



# Meraki Solar

Setup Guide

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# **System Overview**

The Meraki Solar enables you to provide wireless coverage over large outdoor areas quickly, easily, and cost effectively. A Meraki Solar system has three components: a solar repeater, a solar panel, and a solar panel mount kit, each sold separately. The following section describes each component in more detail.

# **Solar Repeater**

The solar repeater is the core of your Meraki Solar system. It contains an 802.11 b/g radio, battery, and charge controller, all integrated into a weatherproof enclosure. This solar repeater package contains the following items:



5/16" (8 mm) in actual scale





# **Solar Panel**

The solar panel provides the energy needed to power the Meraki Solar system. A 15-foot power cable comes pre-assembled to your panel. Meraki provides two types of solar panels: 20W and 40W.





20W Solar Panel

40W Solar Panel

**Note:** If you are providing your own solar panel, you will need to purchase the Meraki Solar Power Accessory Cable (model number SOL-PWR-CBL) to connect your panel to the solar repeater. You will also need to follow your 3rd-party solar panel manufacturer's mounting instructions.

# Solar Panel Mount Kit

The solar panel mount kit is used to mount your solar panel to a pole, roof, or wall. Meraki provides two types of solar panel mount kits: roof/wall mount and pole mount.





Pole Mount

Roof Mount

# **Understanding the Solar Repeater**

Your solar repeater kit has the following features:



# **Understanding the LED Indicators**

Your solar repeater is equipped with a series of LED lights on the front of the unit to convey information about system functionality and performance:

#### 🔆 Solar Panel Status LED

On: Solar panel is powering radio, battery is fully charged Off: Nighttime or solar panel is disconnected; battery is powering radio Flashing: Solar panel is powering radio, battery is charging

#### U Radio Power LED

On: Radio is on Off: Radio is off Flashes 4x and then turns off (when power button is first pushed): Battery charge too low to power radio

#### III Signal Strength

1 Light: Fair, 4 Lights: Strongest Moving Lights: Searching for signal

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# **Pre-Site Preparation**

You should complete the following steps before going onsite to perform the installation.

#### **Collect Tools**

You will need the following tools to perform your installation.



#### Collect Additional Mounting Hardware Solar Repeater – Pole Mount

Your solar repeater fits on poles from 2.0-4.5" (5.1-11.5 cm) diameter with u-bolts and poles larger than 4.5" (11.5 cm) with hose clamps. You will need the proper size u-bolt or hose clamp for your pole. U-bolts for 2.5" (6 cm) poles are included.

#### Solar Repeater – Wall Mount

You will need screws and anchors appropriate for the wall surface that you are using.

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#### Solar Panel – Roof/Wall Mount

Hardware for assembling the mount is included, but you will need to acquire any appropriate hardware for fastening the roof/wall solar panel mount to your desired surface.

#### Configure your Solar Repeater on Dashboard

Your solar repeater will act as a repeater, but not as a gateway. Therefore, you will need to have an existing Meraki network that is connected to the Internet. We recommend that you add your solar repeater to a network on Dashboard before mounting it in the field.

- 1. Login to http://dashboard.meraki.com. If this is your first time on Dashboard, create an account.
- 2. Find the network to which you plan to add your solar repeater.
- 3. Go to the "add nodes" section on the "Configure" tab. In order to register the node, you will need the serial number of the unit, which looks like Qxxx-xxxx, and is found on the bottom of the unit.
- 4. Finally, go to the map view and place each repeater on the map by clicking and dragging it to the location where you plan to mount it. You can always modify the location later.
- \* If you do choose to add the repeater to Dashboard after the installation, make sure to write down the serial number and MAC address of the unit before installing it.

#### **Determine Correct Solar Panel Orientation and Elevation Angle**

You will need to orient your solar panel properly to ensure maximum performance. The two parameters to keep in mind are the orientation (compass direction) and the elevation angle. The section below describes how to determine these two parameters.

# Orientation



Contour Interval: 2 degrees

If you are in the Southern hemisphere, your solar panel should point to true north (directly at the geographical north pole). If you are in the Northern hemisphere, point your solar panel to true south. If you use a magnetic compass to measure your orientation, keep in mind that depending on your location, magnetic north often varies from true north due to variation in the earth's magnetic field around the globe. The curved lines on the world map above show you the compass direction in which you should point your panel to compensate for this variation.

**Example:** Let's say you are in San Francisco, California. Look at the map and find your location. You will see that San Francisco is located near the curved line that represents 196°. Therefore, point your panel to 196° as shown on your compass.

Record the correct orientation for your solar panel here:



\_ degrees





The elevation angle should point the panel directly at the sun at noon during the winter. To determine the correct angle for your location, find your location on the Elevation Angle Map above and read off the elevation angle. The exact angle is not critical; a variation of up to  $5^{\circ}$  is acceptable after the panel is installed.

**Example:** Let's say you are in San Francisco, California. Look at the map and find your location. According to the scale at the left side of the map, your correct angle is 55°.

Use this space to record your elevation angle:





If you are within 1-2 degrees of latitude of the equator, point the panel either north or south (whichever direction has the lowest horizon) at a 15 degree angle to assure that the panel self-cleans when it rains.

\_ degrees

# **On-Site Instructions**

#### Checklist

The following tasks should be complete before you go on-site to complete your installation.

Solar repeater, solar panel, and	Tools ready
Mounting hardware ready	Solar repeater configured on Dashboard
Orientation angle determined	Elevation angle determined

#### Find a Good Mounting Location

A good mounting location is important to getting the best uptime and repeater performance out of your Meraki Solar. Keep the following in mind:

- 1. The solar panel should have an unobstructed view of the sun from dawn till dusk, year round. In addition, make sure that the unit will not cast a shadow onto the solar panel.
- 2. The solar repeater should have line of sight to at least 2, preferably 3 or 4, Meraki repeaters.
- 3. The solar repeater power cord is 15' (4.5 m) long, so the panel can be up to 15' from the repeater.
- 4. The antenna should be as unobstructed as possible. For example, do not place the unit directry behind the solar panel.

#### **Pre-Installation Signal Strength Check**

Before installing your Meraki Solar system, make sure your selected site will give you good signal strength to your Meraki network.

Screw the antenna onto the solar repeater. Be careful not to over-tighten the antenna; it only needs to be snug (do not use a wrench). Press the power button on the side of the unit. The " $\oplus$ " light on the front of the unit should illuminate. If this does not happen, see the troubleshooting section on page 20.

Use the signal strength LEDs to ensure that the unit has a strong connection to your Meraki network. If the signal is weak, try repositioning the unit. If the signal LEDs are alternating, then the unit is scanning and cannot find a gateway. You will need to correct this before moving on.



**Tip:** If you want to see additional detail about other nearby Meraki devices, associate with the Meraki Solar directly via wifi and go to <a href="http://setup.meraki.com">http://setup.meraki.com</a>. This page will give you additional detail about the other devices that the Meraki Solar can see.

# **Install Solar Panel**

There are several mounting options for your solar panel. You should have purchased either a pole or a roof/wall mount kit. Follow the appropriate set of instructions below for your mount type.

# Solar Panel Pole Mount Kit







Arm

U-bracket

Clamp



Hose Clamp



s x4

5/16" (8 mm) Nut & Washer



1/4" (6.4 mm) Nut & Washer



Spare hardware kit



# **Pole Mount**



# 1. Attach the Mount Arm to the Solar Panel

Lay the solar panel face-down on a protected flat surface such as a towel or carpet. Center the arm on the back of the panel and attach it to the panel as shown using 1/4" (6.4 mm) bolts and clamps, gripping the edges of the panel frame between the arm and the clamps. Tighten the clamp nuts to 7 ft-lbs.

# **Pole Mount**

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- Tip: Check the fit of the hose clamp to your pole before installing. Trim off any excess length of hose clamp with the tin snips to save install time, leaving about 2" (5.1 cm) of excess length when installed.
- Tip: Using an electric screwdriver with nut driver will greatly reduce install time.



Tip: For a pole diameter greater than 4.5" (11.4 cm), flip the bracket around so the "u" faces the pole and flip it top-tobottom as seen in the above image.

# 2. Attach the U-bracket to the Pole Using Hose Clamps

Feed the hose clamps through the u-bracket. Tighten the hose clamp screws to 3 ft-lbs.

Note: Make sure the bracket is oriented correctly (determined in the "orientation" section on page 6) before tightening screws.

**Pole Mount** 



# 3. Attach the Panel and Arm to the U-bracket

Insert a single bolt through the panel mount arm and the u-bracket. Hand tighten the bolt. Next, insert the other three bolts and hand tighten.

# 4. Set Proper Elevation Angle of Panel

Using the included inclinometer, set your solar panel to the angle that you calculated in the "Elevation" section on page 7. Tighten the 5/16" (8 mm) nuts to 12 ft-lbs.

# Solar Panel Roof or Wall Mount Kit





# Wall Mount



#### 1. Attach the Rails to the Solar Panel

Lay the solar panel face-down on a protected flat surface such as a towel or carpet. Attach the rails to the frame of the solar panel using 1/4" (6.4 mm) bolts. Put the bolts through the holes in the frame and long slots on the rails. Tighten the nuts to 7 ft-lbs.

#### 2. Attach the Arms to the Rails

Assemble the arms to the rails as shown using 5/16" (8 mm) bolts. Hand tighten nuts only.

#### 3. Attach the Feet to the Arms and Rails

Assemble the feet to the arms and rails as shown using 5/16" (8 mm) bolts. Hand tighten nuts only.



# 4. Attach Upper Feet to the Wall

Using appropriate wall anchors for the surface to which you are mounting the panel, attach the upper feet to wall so that the panel hangs freely from these fasteners.

# 5. Set Proper Elevation Angle of Panel

Using the included inclinometer, set your solar panel to the angle that you calculated in the "Elevation" section on page 7. See diagram for how to properly use the inclinometer to set the angle of the panel.

**Example:** If you are in San Francisco, the correct elevation angle is 55 degrees.

#### 6. Attach Lower Feet to the Wall

Using appropriate wall anchors for the surface you are mounting the panel to, attach the lower feet to wall in the correct locations. Tighten all 5/16" (8 mm) fasteners to 12 ft-lbs.

# **Roof Mount**

The solar panel can be mounted to a flat or angled roof in the same manner as to a wall. Confirm that your panel will be facing true south (per "Orientation" section on page 6) within  $\pm 5$  degrees once installed.



#### 1. Attach the Rails to the Solar Panel

Lay the solar panel face-down on a protected flat surface such as a towel or carpet. Attach the rails to the frame of the solar panel using 1/4" (6.4 mm) bolts. Put the bolts through the holes in the frame and long slots on the rails. Tighten the nuts to 7 ft-lbs.

#### 2. Attach the Arms to the Rails

Assemble the arms to the rails as shown using 5/16" (8 mm) bolts. Hand tighten nuts only.

#### 3. Attach the Feet to the Arms and Rails

Assemble the feet to the rails as shown using 5/16" (8 mm) bolts. Hand tighten nuts only.

# **Roof Mount**





**Tip:** Note where lower feet should be attached to the roof to fix the panel at the proper angle. Mark the proper location of the feet on the roof through the holes in the feet using a pencil, pen or marker.

# 4. Attach Upper Feet to the Roof

Using appropriate roof anchors for the surface you are mounting the panel to, attach the upper feet to roof.

# 5. Set Proper Elevation Angle of Panel

Using the included inclinometer, set your solar panel to the angle that you calculated in the "Elevation" section on page 7. Note where lower feet should be attached to the roof to fix the panel at the proper angle.

# 6. Attach Lower Feet to the Wall

Using appropriate anchors for the surface you are mounting the panel to, attach the lower feet to roof. Tighten all 5/16" (8 mm) fasteners to 12 ft-lbs.

# Mount the Solar Repeater

Your solar repeater can be mounted to a pole or wall. Remember, your solar repeater can be up to 15' (4.5 m) away from your solar panel if using a Meraki solar panel.

# **Pole Mount**

Your solar repeater includes 2.5" (6 cm) u-bolts for mounting to a 2.5" (6 cm) pole. If you are mounting to a larger or smaller pole, you will need to use your own hardware.



# 1. Attach Solar Repeater to the Pole

If using included u-bolts, tighten the nuts to 12 ft-lbs.

# 2. Attach the Solar Panel Cable to the Solar Repeater

Insert the plug and rotate the outer housing clockwise to lock it in place.

# Wall Mount

Your solar repeater may also be mounted to a wall. Keep in mind that most walls will block the solar repeater's wifi signal. If you are mounting to a wall, consider mounting at the top of the wall so the antenna is unobstructed or using a directional antenna to amplify the repeater signal to the front of the unit.



# 1. Attach Solar Repeater to the Wall

Use appropriate mounting hardware.

# 2. Attach the Solar Panel Cable to the Solar Repeater

Insert the plug and rotate the outer housing clockwise to lock it in place.

# **Power Up Your Repeater**

Press the power button on the side of the unit. If it is daytime, the " $\ddagger$ " light on the front of the unit should come on and start flashing. This indicates that the solar panel is delivering power to the unit.

#### **Test Your Coverage**

Confirm that you have good signal strength throughout your coverage area. You can use the signal strength meter on a laptop.

# **Congratulations!**

You are done configuring the Meraki Solar.

### **Monitor Your Solar**

Check out the device list under the Monitor tab in Dashboard for information about battery health and charge status.

# Troubleshooting

#### When I press the power switch, nothing happens.

Either your battery is completely discharged or there is a malfunction with the unit. Try charging the unit via the solar panel for 2-3 hours in direct sunlight (or 7-8 if it is a cloudy day). Check the power light again. If the power light is now on, your unit should now function properly; if the light is still off, press the power button again. If the light still does not illuminate, contact Meraki technical support.

# When I press the power switch, the power light flashes four times and then turns off.

The battery is drained of power and needs to be recharged before the unit will function. Attach it to a solar panel. If it is sunny, the unit should immediately begin to run off of solar power. If it is cloudy, it might take several hours for the battery to charge enough to run the unit.

# There has been a noticeable drop-off in solar panel performance or radio up-time.

As long as the solar panel is mounted at an elevation angle of at least 15 degrees, it should be self-cleaning. Also, snow should quickly melt off. However, it is possible that in certain circumstances the panel could become covered with foreign debris (e.g., bird droppings) to the point where performance could be impacted. If you notice a drop-off in performance, check the panel to see if it needs to be cleaned. The panel can be cleaned like any other glass window; no special cleaning suppliers are required.

See the Meraki knowledge base at http://www.meraki.com for additional information and troubleshooting tips.

# FCC and Other Disclosures

US - Federal Communication Commission Interference Statement

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instructions may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

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

Any changes or modifications not expressly approved by Meraki, Inc. could void the user's authority to operate this equipment.

EU - EN 55 022 Declaration of Conformance

This equipment is shielded against the generation of radio interference in accordance with the application of Council Directive 89/336/EEC, Article 4a. Conformity is declared by the application of EN 55 022 Class B (CISPR 22).