

# Follow the sun into the future.™

AllEarth Renewables™  
Solar Tracker System  
Customer Manual



# Congratulations

on the purchase of your AllEarth Solar Tracker. We are confident that this American-made solar electric system will provide you with years of clean, reliable, efficient and renewable power.

The purpose of this manual is to give you information to better understand how your system works. It will address what is expected during normal operation and what you can do if there is a problem.

Thanks again for your investment in renewable energy and the trust you have placed in us and our business partners.

Sincerely,

AllEarth Renewables

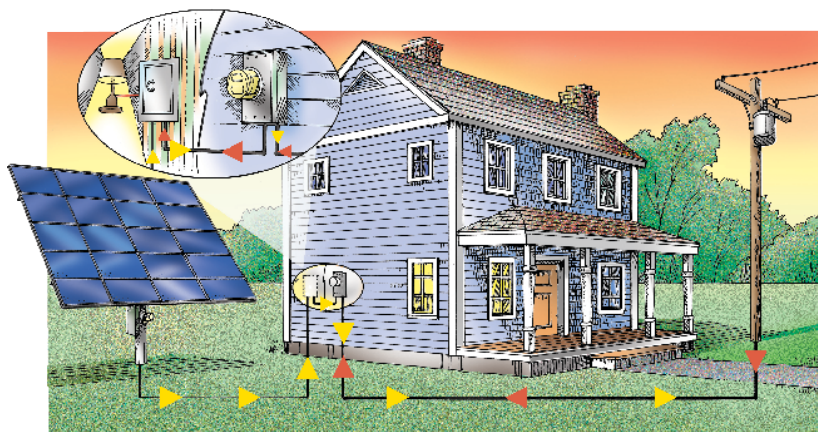




# Solar 101

A solar system begins with the solar panels. The silicon-based PV panels are designed to absorb the energy of the sun and convert it into electricity. On the AllEarth Solar Tracker, there are multiple panels (typically 20 or 24) arranged together to create the solar array. The electricity that is generated by the solar panels is Direct Current (DC) (similar to the current in a battery). Before this electricity can be used to power household appliances it must be converted to Alternating Current (AC). This is done by running the DC current through an inverter. The resulting AC current is then run to the electrical panel in the house and is now available to run household appliances and reduce the amount of energy that is needed from the utility grid.

The AllEarth solar system is tied to the grid. What this means is that the electric panel inside the house is designed to accept electricity from either the solar system or from the utility. The grid-tied inverter synchronizes the voltage and frequency from the solar array so it aligns with the voltage and frequency of the grid. This allows the electrical panel inside the house to use either source to supply energy to meet household demand. When there is a demand for electricity, the panel accepts energy from the solar system. If there is no power being generated by the solar system, or not enough power to cover the demand, then the panel pulls power from the grid. The electrical panel uses the solar power first and then turns to the grid. The result is that the solar power helps reduce (or even eliminate) the amount of utility power that is needed to supply the electricity for the household demand, and thus, lower utility power usage and cost. However, if the system somehow lost the grid connection, like during a power outage, it is designed to automatically shut down and the solar energy would not be available to power the household.

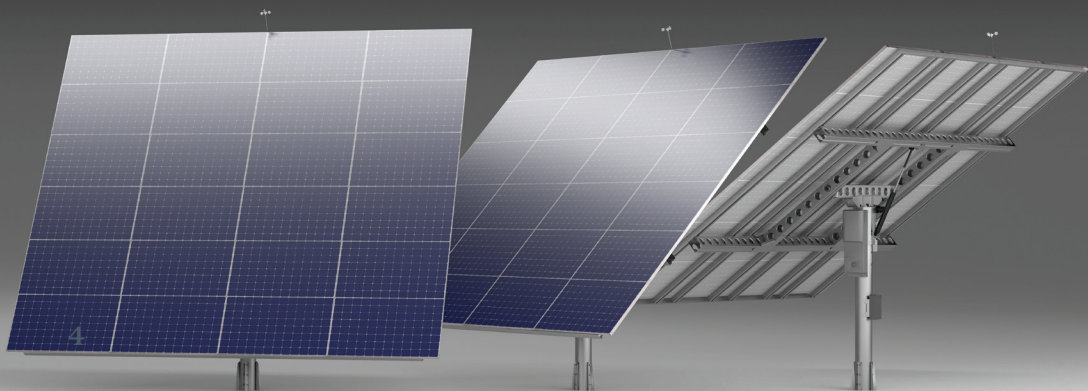


# AllEarth Solar Trackers

Solar systems only produce power when the sun is shining. The more directly the sun hits the panels, the more electricity the system can produce. The angle of the sun varies greatly over the course of the day. In addition, the sun's location varies according to the season. For a fixed system, like a roof-mount, the orientation of the panels is set. The exact angle and pitch is a compromise that captures as much solar energy as possible, but is not optimized for the full range of the sun's movement. Tracker systems, in contrast, are designed to follow the path of the sun. The solar panels are mounted to a racking system that has a small motor drive that allows the panels to move and follow the sun. The tracker comes with an integrated motor drive and gear system that moves the panels every few minutes to keep them oriented directly toward the sun. This allows the panels to be optimized to capture solar energy during the entire daylight period. By following the sun during the day and adjusting the orientation for the different seasons, an AllEarth Solar Tracker can **generate up to 45% more power than a fixed system.**

In normal daily operation, the tracker begins its day in what we call safe mode. In this position the tracker is laying flat and parallel to the ground. Before sunrise the panels will rise and position themselves to face east to capture the first sunshine of the day. Over the course of the day the tracker will adjust its position and follow the path of the sun. After sunset the panels will tilt back into safe mode and stay static through the night before rotating back around to the East and repeating the process again when the sun rises the next day.

Visit [allearthrenewables.com](http://allearthrenewables.com) to see the trackers in motion.





# Monitoring, Controls and Communications

Built into every AllEarth Solar Tracker are a number of sophisticated devices and controls which continually monitor a range of environmental and performance factors that assure that the unit is working correctly and, more importantly, automatically make adjustments if they are required.

This internal monitoring and communication is standard on all trackers. Each unit monitors performance data on an ongoing basis and detects if there are any performance issues with the system. Sensors on various parts of the unit supply data to the control box regarding tracking, temperature, wind, and other variables. The controller has been programmed to monitor this data and respond when it sees information that is not expected or out of normal range.

The GPS unit in the control box allows the tracker to know exactly where it is and what time it is. At night and/or after it has returned to safe mode, the system calibrates what time to wake up and start moving with the sun. The tracker constantly monitors GPS signals to know when and where to move to be facing the sun throughout the day. After waking up in the morning or after coming out of safe mode after high winds, the tracker knows exactly where to face. This eliminates the need to move or adjust the system after an extreme weather event or something as mundane as the change to daylight savings time.

# Weather Happens

From the heat and wind of the Southwest to the cold and damp of New England, we assume that the tracker will face harsh conditions and design and build the systems accordingly. The system is designed to monitor weather conditions and to react when there are factors that can stress the components. These include:

**Wind:** If the wind gusts above 30 mph for more than 5 seconds the tracker will return to safe mode and remain in wind-hold until there is a three-hour period with no winds above 20 mph. While in wind-hold, the tracker continues to produce energy but at a reduced rate.

**Cold:** Hydraulic systems can be impacted by extremely cold temperatures. To prevent undue stress on the tracker hydraulics, the unit is designed to temporarily go into safe mode when temperatures drop below 0°F and resume normal function when the temperatures rise above 10°F. As with wind-hold, the tracker will continue to produce energy in these situations.

**Snow:** During periods of heavy snowfall the panels may become coated with snow. Since they are always facing the sun, the panels will warm up and allow snow to melt and slide off the array. Trackers shed snow more quickly than fixed arrays because they tilt at a steeper angle. In most cases the normal movement of the panels will eliminate any snow build-up on the panels. It is not recommended to manually remove the snow from the panels as they can be scratched and damaged during this process.

**Snowdrifts:** With large snow accumulation it is possible for the snow to build-up on the ground and interfere with the standard movement of the panels. In these cases it is recommended to remove any snow drifts or banks of snow that may be blocking the panels. If the panels have been blocked by snow do not worry that the system will be damaged. There is an internal hydraulic relief valve that releases the pressure if the unit is stuck and cannot move. The hydraulic controls are not being stressed and will not be impacted by the blocked movement. Once snow banks have been removed and the tracker naturally resets overnight it will resume normal operation and tracking.

**SnowMode:** The tracker does have an optional SnowMode setting where, during winter months, the system is designed to move during the night to avoid any heavy snow accumulation and to evenly disperse any snow that does accumulate. This mode is not automatically activated, as most locations will not require this functionality. To request activation of SnowMode, please contact your dealer/installer.



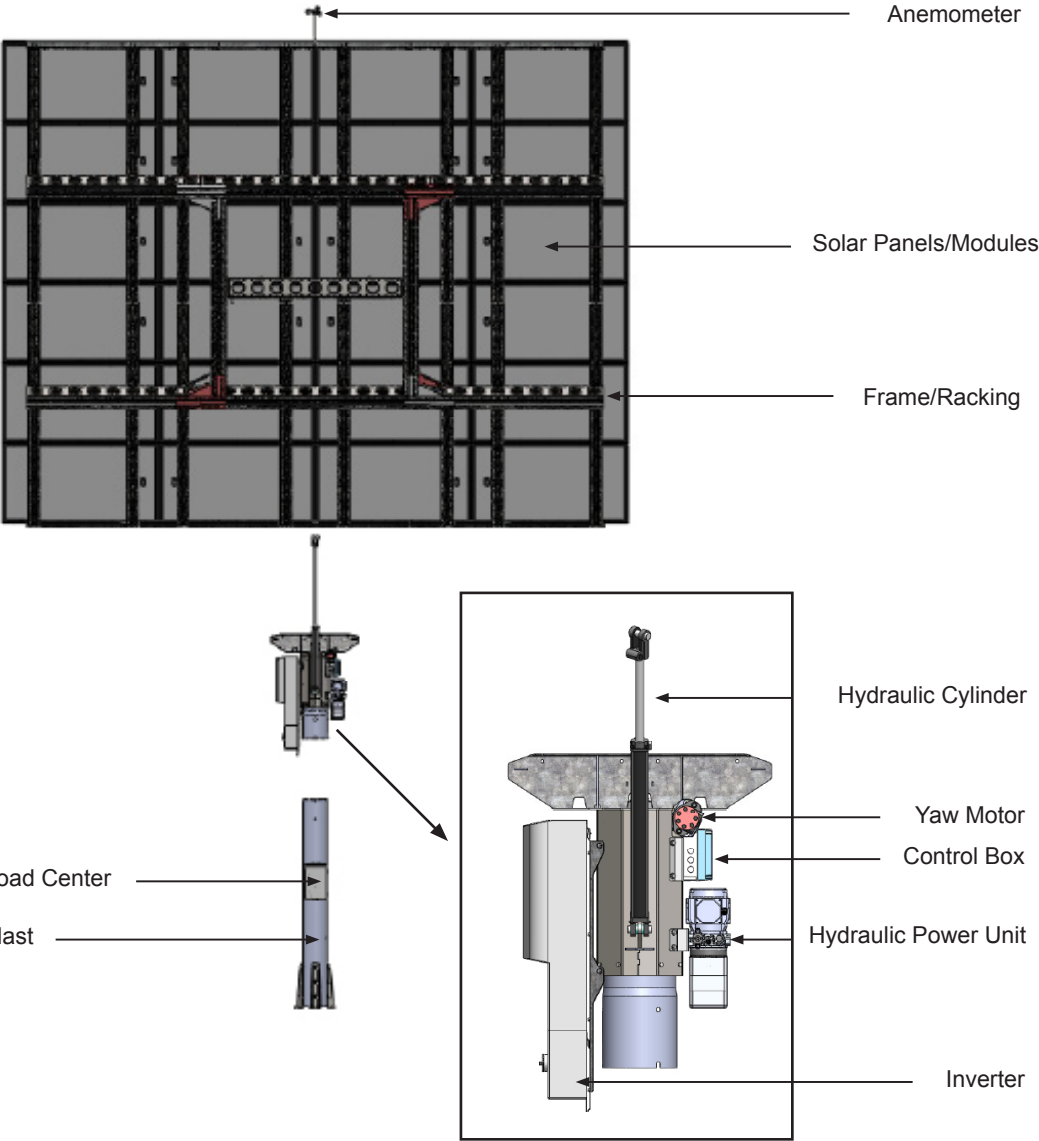
# Maintenance

From initial design through decades of operation, AllEarth Solar Trackers are built to supply high performance with minimal operating and maintenance requirements. Trackers do not require much maintenance and operate with little or no down-time for service. We design our product with minimal complexity and service demands.

As with any mechanical device, though, components can occasionally be damaged or fail. We recommend that you do a basic inspection on your system from time to time. The most important action you can take is to seasonally walk around the system and perform a visual inspection. Look for anything that may have changed from last time and check:



- Is the machine tracking (moving every few minutes)? Be aware that the tracker may remain flat and not move if it's responding to weather events such as high winds or sub-zero temperatures.
- Does it appear to be correctly aligned towards the sun? If the machine appears to be out of alignment, wait overnight for it to reset and observe if the problem has corrected itself.
- Are there any obstacles or vegetation that could block its movement, or have trees around the tracker grown taller so that they shade the panels from the sun?
- Are there any loose wires or connections?
- Is there any hydraulic fluid leaking around the hydraulic tubes and hoses?
- Are there any chips or cracks in the panels or frame?
- If you see any problems or notice anything that is unusual, contact your dealer/installer.





# Tracker Components And Functions

## **Base**

The in-ground structure that supports the tracker

## **Mast**

Vertical steel column that holds the panels/racking

## **Solar Panels/Modules**

Multiple units of silicon based cells that absorb the energy from the sun

## **Tracker ID #**

Located on the right side of the control box is a unique identifying number for the Solar Tracker

## **Frame/Racking**

Steel frame that supports the solar panels

## **Load Center**

Electrical breakers that control power to the tracker

- 40Amp circuit controls power to inverter
- 15 Amp circuit controls power to Motor/Controls

## **Hydraulic Power Unit/Motor Drive**

Power and control the movement of the panels and direct the hydraulic cylinder and yaw motor

## **Yaw Motor**

Controls yaw—East/West movement of the panels

## **Hydraulic Cylinder**

Controls tilt—vertical angle of the panels

## **Control Box**

Microprocessor and sensor system that lets the system “know where it is” (it receives data from the sensors and direct the movement of the panels)

## **Anemometer**

Measures and monitors wind speed

## **Inverter**

Takes the DC current from the panels and converts it into AC current that can be used to power the household. Depending on the specific model/design of the system there may be an inverter for every panel or there may be one inverter for the entire system.

# FAQ's

## **How much energy does the tracker need to operate?**

The system is powered with electricity from the electrical panel in the house. There is very little power required for tracking and the system uses less than 1% of the power it produces.

## **What happens if the tracker loses power?**

When the power is shut off, the tracker will not move or produce any electricity. There's no need to do anything to the tracker once power is restored. When power is restored, the tracker automatically resets, reorients itself to point at the sun and starts producing electricity. In addition, if the grid power were to go down the inverter automatically shuts down to protect the system and its connection to the grid.

## **How long does it take the system to reset itself after the power goes back on?**

When the power comes back on the tracker goes through a process to reorient and reposition itself. This involves moving to the flat (safe mode) position to reorient the tilt angle and then slowly spinning around to confirm the yaw angle. This process typically takes just a few minutes, but may take up to 20 minutes.

## **How do I set the trackers flat in safe mode?**

The easiest way to position the trackers to be flat is to turn off the power at the load center on the tracker mast. There are two breakers on the system. The 40 Amp circuit controls the power to the Inverter. The 15 Amp circuit controls power to the motor/controls. Step one is to turn off the 15 Amp breaker. Step two is to wait a minute and then turn the system back on. This will then cause the system to reset. During the reset process, the panels will move to the safe mode position and lay flat. At this time turn the power off (using the same 15 Amp breaker) and they will stay in this position. When you want them to start moving again, turn the power back on.

## **What should I do if the tracker appears to be out of alignment and is not correctly oriented to the sun?**

The first thing to know is that even if your tracker is slightly out of optimal alignment with the sun it will still create power. In fact, as long as it is within 10° of correct orientation it will still produce 99% of the potential power. Each night the tracker goes back to safe mode and will adjust alignment the following day.

## **How does the tracker know what time it is and adjust its position?**

A GPS unit inside the tracker control box knows the tracker's location as well as the time. Knowing its location and the time, the tracker knows exactly where the sun is at any given moment. The tracker uses its hydraulic drive to position the array to directly face the sun. As the sun moves, the tracker will periodically reposition the array. It is not dependent on clock time for any particular time zone and thus will not be impacted by any weather events or the change to daylight savings time.

## **How does the tracker know what to do after it has gone to safe mode?**

When the tracker stores itself flat overnight, it will naturally wake up at sunrise and resume normal operation. If the tracker has been flat due to high winds or extreme cold, the tracker will resume normal operation on its own after winds subside (three hours) or temperatures warm up slightly.

## **How do I know if my system is working correctly and producing electricity?**

There are a few simple ways to check that the tracker system is working.

- Observe the system and watch that the tracker is moving every 6-10 minutes. This assures that the tracker motor is functioning.
- Most dealers offer some sort of production monitoring program. Talk to your dealer/installer and see if they provide this service.
- Check your monthly electric bill.

## **Why is my tracker not moving?**

Remember that the tracker is designed to only move a small distance every few minutes, so it may be between moves. If the tracker is flat during the day, it may be due to high winds, sub-zero temperatures or other factors that have it move into safe mode. Finally, during reset it can take up to 20 minutes to run through it the process.

## **Does the motor of an AllEarth Solar Tracker require any chemicals or make noise?**

The tracker uses standard hydraulic fluid in its hydraulic system to make it move. The motor that runs the system makes about as much noise as your refrigerator.

## **How long do solar tracking systems last?**

They are designed for a 25-year lifespan, and have a 10-year parts warranty. (See WARRANTY for details)

## **How will installing a tracker affect my homeowners' insurance policy?**

Most homeowner policies cover "other structures" up to a certain percentage of your overall policy. Check with your insurance agent about tracker coverage.

## **Who will provide maintenance and service on the AllEarth Solar Tracker system?**

The company from which you purchased your AllEarth Solar Tracker will provide manufacturer-supported maintenance and service.

## **Where are AllEarth Solar Trackers produced?**

AllEarth Solar Trackers are produced in Williston, Vermont from components sourced mainly in the U.S. We also engineer our system at our headquarters in Vermont.





# Warranty

We stand behind our trackers and are confident that they are the most reliable dual-axis systems available today. We back this up with our industry leading warranty of 10 years for electronic and mechanical parts. More than mere words, this warranty speaks volumes of our belief in the durability of the Solar Tracker. The full, detailed warranty is available on our website ([allearthrenewables.com/energy-resources](http://allearthrenewables.com/energy-resources)).

If you have any questions or concerns on the performance of your system you should first contact your local solar dealer/installer.

## Your Tracker

Key contacts if you have any questions/concerns or issues with your system—this information should be provided by your dealer/installer at the time of installation.

### Dealer/Installer:

This is your first point of contact for any issues related to the system

Dealer Name: \_\_\_\_\_

Phone: \_\_\_\_\_

Email: \_\_\_\_\_

### Tracker Device ID#

This is a key piece of information to record. The ID# is located on the side of the controller which is in back of the panel (see Tracker Components and Functions for location)

Tracker Device ID: \_\_\_\_\_

Date Installed: \_\_\_\_\_

### Panel Model and Manufacturer:

Your dealer/installer will have this information

Model: \_\_\_\_\_

Manufacturer: \_\_\_\_\_

### Inverter Model and Manufacturer

Your dealer/installer will have this information

Model: \_\_\_\_\_

Manufacturer: \_\_\_\_\_

**Register Your Tracker at [allearthrenewables.com/registeryourtracker](http://allearthrenewables.com/registeryourtracker)**



**AllEarth Renewables**

**802-872-9600**

**[allearthrenewables.com/support](http://allearthrenewables.com/support)**

**[support@allearthrenewables.com](mailto:support@allearthrenewables.com)**