



Solarflex SA.

User Manual.

Guide for Connecting Digital Devices.

Supplying Power to Devices in the Field.

Digital Cameras, PDA's, iPhones, Cellphones, Video Cameras, etc.

Stating the obvious.

- All portable or mobile digital devices require power from batteries to operate.
- Most digital devices can make use of rechargeable batteries for supplying power to the device.
- Unless specifically sure that the input power from a solar panel is compatible with the devices circuitry it is not advised to directly connect the solar panel to the device.
- Where possible an extra device battery in the field will assist in keeping any device having power, whilst one battery is in use the spare can be recharged.

Do's and Don'ts.

- Do not attempt to recharge non-rechargeable device batteries with an AC Charger.
- Best practice is to utilise a Solar Charge Controller between the Panel and any size deep cycle storage battery or any standard 12v storage battery.
- This will prevent any overcharge of the storage battery.
- For best results never run a storage battery below 25% of power – a large deep cycle storage battery of 105a/h should not be run to less than 25a/h remaining.
- Laptops utilising Lithium batteries are not well suited for solar power, they do not make use of the pass through system and will invariably “ignore” any external power source if it less than the existing power from the battery pack. This results in the laptop extracting power from the internal battery pack.
- Larger size Solar Panels can recharge power to a spare laptop battery pack but will not actually directly “operate” a laptop if directly powering a laptop.
- Laptops require specific operating currents and will normally revert to the battery if it senses any fluctuating currents being supplied to it.

Power from panels.

- A 7Watt flexible PV panel will typically supply about 0.45 amps (450 milli amps) per hour to a battery at about 14 to 15 volts.
- This equates to 5.4Watts per hour.

Example of a 32Watt panel output.

$P=V \times I$.

Power = Voltage x current.

32Watts / 14 volts = 2.28 Amps.

Example of a 14Watt panel output.

$P=V \times I$.

Power = Voltage x current.

14Watts / 14 volts = 1.0 Amps.

Example of a 7Watt panel output.

$P=V \times I$.

Power = Voltage x current.

7Watts / 14 volts = 0.5 Amps.

Digital Devices: an example of power consumed by a standard Digital Camera.

- Most Digital devices run on lower amps than larger 12v products.
 - The most common rechargeable AA batteries used are the 2500mA per hour, NiMH.
 - Most will consume on average @ 15Watts per hour.
7.4v at 2500ma = 18.5Watts.
- An example of some digital cameras battery capabilities.

Camera	Battery life, LCD on (CIPA standard)	Battery used for test
Canon PowerShot S2 IS	550 shots	2300 mAh NiMH
Canon PowerShot S3 IS	550 shots	2500 mAh NiMH
Fuji FinePix S5200	500 shots	2500 mAh NiMH
Fuji FinePix S9000	340 shots	2500 mAh NiMH
Kodak EasyShare P850	290 shots	KLIC-5001
Kodak EasyShare Z612	262 shots	KLIC-8000
Konica Minolta DiIMAGE Z6	420 shots	2500 mAh NiMH
Panasonic Lumix DMC-FZ7	320 shots	CGR-S006
Panasonic Lumix DMC-FZ30	280 shots	CGR-S006
Panasonic Lumix DMC-TZ1	250 shots	CGA-S007
Samsung Digimax Pro815	450 shots	SLB-1974
Sony Cyber-shot DSC-H2	400 shots	2500 mAh NiMH
Sony Cyber-shot DSC-H5	340 shots	2500 mAh NiMH

Battery life numbers are provided by the manufacturer

Batteries explained:

With thanks to Vincent Bockaert.

Most digital cameras use either rechargeable NiMH Lithium-ion batteries or rechargeable/disposable AAs.

Disposable AAs

Given the high power consumption of digital cameras, it is economically and environmentally unjustified to use disposable batteries other than in emergency situations when your rechargeables are depleted. Disposable Lithium AAs are more expensive than Alkalines, but having about three times the power packed in half the weight, they are ideal to carry with you as a backup.

Rechargeable AAs (NiCd and NiMH)

NiMH (Nickel Metal Hydride) rechargeable AA batteries are much better than the older NiCd (Nickel Cadmium) AAs. They have no "memory effect" (explained below) and are more than twice as powerful. Capacities are constantly improving and differ per brand.



Rechargeable Lithium-ion Batteries

Li-ion (Lithium-ion) rechargeable batteries are lighter, more compact, but more expensive than NiMH batteries. They have no memory effect and always come in proprietary formats (there are no rechargeable Li-ion AAs). Some cameras also accept disposable Lithium batteries, such as 2CR5s or CR2s via an adapter, ideal for backup purposes.



Example of Lithium-ion battery and adapter to accommodate three CR2 Lithium batteries.

Charging

Fully charged batteries will gradually lose their charge, even when not used. So if you have not used your camera for a few weeks, make sure you bring a freshly charged battery along on your shoot-out. Charging NiCd batteries before they are fully discharged will reduce the maximum capacity of subsequent charges. As the effect gets stronger when repeated often, it is called "memory effect". It is therefore recommended to recharge the batteries only after they are fully depleted. To a lesser extent, this is also useful for NiMH or Lithium-ion batteries, although they have virtually no memory effect. Doing so will also increase the life span of the battery which is determined by the number of "charge-discharge" cycles that depends on the type and brand.

Lithium rechargeable batteries, like the ones found in digital cameras & camcorders, typically have their own proprietary chargers, but because these require AC power, this means also purchasing an AC inverter for use with your car or solar power kit.

Note that because inverters cannot operate directly from a solar panel, they require a sealed lead-acid battery between themselves & the solar panel.

There are DC chargers available for proprietary lithium batteries that eliminate this AC problem.

When it comes to NiMH batteries (Nickel Metal Hydride), it is important to purchase a charger that contains proper charging circuitry. Look for features like 'reverse polarity protection', 'temperature compensation', 'overcurrent protection' & others.

These special features ensure that your batteries have a long, useful life.

SPECIAL NOTE: The faster you charge your NiMH batteries, the more abuse they are taking and the shorter their lifespan & useable capacity.

Connecting the Panel.

A standard 7Watt flexible solar panel can be connected to a storage battery via the CL plug.

A 7watt panel will supply a trickle charge of power to the battery.

If a rechargeable unit is supplying power to the rechargeable battery at the same time there should be a parity of power between the input and output.

It is recommended to be familiar with what the input and output requirements are for your devices.

The 12v battery charger which has the devices rechargeable battery can be connected to the storage battery via the CL plugs or any other connector as required.

It is recommended to attach a solar charge controller between the solar panel and the storage battery to prevent an overcharge of the storage battery.

Items required:

Fig A.



12v Rechargeable Battery Charger – suitable for your devices battery.

Fig B.



12v Storage battery – it can be from a 7a/h 12v battery to any larger size, but up to 40a/h should suffice for most, depending on requirements.

Fig C.



7Watt Flexible Solar Panel with CL connector plug.

Fig D.



The Panel is connected directly to the battery through the CL adapters. Male on the panel to a Female CL adapter extension cable to the storage battery.

Another Cable connects directly to the storage battery and supplies power to the rechargeable battery unit via the female CL adapter to male CL adapter supplied with the 12v rechargeable battery unit. Any 12v connector can be utilised to complete the connection depending on what connectors are supplied.

Fig E.



A 6amp solar charge controller which can be utilised between the panel and the storage battery.

Fig F.



Examples of the CL adapters, standard male and female 12v connectors.

Connecting the Load.

The load can be connected directly to the Battery or alternatively to the load output on the Battery Charge Controller itself.

This is entirely up to the user to choose one or the other method of connecting.

It is highly recommended to utilise a Solar Battery Charge Controller between the solar panel and the storage battery if you are not sure what the rate of discharge from the battery is, too little take up from the load will lead to the battery being overcharged if the panel is always connected to the storage battery, which will result in battery failure.

Inverters.

There are 12v DC inverters available for supplying power to digital devices on the market, most will have a CL adapter for converting power from a 12v vehicle adapter and converting it to 220v for the camera's battery charger.

Please check the manufacturer's specifications before using any inverter in a vehicle as to what the standard operating procedures are.

Small 300watt inverters are best suited for this function.

Larger capacity inverters could cause damage to the vehicles wiring.

When making use of the inverter to charge your device's batteries is best to have the vehicle running, otherwise the car battery can be easily discharged.

Sine-wave invertors are recommended as they provide cleaner power for sensitive devices.

Cellphones.

Most cellphones can be directly connected to a low watt solar panel. The picture below shows a Solarflex SA 5Watt flexible solar panel directly coupled to a Nokia Cellphone. The cables from the panel are connected to a CL Female extension cable and the phone connection via a male CL extension cable.

Fig G.



Fig H and Fig I.



We have sold panels to long distance truckers that have successfully used the 5Watt solar Panel for maintaining charge on their Cellphones whilst on the road.

Fig J.



Connector packs which contain most popular device connections with a CL female extension adapter are available, including iPhones.

Glossary.

- **PV = Photo Voltaic solar panel.**
- **Storage Battery – any size 12v battery that can hold charge from a solar panel and provide power to the devices 12v battery recharge unit.**
- **Device battery – the re-chargeable battery supplied with the device.**
- **CL – Cigarette Lighter plug, male or female, also known as Hella connectors for 12 v appliances.**
- **NiMH - Nickel Metal Hydride**
- **Inverter – Converts a 12v dc input to 220v ac output.**

Disclaimer.

- **The above is a guideline only; please contact us for best practice connection in the event that any clarification is required.**
- **We cannot be held responsible for any incorrect wiring procedures in the event of any mishaps.**
- **Overcharging any battery, whether a rechargeable or deep cycle or standard 7a/h or larger a/h capacity will result in battery failure, which will cause damage.**
- **Solarflex SA cannot be held responsible for damage caused to equipment.**
- **Please consult the device manufactures manual or consult a reputable retailer for further advice on your product.**
- **Check the internet for other examples and experiences that other users have recorded, there are many DIY websites that can offer solutions for any situations.**

Tips and experiences are most welcome from any users for posting on the website.

Please contact your authorised retailer for further information.

Or alternatively please mail: info@solarflex.co.za

Thank you for choosing Solarflex SA Solar Panels for your recreational power requirements.

