



Solarflex SA Home Power.

Before selecting hardware for a Home Power solution it is essential to know what the expected power consumption of the load will be by calculating the power required and the minimum expected operating time of the equipment which will be in operation during any electrical blackouts.

- Some appliances such as geysers, kettles, stoves, heaters and washing machines require too much energy to be powered by a battery back up system.
- The right size inverter is critical as the total wattage of the load should not exceed what the inverter is capable of supporting.

Of importance is the Automatic Switchover capability which will ensure that the system switches on automatically when the power fails; when the power is restored the inverter will automatically revert to a battery recharge state.

Modified Sine Wave Inverters.

Whilst these systems are cost effective they do have their disadvantages.

A by-product of these inverters is electrical noise which may result in “snow” on TV’s and a background “humming” noise on sound equipment.

It is not recommended to operate the following with a modified sine wave inverter.

- Laser Printers, photocopiers or Computers.
- Fluorescent lighting with standard inductive ballast.
- Power tools which utilise solid state power or variable speed control.
- Battery chargers for power tools.
- Digital clock radios.
- Sewing Machines with micro processor controls.
- Any medical equipment.
- Any load with high inductive and/or capacitive components such as high volume water pumps.
- Any device which does not have a fuse for protection.

Pure Sine Wave Inverters.

These are the most advanced inverters which will ensure that sensitive loads will be correctly powered without interference.

Features include;

- Low harmonic distortion.
- Inductive loads such as microwaves can be operated.
- Minimizes electrical noise.

Example of Hardware required.

1 x 32Watt Solar Panel.

1 x 12v 105AmpHour Deep Cycle battery.

1 x 6.6Amp Battery Charge Controller.

1 x 1500Watt pure Sine wave Inverter.

Cables and Connectors.

1 x 220v Multi Plug.

Load Calculation.

Watts are calculated by multiplying Volts x Amps.

All CE compliant electrical equipment should display the operating amperage as well as the operating voltage. Once you have tabled all the details for the devices a total required Wattage can be calculated.

Volts x Amps = Watts.

Amps = Watts/Volts.

Watt-Hours = Watts x Time.

1 x 32 Watt Solar Panel operating at 15 volts supplying 2.0 amps per hour to the battery on average will result in a total of 30 Watts per hour being stored in the battery.

Calculate the number of Watt Hours required to operate the desired equipment.

Total Watts x Hours = Watt Hours.

1 x Standard desktop PC will consume 200watts per hour on average.

1 x DSL Router approx 12 Watts per hour.

1 x Standard Laser Printer 330 Watts per hour.

1 x Radio 2 Watts per hour.

1 x Standard kitchen fridge 300 Watts per hour.

Assume a 2 hour back up time frame.

PC 200 x 2 = 400 Watt Hours.

Router 12 x 2 = 24 Watt Hours.

Printer 330 x 2 = 660 Watt Hours.

Radio 4 x 2 = 8 Watt Hours.

Fridge 300 x 2 = 600 Watt Hours.

Total: 1692 Watt Hours required to operate the above equipment for 2 hours.

- A fully charged 12v 105AmpHour battery will supply 12 x 105 = 1260 Watts in total.

It is however highly recommended to never run a battery lower than 30% of it's charge remaining.

This limits the battery to 12v x @70Amps = 840 Watthours.

By taking into allowance battery and inverter inefficiencies and cable leakage of approx 10% the best practice result would be a maximum of 750Watts per hour per battery.

Therefore a minimum of 3 Deep Cycle batteries would be necessary.

In the above scenario it would be recommended to install a total of 4 batteries for additional operating time, taking into allowance the time required to recharge the batteries.

It can be seen that more than one solar panel would be required to replenish power to the batteries, as the recharge time could be longer than desired.

One solution is install a number of Solar Panels in series and increase the voltage supplied to the batteries to 24v (2 panels in series) or 48v (four panels in series) this would require the correct type of batteries and charge controllers.

Installation.

Home Power Systems can be deployed independent of any circuitry when operating a number of small locally grouped devices. This type of installation can be self installed in the event that the user has some working knowledge of electrical connections.

Whilst the installation of solar panels, a battery charge controller, 12v deep cycle battery banks and inverter seems straightforward there are a number of fundamentals that will need to be observed.

Please consult the operating manuals of all the devices prior to installation.
If in doubt please consult a licensed electrician.

Alternatively large systems can be hard wired into existing circuitry.
It is highly recommended that hard wiring should be carried out by qualified electricians for personal safety and for the protection of the equipment.

Solarflex SA does not responsibility for the installation of any systems and their operation.



1 x 32 Watt Flexible Solar Panel.



1 x Phocos 6Amp unsealed battery charge controller.



1 x 1400Watt Inverter, 12v,



4 x 12v 105amp deep cycle batteries.

Connectors and Cables excluded.

Average Power ratings of standard appliances.

Power consumption may vary according to age and model variations but these are general averages which give an indication of the Power consumed by these devices.

Colour TV	200 Watts.
Geyser (regular recovery)	2500 Watts.
Refrigerator and freezer.	600 Watts.
Microwave oven.	1475 Watts.
Tumbledryer.	6000 Watts.
Coffee maker.	800 Watts.

Terms.

Watt Watts are a unit of power, which is to say the rate of energy being used every second
Joule. A Joule is a Watt second, so 1 Watt hour is the same as 3600J.
KWh. Electricity bills are normally calculated in Kilowatt-hours. 1000Watt hour = 1KWh.

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