



Solar Module - System Expansion.

Your solar installation can be expanded to run many 12v DC appliances, including audio, visual, water pumps etc.

All appliances are parallel connected, circuit diagrams A & B show how this can be achieved.

Accessories can be individually switched and fused. This makes circuits and accessories easier to isolate and separate without the whole installation being switched off. This is particularly important in larger installations where many appliances can be connected.

If a common supply fuse and connector block system is used (*Diagram A*) the supply fuse will need to be up-rated as accessories are added to the battery. Also, the supply cable to the common connector block will need to be larger (1mm sq. will carry a max of 8.75amps, 2.5mm sq., 17.5amps etc)

Bear in mind that as the installation grows, the size of the solar module will need to increase and possibly the battery capacity as well.

Solar modules can be connected together in parallel to increase current/watt output; this is a positive to positive & negative to negative connection. (Series connection will increase voltage) This connection can be made direct at the battery terminals, or at the voltage regulator if fitted.

Parallel connection can be seen in the circuit diagram C. Solar panel A is the original solar panel, panel B has been added in parallel as the power requirement has increased.

All circuits must be protected from short circuit & overload protection; if one fuse protects the whole installation do not exceed 20amps.

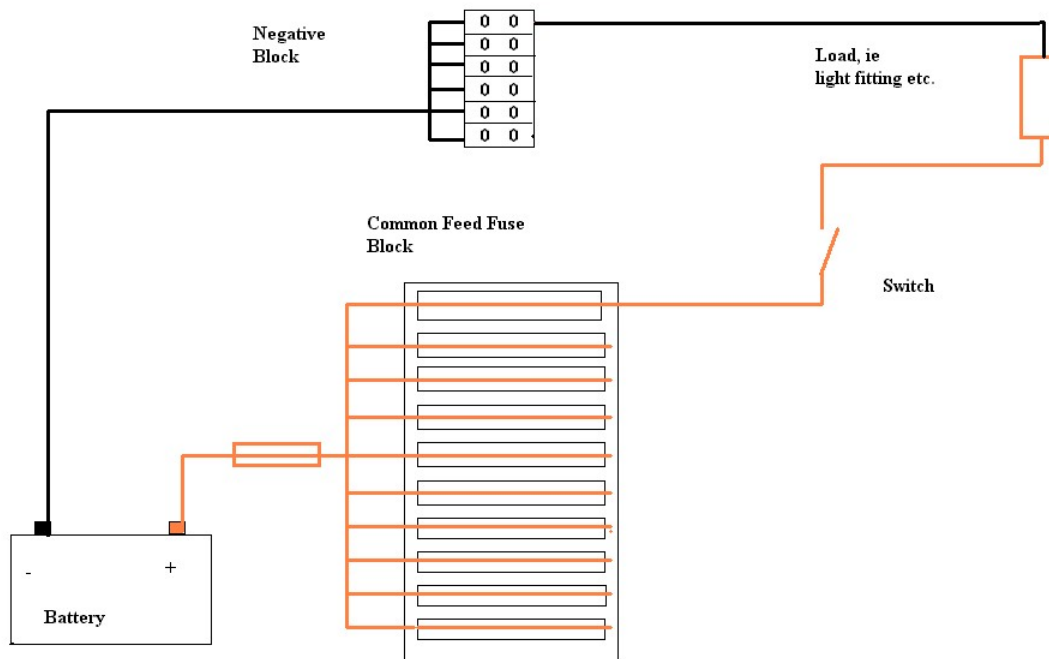
If circuits are switched and fused individually, lower fuse values can be used ideally 5 - 10amps, & smaller cable sizes used for sub circuits (1mmsq for up to 8.75amps&2.5mmsq for up to 17.5amps). The main supply cable must be fused as near to the battery terminal as possible.

The main supply cable fuse must be the largest value fuse in the installation, or larger than any other sub-circuit fuse used, the fuse rating must not exceed 20amps.

Common fuse distribution. Diagram A

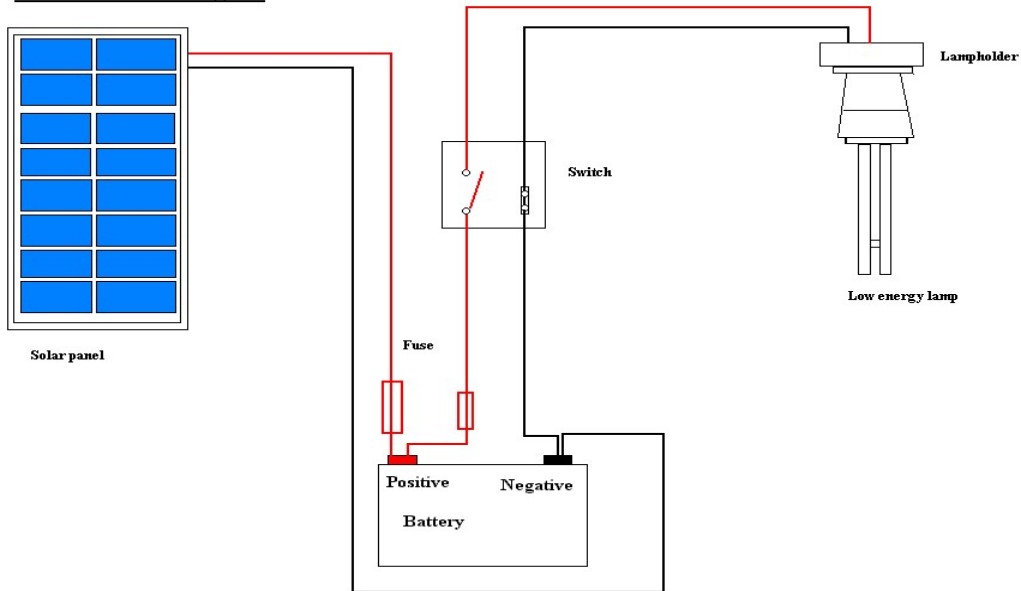
The diagram below shows a common fuse box circuit. The battery positive supplies the fuse box and further sub-circuits are then supplied from the fuse box.

The battery negative is also a common connection.



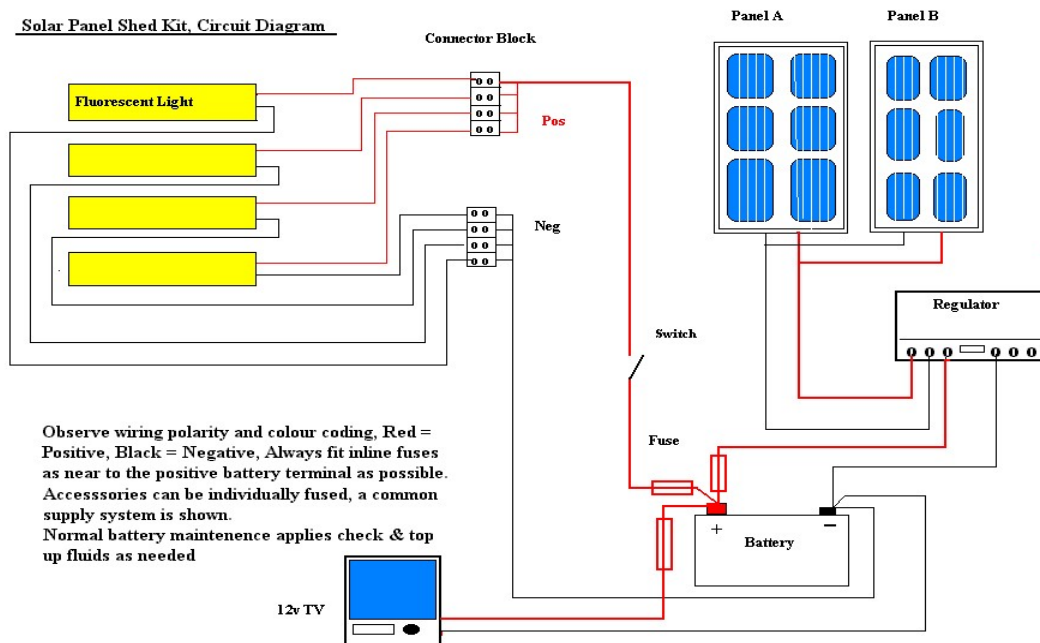
Circuit Diagram B (Single Lamp installation)

Shed Kit Circuit Diagram



Circuit Diagram C (Multi-lamp, with parallel connected solar modules)

Solar Panel Shed Kit, Circuit Diagram



Observe wiring polarity and colour coding, Red = Positive, Black = Negative, Always fit inline fuses as near to the positive battery terminal as possible. Accessories can be individually fused, a common supply system is shown. Normal battery maintenance applies check & top up fluids as needed

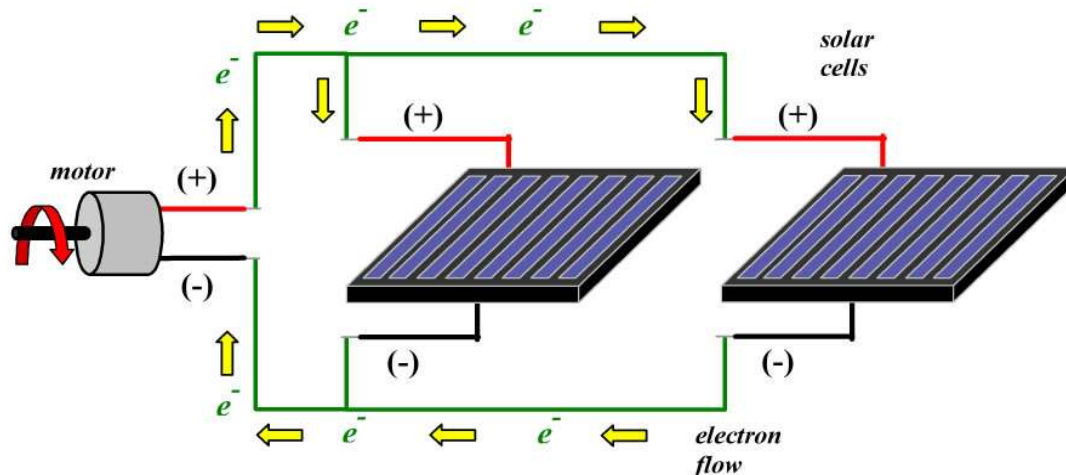
12v TV

System Expansion

Parallel & Series Connection

The basic system can be added to if power requirements change. In most cases the addition of one or two solar modules connected in parallel may be all that is needed. The connection of the modules in parallel will increase the wattage value of the system and the module wattage can be added together. If two 28w modules are connected in parallel the combined power put will be 56watts, the output voltage will remain the same 21.6vDC (This is normal for 12v battery charging)

Solar Cells in Parallel



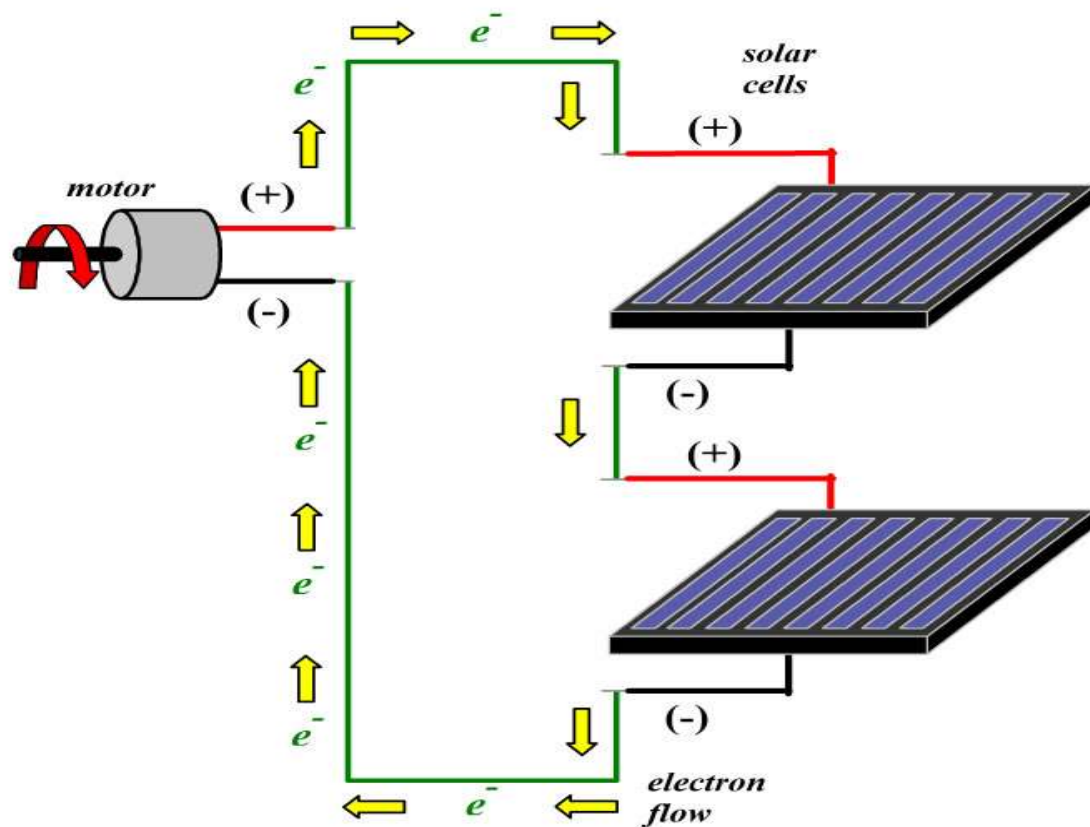
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Modules connected in **series** will raise the voltage and the module voltage can be added together. If two 28w modules are connected in series, the out watts will still remain at 28w, but the output voltage will be 43.2vDC, (This is normal for 24v battery charging)

Modules can be connected in parallel and series to increase the wattage output & voltage output.

A multiple of modules will normally be termed as an array.

Solar Cells in Series



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The parallel connection can be made at the module terminal box, at the voltage controller/regulator. Or it may be more convenient to use a separate terminal box (depending on how cables and the cable size that are to be connected together). It is a matter of connecting the positive conductors together and then the negative conductors together, as shown in the diagrams. This will give the combined wattage of the two modules.

The series connection may be best done at the module terminal box or at a separate terminal box; this cannot be done at the voltage controller/regulator. Connect the positive of a module to the negative of the other as shown in the diagram. This is a series connection. The remaining positive and negative connections will be the combined voltage of the two modules.

NOTE

With series connection it is possible to achieve high DC voltages so care must be taken to avoid electric shock

When working on solar modules in general it is best to cover the modules so that the modules are not producing current when terminating cables.

With the larger solar modules (43 watt and above) the terminal box may have three terminals. Ignore the centre terminal and connect to the outer terminals. Positive is normally on the right hand side looking into the terminal box and negative is the left hand terminal. The terminals can be identified by an embossed + & - on the terminal box frame. The positive terminal can be further identified by the large shading diodes between the terminals. The silver band on the diode will connect to the positive terminal on the right hand side of the terminal box.

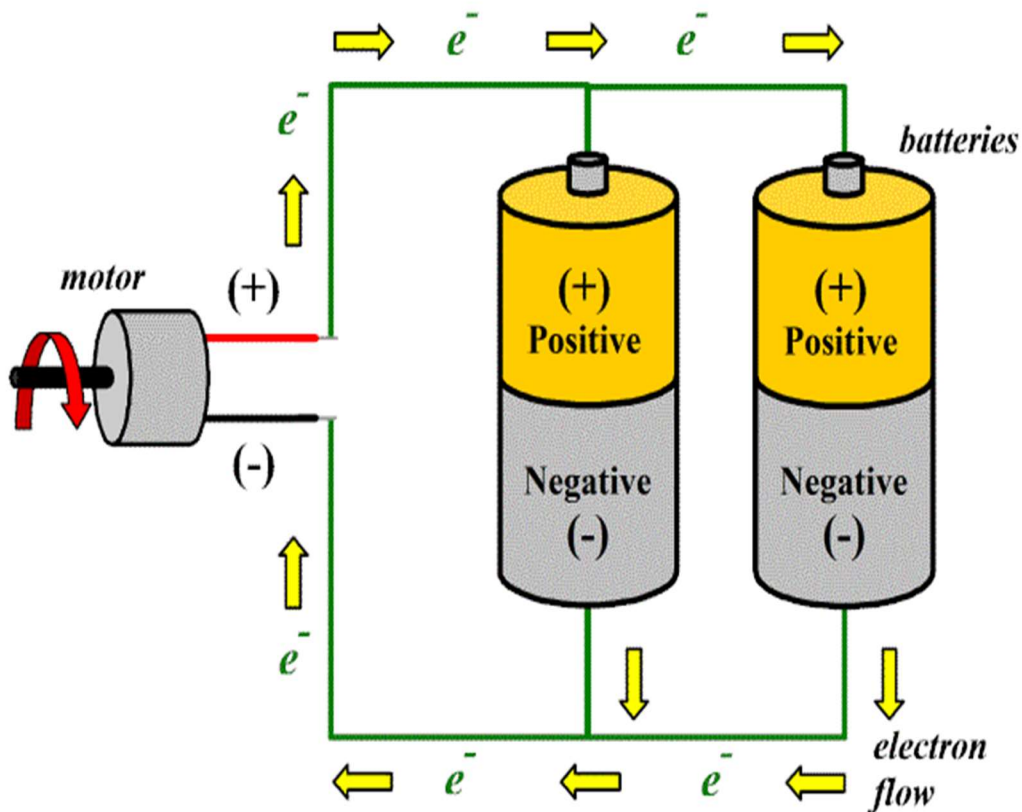
Parallel connections to other modules can be made in the module terminal box, or at the voltage regulator. If this is not possible parallel connections can be made using a suitable junction box between the solar module & the voltage regulator. (There may not be enough room in the module terminal box or at the voltage regulator connection to make a good connection, in this case connect the parallel cable using a suitable junction box)

Connecting Batteries

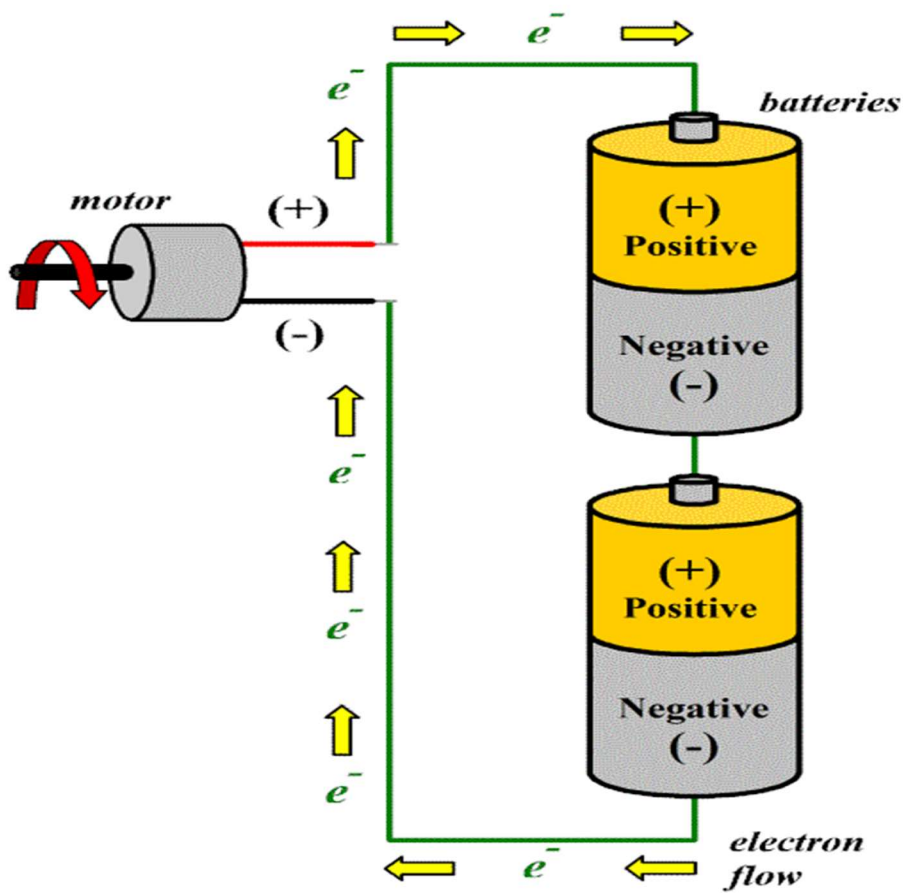
Batteries can be connected the same way, connect in parallel to increase the ampere hour capacity

Connected in series to increase the voltage. (Batteries can be series and parallel connected to increase capacity and voltage)

Batteries in Parallel



Batteries in Series



For further information or advice on fitting your solar installation, call our technical team on 01684 774000.

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