PHD POWERHOUSE
RELIABLE POWER SOLUTIONS

Solar electricity systems in the South African Environment

Solar electricity systems have been around for a few years already, mainly in Europe, Asia and North America. In Africa, however it's only become a viable option over the past 20 years or so, and many users are therefore unfamiliar with the fundamentals of solar electricity systems. PHD powerhouse has supplied and installed electrical systems for the South African market for many years. We believe that the expertise gained over this time is invaluable and would like to share some of it with you.

Calculating the requirements for a solar system is no simple task, and the more information obtained from the customer, the better. We have given a few pointers below to assist the customer/end user in deciding what the best solar system for them will be.

It is important to remember that if you are looking to install a solar system, then energy saver lights, solar water geysers, motion sensing light switches, soft starters and any other energy saving component will massively reduce the size and therefore the costs.

There are two main types of solar electrical systems namely.

- **Grid-tie solar systems**, comprising of the grid-tie inverter and solar panels. These systems are very common in North America and Europe, but unfortunately have to be legislated by government as the system feeds current back into the national grid. In more progressive countries the government provides a rebate on your electrical bill proportional to the amount of energy fed back into the grid however at the time of writing this article legislation has not been made to allow this in SA.
- **Standalone systems**, comprising of solar panels, solar charge controller, batteries and inverters.

For this article we will focus mainly on the latter option – the stand alone solar system.

The main elements to consider when selecting the correct solar system are as follows:

- **Type of inverter**: Modified sine wave inverters can cause damage to some electronic equipment, it is therefore advised to use a pure sinewave inverter for all solar applications

- **Type of solar charge controller:**
    - MPPT or “maximum power point tracking”
    - Standard diode type charge controllers

  form the two basic types of charge controllers. in small applications the diode solar charge controllers will work fine but for larger applications the MPPT units can provide as much 10% - 20% more charging current for your batteries.
- **Types of solar panels:** This is not as relevant anymore due to the accuracy and the quality of solar panels made now days.
- **Angle to the Sun:** In JHB this angle is about 30^{o} north facing with the angle getting greater the further away from the equator you go.
- **Types of batteries:** Only use deep cycle batteries, these batteries have thicker plates inside designed for constant charging and discharging, and only charge batteries from solar via a charge controller, no 12 volt battery is designed to take the approximately 17VDC coming directly from the solar panels.

- **Cables:** This is often the most overlooked component when installing solar systems. One should only use multi strand DC Welding cable when connecting your solar systems. This is due to characteristics of DC currents running through a conductor. One should also ensure that all DC cables are as short as possible to ensure maximum efficiency throughout solar installation.
- **Charge times:** Solar systems only charge for approximately 5 hours a day, it is critical therefore to take into account weather patterns when sizing solar systems.

When calculating a solar system only connect essential load, this will ensure the solar system remains as small as possible while maintaining maximum efficiencies.

Always ask for professional advice. If one has limited experience, then it’s likely that mistakes will be made when sizing or calculating a solar system.

When inquiring about a system it is important to obtain the following information first:

- The proposed location of the system
- The Load (equipment you want to run) preferably in KW ratings
- Runtimes required for each piece of equipment
- Available north facing area for installation of panels (m2)

PHD Powerhouse distributions and solar

At PHD we offer first class advice and products for any type and size of solar systems.

We offer complete systems including:

- Solar surge protection devices
- Solar equipment Housings
- Solar DC connection boxes
- Charge controllers
- Batteries and battery cabinets
- Inverters

For more information on our solar products please go to **www.phdpowerhouse.co.za**

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- **Voltage stabilizers**
- **Surge protection**
- **Inverters**
- **Home back-up installations**
- **Battery runtimes calculations**
- **Power definitions**