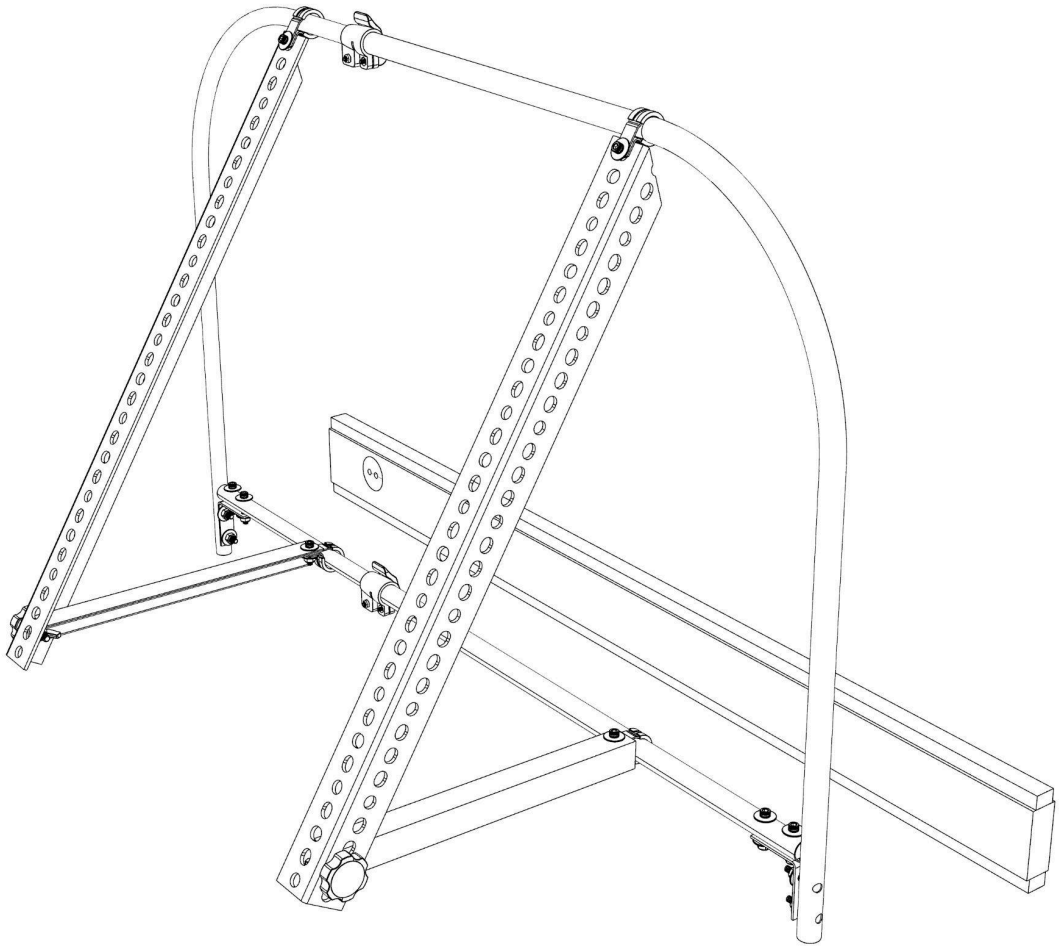
Adjustable 50W Window Mount V1.0

User Manual Version 01112025

ENERGY TRANSITION DESIGN



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Important Safety Information

- Read all the instructions before installing this product.
- The 50W Window Mount is NOT guaranteed to be in compliance with any residential building code.
- This product does NOT replace child safety bars, which may be required by law in some jurisdictions. This product cannot support the weight of a person.
- Do NOT install this in a window used as an emergency exit.
- Use of this product may limit the ability to lock the window.
- This product is NOT intended to withstand high winds. Deinstall the device prior to a major weather event.

Installation safety:

- Wear work gloves and safety glasses when installing. (This product has sharp edges you should be aware of when working with it.)
- The installation requires 2 people.
- Use the same precautions as you would if you were installing a heavy window mounted AC unit.
- If installed at high elevations or above a heavily trafficked area, it must be screwed into the window frame. While it is not always required in other contexts, it's a good practice to always screw the mount into the window frame for additional support.
- Never lean out the window when installing or deinstalling this product.

Additional Disclaimers:

- The specific installation method described and this style of mount in general is not appropriate for all window types and dimensions. If this mount does not fit securely and safely in your specific window, do not use it.
- All energy performance characteristics and formulas described in this document are meant purely as a loose guide and are NOT to be relied upon for your specific context.

ENERGY TRANSITION DESIGN

General Information

About Energy Transition Design LLC

Energy Transition Design LLC (ETD) is an education and technology design studio for the energy transition, based in NYC. Our mission is to make the energy transition more equitable, accessible, and understandable through user-centered and energy-centered design practices. We produce educational and accessible renewable energy products and services for all sorts of folks.

We are an extremely small company. We work slow and have a limited ability for customer service, but we do our best! Email yo@energytransitiondesign.com with any questions.

About this Product

This product is designed for renters who are typically unable to own and benefit from solar power systems. To address this need, we have designed an adjustable solar panel mount that installs in a double-hung window, in a similar way as a standard air conditioning unit. While we recommend screwing the mount into the window frame to be extra secure (as you would with an AC), in many contexts, you do not need to and it can be used completely non-invasively. Basically, you can now have a solar panel without losing your security deposit!

There are two versions of this mount:

- Small - for window openings between 22”-29”
- Large - for window openings between 29”-36.5”

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Selecting a Window

Your solar panel should always face towards the equator. In the northern hemisphere, this means that a southern orientation is best. In the southern hemisphere, a northern orientation is best. East and west will also work, but usually receive less light.

You must consider any obstructions, like trees or buildings, that may block sunlight. If there are obstructions, your solar panel will under perform.

The use of this product may restrict your ability to lock the window as you would normally. A window lock is included with this product, but it is not intended for security purposes. It is primarily intended to help keep the window securely in place for the weather barrier.

Double-Hung Windows

This mount is intended for double-hung windows with ¾” channels on both sides.

A double-hung window (pictured right) is a type of window where both the bottom and top window sections (called “sashes”) can be opened by moving them up or down.

You cannot install this product with a screen in the bottom section of your window, so you must be able to raise or remove it.

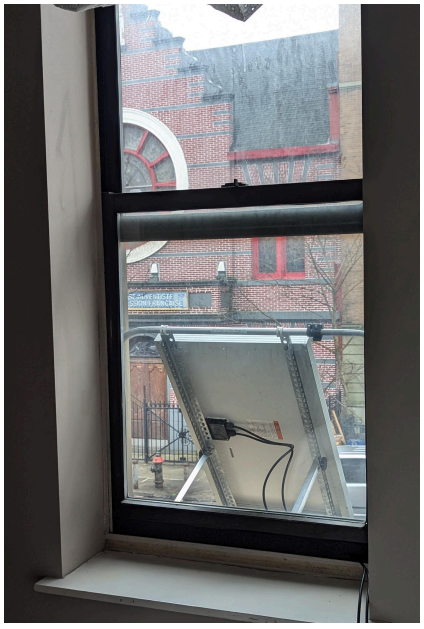

Image: A 50W solar panel mounted in a double-hung window.

Both channels need to be at least ¾” in width and depth. If the width exceeds 1”, we recommend screwing the mount into the frame to minimize wiggling.

Measure the channel width.


Measure the channel depth.

Note: These images depict the mount already in place, for context. You will be measuring these dimensions before installing your mount.

Window and Solar Panel Sizing

Our window mount comes in 2 sizes:

- Small: for windows roughly 22”-29”’ wide
- Large: for windows roughly 29”-36.5” wide

There are 4 primary measurements you need to ensure our solar panel mount will work with your window and solar panel.

1. Window opening width
2. Window frame width
3. Solar panel width
4. Distance between mounting holes on the solar panel

The solar panel width cannot exceed the width of the window. The distance between mounting holes on the back of the solar panel cannot exceed the window frame width minus 7”. **Always ensure that the telescoping tubes overlap by at least 3” when installed.**

Elements of a Solar Power System

While our solar panel mount can be used to support a wide range of types of solar power systems, we anticipate that it will primarily be used in small scale off-grid applications and by users with little to no solar power experience. We have designed our mount to be installed by anyone and, in keeping with that goal, the solar power system described here is as simple and user friendly as possible.

A classic off-grid solar power system is composed of many components. In addition to the solar panel and mounting system – it includes a battery to store energy, a charge controller that manages charging the battery, an inverter that converts the DC electricity produced by the panel into AC electricity suitable for most appliances, protection circuitry like fuses, and wires to connect everything. Rather than sort through this sometimes complicated mess of components, we recommend many users use an all-in-one plug and play power station. These devices dramatically simplify a system by combining most of these components in one box. Modern power stations often also provide smart phone apps for monitoring and controlling the system.

Selecting a Solar Panel and Additional Components

Note: Always follow the instructions provided by manufacturers for any components you purchase. Nothing in this document is intended to supersede or overwrite 3rd party manufacturers’ instructions for their own equipment.

We recommend an inline MC4 fuse placed as close to the solar panel as possible. If you’re purchasing extension cables, your PV cables should not exceed 25’.

Solar Panel Selection

This mount is designed to work with rigid solar modules, up to 50 watts.

You can mount your solar panel in either direction. However, the solar panel cannot be wider than the window opening.

The back of the solar panel frame has holes on either 2 or 4 sides. The mounting holes on the solar panel cannot exceed the width of the window opening minus about 7 inches. This accounts for the window frame and shape of the mount. In the vertical dimension, the holes should not be further than roughly 28.5” away from each other to fit on the 30” long mounting brackets.

Battery Selection

While battery selection is not directly relevant to the mount, when purchasing a battery, keep the following in mind:

- The output of your solar panel must align with the battery specifications.
- A typical solar panel has MC4 connectors on its wires. Most power stations do not have direct inputs for MC4 connections and an adapter must be used. Many power stations come with an MC4 adaptor.
- In general, you don’t want a battery dramatically larger than the solar panel, because it will take a very long time to charge. If you plan on using the battery every day, the solar panel should be able to charge the battery up fully in 1 day on average. If you plan on using the battery less frequently, size it so that it is fully charged and ready for you when you need it.
- We recommend LiFePO4 batteries, because they have a very long lifetime and are safer than other types of lithium-based batteries.

Energy Performance

The energy performance of a solar power system varies extremely widely and depends on the solar module size, available light, temperature, time of year, weather, obstructions, battery size, and human behavior. **This information is meant purely as a rough guide for estimating performance. Energy Transition Design LLC does not make any guarantees about the accuracy of these equations or the energy performance of any system.**

Solar Panel Output

Determining the average power your module will produce is relatively straightforward, if you ignore obstructions.

First, you'll determine the sun hours at your location. A sun hour is when the amount of available light averages 1000W/ m^2, roughly noon on a sunny day. The amount of sun hours in a day depends on where you live and the time of year. Your solar panel will produce additional power at a lower level outside of this window, but we often ignore that when estimating solar production.

Use a solar calculator, like NREL's PV Watts calculator (https://pvwatts.nrel.gov), to determine the average sun hours in your location. Make sure you set the orientation (direction the window faces) and angle of the solar panel for accurate results.

Without a tool, identifying the actual amount of shade caused by obstructions is nearly impossible to do. There are a number of tools that pros use for this, but in lieu of that you'll need to do your best estimating the percentage of sun hours that your solar panel is in shade. Over estimate the amount of shade.

This equation will help you determine how much energy you will produce on average:

Avg Daily Watt Hours DC =
*Solar Panel Wattage DC * Avg Daily Sun Hours * (1 - shade percentage) * .95 derating*

Note: Derating is a measure of inefficiency and because nothing is 100% efficient we're going to assume the system is 95% efficient. (Your specific system may be more or less efficient.)

Next, let's estimate how many days it will take to fully charge the battery when depleted down to 20%. (In general, you don't want to deplete a LiFePO4 battery below 20% or it will decrease its lifespan. This is called the depth of discharge.) This formula will allow you to estimate how long it will take to fully charge:

*Avg Days to Full Charge = (Battery Wh DC * 0.8) / Avg Daily Watt Hours DC*

Load Run Times

To estimate how long a specific appliance can run off of your battery, follow the steps below. DC devices, which include anything USB powered, do not need to be converted to AC. An inverter is used to convert DC electricity to AC and is relatively inefficient. In the equation below, we've assumed the inverter is 85% efficient, which is about average. Your power station or inverter manufacturer can provide specific conversion efficiencies for their products.

*DC Device Run Time Hours = (Battery Wh DC * 0.8 DoD) / Appliance Watts DC*

AC Device Run Time Hours =
*(Battery Wh DC * 0.8 DoD * 0.85 Est. Inverter Conversion Efficiency) / Appliance Watts AC*

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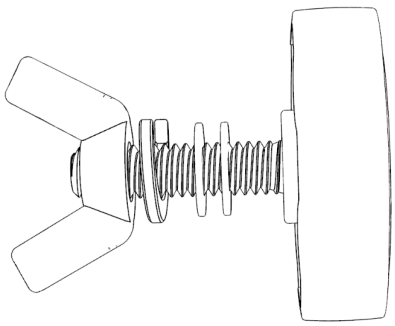
Installation Instructions

Installation Best Practices

- When installing the mount, the solar panel should be disconnected from all electrical devices.
- Don’t try to work with tools to tighten or loosen any components while the mount is hanging out the window – you will likely drop all your hardware on the ground.
- Never work above someone. If someone is standing underneath the window, wait for them to move before commencing work.
- If you care about your work surface, assemble the mount on cardboard or a blanket, to avoid scratching the floor or table.
- Don’t press or rest anything on the underside of the solar panel. The fragile underside is usually white and has an electrical junction box with cables coming out of it. The glass side is actually the more rugged side, though you shouldn’t press on that side either.
- Unless otherwise specified, all bolts should be stacked with 2 washers, 1 lock-washer, and 1 nut – as in the image on the right. The material you are bolting together is sandwiched between washers.
- Always ensure that the telescoping tubes overlap by at least 3” when installed.



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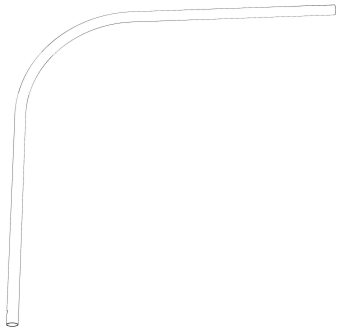
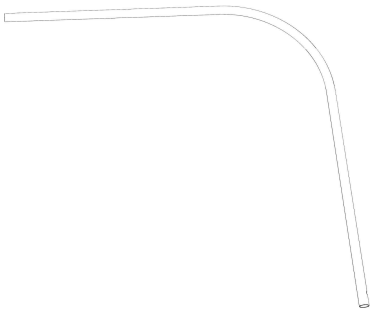
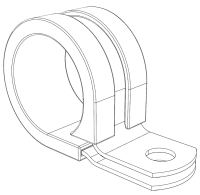
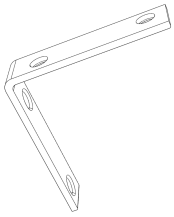
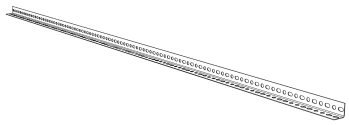
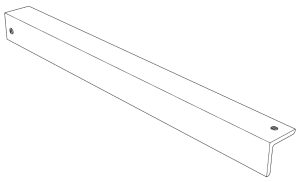
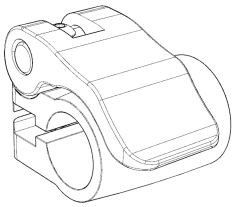
Parts

The window mount is composed of aluminum and galvanized steel components. The fasteners are stainless steel.

 A) ¾” Curved Frame (1x)	 B) ⅝” Curved Frame (1x)	 C) ⅝” Horizontal Frame (1x)
 D) ¾” Horizontal Frame(1x)	 E) Loop Clamps (4x)	 F) Corner Braces (2x)
 G) 30” Mounting Rails (2x)	 H) 12” Support Legs (2x)	 I) Lever Locks (2x)

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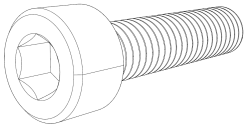
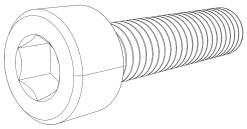
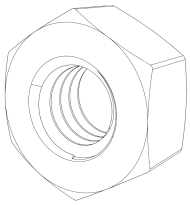
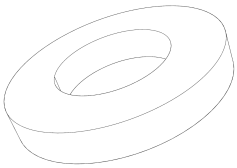
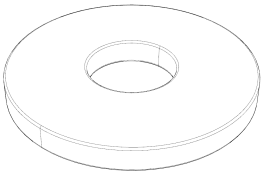
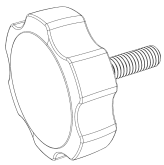
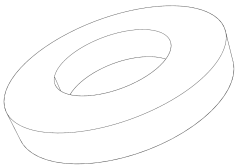
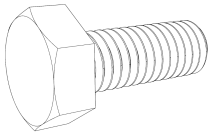
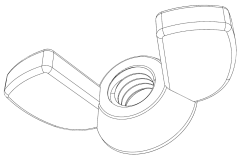
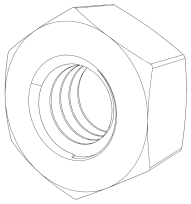
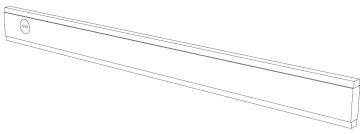
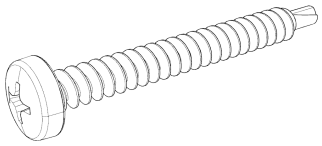
 J) M5 20mm Socket Bolts (8x)	 K) M5 30mm Socket Bolts (4x)	 L) M5 Nuts (12x)
 M) M5 lock washers (12x)	 N) M5 washers (24x)	 O) Oversized washers (8x)
 P) M6 25mm thumb screws (2x)	 Q) M6 washers (12x)	 R) M6 lock washers (6x)

 S) M6 x 16mm Hex Bolts (4x)	 T) M6 Wing Nuts (2x)	 U) M6 Nuts (4x)
 V) Cable entry insulation strip with plug (1x)	 W) 4x 1.5” self tapping screws	

Additional Components
X) Zip ties (2x)
Y) Window locks (2X)

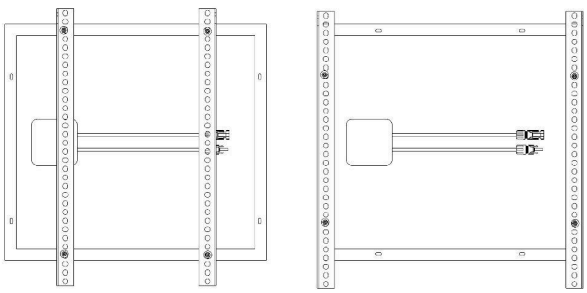
Installation Tools

- Safety glasses and work gloves
- Tape measure
- Box cutter
- Metric and imperial Allen wrench set
- Crescent Wrench and/or pliers
- MC4 Tool (optional)
- Drill (optional)

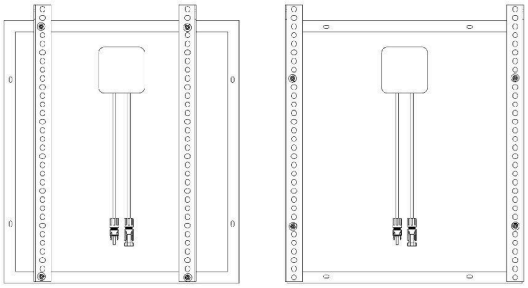
Assemble

1. Attach mounting brackets to the solar panel with 16mm M6 bolts by placing the solar panel face down, as shown in the image. Either portrait or landscape orientations will work with the mount, although they may not work for every solar panel or window. The top of the bracket is indicated by the angled cut on one end. (The angle should face out.) Make sure to leave at least 1 hole free on top – this will be needed to clamp to the frame later on. Use the included oversized washers to attach bolts to the bracket.

Possible Module Orientations

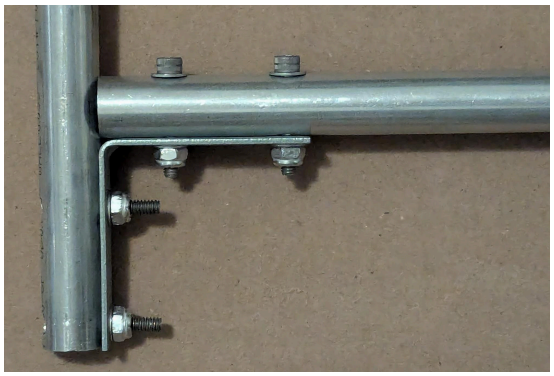


Landscape Orientation



Portrait Orientation

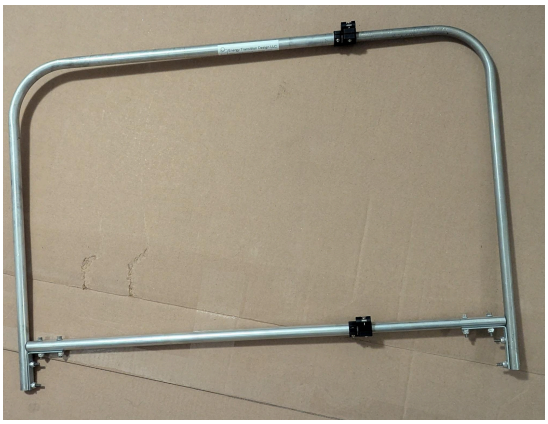
2. Assemble tube frame by using M5 socket bolts to attach the corner braces to the rails. Group them by size (¾” tube to ¾” tube and ⅝” tube to ⅝” tube). The 20mm bolts are used on the vertical piece and the 30mm bolts are used on the horizontal piece. The 20mm bolts are inset.



.

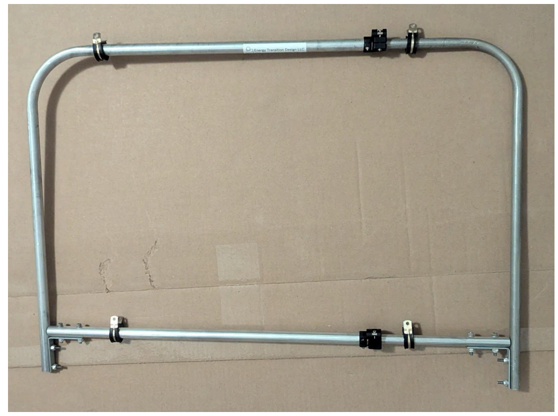
3. Place the level locks on the ¾” tubes and tighten in place. To avoid blocking the window from closing, it is usually necessary to orient the lever vertically, facing out.

   Slide the ⅝” tubes into the ¾” tubes. Tight the lever-side bolt. It is usually easier to tighten when the level is open. When both bolts are tightened and locked, the assembly should not budge when pulled. Note: It is easy to strip the small bolts on the lever locks, so go slow.

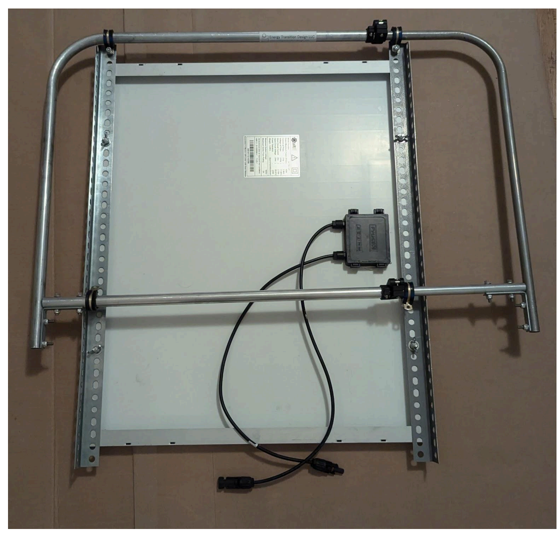


4. Practice putting the frame into the window, without a solar panel on it. This will allow you to understand how the frame will fit into your particular window and it will make it much easier to do once there is a solar panel on it if you already know where it goes. Once you’ve tested placing it in the window, bring it back inside. Set the frame width to be slightly smaller than the window opening and lock in place.

5. Roughly place the loop clamps on the rails – two on top and two on the bottom – with the flat side facing up.



6. Place the frame on top of the solar panel and align the loop clamps to the brackets.



7. Attach the top loop clamps to the brackets with 20mm M5 cap bolts. Use the included oversized washers to attach bolts to the bracket.

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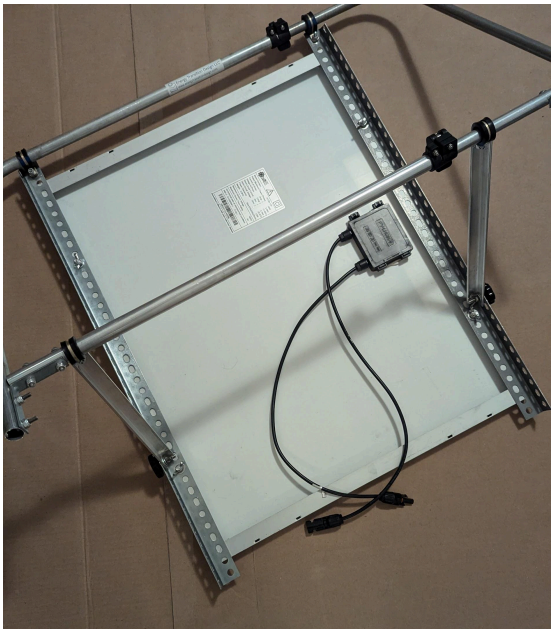
8. Attach the bottom loop clamps to the bottom support legs with 20mm M5 socket bolts. Make sure the loop clamps are all square – use a tape measure if necessary – and tighten them all down. Note that the clamps on the smaller diameter pipes will be a little loose – this allows you to easily adjust the width of the frame without needing to loosen any bolts when placing it in the window.

9. Estimate the angle of your panel and use the M6 thumb screws to secure it in place at the desired angle. If needed, use the included oversized washer to attach bolts to the bracket.



When fully assembled, the mount should look like this. (The exact position of brackets and legs will differ based on the size of the window and solar panel.)

Place in Window

9. Open the quick release clamps so you can change the width of the frame.

Note: If you are using an in-line MC4 fuse, connect it to the positive cable of your solar panel at this point.

10. This step should be done with 2 people for safety. Place the mount in the window and expand the frame into both side channels. Lock it in place. It should fit snugly into place and not move left-to-right. Depending on your window frame, there may be a little play in the front-to-back direction.

11. If the solar panel angle and position is not correct remove the mount from the window and, once safely inside, make the required adjustments.

12. Once you are satisfied with the position of the solar panel, it is recommended to screw the mount into the sides of the window frame for a secure installation. Once you've screwed one side in, it may be helpful to release the lever locks to ensure the other side is flush to the window frame before screwing it in. Once screwed in place, relock the levers.

Cable Runs and Window Insulation

The foam cable entry insulation strip should be positioned so that the window closes on it, creating a nice weather seal. You will need to cut it to the proper length, before securing it in place.

13. Measure the window opening, including the depth of both channels, and cut the foam to that length. It's better for the foam to be a little long, as it will compress.

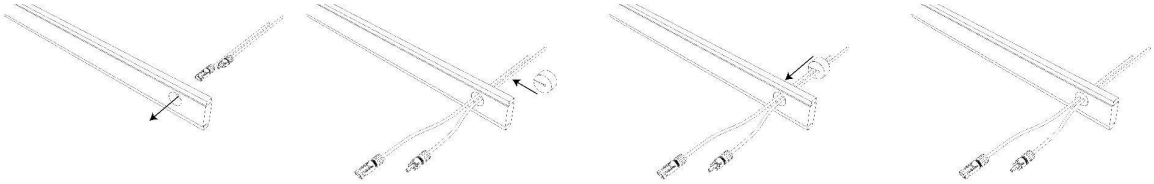
    One end of the foam has a hole with a plug in it. DO NOT CUT THIS END. Cut the other end of the foam.

Before moving on to the next step, clean the bottom of the window frame so that the insulation strip will adhere to the window frame.

14. Remove the plug from the insulation strip. Peel off the sticker from the bottom of the insulation strip and push into place. Hold for roughly 30 seconds.

15. Put the cables through the hole in the insulation. Once through, slide the plug on the cables from the side and push into place to seal, as shown in the illustration below. Make sure there isn't too much tension or slack on the line.

Insulated Cable Entry Steps:



16a 16b 16c 16d

Optional Steps

Cable Management

Zip tie the cables to the mount to relieve tension from the cable entry and to avoid flopping around in the wind.

Window Locks

The use of this product often restricts the ability to use the standard window locks. Depending on your environment, it may be pertinent to add locks.

Troubleshooting

Bracket Alignment

If the holes on your solar panel do not line up the holes on the mounting brackets, there are a few options:

A. First, make sure you've tried to mount the solar panel in both orientations. Rotate the solar panel 90 degrees.
B. Use Z brackets to mount the solar panel. These brackets will give you some additional flexibility as far as hole alignment is concerned.

Additional Weatherization

Additional weatherization may be necessary in some climates. Commonly found air conditioner weather stripping foam or weather sealing tape can be used to close any gaps at the top or bottom of the window sash.

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We’d love to see how you’re using the window solar mount!

Say hi at yo@energytransitiondesign.com

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