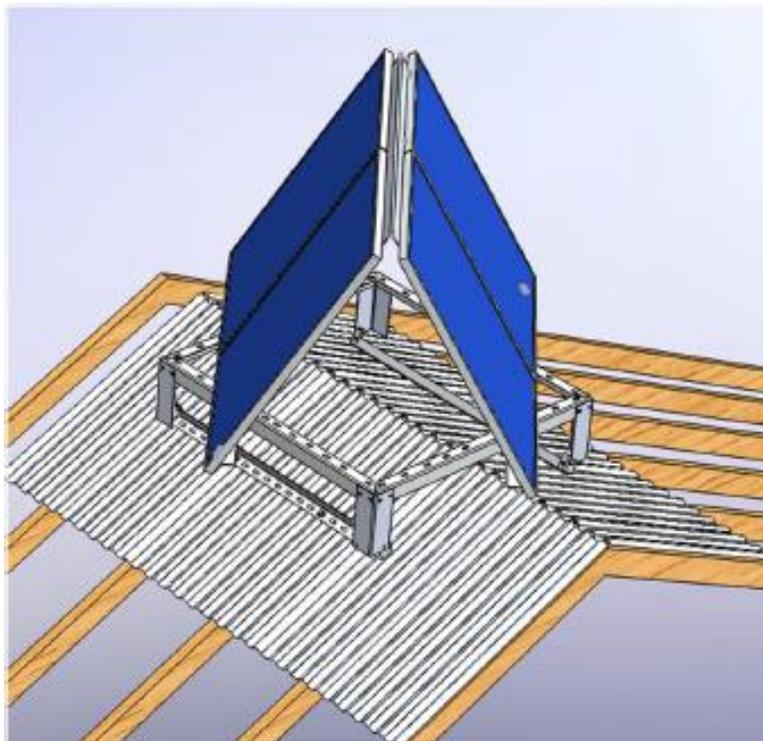


# SunDancer<sup>DC-Powered Refrigeration</sup>



## **Roof Mount PV** ***Installation Manual***

Version 12.2018

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## Introduction

- The SunDanzer unit is designed for use without a battery. It contains icepacks filled with a patented, proprietary solution which freezes at 4°C. This solution is the “thermal battery”.
- The unit is designed to operate with the components listed on the next page The Solar Module Mounting frame is designed to allow secure placement on top of a sloped surface (for a flat roof, attach modules with masonry screws, not included).
- When locating the placement of the roof mount system, ensure no shadows fall on the modules during sunlight hours to maximize power generation.
- The innovative SunDanzer direct drive system orients the solar modules East and West for longer power compressor run time compared to traditional equator orientation.



## Health and Safety

### Prior to Installation

At delivery, check that the appliance is complete and has not been damaged during transport. Do not connect the appliance if the electrical supply cable or refrigerant circuit are damaged.

### General Safety

- Before cleaning or repositioning the appliance, always disconnect the power supply.
- Only a trained or authorized technician should service the appliance. The appliance contains refrigerant R-134a and POE oil in the refrigerant circuit.
- Do not use other electrical appliances inside the unit.

### Child Safety

- Keep children away from packaging material.

### Installation Safety

- The appliance is heavy. Be careful when moving.
- Be sure the appliance does not stand on the electrical supply cable. The electrical cable should not be squeezed or bent when the appliance is installed or moved.

## Parts List

Verify all parts before beginning installation:

	<b>QUANTITY</b>	<b>DESCRIPTION</b>
<input type="checkbox"/>	1	Solar Direct Drive Vaccine Refrigerator
<input type="checkbox"/>	4	Solar modules, 80-100W 12V
<input type="checkbox"/>	1	Grounding Rod
<input type="checkbox"/>	2	Cables with MC4 connectors on both ends
<input type="checkbox"/>	1	Ground wire
<input type="checkbox"/>	1	Apex Rail
<input type="checkbox"/>	2	Module Rail
<input type="checkbox"/>	1	Module Base Table
<input type="checkbox"/>	3	MC4 Branch Connector F-F-M
<input type="checkbox"/>	3	MC4 Branch Connector M-M-F
<input type="checkbox"/>	1	Ground rod clamp
<input type="checkbox"/>	5	Grounding lugs
<input type="checkbox"/>	2	Adjustable wrenches
<input type="checkbox"/>	1	Reamer
<input type="checkbox"/>	1	Hammer
<input type="checkbox"/>	1	Roof Sealant
<input type="checkbox"/>	1	Multi-Screw Driver
<input type="checkbox"/>	1	Compass
<input type="checkbox"/>	4 each	Cable ties
<input type="checkbox"/>	4 each	Cable clips
<input type="checkbox"/>	1	Module Base Table
<input type="checkbox"/>	4	Stabilizing Plates

# Component Identification

1 x Vaccine Refrigerator



4 x Solar Modules



1 x Grounding Rod



1 x Grounding Rod Clamp



5 x Grounding Lugs



1 x Grounding Wire



3 x MC4 branch connectors F-F-M



3 x MC4 branch connectors M-M-F





4 x Wire Clips



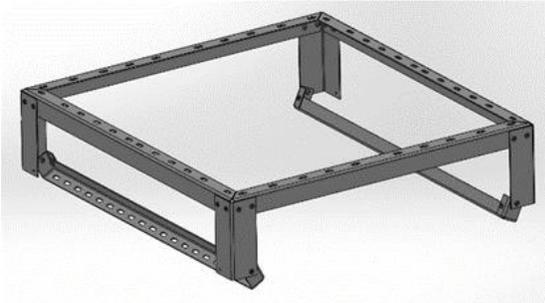
4 x Zip Ties

2 x Black cables with MC4 connectors on both ends

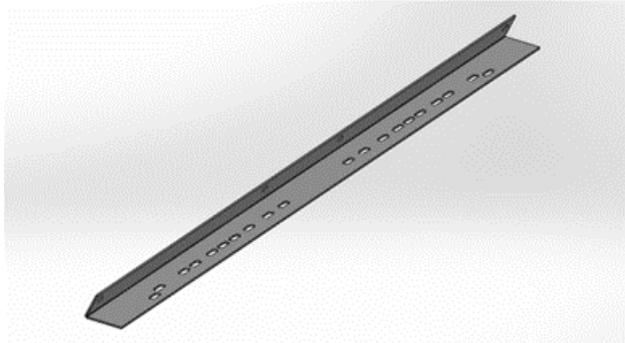


### MOUNTING STRUCTURE COMPONENTS

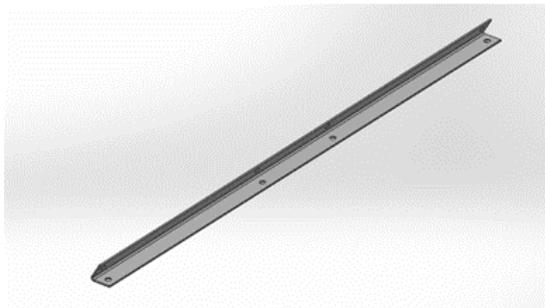
1 x Base Table



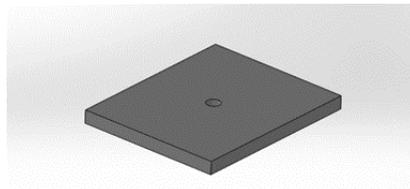
2 x Module Rail



1 x Apex Rail



4 x Stabilizing Plates



### MOUNTING STRUCTURE COMPONENTS (CONT)

Roof Sealant



Compass



### MOUNTING FASTENER KIT

4 x 5/16" by 3" wood screws



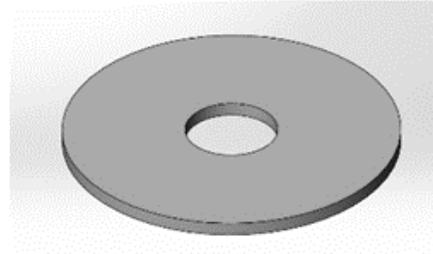
4 x 5/16" by 4" wood screws



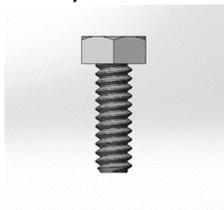
4 x 5/16" by 5" wood screws



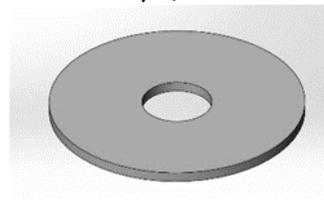
4 x 1/4" x 1" washers



2 x 1/4" by 1" Hex Screws



20 x 1/4" by 5/8" washers



## MOUNTING FASTENER KIT (CONT)

13 x ¼" by 5/8" Hex screws



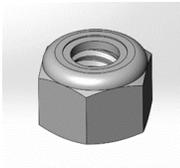
2 x ¼" by 1" security screw



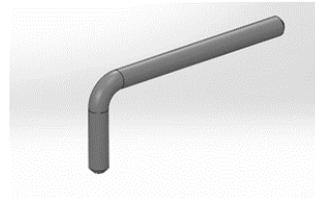
4 x ¼" by 5/8" security screws



20 x ¼" lock-nuts



1 x Security wrench



## TOOL KIT

Adjustable Wrench x 2



Hammer



Punch Tool



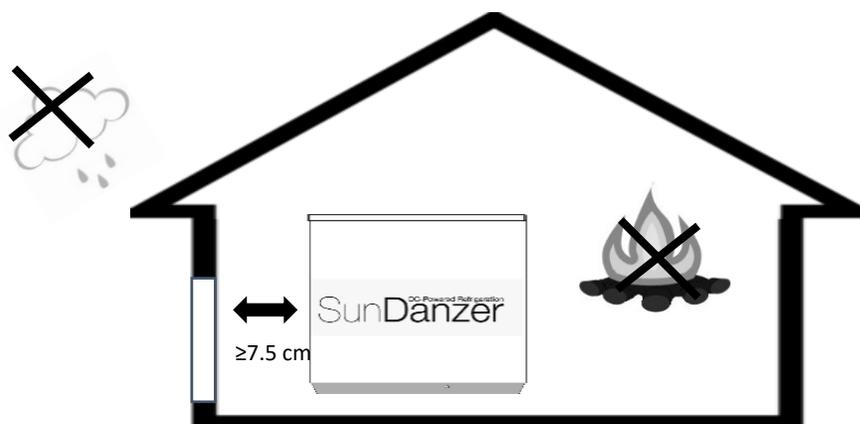
Multi Screwdriver



**Note:**  
Some spare fasteners are included

**Recommended Tools NOT included**  
Ladder, cordless drill, drill set, tape measure, marking pen, safety fall arrest, gloves

## Positioning the Refrigerator



### Location

- Install in cool, dry, and suitably ventilated area.
- Place refrigerator horizontally on flat, firm, and stable surface resting level on wheels.
- Use wood or metal shims to level the appliance, if necessary.
- Do not place the appliance close to heat (e.g., heater, stove, boiler), and avoid prolonged exposure to direct sunlight.
- Ensure adequate space (3 inches or 7.5 cm recommended) between the appliance and walls or large objects. This provides sufficient airflow, efficient operation, and longer life.
- Keep the air vent opening at the base of the unit free from dust and obstructions.
- If the unit will not be in service, let it warm to room temperature with the lid closed, then leave the lid partially open for ventilation.

### Starting the Appliance

- Let unit stand for **2 hours before starting** to allow refrigerant oil to settle.
- If the appliance has been standing on its side or end, allow it to stand in the normal operating position for 12 hours before turning on.
- After connecting the appliance to the power source, move the switch on the bottom front side of the refrigerator to the ON position. The compressor will automatically start and the cabinet will begin cooling.
- **Allow the refrigerator to cool for at least 3 days before adding vaccines to ensure sufficient time to cool the thermal storage packs.**

### Important notes

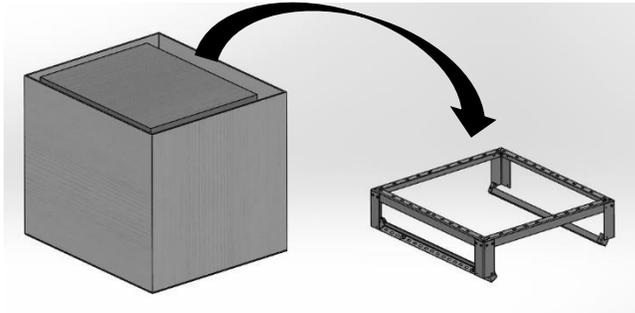
- The refrigerator should only be connected to the solar modules using the MC4 connectors provided. DO NOT connect to an alternative electric source.
- The unit has an on-off switch located on the front.

## Installing the Roof Mount Solar Array

Assembly requires 2 people

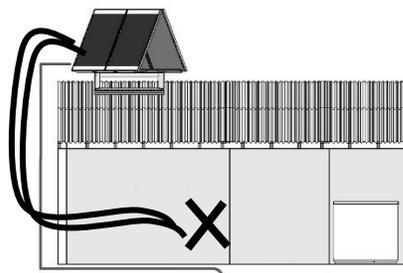
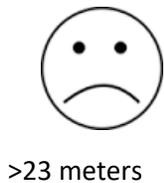
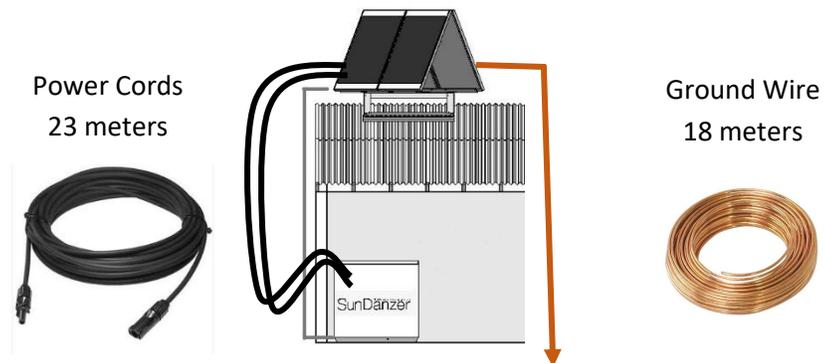


### 1) Unpack roof-mount base

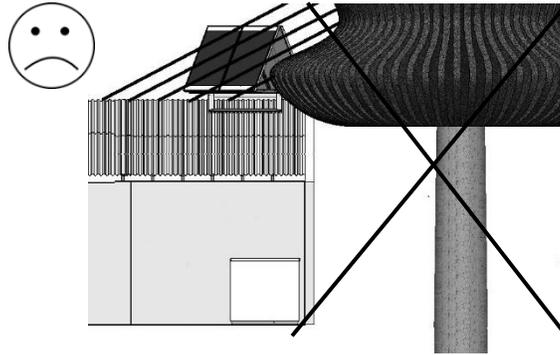


### 2) Select mounting location

- a. Included power cords are 75' (23 meters) and must be able to reach your SunDänzer refrigerator from the roof-mounted array. The 60' (18 meters) grounding wire must reach from your array to the ground.

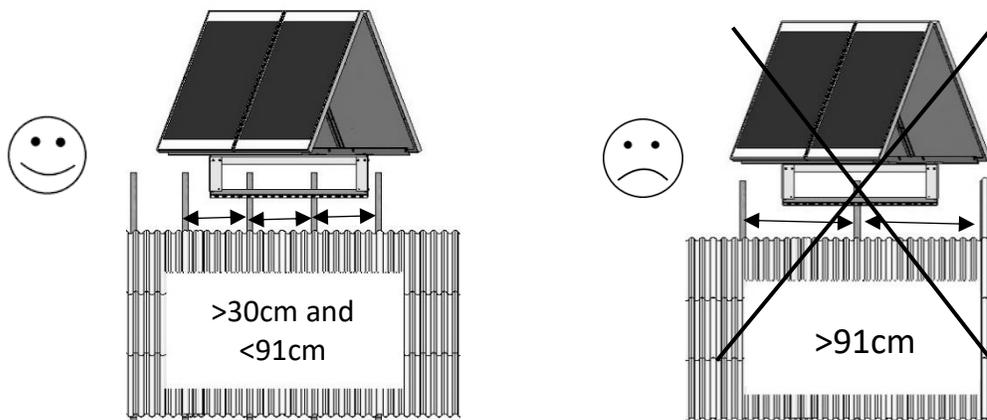


- b. Do not mount the array where it is shaded by trees or buildings.

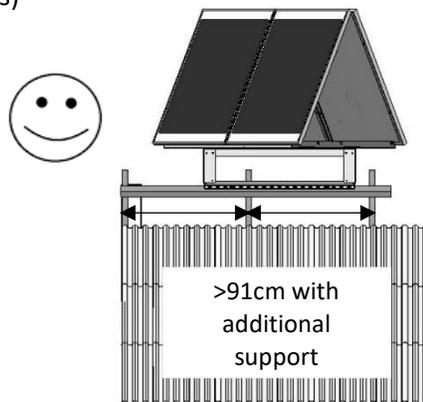


3) Locate and examine rafters

- a. The Roof Mount base must be secured to at least two rafters. The rafters must be a minimum of 30cm apart to keep the modules from shaking in high winds, and a maximum of 91cm apart.

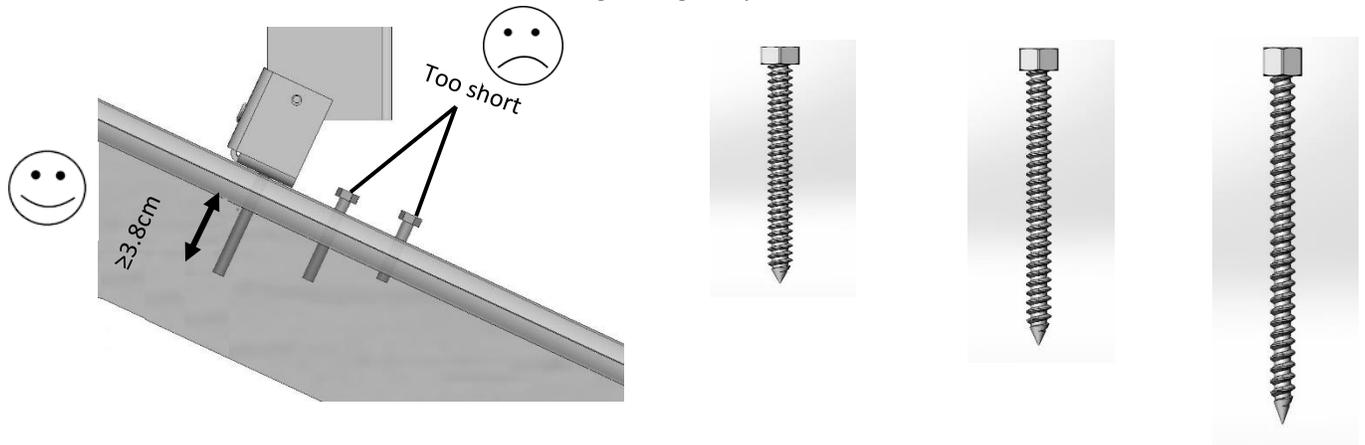


- b. If the base cannot be secured in this manner, additional materials will be needed (i.e. wooden boards)

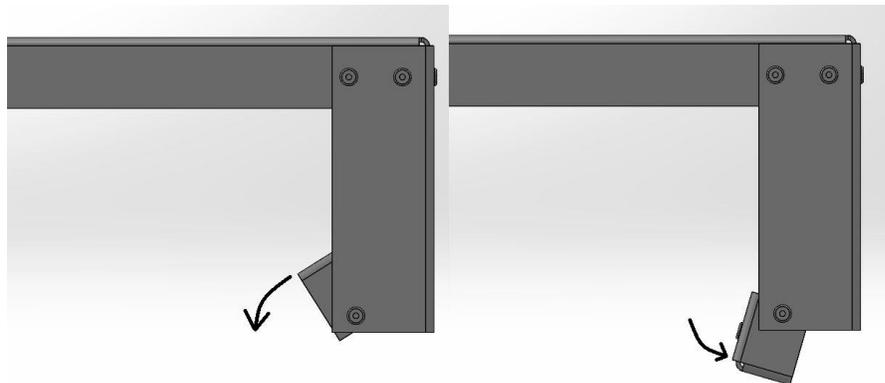


- c. Mark rafter location in a way they can be seen once on the roof.

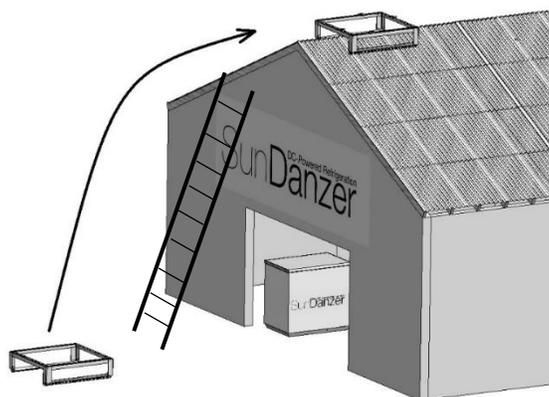
- d. Select screw size from included options based upon internal distance from roof to rafter.
- i. Ensure the screw is long enough to penetrate the rafter at least 3 cm.



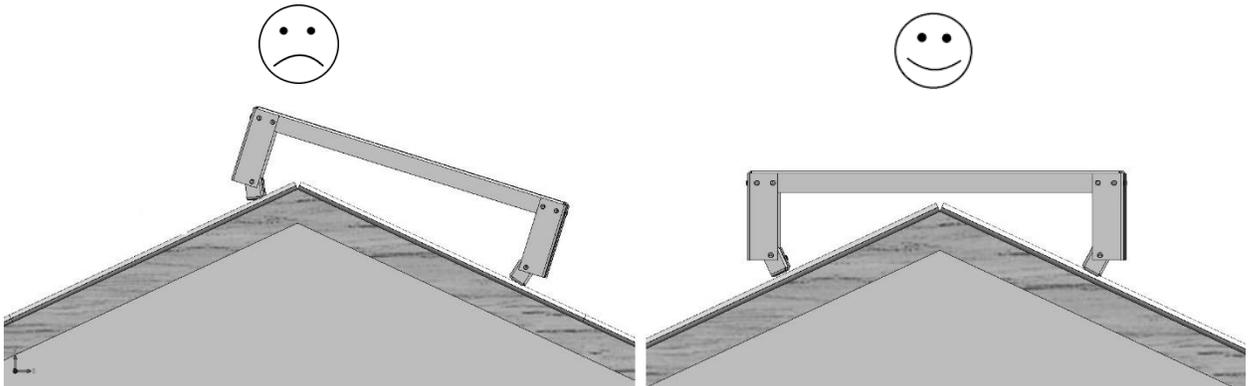
- 4) Position base on roof
- a. Unfold the mounting feet from the legs of the base.



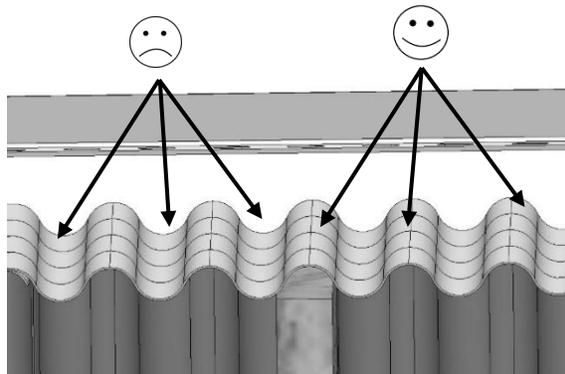
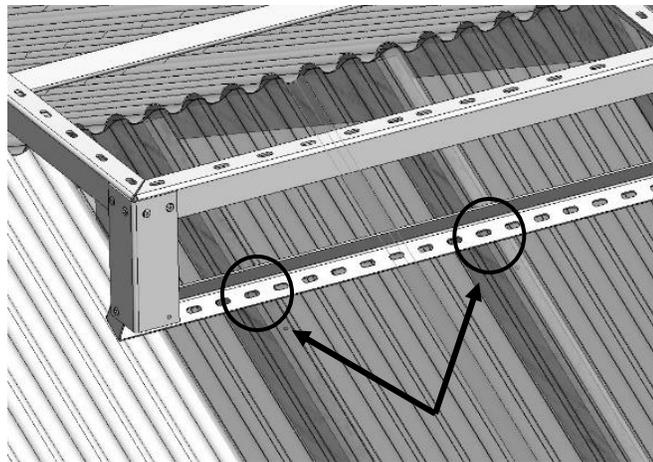
- b. Position roof mount structure onto roof.



- c. With the holes of the feet facing the roof, position feet so the top of the base is level and feet are flush with roof. Adjust (rotate) the feet as necessary.

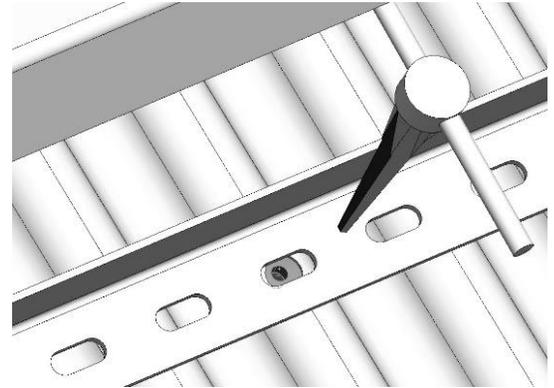
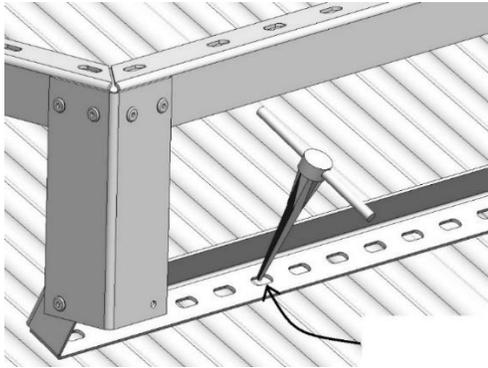


- d. Align holes in the feet with rafters, using marks from step 3.c.  
e. Mark a minimum of two holes for each foot. If possible, make the holes on the crests of corrugated roofing material to prevent water flowing over the mounting holes.



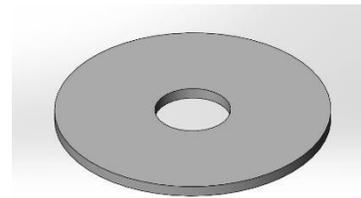
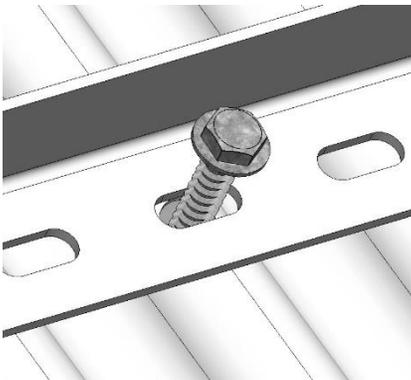
5) Create holes for mount

- a. Using the reamer and hammer, make pilot holes in the roof big enough to insert the screws (5/16" or 8mm) to a depth of 1cm.



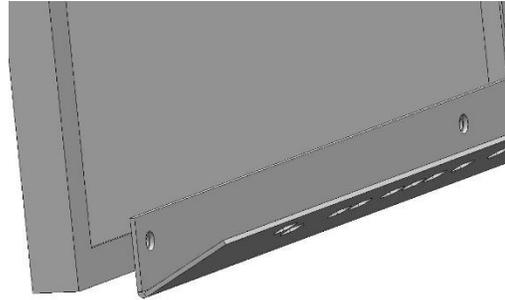
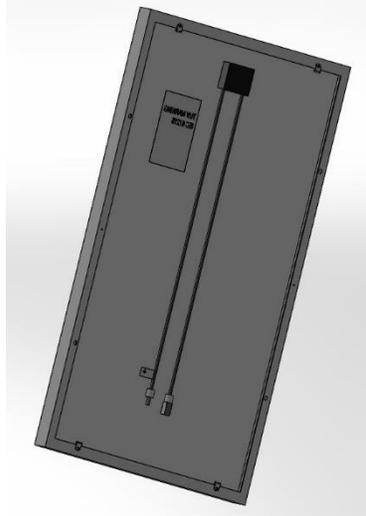
6) Attach feet using screws

- a. Put a 5/16" washer on each of the four 5/16" screws chosen from step 3.d. Using the included wrench, insert all 4 screws (minimum number) half way.

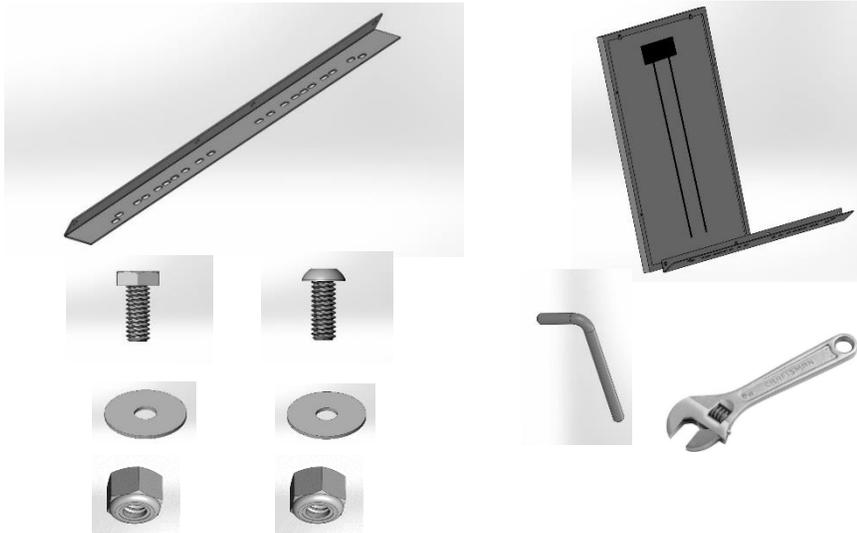


- b. Use the silicone sealant to seal around each hole. Use enough sealant so the hole is rain-proof.
- c. Complete tightening all screws. Apply remaining sealant around holes after tightening.

- 7) Prepare modules to be lifted to the roof.
- a. Carefully lean one solar module against a wall with the glass facing the wall and the wire junction box visible at the bottom.



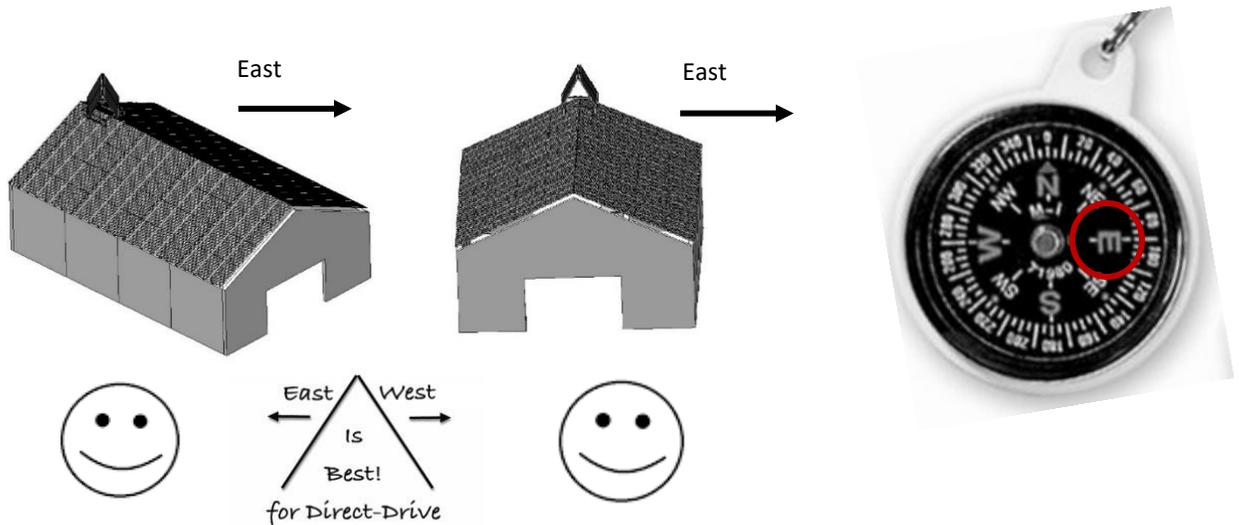
- b. Select one of the two “Module Rails” and line up one pair of circular holes with the holes in the frame as shown below.
- c. Screw in one 5/8” length hex screw with a 1/4” washer and lock nut with the wrench through the Module Rail in order to attach it to the solar module. In addition, attach one 5/8” length **security** screw with a 1/4” washer and lock nut through the Module Rail to attach the other side of the module

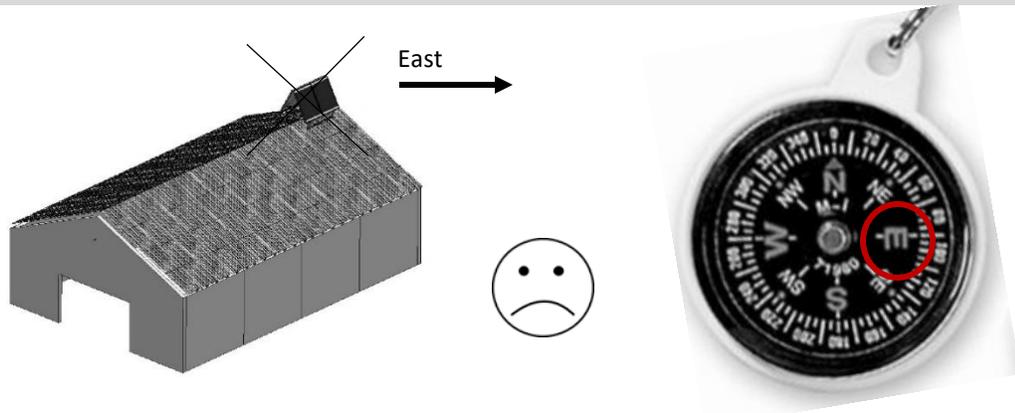


- d. Repeat Steps 7a-7c for the second solar module and Module Rail.
- e. Select the "Apex Rail" and use two of the 5/8" length hex screws and two 1/4" washers to attach as shown in the image below to one of the solar modules already attached to the module rail.



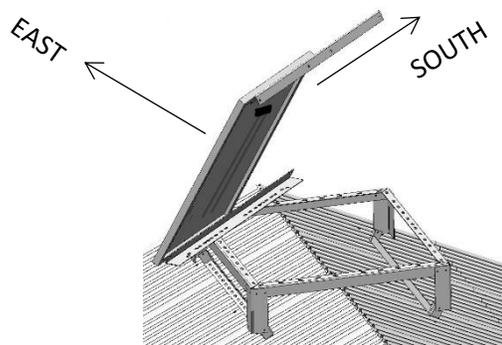
- 8) Plan which direction to mount the modules.
  - a. The SunDanzer Roof Mount Solar Array allows you to point the modules east –west regardless of the orientation of the building. Use the compass to determine which direction is east. Avoid using the compass while standing on or near large metal objects, including a corrugated metal roof, to ensure compass accuracy.
  - b. One pair of modules should face East, the others, West



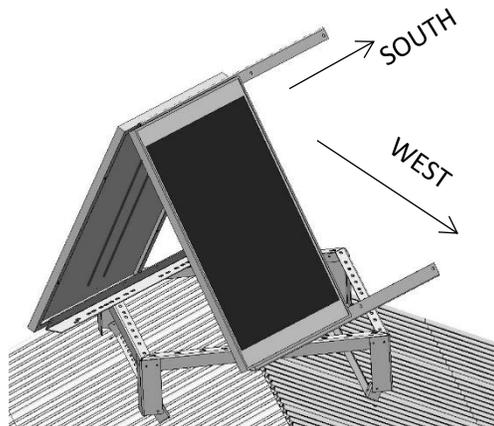


9) Lift modules up to the roof one at a time.

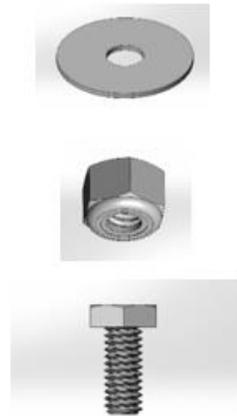
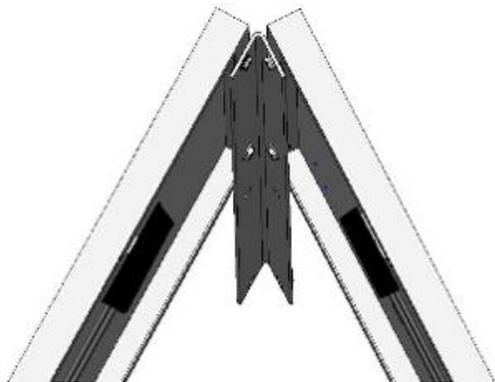
- a. Carry the solar module with Module Rail and Apex Rail attached onto the roof and set facing east. The wires should hang down from the top of the module.



- b. Bring fastener kit and second solar module (with Module Rail attached) onto the roof and set facing west.

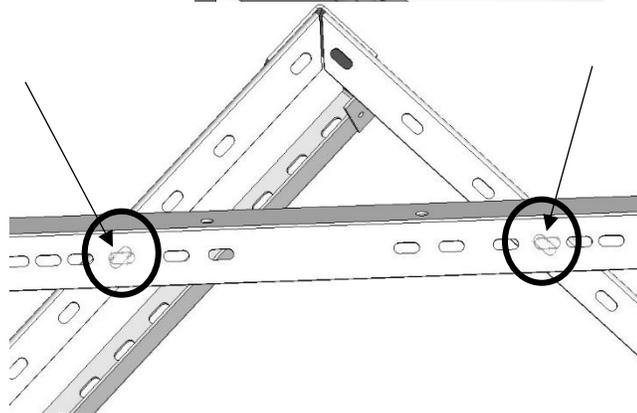
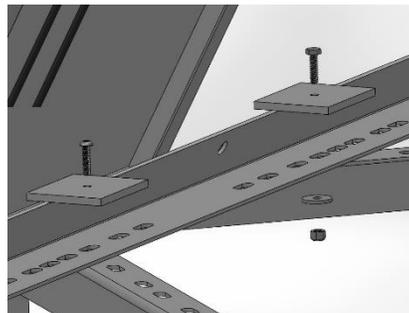
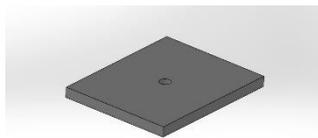


- c. Holding the two modules in the shape of a triangle, attach the second module to the Apex Rail as shown below. Fasten with two 5/8" length hex screws, 1/4" washers and locking nut. One installer must hold the apex while the other proceeds to fastening the additional screws, washers, and locking nut. Once the modules are attached in this shape, do not bend the Apex Rail by pushing the modules together or forcing them apart.

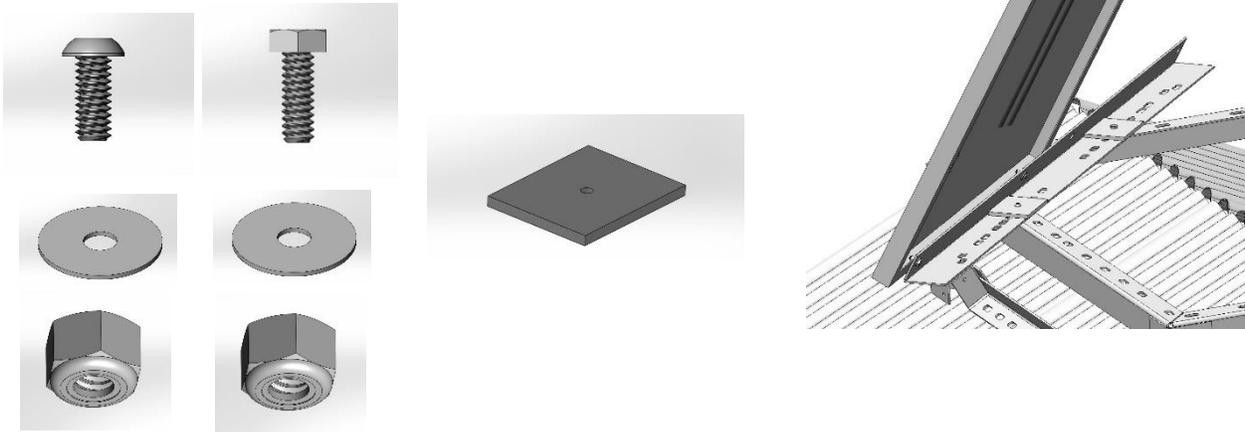


10) Align and mount the first two modules.

- a. Using two Stabilizing Plates, one 1/4" by 1" length security screw, one 1/4" by 1" length hex screw, two 1/4" washers and two 1/4" nuts, find two pairs of slots in the Module Rail and Roof Mount that line up. Use these components to attach the Module Rail to the modules as shown below.

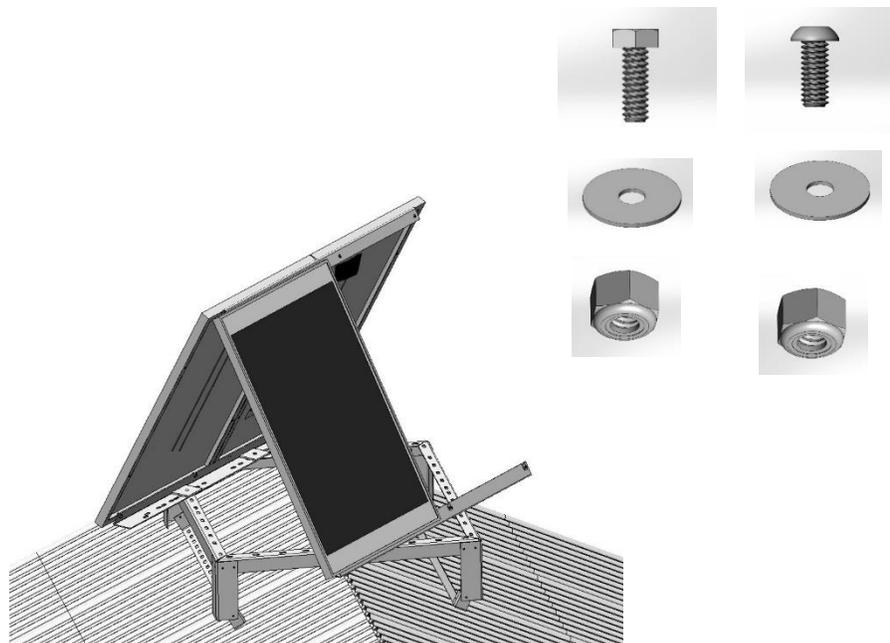


- b. Locate two more pairs of slots that match up on the other side and attach in the same manner using the remaining 1" length hex and security screws. Once complete, let go of the modules.



11) Install the last two modules.

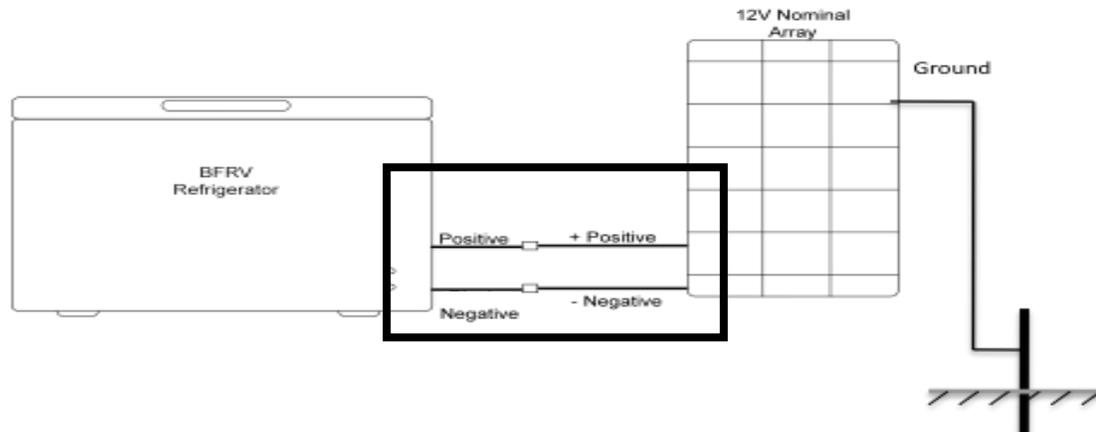
- a. Bring the third module onto the roof.
- b. Position the module on the triangle built in the previous step.
- c. Using three 5/8 length hex screws and one 5/8 length security screw, attach the module to the structure in the same manner. Remember to include a 1/4" washer on each screw. The attachment at the Apex Rail uses the two hex screws, while the attachments to the Module Rails use one hex screw and one security screw.



- d. Repeat Steps 11a-c for the fourth module.



## PV Cable Assembly and Connection



The modules should be connected **directly** to the SunDanzer unit using the #10 AWG wire and the MC4 connectors. Once the modules are mounted, wire in **parallel** using the provided F-F-M and M-M-F MC4 branch connectors. Two modules should be connected in parallel using the branch connectors, and two pairs of modules should be connected in parallel, using branch connectors as well. Please see the diagram and pictures on the following pages.

Three branch connectors should be used for the positive line and three for the negative line. Once all four modules are connected in parallel, the array should be connected directly to the refrigerator using the supplied black 23-meter wires with MC4 connectors on each end.

Both the modules and the SunDanzer unit are equipped with MC4 connectors. All MC4 connections have been factory-made in accordance with the manufacturer's instructions and should not be modified. Do not attempt to shorten or lengthen the supplied wires

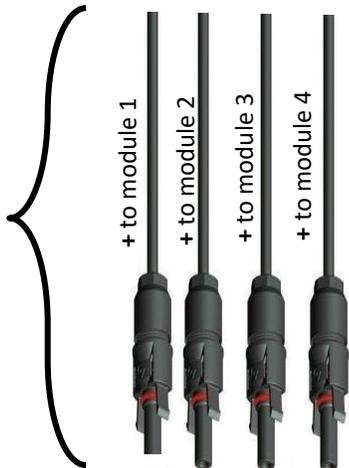
**This appliance operates on 12V DC (direct current) only!**

**Under no circumstances should this appliance be connected to an AC (alternating current) power source.**

+

-

PV Module



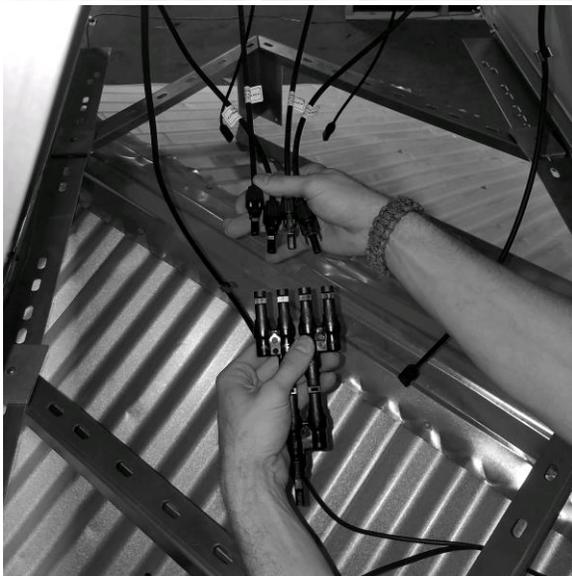
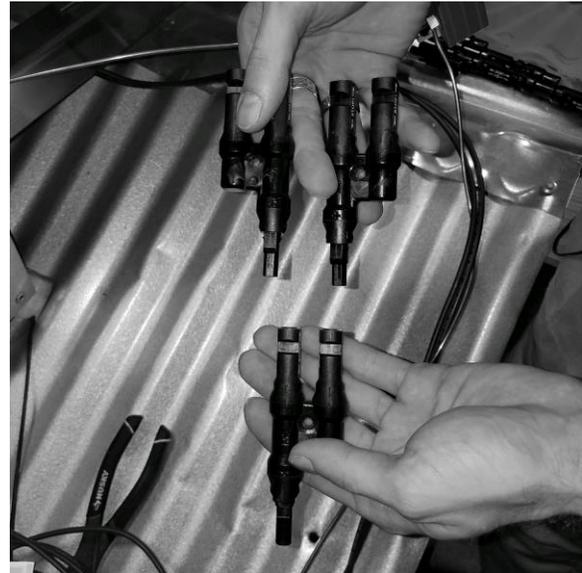
Branch Connectors



23m long PV cable



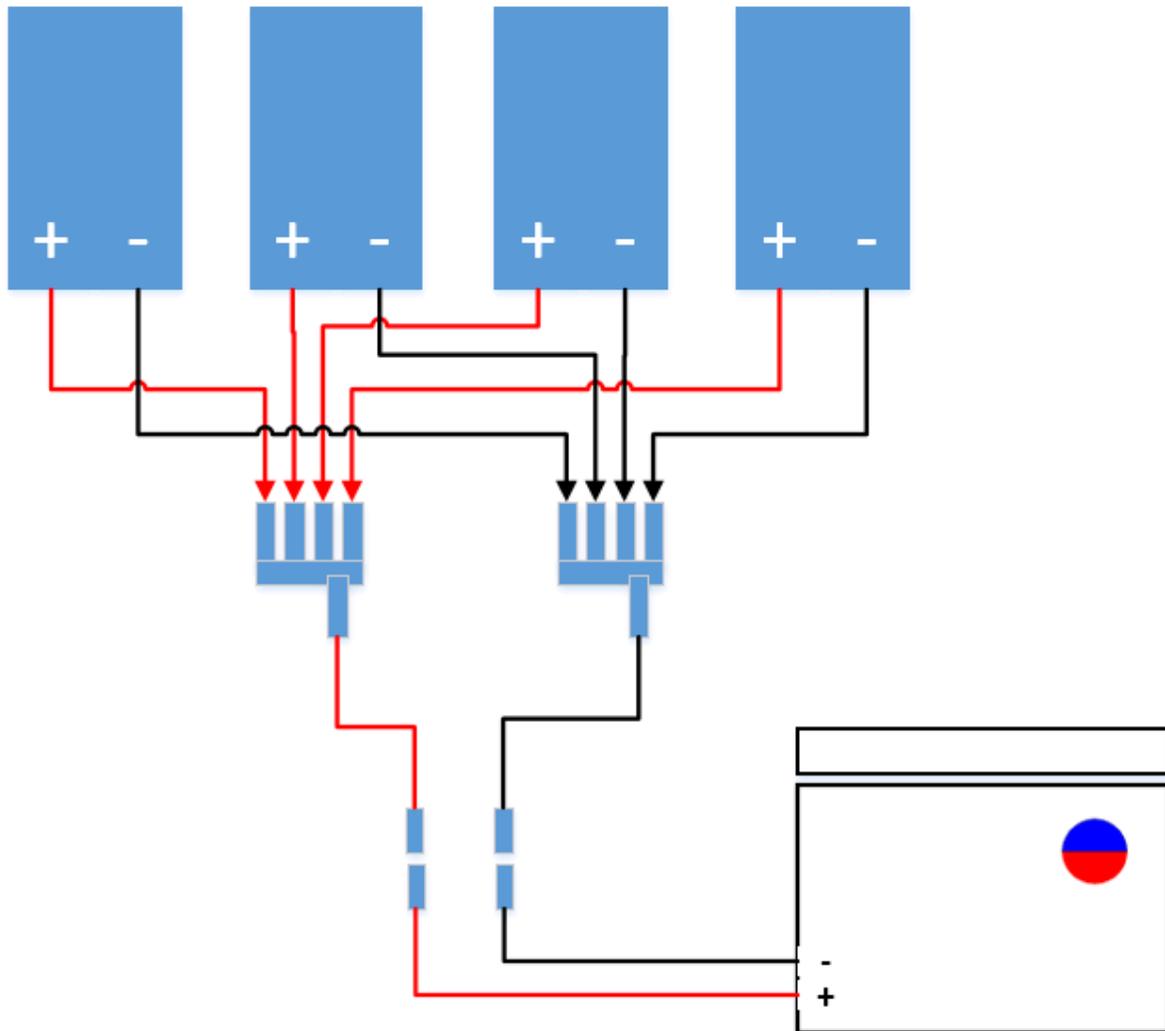
**STEP 1:** Assemble 3 branch connectors of each type. While on the roof, connect all positive cables to branch connector assembly. Repeat for cables marked negative.



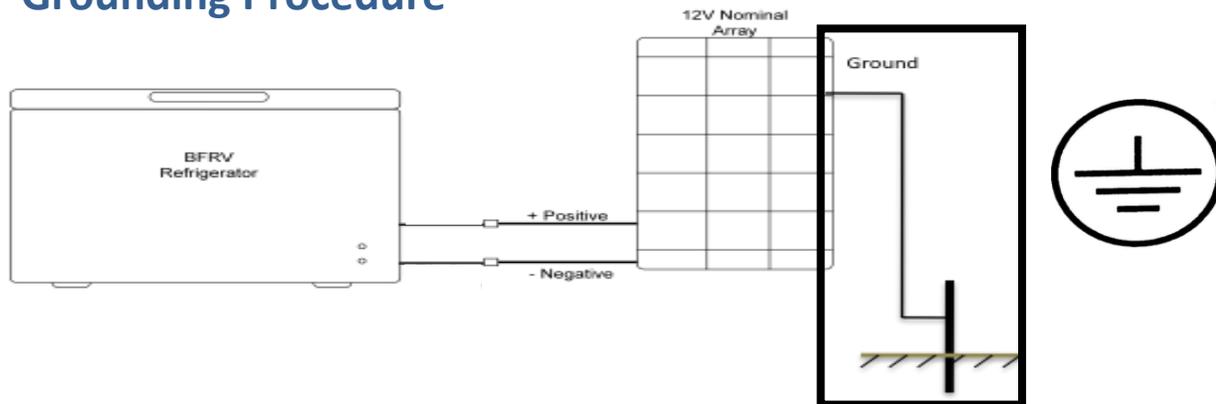
**STEP 2:** Connect the PV wires marked positive and negative to the branch connectors.

**STEP 3:** Route all wires neatly and securely into building. If wires enter the building through a window, create a drip loop to prevent rain and water from entering the building via the wires.

## Wiring Diagram



## Grounding Procedure

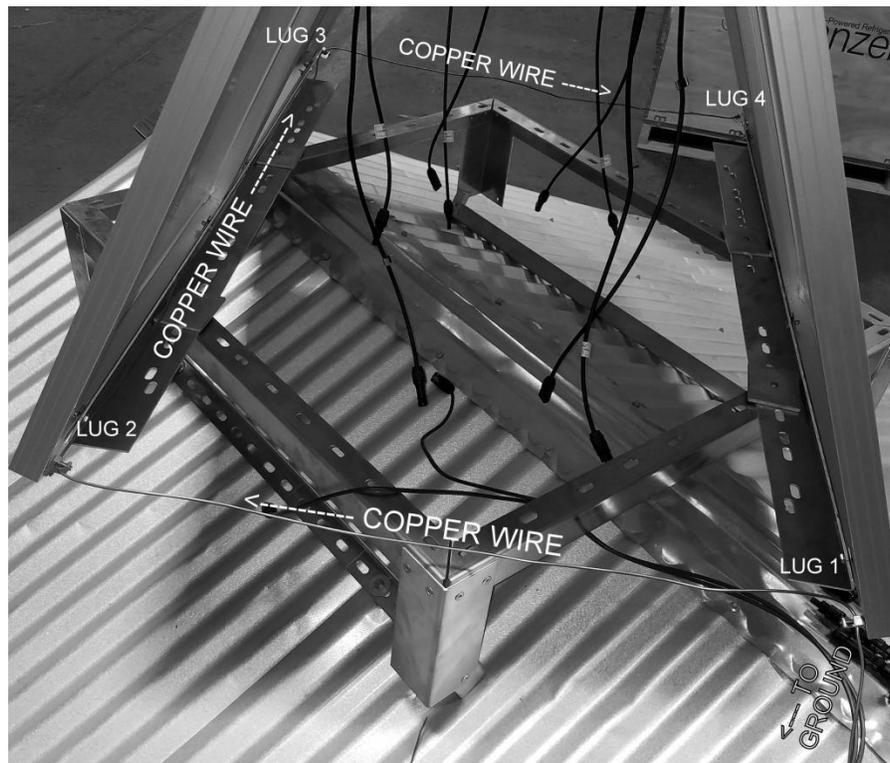


**STEP 1:** Attach grounding lug to each module at the Module Rail ends with screw.

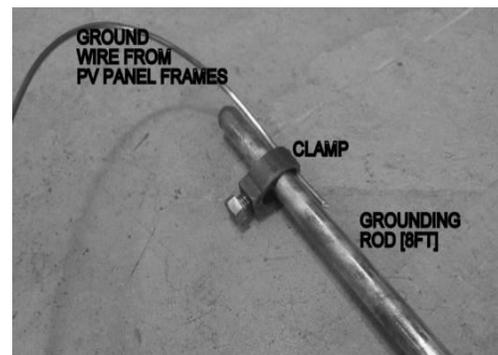


1a. Drill a 3/16" hole in roof rack and attach the 5<sup>th</sup> grounding lug.

**STEP 2:** Attach bare copper wire to each grounding lug, beginning at Lug 4 (see picture) and ending with Lug 1. Take grounding wire down to the ground.

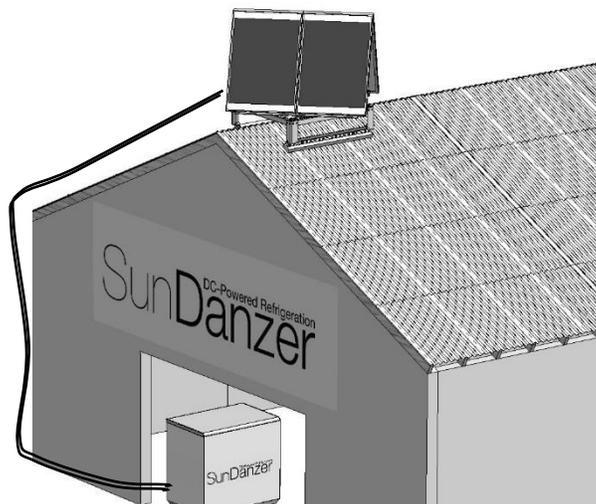
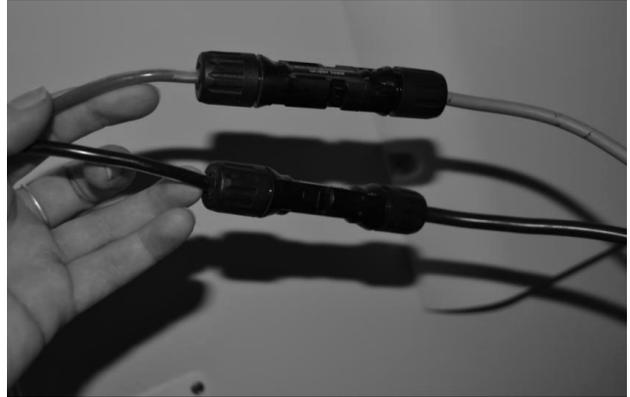


**STEP 3:** Drive grounding rod into the soil straight or at an angle leaving 20 cm of rod exposed. Securely attach ground wire to the rod with clamp.



## Connecting the Power to Refrigerator

**STEP 5:** Route the cables from the roof into the building and connect to the refrigerator.



## Installation Complete!

### **BFRV55 AND BFRV15 success =**

- ✘ Turn the refrigerator on and the Green LED light illuminates, and a humming noise comes from the compressor.

### **BFRV55 AND BFRV15 troubleshooting =**

- ✘ Red LED light blinks; refer to refrigerator manual trouble shooting guide.

Contact SunDanzer:  
SMS Text 1.520.329.5329  
Medical@sundanzer.com  
www.SunDanzer.com