with description of the goal of the procedure. Individually numbered steps follow, which may be interrupted by background information, illustrations, or warnings.



Background and additional information or the status of a procedure. Appears between the steps of a procedure, within the sequence/ course of a procedure.



CAUTION

Denotes a hazardous situation. Disregard of this instruction may lead to slight or moderate injury.



DANGER

Denotes an extraordinarily hazardous situation. Disregard of this instruction may lead to serious, irreversible injury or death.

1.3 Standards and technical directives

Conergy ON modules comply with the following standards:

| UL 1703 (Canada and USA)

1.4 Intended use

Conergy ON modules are designed for use in photovoltaic systems. Any other use is deemed to be not as intended. Intended use also includes compliance with the specifications stated in this installation manual. Conergy shall not be held liable for damages arising from a failure to observe and follow the installation manual, particularly the safety instructions, or from any improper use of the product.

2 Safety

2.1 Responsibilities of the owner/operator

Installing solar photovoltaic systems may require specialized skills and knowledge. The system operator has safety-related responsibilities, and must ensure that:

- | locally applicable standards and directives are complied with;
- | the installation is performed by qualified persons;
- | those commissioned to perform the work can evaluate their assigned tasks and recognize possible risks;
- | those commissioned to perform the work are familiar with the system components;
- | the installation manual is available during the installation;
- | the installation manual is an integral part of the product;
- | the installation manual, and in particular the safety instructions, have been read and understood by the relevant personnel before installation;
- | suitable lifting gear and tools are used for the installation;
- | if replacements are required, only Conergy components are used and repairs are carried out only by qualified persons, otherwise the warranty will expire;
- | only components (cable, plugs, mounting parts, etc.) that are suitable for use in photovoltaic systems are used;
- | the module is not installed near highly flammable gases or vapors;
- | sunlight is not artificially concentrated on the solar module;
- | no paint, coatings or stickers are applied to the module;
- | the module is not dismantled and none of the parts provided on delivery are removed.

2.2 Basic safety instructions

The following safety instructions and warnings form an essential part of this manual and are of fundamental importance when handling this product.

- | Solar modules produce electrical energy when exposed to light. Even a single module produces enough voltage and current to cause shocks and burns if safety precautions are not followed. The shock hazard increases as modules are connected in series (producing higher voltages), and in parallel (producing higher current).
- | Make allowance for the loads that the Conergy ON modules may generate for the entire structure.
- | In order to prevent damage (e.g. breakage of glass), never leave Conergy ON modules unsecured.
- | Check Conergy ON modules for mechanical integrity before installation. Use only undamaged modules.
- | Use only mounting systems that can withstand the expected loads for snow, wind, etc.
- | Make sure that no other system components will impair the mechanical or electrical function of the Conergy ON modules.
- | Do not drill holes in the module frame or in the glass surface and do not carry out any welding work on or near the Conergy ON modules.

- | Comply with the applicable occupational health and safety regulations.
- | Wear suitable clothing and gloves and remove metallic jewelry to prevent accidental contact with energized components.
- | The presence of a second party who can provide help in the event of an accident is recommended during the entire installation process.
- | Ensure a copy of this installation manual is provided to the system owner.

3 Installation

3.1 General installation instructions

- | Make sure that all locally applicable standards, construction regulations and accident prevention regulations are complied with.
- | The module must be installed in accordance with Canadian Electrical Code Part I (CEC) in Canada and in accordance with National Electrical Code (NEC) in the US.
- | We recommend the Conergy SunTop mounting system for installations on sloping roofs.
- | Select an installation location with the maximum sunlight at all times of the year. Avoid shaded areas.

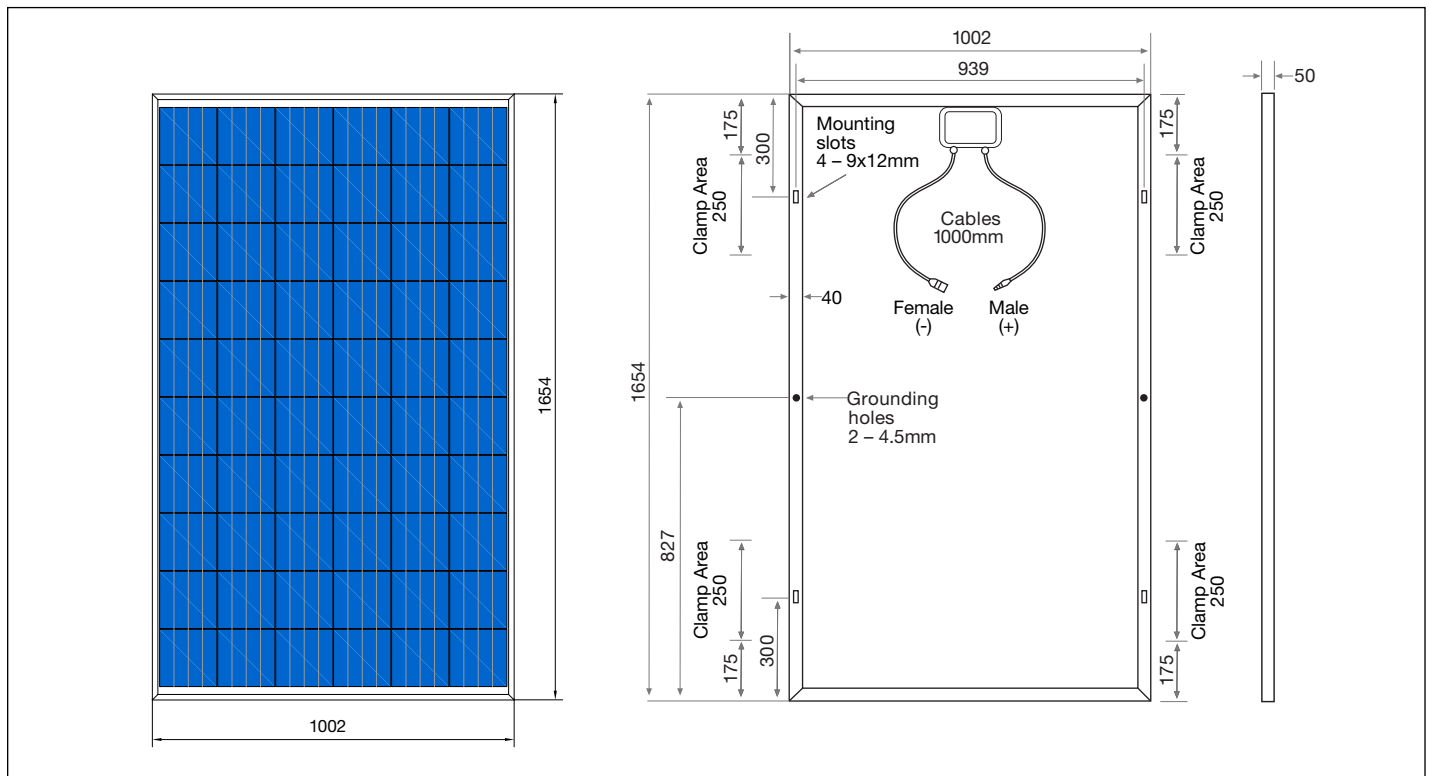


Fig. 3-1: Dimensions [mm]

| In northern latitudes, orient the photovoltaic modules to the south. Determine the ideal setting angle according to the latitude of the installation location. Request this information from your dealer or find it in the official tables.

| You can find further installation instructions in the installation manual for the relevant mounting system.

| The photovoltaic modules may be bolted or clamped in place depending on the design of the mounting system and may be mounted in either portrait or landscape orientation. The mounting structure must be made from material that is resistant to corrosion and atmospheric conditions and able to withstand the loads required.

3.2 Securing the photovoltaic modules to the frame



Prevent damage to the photovoltaic modules due to incorrect installation.

CAUTION

- | Work only in dry conditions.
- | Secure the modules against slipping and falling.
- | Do not drop the modules.
- | Do not hold the module by its socket or connection cables.
- | Always carry modules by lifting at two opposite points on the frame.
- | Never carry modules by just one part of the frame.
- | Do not drop any objects on the module and do not step on it.
- | Do not drill the module frame.

3.2.1 Bolting the photovoltaic module in place

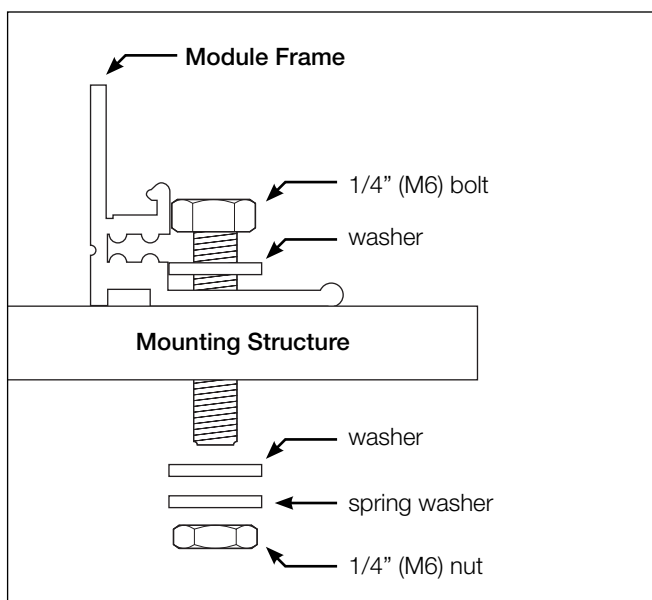


Fig. 3-2: Securing the module with bolts



1. Place the module on the frame.
2. Insert four stainless-steel bolts (M6 or 1/4") through mounting slots in the frame.
3. Secure each bolt to the frame with 2 stainless-steel washers, a stainless-steel spring washer or toothed lock washer and a stainless steel nut (M6 or 1/4") (recommended tightening torque: 8 Nm or 70 inch pounds).

3.2.2 Clamping the photovoltaic module in place



The module may be clamped only in the permitted clamping areas on the long side of the frame (+/- 125 mm or 5" from the mounting holes).

The module clamps **1** must not overlap the glass or shade the module surface **2** and must be a minimum of 38 mm or 1-1/2" wide (contact surface on the frame in a longitudinal direction). Clamps must also overlap the frame by at least 6 mm or 1/4".

Regardless of which mounting method is used, a minimum gap between modules of 7 mm or 1/4" is required for thermal expansion allowance. On roof-mounted systems, a minimum gap of 25 mm or 1" is required between modules and the roof for ventilation. The assembly is to be mounted over a fire resistant roof covering rated for the application.

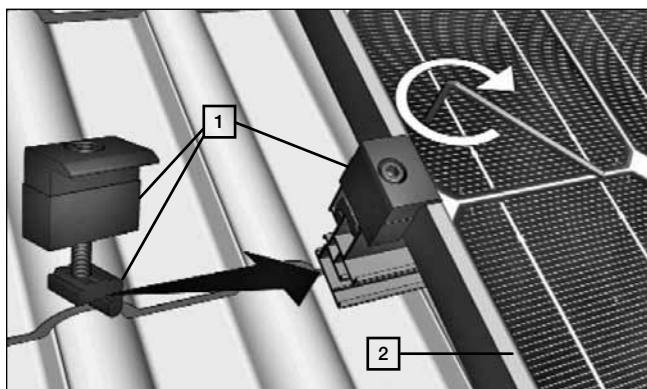


Fig. 3-3: Securing the module with clamps



1. Place the module on the mounting rail.
2. Clamp the module in place with the module clamp **1** (recommended tightening torque: 8 Nm or 70 inch pounds).

3.3 Electrical installation

3.3.1 Electrical values

All relevant electrical values are specified on the label on the back side of the module. Please find an overview of the technical data in section 7 of this manual.

| Under normal conditions, a photovoltaic module is likely to experience conditions that produce more current and/or voltage than reported at standard test conditions. Therefore, the values of I_{sc} and V_{oc} should be multiplied by a factor of 1.25 when determining component voltage ratings, conductor ampacities, fuse sizes and ratings of components connected to the module output.

| Refer to the applicable section of the Canadian Electrical Code (CEC) or to Section 690-8 of the National Electrical Code (NEC) for any additional multiplying factors greater than 1.25 which may apply.

3.3.2 General safety instructions

| Carry out the cabling in accordance with applicable regulations, codes and standards.

| Make sure that the cables and connections are not damaged. Protect the cables from damage.



DANGER

Risk of electric shock. Risk of fire and injury from electric arc.

- | Do not disconnect connections under load.
- | Make sure there is adequate protection against contact with live conductors.
- | Use only insulated tools.

3.3.3 Parallel and series connection

| Modules of the same type can be connected in parallel or in series. Modules or series strings of modules connected in parallel may require overcurrent protection in each series string.



CAUTION

Material damage due to connection errors.

- | Use only modules of the same type and output for series connection.
- | Make sure that the number of modules and their connections correspond with the electrical values specified by the devices connected to the photovoltaic system.
- | Use only 90°C wet-rated, sunlight resistant, stranded or solid conductor cables for all module and interconnect wiring that may be exposed to weather.
- | Make sure that the polarity is correct.

3.3.4 Connecting the photovoltaic module in series

On the rear of the photovoltaic module, there is a connection box [3] with connection cables [4], plugs [5] and sockets [6].

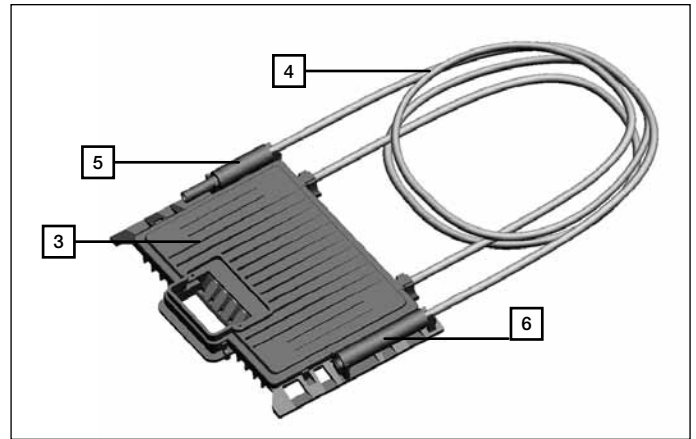


Fig. 3-4: Connection kit on the rear of the module



1. Take the plug [5] and socket [6] of the module out of the retaining clip.
2. Connect the plug of one module with the socket on the next module.
3. Connect the plug and socket of the first and last modules within a module series string to the conductor cables leading to the inverter. An adapter kit for solar connectors with a 4 mm² cross section is available as an option.







3.3.5 GROUNDING

Several different methods of grounding can be used to provide the required connection through the frame anodization. Before installation contact the local code Authority Having Jurisdiction (AHJ) to determine the proper grounding requirements. Attach all module frames to an earth ground in accordance with applicable articles of the Canadian Electrical Code or the National Electrical Code (NEC), 250 and 690.

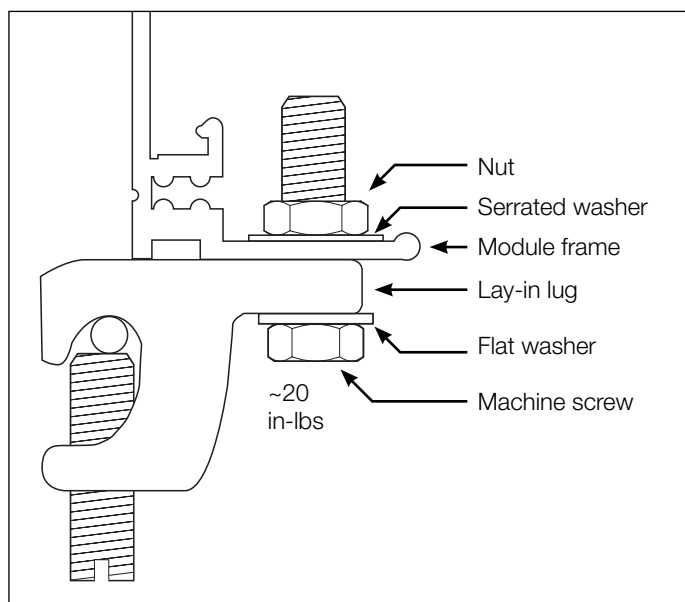
| For listed devices, follow the instructions of the Grounding and Bonding Equipment manufacturer's installation instructions.

| If the frame mounting holes are not used to secure the module, they can be used for grounding.

When using ground wire, select ground wire of copper, copper alloy or other suitable material no smaller than 14 AWG (2.1 mm), sized accordingly for the photovoltaic system per NEC, and sized compatibly with the Grounding and Bonding Equipment manufacturer's installation instructions.

Component	Example for manufacturer	Example for manufacturer part number	Example for picture
Lay-in lug	IlSCO	GBL-4DBT	
Machine screw	Fastenal	0170682	
Nut	McMaster	91841A007	
Flat washer	McMaster	92141A007	
Thread-cutting screw	Fastenal	0176067	
Serrated washer	McMaster	91120A140	

3.3.5.1 Grounding lug with machine screw at frame hole



1. Select a grounding lug listed for direct burial and outdoor use (tin-plated, solid copper lay-in lug with a stainless-steel set screw) capable of accepting a 4-14 AWG copper conductor.
2. Secure the lug to any module frame hole with a stainless steel machine screw (minimum #8), flat washer, serrated washer and locknut, as shown in Fig. 3-5.
3. Tighten the nut to approximately 2.26 N-m (20 in-lbs).
4. Tighten the lug set screw to the copper wire at the torque specified by lug manufacturer.

Fig. 3-5: Grounding lug with machine screw

3.3.5.2 Grounding lug with thread-cutting screw at grounding hole

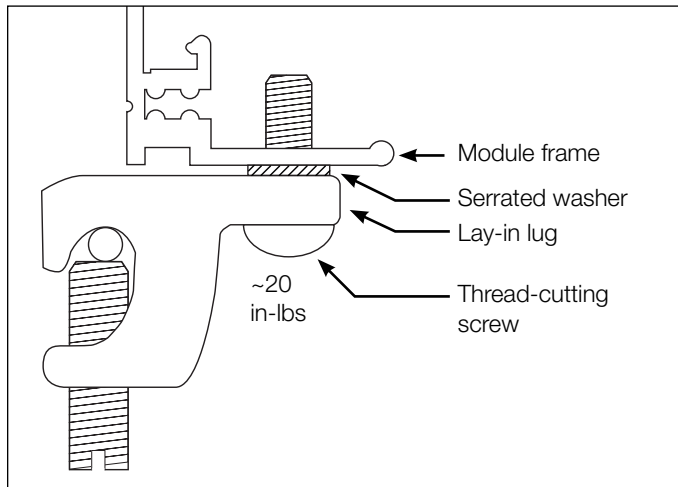


Fig. 3-6: Grounding lug with thread-cutting screw



1. Select a grounding lug listed for direct burial and outdoor use (tin-plated, solid copper lay-in lug with a stainless-steel set screw) capable of accepting a 4-14 AWG copper conductor.
2. Secure the lug to the grounding hole with a stainless steel thread-forming screw of at least 32 threads per inch and serrated washer, as shown in Fig. 3-6.
3. Tighten the screw until serrated washer has penetrated frame anodization, approximately 2.26 N-m (20 in-lbs).
4. Tighten the lug set screw to the copper wire at the torque specified by lug manufacturer.

3.3.5.3 Grounding wire bolt at grounding hole (e.g. Tyco Electronics Solar Grounding Connector 2058729-1)

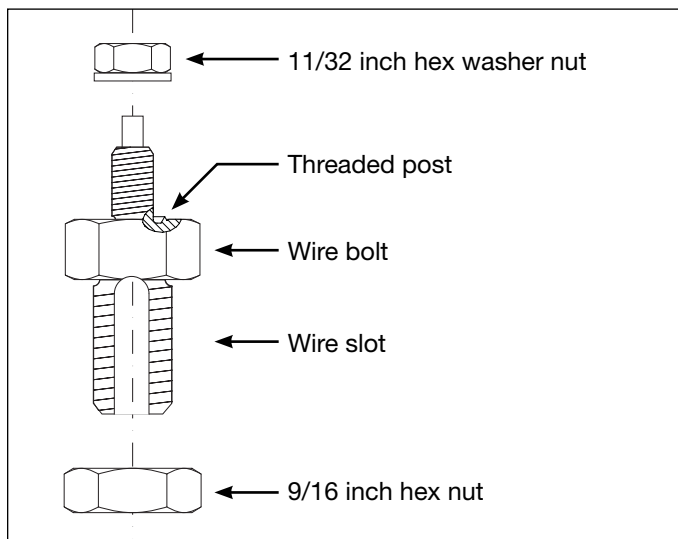


Fig. 3-7: Grounding wire bolt at grounding hole



The grounding assembly accepts solid uninsulated copper wire sizes 6 or 8 AWG.

1. Insert the thread post end of the wire bolt into the hole.
2. Thread the hex washer nut onto the threaded post end of the wire bolt. Finger tighten.
3. Position the wire into the wire slot.
4. Thread the hex nut onto the wire slot end of the wire bolt. Finger-tighten until the wire is compressed.
5. Using a 9/16-inch open end wrench, hold the hex body of the wire bolt, and using an 1 1/32-inch socket wrench, tighten the hex washer nut to a torque of 2.82 N-m (25 in-lbs).
6. Continue holding the hex body, and using a 9/16-inch socket wrench, tighten the hex nut to a torque of 5.08 N-m (45 in-lbs).

4 Maintenance and care

Conergy ON modules are low-maintenance. However, Conergy recommends that you carry out a visual inspection and a check of the mechanical and electrical connections for damage once a year. Dirt on the modules reduces the output and the yield. If the photovoltaic modules are installed with an inclination angle of more than 15°, they will generally be adequately cleaned by rain.



CAUTION

Prevent damage to the module surface by scratching or extreme differences in temperature.

- | Use only pH neutral liquid cleaners, even if there is excessive dirt build-up.
- | Do not use abrasive cleaning agents.
- | Ensure cleaning solutions are at roughly the same temperature as the module surface.
- | Wipe the module surface with water and a soft cloth.

5 Removal



Risk of electric shock.

| Do not touch any bare electrical connection parts.

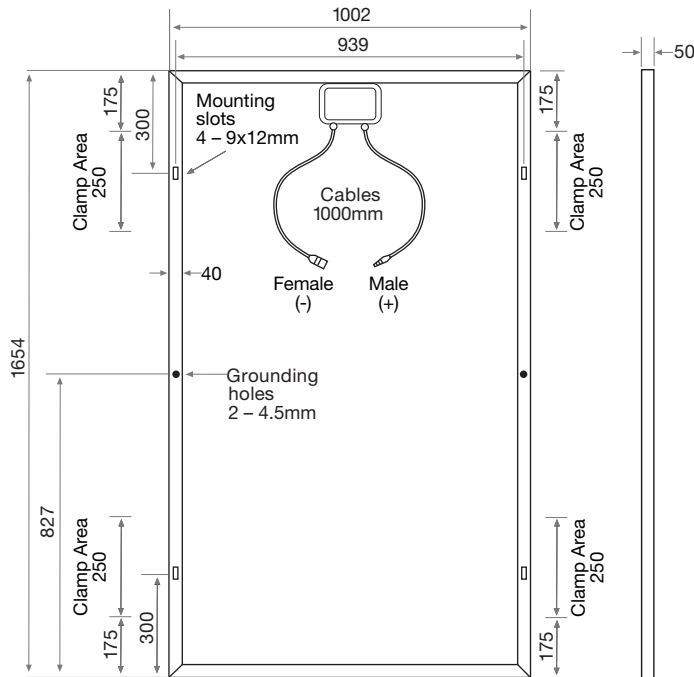
| Use only insulated tools.

1. Disconnect the inverter from the utility power on the AC side so that the photovoltaic system has no load.
2. Disconnect the photovoltaic system from the inverter at the cut-off point on the DC side.
3. Make sure that the system is not supplied with voltage.
4. Remove the photovoltaic system in the same way as it was installed; observe the safety instructions.

6 Disposal

Please ask your installer, dealer or Conergy, Inc. about disposal.

7 Technical Data

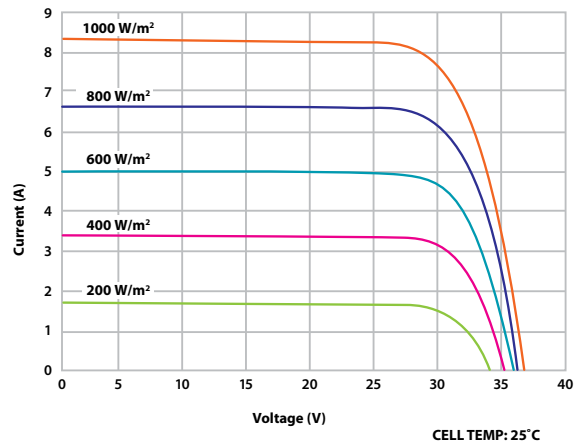


Module dimensions	1654x1002x50mm
Cell dimensions	156mmx156mm
Number of cells	60
Module weight	21kg
Static load	5400Pa
Dynamic load	2400Pa
Glass	3.2mm tempered
Junction box	Huber+Suhner
Cable	Radox PV Wire, 4mm ²
Connector	MC4
Certifications	
Operating certifications	UL 1703
Fire safety classification	Class C
Warranty	
Material and workmanship warranty	5 years
Power warranty 1	90%/10 years
Power warranty 2	80%/25 years



	Conergy ON Series				
	220P-60	225P-60	230P-60	235P-60	240P-60
Rated power (P_{max})¹	220W	225W	230W	235W	240W
Power tolerance	±3% W _p				
Module efficiency	13.3%	13.6%	13.9%	14.2%	14.5%
Maximum power voltage (V_{mpp})	29.8V	29.9V	30.0V	30.1V	30.2V
Maximum power current (I_{mpp})	7.40A	7.53A	7.67A	7.81A	7.95A
Open circuit voltage (V_{oc})	36.5V	36.7V	36.8V	36.8V	37.0V
Short circuit current (I_{sc})	8.12A	8.18A	8.34A	8.44A	8.54A
Nominal Operating Cell Temperature (NOCT)	45°C				
Temperature coefficient (P_{max})	-0.46% /°C				
Temperature coefficient (V_{oc})	-0.34% /°C				
Temperature coefficient (I_{sc})	+0.06% /°C				
Maximum series fuse rating	15A				

¹ At Standard Test Conditions (STC): 1000W/m², 25°C, air mass 1.5



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