

What do
I do?



solar power
simple, quick, clean

clas ohlson

Lighting in your summer cottage? TV in the children's den?
See how you can use the sun's rays as a source of power.

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foreword

Environment-friendly. Self-powered. Cost-saving.

There are many reasons for wanting to use energy from the sun, but how does one go about it? What do you need to create your own solar power plant? And what is the simplest way to maintain the system?

The aim of this brochure is to describe a simple way of constructing your own 12/24 V solar cell installation. We also cover the things you need to consider when setting up and using the system.

To make it easier for you to obtain the necessary components there are clear references to the Clas Ohlson range of products.

Good luck!



what can one do?

Use the rays of the sun to produce electricity for your summer cottage, your boat or your caravan!

Nowadays it's easy and cheap to install solar panels. And the use of low-energy products, such as LED lights, increases still further the ability of solar panels to supply power.

If you are considering installing solar power, but are hesitating because it sounds complicated, stop worrying. Nowadays it's easy to install and you get simple instructions on how to connect it up and suggestions for developing your system further. Make life simple and convenient for yourself with solar power!

Installations connected to the mains

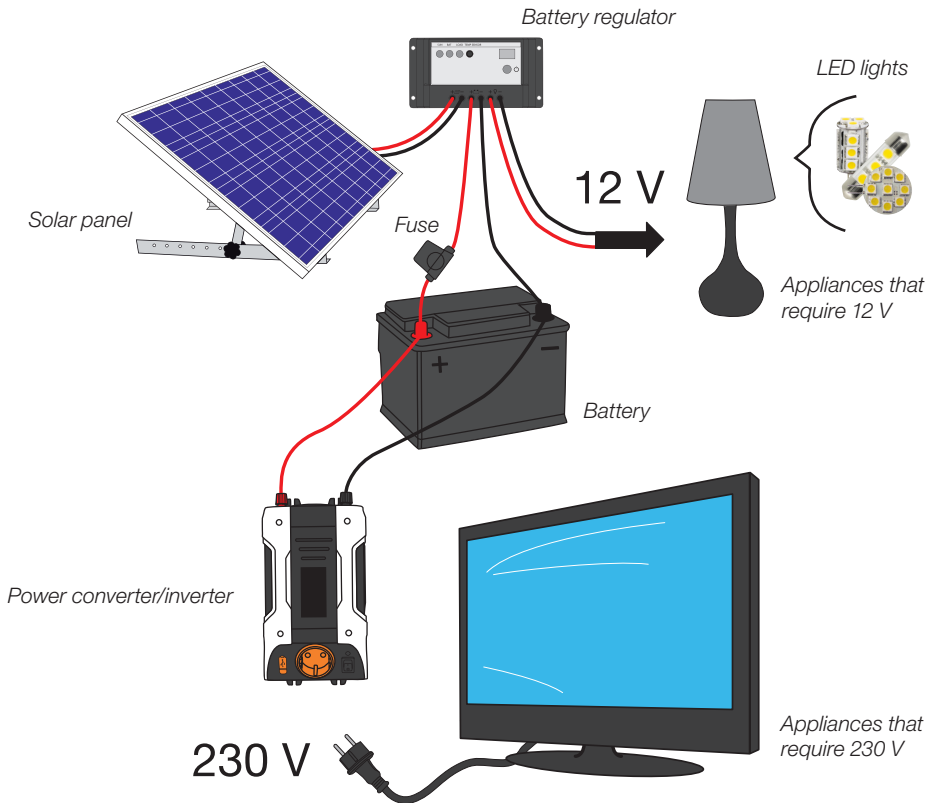
It is becoming increasingly common in Scandinavia and elsewhere in Europe to connect solar panels to the ordinary electricity supply (230/400 V). Clas Ohlson's solar panels work very well with such a system, but at present we don't have the approved inverter equipment that's needed to connect the panels to the mains. There are national regulations for every country.

You will need to contact your Local Authority Building Control Department before beginning any installation. All installations must conform to the National Electrical Safety Standard BS7671 and be carried out by a competent electrician.

For a competent contractor in your area:
www.elecsa.org.uk or www.niceic.org.uk

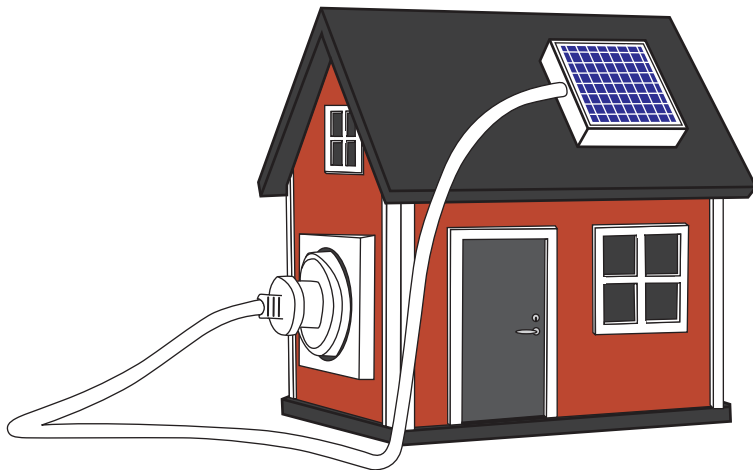
what do I do?

Using a solar panel, a battery regulator and a 12 V battery you can have a 12 V electrical system which works in your summer cottage, on your boat and in your caravan. If you want a 230 V supply you can add an inverter to the system.

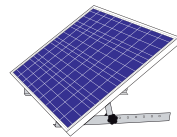


The solar panel must be installed outdoors facing south. The battery regulator and the battery can be installed in a suitable location indoors or outdoors, preferably close to the appliances that will be using the solar power (inverter, lights, TV, etc).

The size of the system depends on how much electricity will be used and how often. For example, in a summer cottage that is used every other weekend, one solar panel and two batteries may be enough. But if the summer cottage is used every weekend you may need two solar panels and two batteries so that the batteries have time to charge.

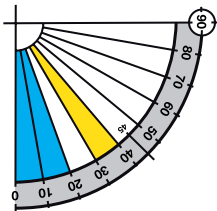


worth knowing



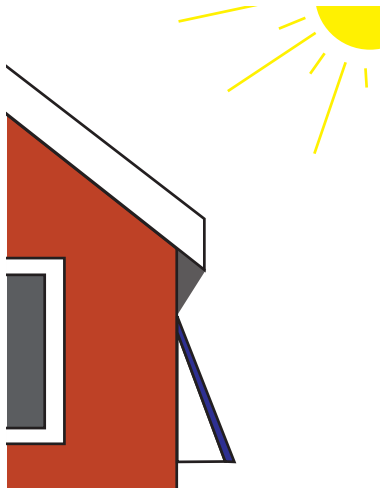
Solar panel

It is important to install the solar panel correctly, without shade and at a maximum angle to the sun, ie facing south here in northern Europe. Even slight shading can reduce the output of the solar panel. The best installation angle depends on how far north the solar panel is installed. The recommended mounting angle in Scandinavia is about 30–40° in summer (the yellow area on the protractor) and about 0–20° in winter (the blue area on the protractor).



The solar panel should be mounted so that its angle can be adjusted. If you choose fixed mounting, the best angle for maximum power all year round is about 25°. We recommend our solar panel stand, art. no. 36-4490.

A suitable mounting position is on a roof or wall facing south. If the solar panel is mounted on a wall, remember to mount it so that the eaves do not throw a shadow on the panel when the sun is at its highest.





Battery regulator

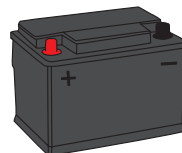
The purpose of the battery regulator is to ensure that the battery receives the correct charging voltage from the solar panel. Clas Ohlson's battery regulator charges using the PWM method to ensure that the battery is optimally charged by stages.

A battery regulator with built-in temperature compensation should be mounted in the same area as the battery, since the regulator compensates for the battery's ability to accept charge at different temperatures. The battery regulator should therefore be placed as close to the batteries as possible, preferably not more than two metres away. This is to prevent voltage drop, which may result in the regulator/distribution box giving the wrong charge to the batteries, since they may become overcharged. The output of the regulator to the load appliances has overcurrent protection. The output automatically cuts off the power to the appliances if the battery becomes discharged (at about 11 V).

Battery

We recommend batteries that can tolerate discharging better than conventional car batteries. Leisure batteries are suitable. There are also special solar panel batteries which are even more tolerant of deep discharging. To maximise their life, batteries should always be float (or trickle) charged, even when the connected installation is not in use.

You can connect batteries in parallel to obtain the capacity you need. It is important to connect the batteries correctly! Take care when handling batteries since they contain acid. They can also deliver a high electric current. Locate the battery where ventilation is good, and so that the cables to the appliances are not too long.



Cables for 12 and 24 V

There is a rule of thumb for cable sizes which says that the cables from the solar panels to the batteries should be at least 30% overdimensioned above the maximum current of the solar panel. This is to avoid voltage drop. A conductor area of 2.5 mm² is usually sufficient between the solar panel and the regulator, and between the regulator and the battery. Stranded copper automotive cable is suitable.

Remember that the highest currents in the system flow between the battery and the appliances. The table below can be used to choose the right cables to supply the appliances (TV, lights, etc.). For cables shorter than five metres, a suitable area is at least 4 mm² = 20 A. If you use a cable that is too thin or too long, the cable will cause a voltage drop and the appliances will not work properly. For example, lights will be dim and a TV set may not start. In a worst-case scenario, a fire may result. Always use a cable that is as short and as thick as possible. The longer the cable you need, the thicker it must be.



Cable length - The area of the cable in mm²

Watt	2.5 m	5.0 m	7.5 m	10.0 m	15.0 m
20	0.75	0.75	1.5	1.5	1.5
40	0.75	1.5	2.5	4	6
50	1	2.5	4	4	6
60	1.5	2.5	4	6	10
75	1.5	4	6	6	10
80	1.5	4	6	6	10
100	2.5	4	6	10	16
120	2.5	6	10	10	16
140	4	6	10	16	16
150	4	6	10	16	25
160	4	6	10	16	25
180	4	10	10	16	25
200	4	10	16	16	25
225	6	10	16	25	25
250	6	10	16	25	-
300	6	16	25	25	-

Fuse

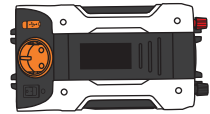
Be sure to fit a fuse at the battery to prevent the risk of fire in the event of a short circuit! The fuse must be rated so that it trips if the system is loaded above its design load.

Appliances

Remember to choose low-energy lighting. Clas Ohlson offers a wide range of low-energy 12 V lighting using LED technology. If you choose low-energy lighting you will not need such a large solar power installation compared to the use of conventional filament lamps.

A high-power appliance (such as a TV set or an inverter) must be connected as close as possible to the battery. High-power appliances must be connected directly to the battery via a separate fuse. The simplest way to connect lower-power appliances is to connect them directly to the regulator. Be aware of the power consumption of your appliances and lights, so that you don't overload the system.





Power converter/inverter

Some appliances cannot be powered directly by a 12 V supply. The solution is to use an inverter. An inverter converts 12 V direct current to 230 V alternating current. There are two kinds of inverter, square-wave (modified “staircase” sine-wave) and sine-wave. Square-wave inverters are the most common and least expensive type.

A square-wave inverter can be used for most purposes, but there can sometimes be problems with circulation pumps, fridges or freezers. It is the electric motors that may have problems. Also, some TV sets and laptop computers may have difficulties with a square-wave supply.

For these you may need a sine-wave inverter (art. no. 18-2058) instead. The voltage from a sine-wave inverter is more like that from an ordinary domestic wall socket.

If you measure the output voltage of a square-wave inverter you may get a low reading. This is normal. If the meter you are using is not a “true RMS meter”, it measures incorrectly as it cannot keep up with the changes in the square wave. With inverters, it is important to realise that they consume power when idle and when converting 12 V to 230 V. In other words, the inverter itself draws current. It is useful to know this when calculating your consumption.

Tips when using an inverter: Switch off the inverter when it is not in use. Since TV sets draw a high current on starting, it is possible that a 150–300 W inverter will not be able to start a 50 W TV set. You will have to find this out by trial and error, since different TV sets have different starting currents.

maintenance

The solar panel installation

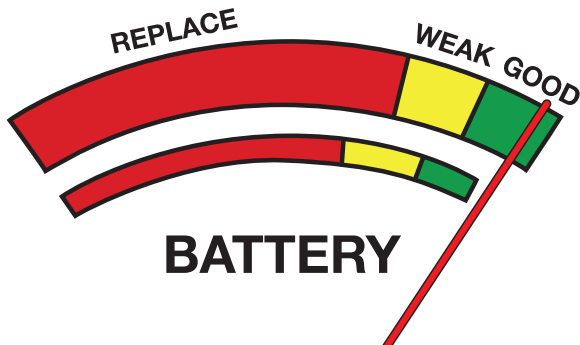
To ensure that the solar panel installation gives satisfactory service, the cables and joints should be checked yearly to find and repair any broken cables and corroded joints or contacts.

Solar panel

Use a window cleaning product or washing-up liquid and water when cleaning the solar panel. Do not use corrosive or aggressive liquids/products. Solar panels should be cleaned once a year or more often if necessary. This ensures that the solar panel can deliver the maximum amount of electric power from the incoming solar energy.

Battery

Keep the battery charged as fully as possible. This will ensure that its life is not shortened. Check the level of the battery acid regularly. If the battery is not sufficiently charged, it may freeze at low temperatures and suffer damage. Follow the maintenance advice of the battery manufacturer! Disconnect all appliances when they are not in use, but make sure that the battery remains connected to the regulator and the solar panel, so that it continues to be trickle-charged. If the installation is to be left unused for a long time, the battery should be disconnected and put in storage. A battery in storage should be charged three or four times a year.



consumption

The size of the installation depends on the length of the periods for which it will be used and on the power demands of the appliances you intend to connect. The table below shows **estimated** figures for the relationship between the size of the installation, the period of use and the size (i.e. power rating) of the appliances used.

Period	Small appliances	Larger appliances
2–3 days	Small colour TV (40–50 W) 2–3 hours viewing/day. 5 x 2 W LED lights lit for 4–5 hours/day. <i>Solar panel: 30 W</i> <i>Battery: 60 Ah</i>	Colour TV (80–100 W) 2–3 hours viewing/day. 10 x 2 W LED lights lit for 4–5 hours/day. <i>Solar panel: 80 W</i> <i>Battery: 75 Ah</i>
4–5 days	Small colour TV (40–50 W) 2–3 hours viewing/day. 5 x 2 W LED lights lit for 4–5 hours/day. <i>Solar panel: 30 W</i> <i>Battery: 75 Ah</i>	Colour TV (80–100 W) 2–3 hours viewing/day. 10 x 2 W LED lights lit for 4–5 hours/day. <i>Solar panel: 80 W</i> <i>Battery: 150 Ah</i>
6–7 days	Small colour TV (40–50 W) 2–3 hours viewing/day. 5 x 2 W LED lights lit for 4–5 hours/day. <i>Solar panel: 30 W</i> <i>Battery: 120 Ah</i>	Colour TV (80–100 W) 2–3 hours viewing/day. 10 x 2 W LED lights lit for 4–5 hours/day. <i>Solar panel: 80 W</i> <i>Battery: 220 Ah</i>

package solutions

Small package

For a small cottage that is not used very often.

One solar panel, 30 W, art. no. 36-4450

One stand for solar panel, art. no. 36-4490

One battery regulator, 10 A, art. no. 36-4452

One AGM battery, 75 Ah, art. no. 36-5466

One battery connector, art. no. 36-4779

One fuseholder (10 A fuse), art. no. 36-3899

25 metres of 2-core auto cable, art. no. 49-39

Accessories

One inverter, 500 W, art. no. 18-2532

Large package

For a cottage or caravan that is used fairly often.

One or two solar panels, 80 W, art. no. 36-4451

One or two stands for solar panel, art. no. 36-4490

One battery regulator, 10 A, art. no. 36-4452

Two or three AGM batteries, 75 Ah, art. no. 36-5466

Two battery connectors, art. no. 36-4779

One fuseholder (10 A or 30 A fuse), art. no. 36-3899

25 metres of 2-core auto cable, art. no. 49-42

Accessories

One inverter, 500 W, art. no. 18-2532

or one inverter, 1000 W, art. no. 18-2055

accessories

22-637	Plug	36-2923	Connecting strip
32-636	Wall socket	36-3899	Fuseholder
32-4528	Downlight 12 V	36-3232	12 V socket splitter
36-5063	LED spotlight	36-4420	Battery Terminal Clamp
32-8478	Downlight 12 V	36-4779	Battery Connector
36-4077	LED spotlight	36-3779	Switch
36-4076	LED spotlight	18-1233	Inverter, cup inverter
36-5065	LED lights	18-2532	Inverter 12 V/500 W
36-5062	12 V LED light strip	18-2542	Inverter 24 V/500 W
36-4078	Rigid LED light strip	18-2055	Inverter 12 V/1000 W
36-5066	12 V LED light bar	18-2058	Inverter, sine wave
36-5067	12 V LED light bar	49-39	Cable 2.5 mm ²
36-4870	LED bulb	49-42	Cable 4 mm ²
36-4635	LED spotlight bulb	49-143	Cable 2.5 mm ²
36-4529	LED lamp	49-144	Cable 4 mm ²
36-4530	LED lamp	49-10	Cable 6 mm ²
36-4131	LED lamp		
36-5437	Low-voltage LED-lamp		
36-5438	Low-voltage LED-lamp		
22-4285	Lampholder		
36-2921	Connecting strip		
36-2922	Connecting strip		



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