



Installation Guide

Smart Modules Installation Guide

Version 1.1

Disclaimers

Important Notice

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The general terms and conditions of delivery of SolarEdge shall apply.

The content of these documents is continually reviewed and amended, where necessary. However, discrepancies cannot be excluded. No guarantee is made for the completeness of these documents.

Please note: This product is intended to provide remote shutdown of the SolarEdge PV harvesting system, to enable safer access to a building in the event of fire. This product DOES NOT reduce the risk of fire or protect firefighters or others accessing a building in the event of a fire.

If the RS485 communication between the firefighter gateway and the SolarEdge inverter(s) is disconnected for any reason (including fire), the firefighter gateway LCD will display "No Communication" or "Partial Com.". In this case, the firefighter gateway cannot be relied upon to disconnect the SolarEdge PV harvesting system.

The images contained in this document are for illustrative purposes only and may vary depending on product models.

Emission Compliance

This equipment has been tested and found to comply with the limits applied by the local regulations.

These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no

guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, you are encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Changes or modifications not expressly approved by the party responsible for compliance may void the user's authority to operate the equipment.

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Version History

- Version 1.1 - (September 2019)
 - Added Appendix A - Module Mechanical and Electrical Rating is STC
 - Modified Technical Specifications for Europe
- Version 1.0 - (November 2018) initial release

Important Safety Instructions

SAVE THESE INSTRUCTIONS

General Safety

NOTE

- Consult and follow local codes and other applicable laws concerning required permitting as well as installation & inspection requirements, rules, and regulations.
- Modules and PV systems should be installed by authorized and qualified personnel.
- Follow all safety precautions of all components used in the system.
- Long periods of shading on the modules surface from the sun can result in cell power dissipation and overheating.
- Do not clean the glass surface with chemicals.
- Do not drop the PV module or drop objects onto the module.
- Do not attempt to disassemble the modules, and do not remove any attached components from the modules.
- Do not scratch or otherwise harm the back sheet ,the glass or the junction box. Do not pull or twist the cables or touch them with bare hands.
- Do not drill holes in the frame or scratch the insulating coating of the frame.
- Keep the module packed in the package until installation.
- Do not use modules near equipment or in places where gases, liquids or other flammable materials may be generated.
- External or otherwise artificially concentrated sunlight shall not be directed onto the front or back face of the module.



Installation Safety

NOTE

- Wear protective head gear, insulating gloves, safety shoes, and insulated tools when installing the modules.
- Do not install the modules in rain, snow, or otherwise wet or windy conditions.
- Modules may be covered with an opaque material during module installation and wiring to reduce risk of charge buildup and electrical shocks or burns.
- When mating connectors, make sure they are firmly connected.
- Due to the risk of electrical shock, do not perform any work if the junction box is wet.
- Do not touch the junction box and the end of output connectors with bare hands.
- Do not unplug the connectors under load.
- It is recommended not to work alone.
- Wear a safety belt if working far above the ground.
- Do not wear metallic jewelry, which can cause electric shock, while installing or troubleshooting the PV system.
- Follow the safety regulations for any and all other system components, including wires, connectors, charging regulators, batteries, inverters, etc.
- The cables must be protected from direct sunlight and away from areas of water collection.
- Do not damage the surrounding modules or mounting structure when replacing a module.
- Do not change any module components (diode, junction box, plug connectors, etc.).



NOTE

- A module's maximum reverse current is 15A. Using a blocking diode and maximum series overcurrent protective device in the combiner box are recommended for reverse current protection when more than four strings are connected in parallel. When used with a SolarEdge optimizer, it's not needed because the optimizer has reverse current protection.
- When installing the modules on a roof, it is recommended to install over a fireproof and insulating roof covering.
- Do not touch terminals, connectors and modules while the system is on.
- Do not stand, walk, drop or put objects on the module.
- Damaged modules (broken glass, torn back sheet, broken junction box, broken connectors, etc.) can be electrical hazards as well as laceration hazards. Contact with damaged module surfaces or module frame can cause electric shock. In such cases, remove the damaged module from array and contact the supplier for disposal instructions.
- Do not block draining holes. When working above ground level, wear a safety belt.
- Avoid use of sharp objects and tools that might damage the module.



Chapter 1: Introduction

This document provides detailed instructions and safety information regarding the installation, electrical connection and maintenance of SolarEdge smart modules.

All instructions and mechanical and electrical requirements should be read and understood before attempting installation.

The installer should conform to all safety precautions in this guide when installing the module.

Limitation of Liability

Because the use of this manual and the conditions or methods of installation, operation, use and maintenance of photovoltaic (PV) products are beyond SolarEdge control, SolarEdge does not accept responsibility and expressly disclaims liability for loss, damage, or expense arising out of or in any way connected with such installation, operation, use or maintenance. SolarEdge reserves the right to change the manual without prior notice.

Modules rated for use in this application class may be used in systems operating at greater than 50V DC or 240W, where general contact access is anticipated. Modules qualified for safety through IEC 61730-1 and this part of IEC 61730 within this application class are considered to meet the requirements for safety class II.

Where common grounding hardware (nuts, bolts, star washers, split-ring lock washers, flat washers, etc.) is used to attach a listed grounding/bonding device, the attachment must be made in conformance with the grounding device manufacturer's instructions.

Chapter 2: Mechanical Installation

Installation Considerations and Environmental Conditions

Install smart modules at sites that meet the following requirements:

- Ambient temperature: -40 to 85 °C
- Operating temperature: -40 to 85 °C
- Maximum altitude: 2000 m
- Mechanical load on modules (e.g., from wind or snow):

	Front	Rear
Design Load	3600 Pa	2400 Pa
Test load (safety factor of 1.5)	5400 Pa	3600 Pa

- To maintain the modules' Class C fire rating, the fire class of the roof and building materials should be higher than Class C. The fire safety rating of this module is valid only when mounted in the manner specified in the mechanical mounting instructions.
- Do not install modules at locations that come with direct contact of water collections, salt water or any aggressive environmental condition.
- Do not install the modules near flames or flammable materials or locations with hazardous materials.
- Do not make any modifications to the module frame.

Installation Method

Clamping

Modules can be laid on rails, either on the long side of the frame (*Figure 1*) or on the short side of the frame (*Figure 2*).

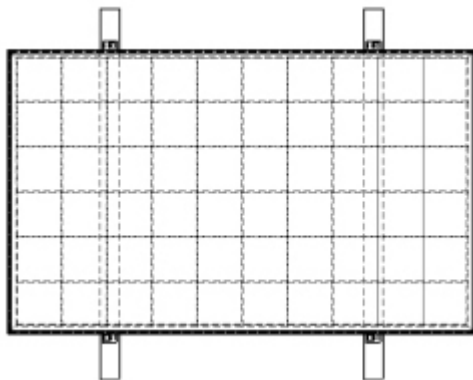


Figure 1: Connecting modules to clamps on long side of frame

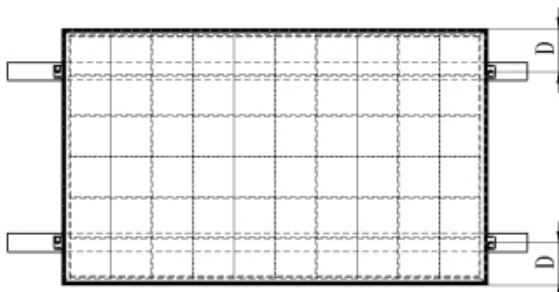


Figure 2: Connecting modules to clamps on short side of frame

Attach each aluminum mounting clamp with an M8 bolt, a plain washer, a spring washer, and an M8 nut. At least 4 clamps should be used to fasten the modules on the supporting rails.

NOTE

Make sure to use clamps with the following properties:



The dimensions for the middle clamps are: $a \geq 40$ mm, $b \geq 26$ mm, $c = 8$ mm, $d \geq 28$ mm, and $\varnothing = 9$ mm. See *Figure 3*

The recommended torque for tightening the bolts and nuts is 28 N*m when the bolts and nuts have property is Class 8.8.

→ To fasten the module:

1. Place the module on two supporting rails (not provided). The rails should be made from stainless material or treated with an anti-corrosion process (e.g., anodic oxidation treatment).
2. If the rail does not have grooves compatible with M8 bolts, suitable holes should be drilled for securing the module frame.
3. Secure each clamp by attaching a plain washer, spring washer, and nut, in that order.
4. Close-ups of the middle clamps and the side clamps are indicated in *Figure 3* and *Figure 4* respectively.

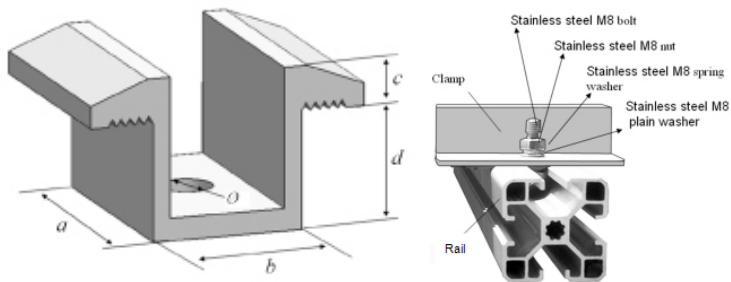


Figure 3: Middle clamps (left) and side clamps (right)

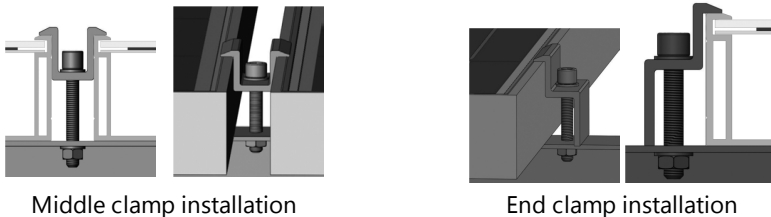


Figure 4: End clamp and middle clamp installation

6. For mounting the supporting rails on the long side of the frame (*Figure 1*), slide bolts through the rail grooves next to the 4 clamp locations. The module may be clamped only in the permitted clamping range.
For exact frame clamping locations refer to area C in *Figure 5* and to Table 1.

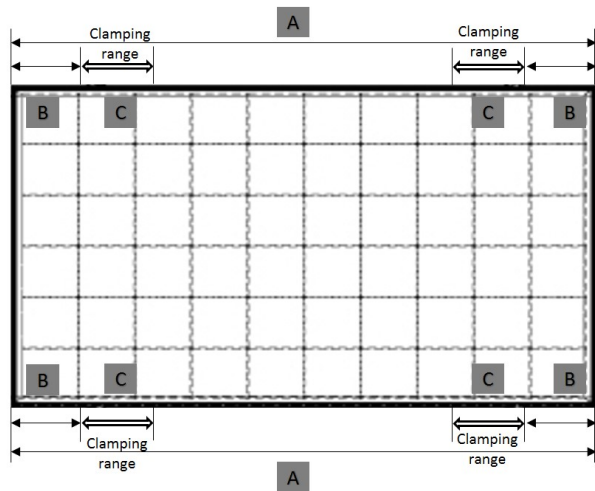


Figure 5: Long side clamping range

Module	Series Dimension	A	B	C Clamping Range
PVxxx-60MM J/ SPVxxx-60MMJ	1650*992*40 mm	1650 mm	200 mm	210 mm

Table 1: Module dimensions for mounting rails on the long side of the frame

7. For mounting the supporting rails on the short side of the frame (Figure 2), slide bolts through the rail grooves next to the 4 clamps locations. The module may be clamped only in the permitted clamping range . For the exact locations refer to area F in Figure 6 and Table 2.

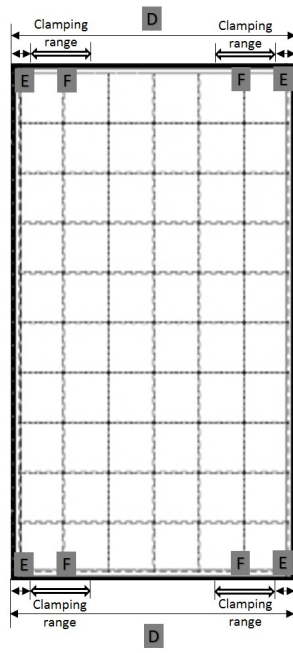


Figure 6: Short side clamping range

Module	Series Dimension	D	E	F Clamping Range
PVxxx-60MMJ / SPVxxx-60MMJ	1650*992*40 mm	992 mm	50 mm	150 mm

Table 2: Modules dimensions for mounting rails on the short side of the frame

Chapter 3: Electrical Installation

Details for electrical installation in accordance with the IEC61730-1.

Installation

- The maximum system voltage with SolarEdge smart modules is 1000 V.
- The power optimizers regulate the string voltage at a constant level, regardless of string length and environmental conditions.
- Under normal conditions, a module might produce more current and/or voltage than reported at standard test conditions⁽¹⁾. The requirements of the National Electrical Code (NEC) in Article 690 shall be followed to address these increased outputs. In installations not under the requirements of the NEC, 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 capacities, over current device ratings, and size of controls connected to the PV output.
- Each series-connected string of modules shall be provided with the maximum series overcurrent protective device, specified as 15A for the module series.
- Use a cable with a cross section of 4 mm² (12AWG) that can withstand the maximum possible system open-circuit voltage and make sure that all connections are safe and tight.
- The cable minimum bending radius should be 43 mm.
- Bypass diodes are included in module junction boxes to avoid decreased module performance. Check the relevant specifications for the specific diodes of the junction box.
- For the smart module electrical data and temperature coefficients see *Smart Module with Integrated Power Optimizer* on page 16.

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

Grounding

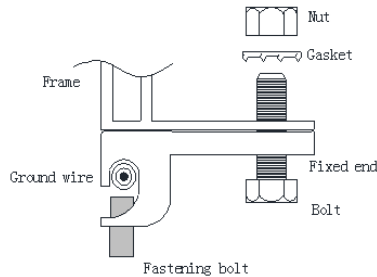


Figure 7: Grounding the aluminum frame with a copper wire

- Use the marked 5.5 mm grounding holes to ground the anodized aluminum frame. Use an M5 nut, an M5 gasket, and an M5 bolt, fastening bolt and a ground wire. All nuts, bolts, and gasket should be made of stainless steel. See *Figure 7*.
- Secure the ground wire on fixed end through fastening bolt (note that the copper wire cannot be attached directly to the aluminum).
- Insert the bolt through the fixed end and then through the hole in the aluminum frame.
- Add the gasket and nut on the other side of the bolt and tighten to secure all parts. The tightening torque should be $2.1 \pm 0.1 \text{ N}\cdot\text{m}$.

Chapter 4: Maintenance and Disposal

- Regularly carry out a visual inspection for dirt, dust, bird dropping, leaves, and other detritus covering the modules.
- If there is a build-up of dirt or dust on the module surface, wash the module with clean non-heated water and a gentle implement (a sponge for example). Never use chemicals on the surface of the module.
- If there is snow, use a soft-bristled brush to clean the surface of the modules.
- Regular electrical and mechanical inspection by a licensed professional will keep the system safe and operating at optimal efficiency.

Smart Module with Integrated Power Optimizer

Technical Specifications for Europe

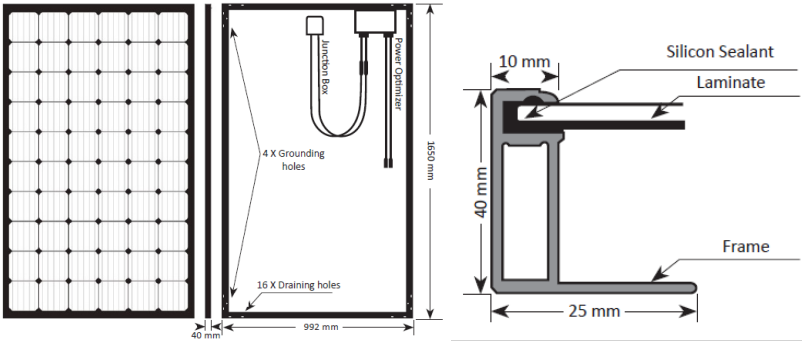
MODULE ELECTRICAL PROPERTIES				
	SPV310-60MMJ	SPV305-60MMJ	SPV310-60MMJ	
STC ⁽¹⁾				
Module Power	300	305	310	W
Max. Power Voltage (V _{mp})	32.62	32.92	33.16	V
Max. Power Current (I _{mp})	9.2	9.27	9.35	A
Open Circuit Voltage (V _{oc})	39.75	39.92	40.09	V
Short Circuit Current (I _{sc})	9.64	9.71	9.76	A
Maximum System Voltage		1000		V _{dc}
Maximum Series Fuse Rating		15		A
Module Efficiency	18.3	18.6	18.9	%
Power Tolerance		0 ~ +5		W
NOCT ⁽²⁾				
Module Power	223.3	227	230.7	W
Max. Power Voltage (V _{mp})	30.34	30.61	30.84	V
Max. Power Current (I _{mp})	7.36	7.42	7.48	A
Open Circuit Voltage (V _{oc})	37.28	37.44	37.60	V
Short Circuit Current (I _{sc})	7.78	7.83	7.87	A
MODULE MECHANICAL PROPERTIES				
Cells	60 (6 x 10)			
Cell Type	Monocrystalline PERC			
Cell Dimensions	156.75 x 156.75			mm
Dimensions (L x W x H)	1650 x 992 x 40			mm
Front Design Load (snow)	3600			Pa
Front Test Load ³	5400			Pa
Rear Design Load (wind)	2400			Pa

(1) Irradiance 1000 W/m², Cell Temperature 25°C, Air Mass AM1.5

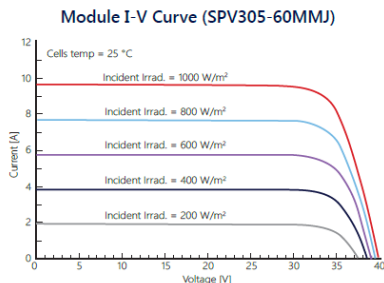
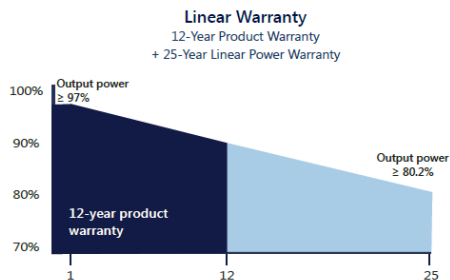
(2) NOCT: Irradiance 800 W/m², Ambient Temperature 20°C, Wind Speed 1 m/s

	SPV310-60MMJ	SPV305-60MMJ	SPV310-60MMJ	
MODULE MECHANICAL PROPERTIES				
Weight	18.8			kg
Front Glass	3.2mm, AR coated toughened glass			
Frame	Black anodized aluminium			

SPV310-60MMJ SPV310-60MMJ SPV310-60MMJ		
MODULE ELECTRICAL PROPERTIES		
Junction Box	IP67	
Connector Type	MC4 (PVKST4II-UR, PV-KBT4II-UR)	
MODULE MECHANICAL PROPERTIES		
Operating Temperature	-40 to +85	°C
Packaging information (units per pallet)	26	
CERTIFICATIONS & WARRANTY		
Module Certifications	IEC 61215:2016, IEC61730:2016, CEC listing AU, SII, AS4040.2:1992 (wind pressure)	
Product Warranty	Power Optimizer — 25-year warranty Module — 12-year warranty	
Output Warranty of Pmax	25-year linear module warranty ⁽¹⁾	
TEMPERATURE CHARACTERISTICS		
Power (Pm) Temperature Coefficient	-0.40	% / °C
Voltage (Voc) Temperature Coefficient	-0.29	% / °C
Current (Isc) Temperature Coefficient	0.04	% / °C
Operating Cell Temperature (NOCT)	45 ± 2	°C



(1) First year: 97% 80.2% power output over 25 years



POWER OPTIMIZER PROPERTIES		
INPUT		
Rated Input DC Power	370	W
Absolute Maximum Input Voltage (Voc at lowest temperature)	60	Vdc
MPPT Operating Range	8 - 60	Vdc
Maximum Short Circuit Current (Isc)	11	Adc
Maximum Efficiency	99.5	%
Weighted Efficiency	98.8	%
Overvoltage Category	II	
OUTPUT DURING OPERATION (POWER OPTIMIZER CONNECTED TO OPERATING SOLAREDGE INVERTER)		
Maximum Output Current	15	Adc
Maximum Output Voltage	60	Vdc
OUTPUT DURING STANDBY (POWER OPTIMIZER DISCONNECTED FROM SOLAREDGE INVERTER OR SOLAREDGE INVERTER OFF)		
Safety Output Voltage per Power Optimizer	1 ± 0.1	Vdc
STANDARD COMPLIANCE		
EMC	FCC Part15 Class B, IEC61000-6-2, IEC61000-6-3	
Safety	IEC62109-1 (class II safety), UL1741	
RoHS	Yes	
Fire Safety	VDE-AR-E 2100-712:2013-05	
INSTALLATION SPECIFICATIONS		
Operating Temperature Range	-40 - +85	°C
Protection Rating	IP68	
Relative Humidity	0 - 100	%

PV System Design Using a SolarEdge Inverter		Single Phase HD - Wave	Single Phase	Three Phase	Three Phase for 480/277V Grid	
Minimum String Length (Power Optimizers)	P370	8		16	18	
Maximum String Length (Power Optimizers)		25			50	
Maximum Power per String		5700	5250	11250	12750	W
Parallel Strings of Different Lengths or Orientations		Yes				

Appendix A: Module Mechanical and Electrical Rating is STC

Module Type	Pmax	Voc	Isc	Fuse Rating	Dimensions
PV210-48MMJ SPV210-48MMJ	210	30.28	9.07	15A	1318 x 983 x 46mm / 51.88 x 39.05 x 1.81 in
PV215-48MMJ SPV215-48MMJ	215	30.41	9.18	15A	
PV220-48MMJ SPV220-48MMJ	220	31.06	9.19	15A	
PV225-48MMJ PV225-48MMJ	225	31.20	9.34	15A	
PV230-48MMJ SPV230-48MMJ	230	31.34	9.41	15A	
PV235-48MMJ SPV235-48MMJ	235	31.56	9.53	15A	
PV240-48MMJ SPV240-48MMJ	240	31.90	9.62	15A	
PV245-48MMJ SPV245-48MMJ	245	32.04	9.71	15A	
PV250-48MMJ SPV250-48MMJ	250	32.28	9.76	15A	

Module Type	Pmax	Voc	Isc	Fuse Rating	Dimensions
PV260-60MMJ SPV260-60MMJ	260	38.63	9.16	15A	1650 x 992 x 40 mm / 64.96 x 39.05 x 1.57 in
PV275-60MMJ SPV275-60MMJ	275	38.63	9.16	15A	
PV280-60MMJ SPV280-60MMJ	280	39.08	9.37	15A	
PV285-60MMJ SPV285-60MMJ	285	39.25	9.44	15A	
PV290-60MMJ SPV290-60MMJ	290	39.42	9.51	15A	
PV295-60MMJ SPV295-60MMJ	295	39.58	9.57	15A	
PV300-60MMJ SPV300-60MMJ	300	39.75	9.64	15A	
PV305-60MMJ SPV305-60MMJ	305	39.92	9.71	15A	
PV310-60MMJ SPV310-60MMJ	310	40.09	9.76	15A	

Module Type	Pmax	Voc	Isc	Fuse Rating	Dimensions
PV315-72MMJ SPV315-72MMJ	315	45.57	9.11	15A	1956 x 992 x 35 mm / 77 x 39.05 x 1.57 in
PV320-72MMJ SPV320-72MMJ	320	45.78	9.16	15A	
PV325-72MMJ SPV325-72MMJ	325	45.86	9.21	15A	
PV330-72MMJ SPV330-72MMJ	330	46.01	9.26	15A	
PV335-72MMJ SPV335-72MMJ	335	46.15	9.31	15A	
PV340-72MMJ SPV340-72MMJ	340	46.33	9.36	15A	
PV345-72MMJ SPV345-72MMJ	345	47.13	9.48	15A	
PV350-72MMJ SPV350-72MMJ	350	47.25	9.57	15A	
PV355-72MMJ-1 SPV355-72MMJ	355	47.36	9.66	15A	
PV360-72MMJ SPV360-72MMJ	360	47.51	9.72	15A	
PV365-72MMJ SPV365-72MMJ	365	47.69	9.78	15A	
PV370-72MMJ PV370-72MMJ	370	47.85	9.85	15A	
PV375-72MMJ SPV375-72MMJ	375	48.07	9.91	15A	

Support Contact Information

If you have technical problems concerning SolarEdge products, please contact us:



<https://www.solaredge.com/service/support>

Before contact, make sure to have the following information at hand:

- Model and serial number of the product in question.
- The error indicated on the product SetApp mobile application LCD screen or on the monitoring platform or by the LEDs, if there is such an indication.
- System configuration information, including the type and number of modules connected and the number and length of strings.
- The communication method to the SolarEdge server, if the site is connected.
- The product's software version as it appears in the ID status screen.

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