



# Installation Instructions for the PowerFit20 Photovoltaic Modules

## Sunflare Components List

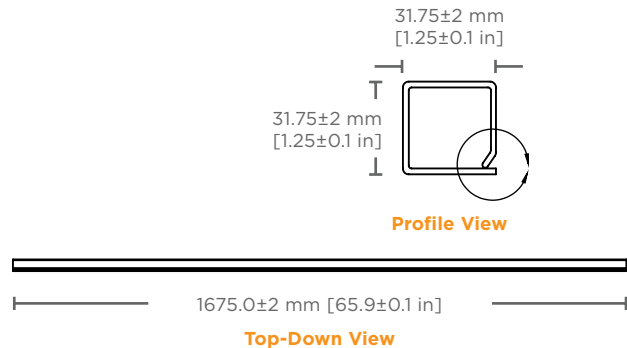
- Metal Standing Seam Roof Width Requirement**

In order for the PowerFit20 to be properly installed, the width between the internal peaks of the seams must be no less than 15.5". The PowerFit20 is only compatible with flat standing seam roofs. Any striations or other non-flat surfaces may prevent the module from adhering for the intended lifetime.

- WMS Wire Conduit**

Specs: 1675.0 x 31.75 x 31.75 mm

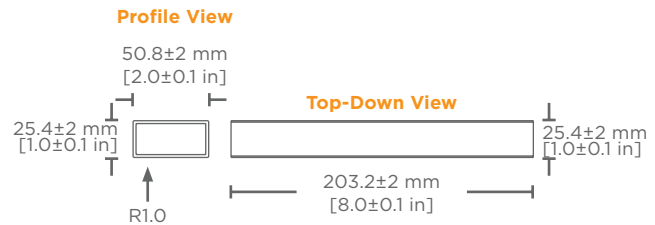
Description: PVC wire conduit that runs parallel with the peak of each seam. It will be justified to one side of the seam and allow for a clean wiring for each module to go to the roof cap. This piece will be installed with the butyl-based adhesive included with the component.



- WMS Spacer Tube**

Specs: 203.2 x 50.8 x 25.4 mm

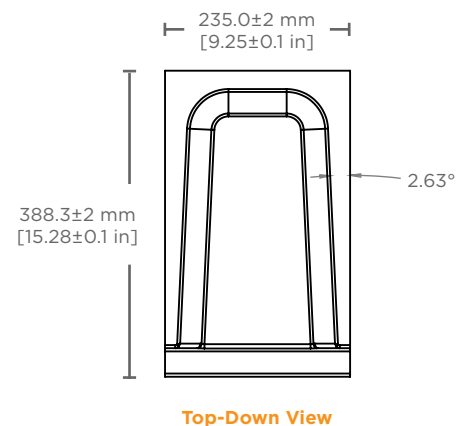
Description: PVC spacer tube used for two functions: 1) as placement between two adjacent modules and 2) as a way to adhere the junction box to the roof. The spacer tube comes with two sides of adhesive to install onto the roof and the bottom of the junction box cover.



- WMS Junction Box Cover**

Specs: 388.3 x 235.0 x 31.9 mm

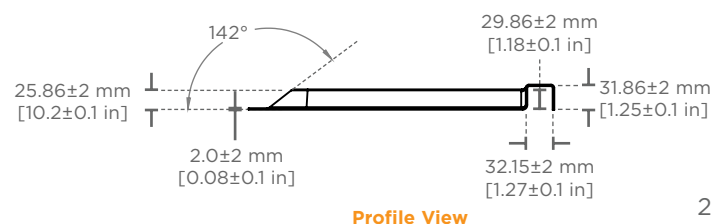
Description: PVC junction box cover used to house and protect the wiring between two adjacent modules. It will be adhered using DOW 804 adhesive to create a water-tight seal.



- 8" Jumper Cable**

Specs: 8" long. 10AWG PV wire with MC4 heads

Description: Pre-cut MC4 PV cabling for an easy connection between two adjacent modules. This cable will be housed underneath the junction box cover.



## Recommended Component List

- **7.5' Jumper Cable**  
Specs: 7.5' long, 10 AWG PV wire with MC4 heads  
  
Description: Pre-cut MC4 PV cabling for connecting one pair of modules to another pair of modules. This cable will run from a junction box on one PowerFit20, through the WMS wire conduit, to the next pair of PowerFit20s.
- **AP Smart System Component RSD-S-PLC**  
Specs: 129 x 30 x 16 mm  
  
Description: Allows for the rapid shutdown of the PV system while meeting the NEC 2017 and 2020 requirements. This device will be attached underneath the ridge cap of the building and connected to each row of modules per seam.  
  
Website: [4301615202\\_RSD-S-PLC-Datasheet\\_Rev2.2\\_2021-3-27.pdf](https://www.apmartglobal.com/4301615202-RSD-S-PLC-Datasheet-Rev2.2-2021-3-27.pdf) (apmartglobal.com)
- **DOW 804**  
Specs: 10.1 Oz DOW 804 PV Sealant  
  
Description: Silicone resin that will be used to help adhere the WMS junction box cover to the WMS wire conduit. This will allow for a more structurally sound install, along with creating a water-proof sealant to prevent debris from entering the WMS.

## Other Required Components

- **Inverters**  
Consult your installer to determine the optimal inverter that will be compatible with the PowerFit20 system. Attached is a compatibility list for the AP Smart component suggested by Sunflare. If the AP Smart component is not being used, one should consult the installer for the optimal inverter based on the array size.
- **Wiring for homeruns**  
Extra PV wiring will be needed to complete the PowerFit20 array. This wiring will be needed to connect modules between seams, as well as being used as the final homeruns going to the inverter. Consult your installer that the proper gauge cable is used depending on the appropriate array size.
- **MC4 Male/Female heads**  
Sunflare's PowerFit20 modules use MC4 male and female connectors. MC4 male and female connectors will be needed for completing the excess wiring with the proper sized PV cables.

# Installation Instructions for the PowerFit20 Photovoltaic Modules

## Introduction

This manual provides important safety instructions for the Sunflare PowerFit20 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 standing seam metal roofing systems. These installation instructions are valid for Sunflare PowerFit20 modules.

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 and installers only.

The PowerFit20 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.
- Any module without a frame (laminated) shall not be considered to comply with the requirements of UL1703 unless the module is mounted with hardware that has been tested and evaluated with the module under this standard or by field inspection certifying that the installed module complies with the requirements of UL 1703.
- The PV modules should only be used for the purpose for which they are intended.
- Concentrated or artificial sunlight shall not be directed 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  $I_{sc}$  and  $V_{oc}$  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 modules and systems requires specialized skills and knowledge. Do not attempt to install these modules if not qualified to do so.
- Installation should only be performed by qualified persons.
- 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 PowerFit20, 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 PowerFit20 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 and support structures (racking systems) on a roof can change the roofing system's fire performance.
- Roof construction and photovoltaic system support structures may affect the fire safety of a building. Improper installation may create a hazard in the event of a fire.
- The module is certified by CSA for use over a Class A standing seam metal roofing system when installed per these instructions. They are not certified for other applications.
- The Sunflare Wire Management System (WMS) is required to maintain the fire rating of the modules.
- Only butyl-based adhesives are certified to adhere the PowerFit20 modules to a roof membrane.
- Use components such as ground fault circuit breakers and fuses as required by local authorities.
- 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 module can act as a sail in even low wind conditions knocking or pulling an installer off a roof. In addition, modules can become missiles if unsecured and blown away by the wind. A flying module can injure roofers 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 modules 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 or the work surfaces are wet, icy, or otherwise slippery. This could lead to personal injury.
- **Warning!** Do not install in the rain, snow or in windy conditions. 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 modules, such as terminals, can result in burns, sparks and lethal shock whether or not the module 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.

## 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 top sheet or the back sheet in any way. Damage to these components could create an electric shock hazard.
- A module with a damaged or torn top sheet or back sheet cannot be repaired and must not be used.
- Work only under dry conditions, and use only dry tools. Do not handle modules when they are wet.
- **Danger!** Keep uninstalled modules in their box until it is time to install them. Make jumper connections to the junction boxes immediately upon installation to keep water and debris from penetrating the junction box connectors. If immediate connection isn't possible, take measures to prevent water and dirt from entering the junction 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 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.

## Mechanical Installation

### Approved Roof Systems

The PowerFit20 module is certified by CSA as part of a Class A roofing system per UL 790 when installed over metal standing seam roofing systems when the following requirements are met:

The PowerFit20 module with Heliobond and the Sunflare Wire Management System (WMS) is certified as Class A over any Class A metal standing seam roofing constructions.

### Metal Roof Manufacturer Approvals

The PowerFit20 module is fully engineered to reduce stresses on metal standing seam roofs and provide a compatible interface. However, before installing PowerFit20 with Heliobond PVA 600BT per these instructions, you must obtain approval from the metal standing seam roof manufacturer. Ensure you follow all their recommendations and requirements. Sunflare makes no guarantees or warranties in relation to the roofing and therefore takes no liability for damage or leaks in the membrane that might be caused from installing the modules.

### Roofing Prep

The roof surface must be thoroughly cleaned and clear of the debris prior to installation and primed if required to meet load requirements. Failure to properly clean the roof 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.

Besides dust and debris, the roof surface must be dry and free from water, ice or snow prior to module installation. In addition, 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. In addition, 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 surface. Sunflare will not take liability for degradation or failure of the module or the roofing surface resulting from poor installation.

To meet the required load capacity, it might be necessary to prime the roofing surface. Use only primers specified by the roof manufacturer and follow all manufacturer's instructions for application. Immediately install the PowerFit20 module upon completion of the priming of the surface.

## Module Installation

After the roof has been cleaned to the requirements above, the components can be adhered to the roof. Align one of the WMS wire conduits to one side of the standing seam. Ensure the side that opens is facing away from the seam. Remove the adhesive lining and install the WMS wire conduit with the top edge going as close to the ridge cap as possible. This will be used to gauge where the first module will be installed as well as be a location to run the wiring.

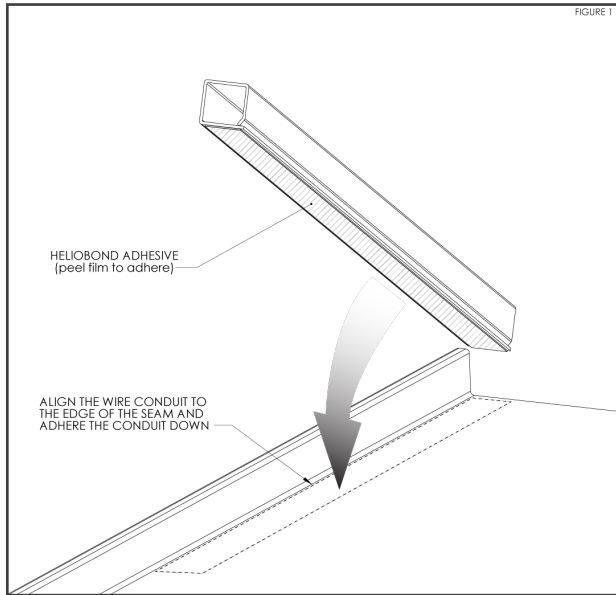


Figure 1. Showing the adhesive on the wire conduit being installed on one side of the standing seam.

Align the first module near the ridge of the roof. Ensure the module is aligned to the side of the standing seam where the WMS wire conduit was installed. The side of the module where there are no junction boxes should be aligned with the top of the WMS wire conduit near the ridge. Proceed to peel the adhesive backing off the module and apply pressure to the module to adhere it to the flat space. Use a rubber wheeled roller to ensure the proper pressure is applied to the module.

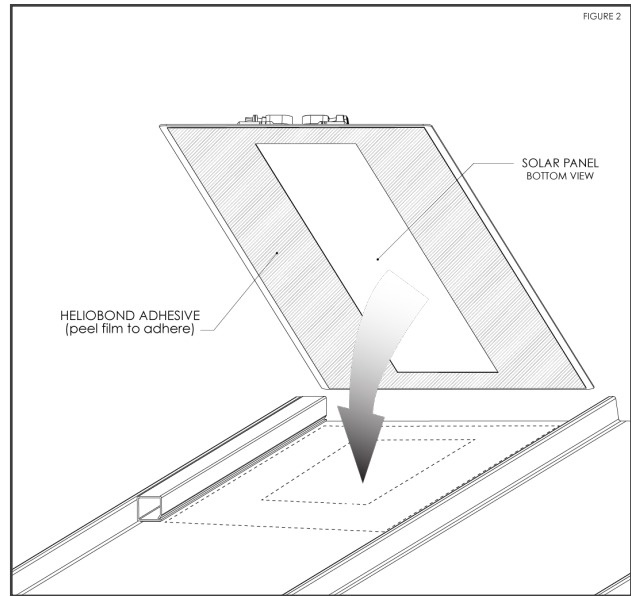


Figure 2. Shows the adhesive on the back of the PowerFit20 module.

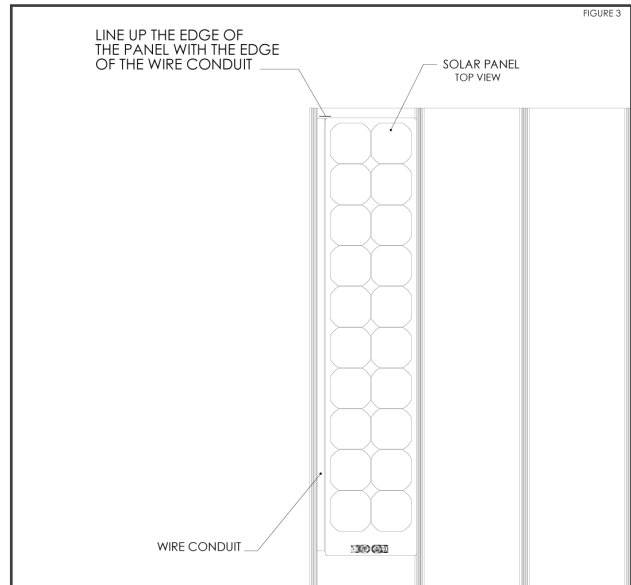


Figure 3. Shows the first PF20 modules installed adjacent to the WMS wire conduit.

With the first module adhered, use one of the WMS spacer tubes and remove the adhesive covering from the bottom. Center the spacer tube and adhere it adjacent to the first module installed on the seam. Apply pressure for the adhesive to stick to the metal roof.



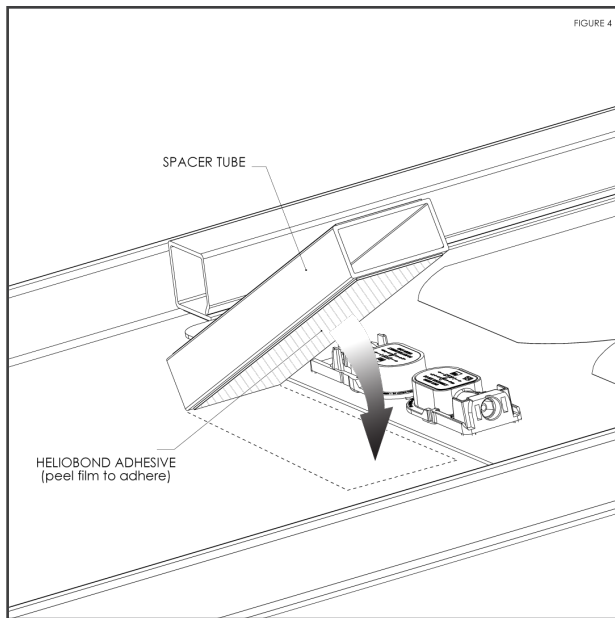


Figure 4. Shows the spacer tube installed with the first module on the standing seam.

The WMS spacer tube will be used to help adhere the junction box cover and also help guide the distance in between modules. Take the second module and line it up so that it is adjacent to the WMS spacer tube and in line with the first module installed. Once placed, remove the adhesive covering and apply pressure to install the second module. Ensure the junction boxes on the second modules are on the upward slope so that they are next to the junction boxes of the first module installed.

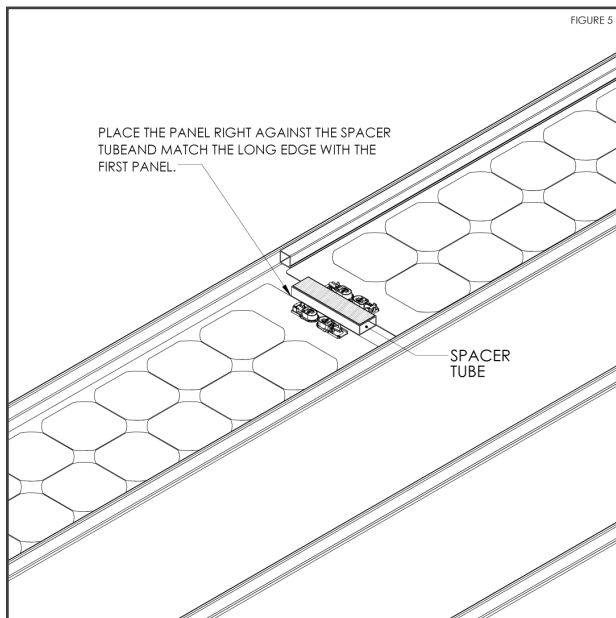


Figure 5. Shows the second module installed with the spacer tube, first module, and first WMS wire conduit piece.

Take another piece of the WMS wire conduit and line it up so that the bottom of the component on the downhill slope is even with the end of the second module. Remove the adhesive covering and apply pressure to install the component.

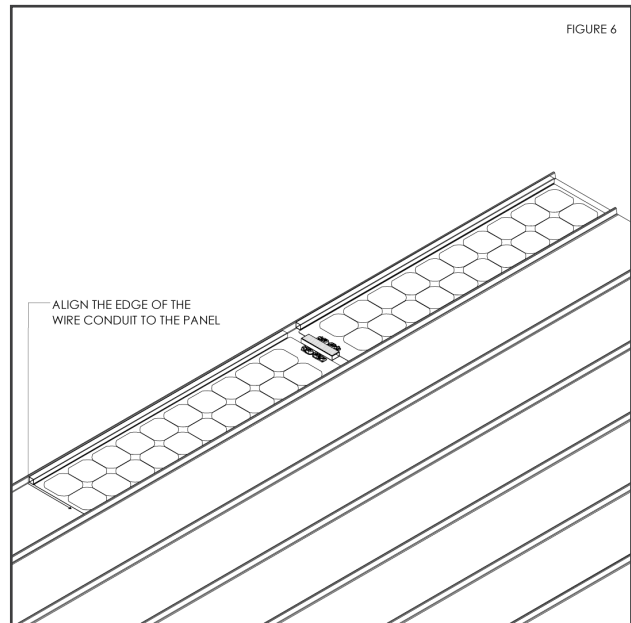


Figure 6. Shows the second piece of WMS wire conduit being installed.

Before installing the last WMS component for the two modules, connect one of the 8" MC4 jumper cables. These should be installed on the junction boxes of the two modules that are opposite the side of the WMS wire conduit pieces. Using the 7.5' MC4 jumper cables connect one end to the module located on the upward slope and run it through the WMS wire conduit towards the ridge of the roof. Use another 7.5' MC4 jumper cable to connect it to the bottom module and run it through the WMS wire conduit towards the eave of the roof.

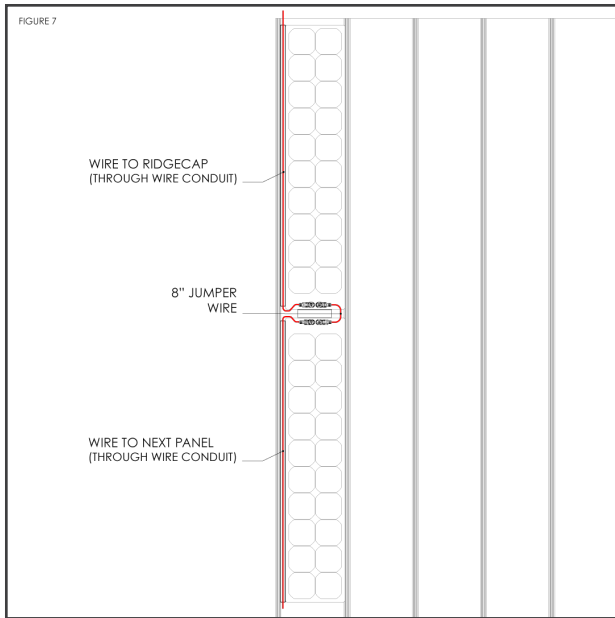


Figure 7. Shows the 8" MC4 jumper cable installed along with both ends of the 7.5' MC4 jumper cable.

The last component can now be installed with a bead of DOW 804 adhesive sealant around the perimeter of the WMS junction box cover. First remove the adhesive backing on top of the WMS spacer tube. This will adhere to the bottom side of the WMS junction box cover. Using a caulking gun, run a bead of DOW 804 around the entirety of the perimeter of the WMS junction box cover.

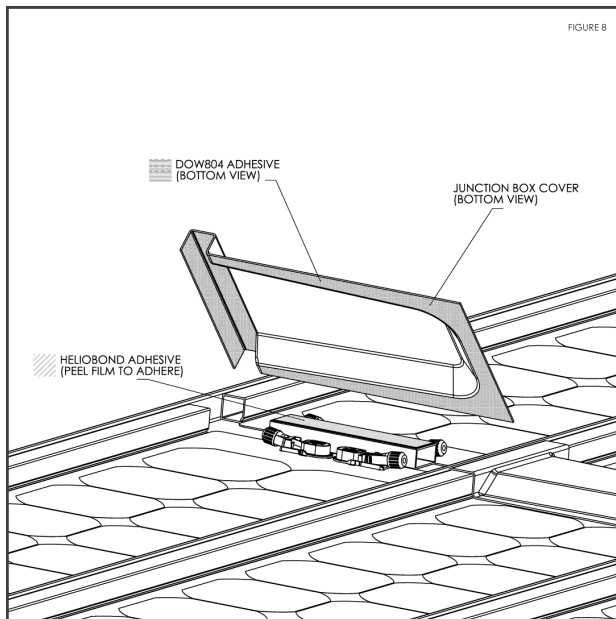


Figure 8. Shows the location of where the DOW 804 needs to be for the WMS junction box cover.

Carefully place the WMS junction box cover so that the edge of it goes around the outside of each set of junction boxes. The side of the junction box cover should go over and around the WMS wire conduit to ensure a watertight seal. Apply pressure to the junction box cover to complete the installation.

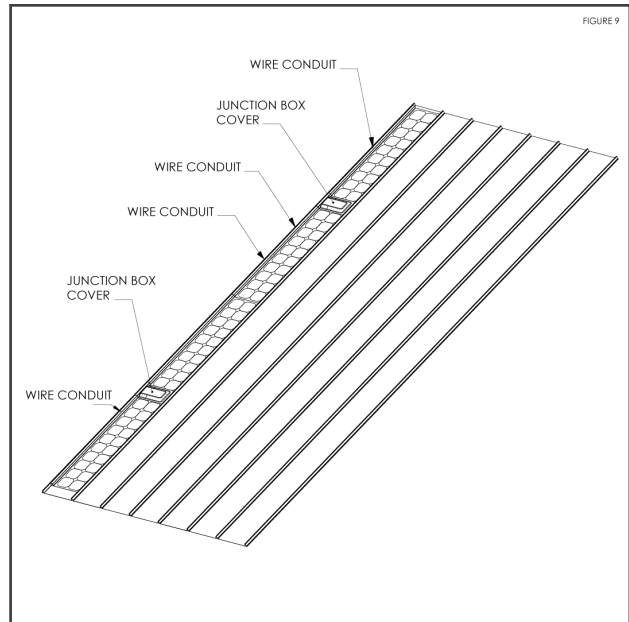


Figure 9. Shows the full installation of (2) modules along with the WMS components.

Repeat this process until you have fully installed all modules on the seam before moving onto the next seam. It is important the roof surfaces remain clean during the application process.

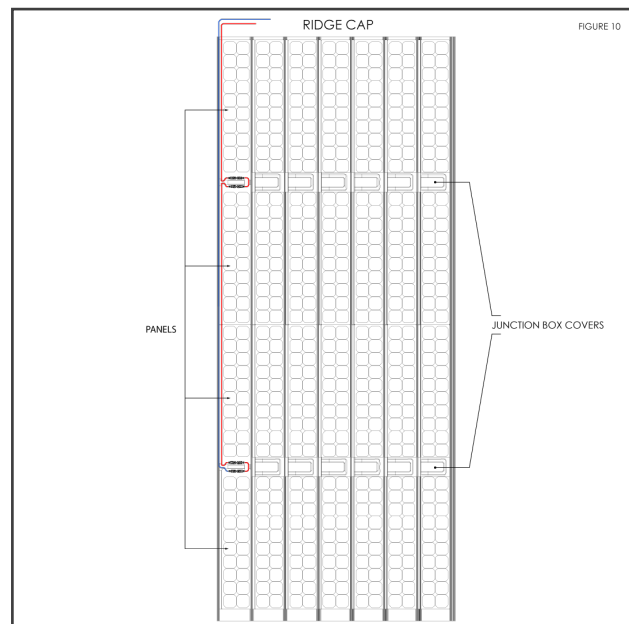


Figure 10. Shows a full roof section of 4 modules in each channel.

When connecting the AP Smart component, it is important to understand the limitations with the PowerFit20 modules. No more than (6) modules should be connected in series to one AP Smart component. Doing any more will result in failure of the PV system.

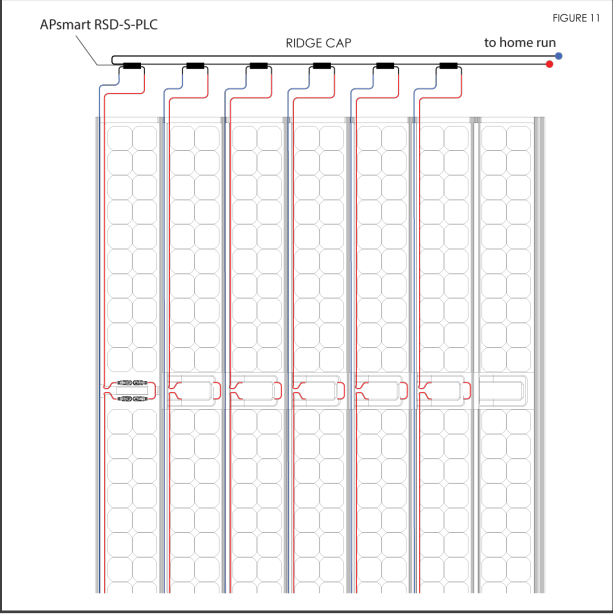


Figure 11. Shows the proper connections of the AP Smart components using (1) AP Smart component for each standing seam.

## 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 (4mm<sup>2</sup>). 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 from Staubli ([www.staubli-alternative-energies.com](http://www.staubli-alternative-energies.com)). Using any other connector with a Sunflare PowerFit20 module will void the warranty.

### Fuses

All Sunflare PowerFit20 modules must be protected by appropriate overcurrent protection devices per NEC guidelines. The maximum series fuse rating for the PowerFit20 module is 12A. Follow all NEC guidelines for fuse rating requirements including size and type.

### Connecting in Series

Only connect PowerFit20 modules in series strings and protect each series from other paralleled strings with proper overcurrent protection. It is recommended that no more than 6 modules should be in series per an AP Smart component. No more than 20 AP Smart components should then be connected in series.

## Maintenance and Repair

The Sunflare PowerFit20 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 6 months.

Read these installation instructions thoroughly before inspecting or servicing a Sunflare PowerFit20 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 WMS junction box 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 surface.

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 junction 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

The Sunflare PowerFit20 module does not require cleaning except in the case of heavy soiling from dust or ash. If cleaning is found necessary to achieve desired power performance, then it should only be cleaned by professional solar module 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, soaps, detergents or robotic cleaners intended for use over glass modules to clean the PowerFit20 modules. Use only water, and if required a soft sponge. Do not use soap or detergents to clean the module. 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 top sheet 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 PowerFit20 product. Those sections are only relevant to products that are mounted above the roof surface and thus do not apply to the adhered PowerFit20 module. Set the effective wind area equal to one module.

## Liability Limitation

Sunflare is not in control of the installation of the module and hence does not accept responsibility nor liability for damages arising from improper use, incorrect installation, operation, or maintenance of the product.

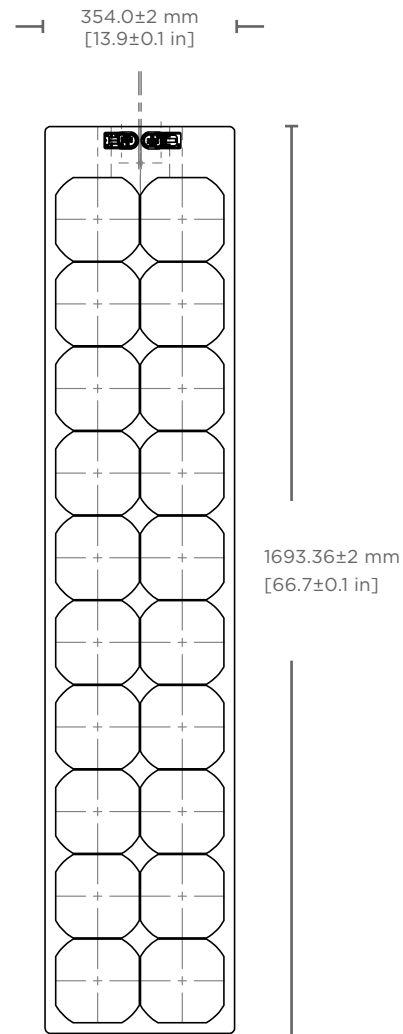
The information provided by this manual is based upon Sunflare’s knowledge and understanding and is believed to be correct and reliable. However, the customer is responsible for the installation, operation and maintenance of the product and any damage that might occur to the product or the roof as a consequence of those activities even if the customer followed guidelines and descriptions set forth in this manual. Sunflare takes no responsibility for material incompatibility between Sunflare components and non-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

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Web: www.sunflaresolar.com

## Revision History

Document	Date of Revision
Sunflare_PowerFit20_Installation_instruction_V1	06/07/2021
Sunflare_PowerFit20_Installation_instruction_V2	07/08/2021
Sunflare_PowerFit20_Installation_instruction_V3	09/20/2021