



Introduction

This manual provides important safety instructions for the Sunflare FLEX60 module and should be read and understood in its entirety prior to handling and installation. These modules have been certified by CSA Group to UL1703 and UL790 for installation on TPO and EPDM roofing systems.

These installation instructions are valid for Sunflare FLEX60 modules with the following model numbers.

Introduction	Wmp	Voc	Isc	Vmp	Imp
FLEX60-160W	160	33	7.4	25.8	6.2
FLEX60-165W	165	34	7.4	26.6	6.2
FLEX60-170W	170	35	7.4	27.4	6.2
FLEX60-175W	175	36	7.4	28.2	6.2
FLEX60-180W	180	37	7.4	29	6.2
FLEX60-185W	185	38	7.4	29.8	6.2
FLEX60-190W	190	39	7.4	30.6	6.2
FLEX60-195W	195	40	7.4	31.4	6.2
FLEX60-200W	200	41	7.4	32.2	6.2

The electrical characteristics are within ± 10 percent of the indicated values of Isc, Voc, and Pmax under standard test conditions (irradiance of 100 mW/ cm2, AM 1.5 spectrum, and a cell temperature of 25°C (77°F)).

Maximum System Voltage	UL/IEC	1000V
Temperature Coefficient Power		-0.35%/°C
Temperature Coefficient Voltage		-0.25%/°C
Temperature Coefficient Current		+0.03%/°C

Installation, commissioning, servicing and repairs to the module, and an array, should only be carried out by qualified and authorized persons in compliance with local and national electrical, fire, and health and safety codes. If there are any discrepancies between these instructions and the applicable local or national codes, the local and national codes take precedence.

These instructions are intended as a guideline for professional solar system integrators only. The FLEX60 modules are not intended for installation by unqualified end users. These instructions are to be retained for future reference in case of maintenance, ownership change, or disposal.

General & Electrical Safety Information

- Danger! These modules can produce lethal electrical voltages when connected in series. Read all safety information prior to handling. Failure to adhere to the following safety guidelines can lead to arcs, fires, and electric shock hazards.
- The module is considered in compliance with UL 1703 only when the module is mounted in the manner specified by the mounting instructions below.
- The PV modules should only be used for the purpose for which they are intended.
- Do not direct any type of concentrated or artificial light onto the PV module.
- All work on the PV system should be performed by qualified personnel only.
- Warning! Solar modules generate direct current (DC) when exposed to light. Breaking or opening a connection under load, i.e. when current is flowing, can cause an electric arc which will not self-extinguish.

- Never work on the system or module under load. Always turn off and disconnect the inverter or other loads before working on the system.
- Under normal conditions, a photovoltaic module is likely to experience conditions that produce more current and/or voltage than reported at standard test conditions. 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 Isc and Voc marked on this module should be multiplied by a factor of 1.25 when determining component voltage ratings, conductor ampacities, overcurrent device ratings, and size of controls connected to the PV output.
- Installing solar photovoltaic panels and systems requires specialized skills and knowledge. Do not attempt to install these panels if not qualified to do so.
- The installer assumes all risks of injury that might occur during installation, including but not limited to, the risk of electric shock.
- Danger! A single module generates more than 30V DC when exposed to sunlight and system voltages can be as high as 1000 V. Contact with voltages greater than 30V DC can be hazardous, leading to electric shock and possibly death.
- Danger! Even though it is safe to walk on the FLEX60 modules, it could become dangerous if the top surface has been damaged, degrading the dielectric resistance of the module. This could lead to electric shock. Have qualified personnel ensure all modules surfaces are undamaged before walking on them.
- Danger! Water exposure can lead to increased risk of electric shock if the module's encapsulation system has been compromised. Have qualified personnel ensure there is no current leakage and the system is in safe working order before walking on or working on the modules.
- Danger! The FLEX60 modules may become slippery when wet. This could cause a slip hazard. If modules are wet, walk carefully, and keep your center of gravity. Failure to do so could result in a fall hazard leading to personal injury. If working on a roof without a parapet or other curb type system, fall protection needs to be deployed.

- Danger! Do not stand or walk on modules unless they are clean. Dirt and debris could damage the outer surface of the module exposing electrical components leading to electric shock.
- Danger! Do not drop objects such as tools onto the modules. This could damage the modules encapsulation surfaces exposing electrical components leading to risk of electric shock.
- Warning! Short circuits on the DC side of the installation can cause arcing. Unlike arcs occurring in low voltage AC wiring, these arcs are not self-extinguishing. The high temperatures generated by these arcs can destroy connectors. If not handled and installed according to instructions, PV modules can present a lethal as well as a fire hazard.
- Danger! Damaged modules, cables, and connectors can present a shock hazard resulting in electrocution and death. Do not attempt to install, service, remove, touch or modify a damaged module. Damaged modules should only be removed by qualified professionals wearing appropriate personal protection equipment for high voltage. If damaged modules are found, they should be immediately identified and secured from access by unauthorized individuals. Never attempt to remove or otherwise service a damaged module if it is wet or raining.
- Danger! To service a module, (1) isolate the string from others in the system, (2) use blackout blankets on the entire string to remove voltage from the system and then (3) disconnect the target module. You may then remove the module from the roof keeping the blackout blanket over the module to prevent voltages from developing during removal. Failure to follow these procedures may lead to electric shock.
- All electrical work must be performed by qualified personnel only. All electrical material must be suitable for DC and rated for the existing system voltage. If exposed to sunlight, the electrical material must be UV resistant.
- String configuration should be planned in accordance with the inverter manufacturer's instructions.
- If the installation is taking place in Canada, it must be in accordance with CSA C22.1, Safety Standard for Electrical Installations, Canadian Electrical Code, Part1.

Fire Safety

- The presence of photovoltaic modules on a roof can change the roofing system's fire safety. Improper installation may create a hazard in the event of a fire.
- The FLEX60 modules are certified by CSA for use over a Class A TPO or EPDM roofing system when installed per these instructions. They are not certified for other applications.
- Sunflare wire baseplates and top caps (Wire Management System) are required to maintain the fire rating of the modules.
- Only buty- based adhesives are certified to adhere the FLEX60 modules to a roof membrane.
- Provide rapid shutdown devices per the NEC.
- The fire rating of this module is valid only when mounted in the manner specified in the mechanical mounting instructions in this manual.
- Consult your local authority for guidelines and requirements for building and or structural fire safety.
- Do not install this module near flammable materials or materials with flammable off gasses.

Installation Safety

- Follow all local and national safety precautions when on a roof, including but not limited to fall protection, gloves, helmets, and safety glasses.
- Warning! A photovoltaic panel can act as a sail in even low wind conditions knocking or pulling an installer off a roof. In addition, panels can become missiles if unsecured and blown away by the wind. A flying module can injure installers or people on the ground. Use all appropriate precautions including fall protection and module capture devices to ensure safe handling in the event of winds or wind gusts. Note, wind gusts can be unpredictable and are not always preceded by increased wind speeds. Care must be taken to ensure panels are always safely secured.
- When handling electrical components use all appropriately rated personal protective equipment for handling any possible voltages at the job site.
- Warning! Do not install solar systems when it is raining, snowy, windy or the work surfaces

- are wet, icy, or otherwise slippery. This could lead to personal injury.
- Avoid exposing cables to direct sunlight to help prevent their degradation over time.
- Danger! Never open electrical connections (such as connectors) when the circuit is under load.
- Danger! 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.
- Keep unqualified persons away from the work area and the system during transportation and installation.
- Completely cover the module with an opaque material during installation to prevent electricity from being generated.
- Do not wear metallic jewelry including ear, nose, and lip rings, watchbands, pins, or any other metallic object during installation or troubleshooting of photovoltaic systems.
- Use only insulated tools that are approved for working on electrical installation at the voltages possible present at the job site.
- Follow all safety regulations and instructions in the installation manuals for all components of the system.
- Do not remove or modify any leads or connectors provided with your module. Doing so could result in electrical shock, arcing, and fires as well as void the module's warranty.
- Use only MC4 connectors from Multi-Contact when connecting to these modules.
- When cutting the wire baseplate, use all relevant personal protection equipment per OSHA guidelines. Cut the baseplate and cover prior to installation and away from modules and the roof surface to prevent accidental damage to those components.

Handling Safety

- System designers and installers are responsible for proper support structure design. Sunflare is not responsible for supporting structures, including but not limited to the roof structure.
- Follow all local, regional, and national statutory regulations and obtain all required building permits.
- Only use equipment, connectors, wires, and support systems suitable for solar electric systems.
- Do not lift or carry the module by its junction box or electrical leads.
- Do not stand or step on the module until they are fully installed.
- Do not stand or walk on modules unless they are clean. Dirt and debris underfoot could cause damage to the surface of the module reducing its electrical performance.
- Do not drop the module or allow objects to fall on the module.
- Do not place heavy or sharp objects on the module.
- Use only original packaging when transporting or moving the modules.
- Do not disassemble the modules or remove any nameplates, serial numbers, or components from the modules.
- Do not apply paint or adhesive to the module.
- Do not modify the module in any way.
- Warning! Do not scratch, hit or damage the topsheet or the backsheet in any way.
 Damage to these components could create an electric shock hazard.
- A panel with a damaged or torn topsheet or backsheet cannot be repaired and must not be used.
- Work only under dry conditions, and use only dry tools. Do not handle panels when they are wet.
- Danger! Keep uninstalled panels in their box until it is time to install them. Make jumper connections to the j-boxes immediately upon installation to keep water and debris

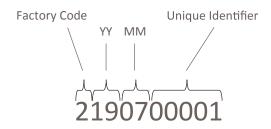
from penetrating the j-box connectors. If immediate connection isn't possible, take measures to prevent water and dirt from entering the j-box connectors. Failure to protect the electrical connections could result in electrical arcs leading to fire and possibly shock hazards.

- Danger! All electrical contacts should be kept dry and clean. Failure to do so could lead to electrical arcs resulting in fire and possible shock hazards.
- Keep all connectors and wires away from the roof or any area which may collect water.
- Modules should not be subjected to concentrated weight loads or stresses during or after installation other than those from environmental factors such as wind and snow loads.
- Warning! Do not attempt to roll or fold the modules. Doing so could result in internal electrical damage leading to arc faults and fires.

Unique Identifier

A record of the modules' serial numbers should be made before installation and this should be included in the system documentation to be saved.

The module's serial number is located on the back of the module near the nameplate and on the front side of the module on the top right next to the j-box. The serial number contains the factory identifier, date code, and a unique identifying number as shown in the example below:



Mechanical Installation

Approved Roof Systems

The FLEX60 module is certified by CSA as part of a Class A roofing system per UL 790 when installed over TPO or EPDM roofing systems when the following requirements are met:

- The FLEX60 module with Heliobond and the Sunflare raceway wire management system is certified as Class A over any Class A TPO or EPDM roofing surface. The maximum slope is 1/4:12 unless the certified construction has a non-combustible barrier board directly under the roofing membrane. In that case, the max slope is equal to that of the certified roofing construction.
- The FLEX60 module with Heliobond and the Sunflare raceway wire management system maintain Class A fire ratings when installed in combination with any Class A EPDM roofing construction that includes a non-combustible barrier board directly under the membrane as specified in the roofing manufacturer's listing. The max slope is equal to that of the certified roofing construction.

The following table outlines the allowable installation configurations:

1 -	Roofing System Class Requirement	Adhosiyo	Barrier Board Required	Sunflare Wire Baseplate Required	Max Slope
TPO	Class A	HelioBond PVA 600BT	No	Yes	1/4:12
TPO	Class A	HelioBond PVA 600BT	Yes	Yes	Per Listing
EPDM	Class A	HelioBond PVA 600BT	Yes	Yes	Per Listing

Notes: (1) Max slope "Per Listing" means per the roofing systems listing prior to the addition of the FLEX60 module. (2) The barrier board must be directly under the roofing membrane.

Roofing Membrane Manufacture Approvals

The FLEX60 module is fully engineered to reduce stresses on roofing membranes and provide a compatible interface. However, before installing FLEX60 with Heliobond PVA 600BT Sunflare suggests you consult with the roof membrane manufacturer and follow all their recommendations and requirements. Sunflare makes no guarantees or warranties in relation to the roofing membrane and therefore takes no liability for damage or leaks in the membrane that might be caused from installing the modules.

Roof Membrane Prep

The roof surface must be thoroughly cleaned prior to installation. The surface needs to be free from dust and dirt prior to module adhesion. Failure to properly clean the roofing membrane can result in much lower load capacities than calculated and could result in module adhesive failures resulting in an electrical arc and flying debris hazards that could lead to fires and personal injury.

In addition to removing all dust and debris, the roof surface must be dry and free from water, ice or snow prior to module installation. The roofing surface must be between 40°F -120°F (4°C to 49°C) during installation. Failure to follow these requirements will result in poor adhesion that could lead to premature failure resulting in electrical arcs and fires, and flying debris and personal injury. Poor adhesion due to insufficient roof prep can result in moisture conditions under the modules that facilitates unwanted microbial buildup. This could lead to mold and rot of the laminate and the roof membrane. Sunflare will not take liability for degradation or failure of the module or the roofing membrane resulting from poor installation.

Module Installation

After the roof has been cleaned to the requirements above, the module can be adhered to the roof. Use chalk lines or other methods to ensure a straight edge for placing the modules. Place the modules so their j-boxes are facing the modules of the next row as shown in Figure 1 to form a row pair. Ensure there is a 1.625" ± 0.25" (1-5/8" ± 1/4") gap between adjacent module rows. Within a row, the modules should be installed right next to each other with a 0" gap between them. This is to ensure that water does not pond between modules.

When sticking the modules down to the roof, first remove the liner from the adhesive on the back of the module. Align the j-box short edge of the modules to the chalk line and roll the module down onto the roof. The adhesive is pressure activated. Apply a pressure of 15 psi across all areas of the modules that have adhesive. Use a soft clean roller to apply the force evenly across the module. Hard or dirty rollers as well as dirty modules may damage the modules top surface.

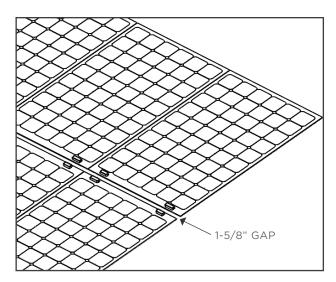


Figure 1 - Ensure proper gap between module pairs.

Wire Baseplate Installation

The Sunflare raceway is designed to manage wire runs and house module level power electronics (MLPEs) such as rapid shutdown devices or optimizers. The raceway provides an aesthetic finish to your array while protecting the wires and power electronics from UV exposure.

There are two components to the raceway, the: (1) baseplate, (2) top cover. The baseplate is designed to fit between the j-boxes of the module as shown in Figure 2.

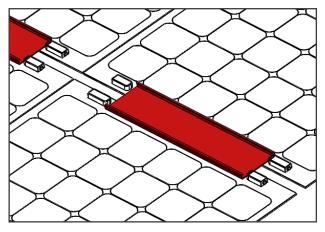


Figure 2 - Install wire baseplates between junction boxes.

The baseplate comes with adhesive already applied along the bottom. Ensure proper alignment prior to installation since removal and realignment is very difficult after the adhesive touches the laminate or the roofing. Clean dust, dirt, and oils from the top of the modules and the roof surface prior to removing the baseplate adhesive liner and installing. In most circumstances soap and water is sufficient to clean the module surface. If required, Isopropyl Alcohol can be used to clean the module's top surface. Follow the roofing manufacturer's instructions for cleaning the roofing surface.

Ensure all surfaces are dry and meet the adhesive application temperatures of 40°F -120°F (4 °C to 49 °C). Failure to follow these instructions could result in adhesive failure.

Butyl Adhesive

Two-sided butyl adhesive is tape pre-applied. If products come without the pre-applied tapes, it can be applied in the field to the back side of the module and the bottom of the baseplate. Only HelioBond PVA 600BT by HB Fuller has been approved for use with Sunflare modules and wire baseplates. Do not use any other adhesive. Doing so could void your warranty and lead to product failures.

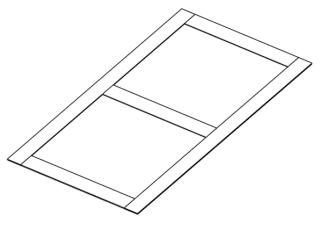


Figure 3

Install a 4" wide adhesive strip to the module and baseplate prior to installing them on the roof. Clean the adhesion areas to remove all oils and dirt. Ensure the module and baseplate are between 40°F -120°F (4 °C to 49°C). Apply the tape along all edges of the backside of the module and across the center as shown in Figure 3. Ensure the tape makes a complete seal all the way around the module to keep water from penetrating under the module. Apply the tape across the entire length of the bottom of the wire baseplate.

Electrical Installation

Modules in Series

The FLEX60-160W to FLEX60-185W modules are strung in pairs to match power ratings for typical MLPE devices. Electrically connect adjacent modules (across rows) using 1' jumper cables as shown in Figure 4. Jump only one j-box per module. The other j-box will be connected to the MLPE. Jump the same j-boxes for every module pair.

It is very important that installers follow the MLPE manufacturer's guidelines regarding voltage. For any solar modules over 185W, the MLPE manufacturer may recommend connecting only one FLEX60 module per MLPE. In that case, the module will NOT be jumped to an adjacent module as shown in Figure 4.

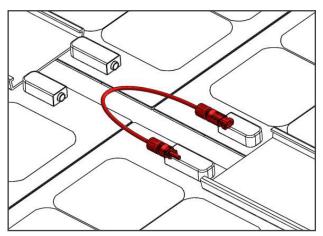


Figure 4 - Create MLPE module pairs using jumpers.

MLPE Installation

The module-level power electronics (MLPEs) such as rapid shutdown devices or optimizers are placed inside the center of the wire baseplate and connect the remaining j-boxes as shown in Figure 5.

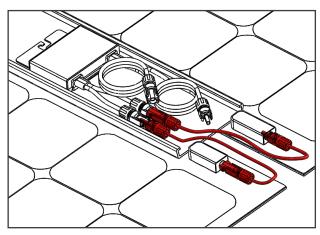


Figure 5 - Connect pair of modules to MLPE.

Once the MLPE is connected to the pair of modules it is ready to be connected to the MLPE of the neighboring pair of modules as shown in Figure 6.

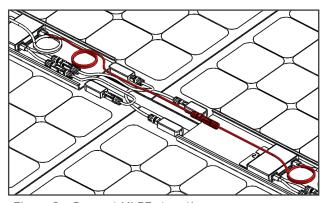


Figure 6 - Connect MLPEs together

Repeat this for every MLPE on the string and then homerun the first and last MLPEs all the way back to the combiner box or inverter.

Manage all wires such that they will stay hidden under the wire baseplate top cover once it is installed. Use only solar ties or other polymeric wire ties with application appropriate UV and environmental resistance. Do not use commercially available wire ties from the hardware stores even if they say UV rated. Do not use metal ties or clips.

Raceway Top Cover Installation

The raceway top cover provides an appealing aesthetic to the array by hiding the wires and MPLEs. It also protects these components from physical damage and degradation from UV exposure.

The top cover is three module widths long and snaps onto the baseplate.

Align the top cover to the edge of the row and snap it down to the wire baseplate as shown in Figure 7. Repeat this process across the row ensuring there are no gaps between the covers. Measure and cut the last cover to the required length prior to installation.

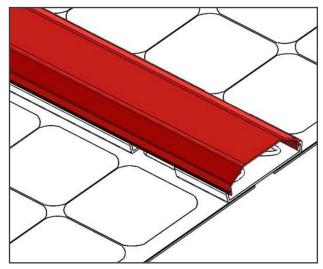


Figure 7 - Align top cover to end of row.

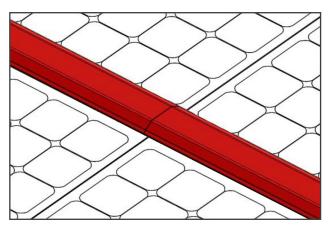


Figure 8 - Top covers aligned with no gaps

For additional information and a photo walkthrough of the installation process, refer to the FLEX60 Installation Supplement at the end of this document.

Grounding

Per its certification, the Sunflare FLEX60 module does not need to be grounded. It is double insulated and has no exposed metal components. Ensure you use only non-conductive polymeric wire management devices and components within the array. Using metal components could result in grounding requirements and a safety hazard.

Electrical Installation

Whenever possible use the jumper cables provided by Sunflare. They are cut to the correct size and have the proper mating connectors for the modules. For making homerun cables follow the instructions and requirements below.

Conductors

Use only USE-2 or UL 4703 "PV Wire" for jumpers and homerun cables. These wires meet NEC requirements per Section 690.31 (C) for use in outdoor exposures in solar arrays. Minimum wire gauge is AWG 12 (4mm2). Use larger gauge wire (lower gauge number) for longer runs or where reduced electrical resistance is desired. Follow all NEC guidelines for wire size and installation requirements.

Connectors

Use only Multi-Contact MC4 plug connectors. They can be procured through Staubli (www. staubli-alternative-energies.com) or your preferred electrical supply house. Using any other connector with a Sunflare FLEX60 module will void the warranty.

Fuses

All Sunflare FLEX60 modules must be protected by appropriate overcurrent protection devices per NEC guidelines. The maximum series fuse rating for the FLEX60 module is 12A. Follow all NEC guidelines for fuse rating requirements including size and type.

Connecting in Series

Only connect FLEX60 modules in series strings and protect each series from other paralleled strings with proper overcurrent protection. It is recommended that no more than 25 modules should be in series per string.

Maintenance and Repair

The Sunflare FLEX60 module is designed for a 25-year life and under normal circumstances should require no maintenance. However, due to the wide variety of environmental conditions and installation practices it is recommended to fully inspect the system and all connections every 12 months.

Read these installation instructions thoroughly before inspecting or servicing a Sunflare FLEX60 system. Inspection and service should only be carried out by qualified personnel using all appropriate OSHA recommended personal protection equipment. Disconnect the system prior to inspection. Replace any wires and connectors that show signs of wear or damage. Replace any wire baseplate and cover that is damaged or significantly degraded. If a module is damaged, leave it in place. Do not attempt to remove the module from the roofing surface unless it poses an electrical risk. Doing so might damage the roof membrane.

If service or inspection is required, disconnect the string with the damaged module from all other strings and use black out blankets to cover all modules in that string. Check that voltages are below 5V. Then, disconnect the broken module from the string and plug the ends of its j-box connections using the MC4 Staubli sealing caps PV-BVK4, and PV-SVK4. Then jumper around the module and reconnect the string.

If the damaged module has compromised electrical encapsulation it can be removed or encapsulated in place using a black silicone sealant. Sunflare will not be liable for roof damage if removing the module or for any issues that may arise from encapsulation by applying a sealant.

Cleaning

As is the case with all Solar PV systems, Sunflare FLEX60 modules will require periodic cleaning to remove dust, soot, bird droppings, sap, pollen, or other deposits on your modules that could lessen their power production. If cleaning is found necessary to achieve desired power performance, then it should only be cleaned by professional cleaners. Prior to cleaning the system, it must be inspected for safety and approved for cleaning by qualified personnel. Failure to inspect the system could lead to electric shock and possibly death.

Never use brushes, harsh detergents, or robotic cleaners intended for use on glass modules to clean the FLEX60 modules. Use only water with mild soap, and a soft sponge. Do not walk onto the array unless absolutely necessary. Do not walk on dirty modules or over clean modules with dirty shoes. Debris underfoot can damage the topsheet of the module leading to power loss and possibly module failure.

Mechanical Load Rating

For design purposes, ASC7-16 Section 30 "Components and Cladding" should be used for calculating the load requirements on the module. Do not use the photovoltaic specific paragraphs in Section 29 for load development on the FLEX60 product. Those sections are only relevant to products that are mounted above the roof surface and thus do not apply to the stick down FLEX60 module. Set the effective wind area equal to one panel.

Liability Limitation

Sunflare is not in control of the installation of the module and hence does not accept responsibility or liability for damages arising from improper use, incorrect installation, operation, or maintenance of the product.

The information provided by this manual is based upon Sunflare's knowledge and understanding and is believed to be correct and reliable.

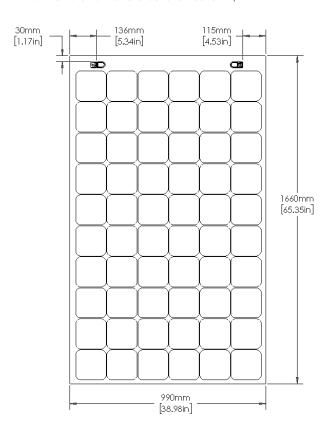
However, the solar installation company is responsible for the installation, operation and maintenance of the product and any damage that might occur to the product or the roof as a consequence of those activities even if the installer followed guidelines and descriptions set forth in this manual. Sunflare takes no responsibility for material incompatibility between Sunflare components, nor to any roofing products with which they may come in contact.

Sunflare accepts no liability for: damages, financial losses of any kind, business interruptions, or lost earnings, whether they be direct or incidental, as a result of the use of the information contained in these instructions, and whether or not they are based upon Sunflare's negligence.

No suggestions, recommendations, power ratings, or any other guidance set forth in this document constitutes an expressed or implied warranty. Product warranties are not made in this document. Warranties are included in a separate warranty document, or through purchase agreements.

Physical Dimensions

All dimensions have a tolerance of +/- 2 mm



Contact Information

Sunflare Co. 1693 Yeager Avenue La Verne, CA 91750 USA

Tel: 1-888-577-9935

Email: info@sunflaresolar.com Web: www.sunflaresolar.com





Sunflare FLEX60 Installation Supplement



STEP 1

Clean the roof of all debris by using a cleaning agent that will not leave any kind of residue on the surface. The surface should be completely clean to ensure proper adhesion and lifetime of the adhesive.



STEP 2

Measure and mark the location for the first panel to be laid down.





STEP 3

Peel off the adhesive liner off the back of the module.



STEP 4

Position the edge of the module so that it matches the marking from Step 2.

Lay the module down. Using a rubber-wheeled pressure roller, apply pressure throughout the entirety of the module. The adhesive is pressure activated, so it is imperative this step is completed.



STEP 5

Measure 1-5/8" inches and make a mark between the installed panel and the next panel to leave room for the adhesive on the back of the wire baseplate."



STEP 6

Peel off the adhesive liner on the bottom of the wire baseplate.



STEP 7

Position the baseplate in between the MC4 connectors on the modules. Press down applying even force to make sure the adhesive sticks well to the surface.



STEP 8

To install the top cap, align one of the edges of the top cap with the slot on baseplate, then lay down the other side and press down until it snaps in place.



STEP 9

Wipe the modules to remove any dirt.



STEP 10

Repeat the process with the rest of the modules.

Revision History

Document	Date of Revision		
SunflareArray_FLEX60_Installation_08-23	08/21/2023		