heliomotion

How does Heliomotion track the sun?
The tracker has an integrated GPS module used to determine the time, latitude and longitude. Using that information it calculates the sun's position in the sky in order to follow it.

How much does tracking increase electricity production?
Solar tracking increases energy yield by 30-60% per year, occasionally more, depending on location, compared with a stationary panel facing south with an ideal tilt. The energy increase depends on the latitude where the installation is located, from +25% at the northern equinox to +60% in Scandinavia. The extra energy is generated in the morning and in the evening which matches the consumption curve of a typical household much more efficiently than a static system which peaks at solar noon – often when everyone is out of the house. The output figures can be tracked daily/monthly/yearly by logging into the system via the inverter portal. Systems can be used singly or in quantity as a micro grid depending on power needs.

How is the Heliomotion solar tracker powered?
It can be powered from any constant 24 VDC power source, either using the included 24 VDC power adapter or by connecting it to a 24 V battery bank. The input voltage range is 24 VDC ± 20%. Average power consumption is 0.4 watt.

How much wind load is the Heliomotion designed to handle?
All Heliomotion models are engineered to withstand wind loads up to 35 metres per second – equivalent to 80 miles per hour. Should expected wind speed surpass 30 m/s (70 mph), it is recommended that you turn off the tracker and use the provided extension rod to tilt the panels horizontally. This will reduce wear and protect the installation until the storm has passed, as this is the optimum position for the installation to resist high wind loads. If wind speeds are expected to go above 35 m/s (80 mph) it's recommended to remove the panels and move them to safety. This is fairly straightforward and the panels can be put back when the hurricane has passed. Do not attempt to remove the panels if it's already windy outside. PV-6 units in the field have withstood wind speeds up to 40 m/s, but we do not recommend building installations where such wind speeds are common. A wind sensor is being developed as an optional add-on. This will provide wind speed and direction data to a Heliomotion, allowing the unit to automatically turn away from the wind in stormy weather to reduce wear. Please contact us if you would like to be informed on the development of this feature.

How is the tilt of the panels adjusted?
Heliomotion uses a fixed rod that follows the azimuth rotation and by pulling or pushing, automatically tilts the panels over the course of the day between 20 and 70 degrees, giving a sinus approximation of the sun's height angle. In morning/evening position the tilt starts at 20 degrees from the vertical plane. In south position the tilt is dependent on the latitude where the unit is installed. For instance, in London (latitude 50°) the tilt in the south position is 40° to get the best angle towards the sun over the course of the whole year.

How does temperature affect solar panels?
Solar panels are rated at 25°C, but their power output varies linearly with their temperature. Mono-crystalline panels have a temperature coefficient of 0.5% per °C so at 15°C on the panel you get a 5% power boost and vice versa.

How long is the design life and warranty of the product?
The Heliomotion tracker is designed to last for as long as the panels last, typically 25-40 years. We give a 3 year warranty to provide free replacement parts. Heliomotion parts including the column and solar tracker are coated using Hammerite Silver for protection and durability. Panel manufacturers normally give a 10 year guarantee with a 95% output guarantee for the first 5 years and 87% for up to 25 years thereafter. (See final page of assembly manual for full details.)

How much noise does a Heliomotion system make?
The solar tracker itself is virtually silent. Listening carefully right next to the tracker, it makes the sound of a distant cicada every 7 minutes or so when it updates its position. The grid-tied micro inverters are fanless and make virtually no noise. The battery-tied solar station has fans which kick in progressively as the inverter load increases, so should be placed somewhere where the sound doesn't bother anyone, such as a garage, a shed or a cabinet.

Should I choose a grid-tied or a battery-tied system?
Our recommendation is to use the grid-tied system if utility power is available, and to use the battery-tied system for off-grid installations without access to utility power. The main reason for this is that the grid-tied system is simpler to install and allows you to automatically utilise 100% of your produced electricity. Furthermore, the grid tied system is cheaper.

What does the solar station do?
A solar station combines a solar battery charger with an inverter and a utility power relay. It can be used with or without utility power, and works even if the power is out. The station automatically switches to utility power when solar and battery power is insufficient/there is an outage. The power from the station is not supplied to the grid, but used locally, via a new electrical outlet or connected to existing outlets via the building's fuse box. When the batteries are full any surplus solar power not consumed will be discarded.

Should I use a 24 volt or 48 volt solar station?
The 24V/3000W solar station is typically used together with Heliomotion PV-2, PV-3 or PV-4 and the 48V/5000W station with Heliomotion PV-6. The input voltage needs to be considered. The 24V solar station handles 30-115V (max 145 Voc) and the 48V station 120-430V (max 450 Voc). 300-330W solar panels usually have voltages around 40Voc. So Heliomotion PV-3M = 120 Voc which is okay to use with the 24V solar station (not high enough for 48V model). PV-4 = 160 Voc works with either 48V model (panels in series) or 24V (panels in parallel to halve voltage). The 24V/3000W station uses ~20W to maintain 230VAC output, whereas the 48V station uses ~40W. Therefore it is preferable to use the smaller 24V model if the extra max power output/input is not needed.

How much battery capacity should I have for an off-grid system?
For off-grid cottages, a 5 kWh battery bank (4 x 12V 110Ah) is the recommended minimum when used together with a PV-2, 10 kWh when used together with a PV-4 and 15 kWh with a PV-6. This allows you to store one full day's solar energy production for use during nights and cloudy days. Additional battery capacity allows for a greater buffer during cloudy/rainy days. EV charging will require more battery capacity.

What battery types are there?
There are several new battery systems coming onto the market (including repurposed EV batteries), PowerQuad/Powerwall/PowerVault etc, and there are older technologies including deep cycle gel batteries for solar battery systems. They are maintenance free, can be used indoors, have a long design life, and are made to withstand deep discharge cycles. Deep Cycle Gel batteries generally have better cycle capacity and longer service life than deep cycle AGM batteries, both under float and cycling conditions.

If my batteries are full, and my panels are working well, what happens to the surplus electricity being generated?
It will be discarded.

How much space does a system take up?
The turning circle for a single PV-2 is 3 metres, the PV-4 is 4 metres. Depending on the time of year, and the adjustment of the tilt, it will rotate up to 180 degrees and the lower edge of the panels will be between 500 mm and a metre off the ground, so you are looking at around a total height of about four metres. The turning circle required for a single PV-6 is 5 metres. Average wattage 60 cell panels each measure up to 1700 high x 1050 cms wide. Newer higher wattage panels are larger. The dimensions of the six panels together are approximately 3140 high x 3120 cms wide. You will find downloadable dimensions drawings for all system sizes on our Documents page.

The area around the foundation column needs to be clear so that the solar tracker can rotate freely without any obstacles. The minimum clearance from the column when using 1.6x1m panels is 1 meter for PV-2, 1.3 meters for PV-3, 1.5 meters for PV-4, and 2 meters for a PV-6. It is strongly recommended to have at least 0.5 meters of extra clearance on all sides to allow for the panels to be tilted horizontally. See the PDF files describing the specific Heliomotion dimensions on the website Documents page for more info.

How do you mount a Heliomotion system?
There are three options: a large hole filled with concrete, ground screws or anchoring it to bedrock. Because the system is securely bolted to the ground using the foundation plate, it means it can be un-bolted and moved if required to a new property. (See the installation manual.) The concrete pad (one metre cubed for PV-6) will need between 4 and 7 days to harden before attaching the foundation column to the base plate.

When using ground anchors/screws, the person installing will require a specialised tool to drive the anchors into the ground. The anchors are more eco-friendly than using concrete and are quicker to install since there is no need to wait for the concrete to cure

When purchasing the product does one need to buy the inverter separately?
When you buy a Heliomotion system you have the choice to buy just the unit itself (foundation piece, column, tracker unit, framework and fixings) or to buy the complete package including inverter, cables, panels etc. On our product page we show different options and packages. For our export sales, we expect that most resellers/customers will buy the panels and inverters locally and just buy the tracker with framework from us. You can install a Heliomotion at quite a long distance from the inverter; using our 4×2.5mm2 cable, you will have only minimal losses up to 100 meters distance. At longer distances, we recommend an increase in the cable diameter. See next paragraph for more detail.

Should I use a string inverter or microinverters?
Heliomotion can be connected to the grid using either multiple microinverters or a single string inverter. When using microinverters two panels connect to each microinverter located directly underneath the panels, and an AC cable runs from the microinverters to the nearest AC fuse box. When using a string inverter all solar panels are typically joined together in series and a DC cable runs from the panels to the string inverter, which in turn is connected to the nearest AC fuse box. The string inverter is often placed indoors.
Use of micro inverters with Heliomotion are recommended for the following reasons:

1. **Simpler installation** – The 24V AC-DC transformer that powers the solar tracker can be placed at the installation site as there is AC available at the site. In contrast, with an indoor string inverter the transformer is typically placed indoors and 2 extra wires are needed in the DC cable that runs to the installation site for carrying the 24VDC. Also, there is no need to install DC breakers when using microinverters.
2. **Easier placement** – No need to find space indoors for mounting the large string inverter. Each microinverter can be mounted directly to the framework behind the solar panels.
3. **Flexibility** – Each microinverter can be connected to the electrical phase where the power is most needed, giving the option of 1-phase, 2-phase or 3-phase systems. In contrast string inverters are either 1-phase or 3-phase with the solar power always divided equally across all 3-phases. Microinverters also allow for 3-phase power output with only 3 panels, whereas string inverters typically requires at least 6 panels to reach the minimum voltage needed to power a 3-phase string inverter.
4. **Modular** – It is easier to expand the installation when using microinverters.
5. **Inverter redundancy** – If a microinverter breaks only the panels connected to that inverter stop generating power, whereas if the string inverter breaks production goes down to zero.
6. **Panel redundancy** – If one of the panels are damaged only output of that panel is reduced, whereas with string inverters it will negatively impact the output of whole panel string.
7. **Shading** – Microinverters optimise each panel individually, in contrast to string inverters where a single shaded panel in the string will have a large impact on solar output.
8. **Smaller** – Microinverters are compact and do not weight a lot compared to string inverters, making them easier to install and transport.

Microinverters are typically not suitable in the following case:

1. When using high voltage panels, such as SunPower, as they have a voltage that goes beyond the 22-50 VDC allowed range of most microinverters.

Microinverters are not ideal in the following case:

1. When using solar panels with output ratings greater than the microinverter's rating.
2. When using half-cell solar panels, as their DC cables are typically not long enough to connect to the microinverter without use of extension cables.

If logging of production data is desired then string inverters often include this functionality as standard whereas microinverters typically require a separate energy meter (such as OWL Intuition) to log production data.

How far away can a Heliomotion power plant be placed?

We recommend the power plant is placed within 100 meters of where the power will be used. The cable size can be adjusted to keep transmission losses low between the power plant and the inverter/charger. Transmission losses are proportional to the ampere so to keep losses low the voltage is kept high. The PV-4/6 systems run at 220 VDC and up to 6 ampere. Using for example 4mm2 wires the losses will be at most 2% at 40 meters, or 4% at 80 meters. Doubling the cross-sectional area of the wire will halve the losses.

What exactly is a kilowatt hour?

A kWh is a measure of how much energy you're using. It doesn't mean the number of kilowatts you're using per hour. It is simply a unit of measurement that equals the amount of energy you would use if you kept a 1,000 watt appliance running for an hour:- if you switched on a 100 watt light bulb, it would take 10 hours to rack up 1 kWh of energy. Or a 2,000 watt appliance would use 1 kWh in just half an hour. While a 50 watt item could stay on for 20 hours before it used 1 kWh.

What else takes around 1 kilowatt hour?

It's hard to be precise, because the similar appliances can have very different wattages, but here are some rough examples of 1 kWh:

- Using a 10,000 watt electric shower for six minutes
- Keeping an immersion heater (3,000 watts) on for 20 minutes
- Cooking in a 2,000 watt oven for half an hour
- An hour's ironing with a 1,000 watt iron or 45 minutes with a 1,500 watt iron
- Less than an hour using a dishwasher (1,000 - 1,500 watts)
- Around three hours watching a plasma TV (280 - 450 watts)
- Keeping a fridge-freezer (200 - 400 watts) on for about three hours
- Keeping an electric blanket (130 - 200 watts) on all night
- Using a laptop (20 - 50 watts) all day
- Keeping a broadband router (7 - 10 watts) on for five days

What's the difference between kWh and kW?

kW stands for kilowatt. A kilowatt is simply 1,000 watts, which is a measure of power. So, for example, the 10,000 watt electric shower in the top bullet point above could also be called a 10 kilowatt shower. A kilowatt hour (kWh) is a measure of energy. A 1,000 watt drill needs 1,000 watts (1 kW) of power to make it work, and uses 1 kWh of energy in an hour. That's why, if you leave a TV or computer on standby, it is still using power and creating a kWh cost on your energy bill.

How many kilowatt hours should I be using each year?

That depends on the size of your home, the number of people in your family, and whether you spend a lot of time out at work, or most of your time at home, and whether you wish to charge an electric car. According to energy industry figures:

- If you live alone in a small home and are out at work full time, you might use 2,000 kWh of electricity a year and 9,000 kWh of gas
- A small family who live in a three-bedroom house and are in full-time work and education might use 3,200 kWh of electricity and 13,500 kWh of gas
- Four or five students sitting around all day in a large four bedroom house could rack up about 4,900 kWh of electricity and 19,000 kWh of gas.

What is the maximum panel size that can be used with a Heliomotion system?

For a standard PV-6 frame, the maximum length 1700mm and maximum width 1050mm. Many new panels are being launched with 60 and 72 cell options and different wattages. It is worth checking with Heliomotion if you are not sure whether your chosen panels will fit.

Edited January 2022