

This revolutionary maximum power point tracker solar charger was designed using the technology that won GSL Electronics the prestigious EDN Innovation Awards 08' and 09' and the Greentech Consensus Awards 09'. A simple, compact and low cost alternative. Ideal for charging batteries from new low cost and high efficiency panels.

The MPPT 60-2 is designed to automatically charge 12V, 24V and 48V Lithium Iron Phosphate batteries from silicon based pv panels such as monocrystalline, polycrystalline and thin film. It has a built in Load Over Voltage switch configurable as a Remote Load Control or a Dawn to Dusk Switch. It can be connected to the MCM for remote control and full system parameter logging and display.



PATENT APPLIED FOR - 2010901565

MPPT60-2L Specifications	
Efficiency typical	96%
Input voltage	16V to 95V
Saturation Voltage	Default 14.6V / 29.2V / 58.4V Long Life Option 14.3V / 28.6V / 57.2V High Capacity Option 14.8V / 29.6V / 59.2V
Maintenance Voltage	14.1V / 28.2V / 56.4V
Output power	3400W / 60A MAX
Quiescent current	0.05A
Thermal protection	Multilevel Type
Dimensions (mm)	260 X 145 X 67mm
Indications	LED display – OUTPUT STATUS

Important notes:

- This equipment must be installed by qualified personnel only and incorrect wiring can cause fire, injury or death – GSL will accept no responsibility for MPPT misconnection or misuse.
- Use only 12V, 24V or 48V Lithium Iron Phosphate (LiFePO₄) and confirm the MPPT settings, charge voltages and currents are correct for your battery system – if in any doubt seek qualified advice!
- Use only PV Systems with open circuit voltage below 95V.
- Use wires suitable for at least 40A, but if wire runs are over 3m then larger wires are recommended to limit voltage drop and losses.
- Install the unit in a dry place out of direct sunlight and away from flammable liquids or gases.
- Battery fuse (BF) is always required and must be located as close to the battery as possible, its sizing depends on the wire size and load rating, battery voltage and size.
- The lowest Maximum Power Point system voltages are 18V for 12V batteries, 36V for 24V batteries and 72V for 48V batteries to ensure full power.
- The load must always be connected directly , without any disconnecting devices, to either the battery or, if available, MPPT load wire.
- Only loads that will not get damaged by surges up to the system Voc can be connected to the battery via a disconnecting device.
- If using any battery disconnecting devices, such as a BMS or switches, those devices must be rated to the system Voc.
- To enhance Battery and Load protection the MIHV or equivalent and a suitable BMS rated to the maximum panel power and 170% of nominal battery voltage is highly recommended.
- This MPPT should always be used with a battery connected.

MPPT60-2L General Information:

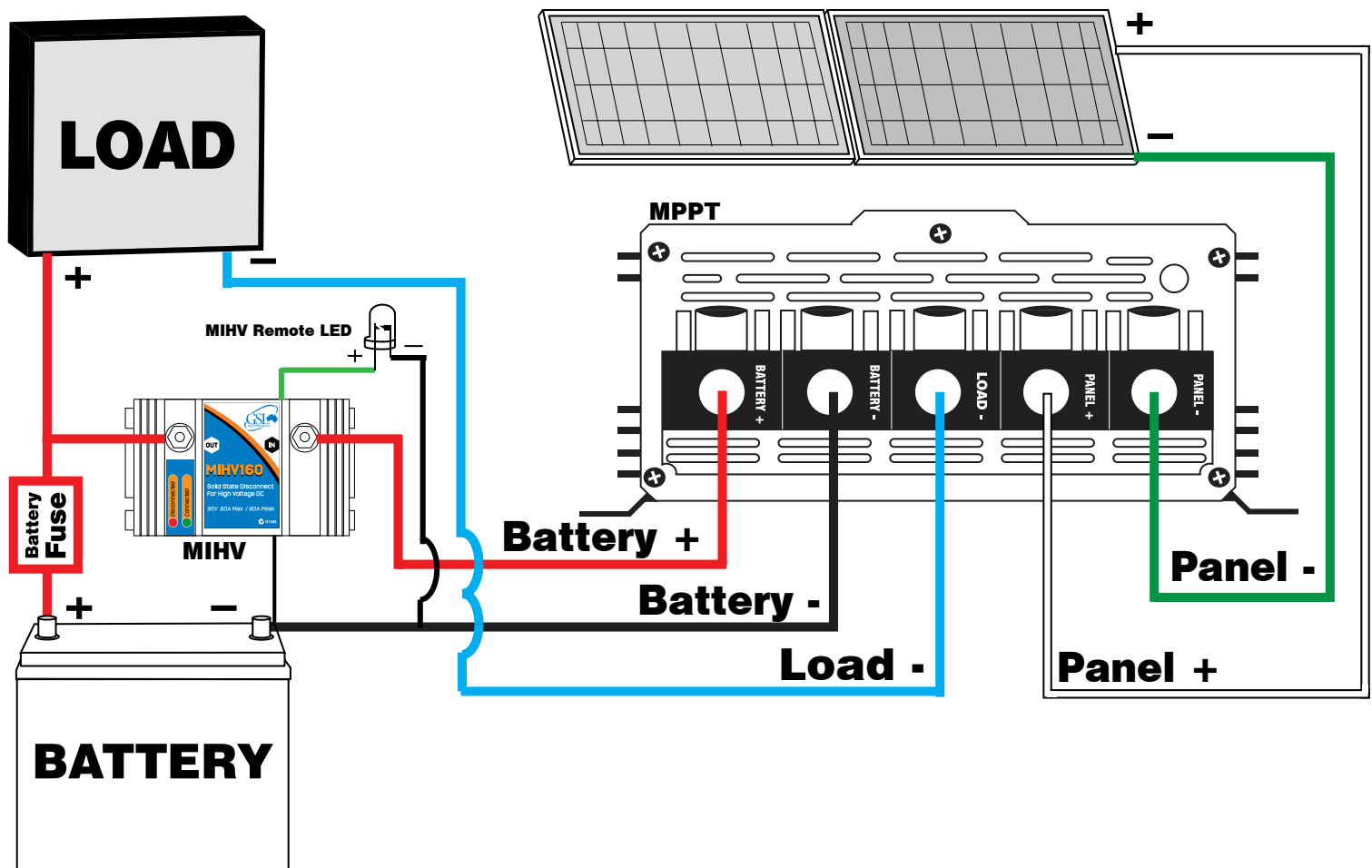
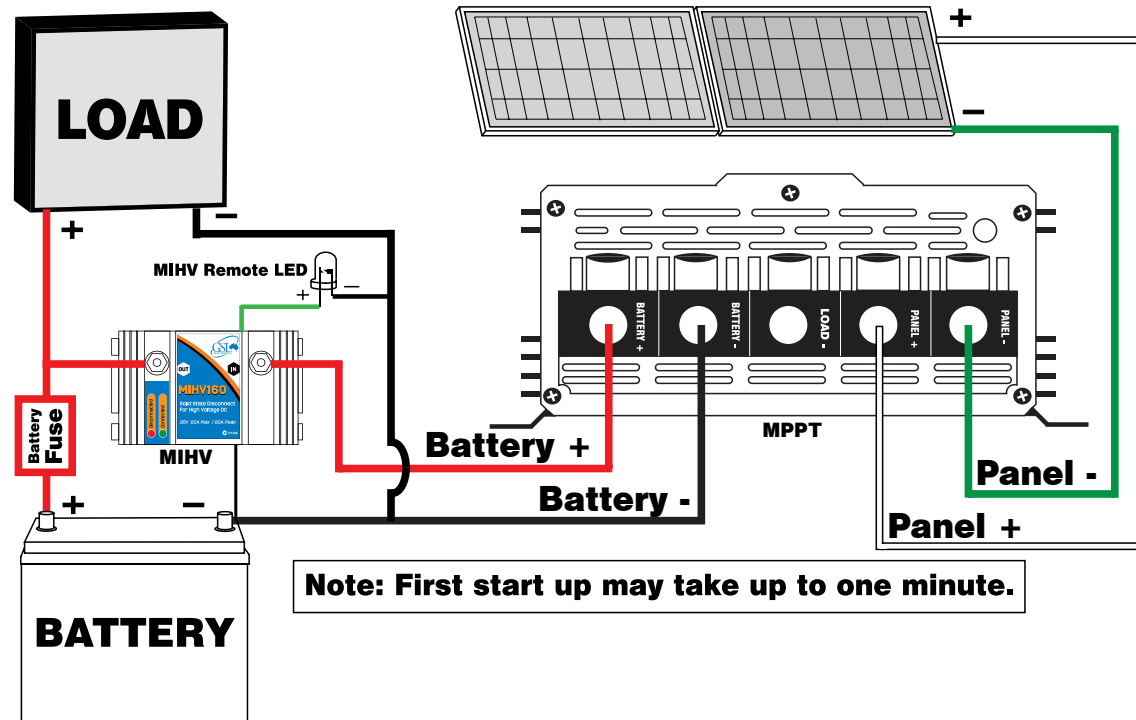
- Green LED On – Battery Ok.
- Green LED Flashing – Battery Low.
- Green LED Off - Fault Condition
- This MPPT is designed to auto detect 12V, 24V or 48V battery systems and select a suitable charge regime.
- The MPPT 60-2 is shipped set to Nominal Charge which is the safest setting. If you require, Long Life or High Capacity Charging then **BEFORE** wiring the MPPT in, follow the **CHANGING CHARGE TYPE SETTING PROCEDURE**.
- The maximum Saturation voltage is (when set to High Capacity) 14.8V, 29.6V or 59.2V and the Maintenance voltage is 14.1V, 28.2V or 56.4V for 12V, 24V or 48V batteries respectively.
- The saturation phase is entered following a low battery condition at dawn and is maintained for the rest of the day. Otherwise Maintenance voltage is applied.
- Custom voltages and thresholds are possible but minimum orders apply.
- This MPPT has a built in multilevel over temperature protection to improve product reliability while maximising output power availability.
- The maximum continuous output power is 3400W in 48V systems, 1700W in 24V systems and 850W in 12V systems. The output current is limited to 60A.
- The threshold before the charger will enter a Saturation charge is 13.9V / 27.8V / 55.6V

BASIC WIRING OPTIONS:

Permanent Load Connection

(Figure 1):

Simplest wiring option where the load is permanently connected and the batteries are not protected from over discharge.

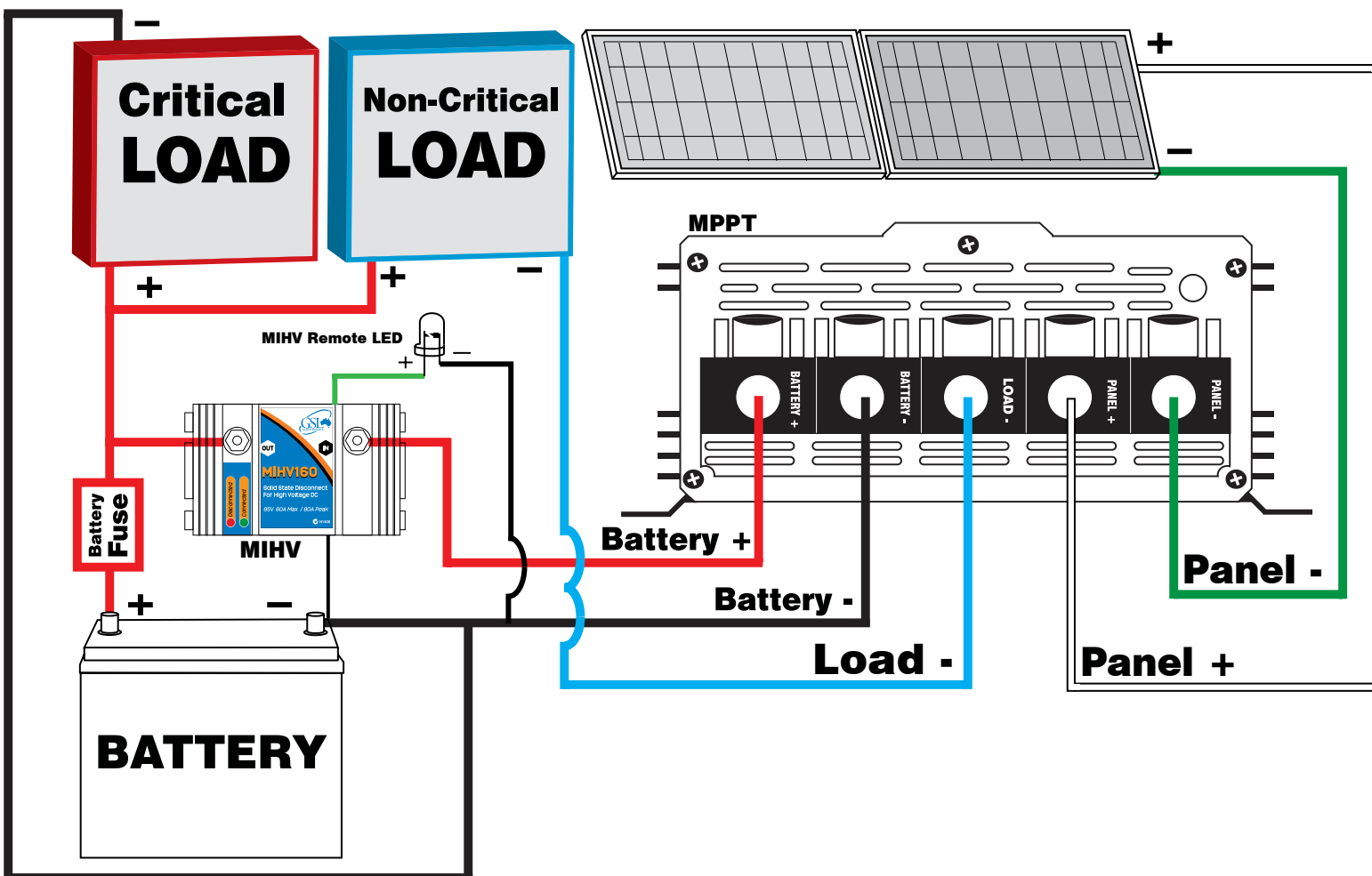


Wiring With Over Voltage Disconnect (Figure 2) :

This option protects the Load from receiving a High Voltage. The MPPT voltage goes over 1V above its maximum programmed value. This protects the load from overvoltage spikes such as disconnection of the battery, or faults with in the system. Most LiFePo₄ are fitted with over voltage disconnects from their onboard charge controllers and are already protected against Over Voltage.

Wiring With Critical And Non Critical Loads (Figure 3):

Critical loads are generally light loads which are powered under any condition. Non critical loads are loads which can be disconnected to ensure maximum on time for critical loads as well as to extend the life expectancy and reliability of the system. The non critical load can be set up as Dawn to Dusk loads (via MCM).



Wiring with MCM option:

Connecting the optional MCM to the MPPT will allow various system parameter display, output voltage and alarm settings and enable the programmable dawn to dusk or remote load control options.

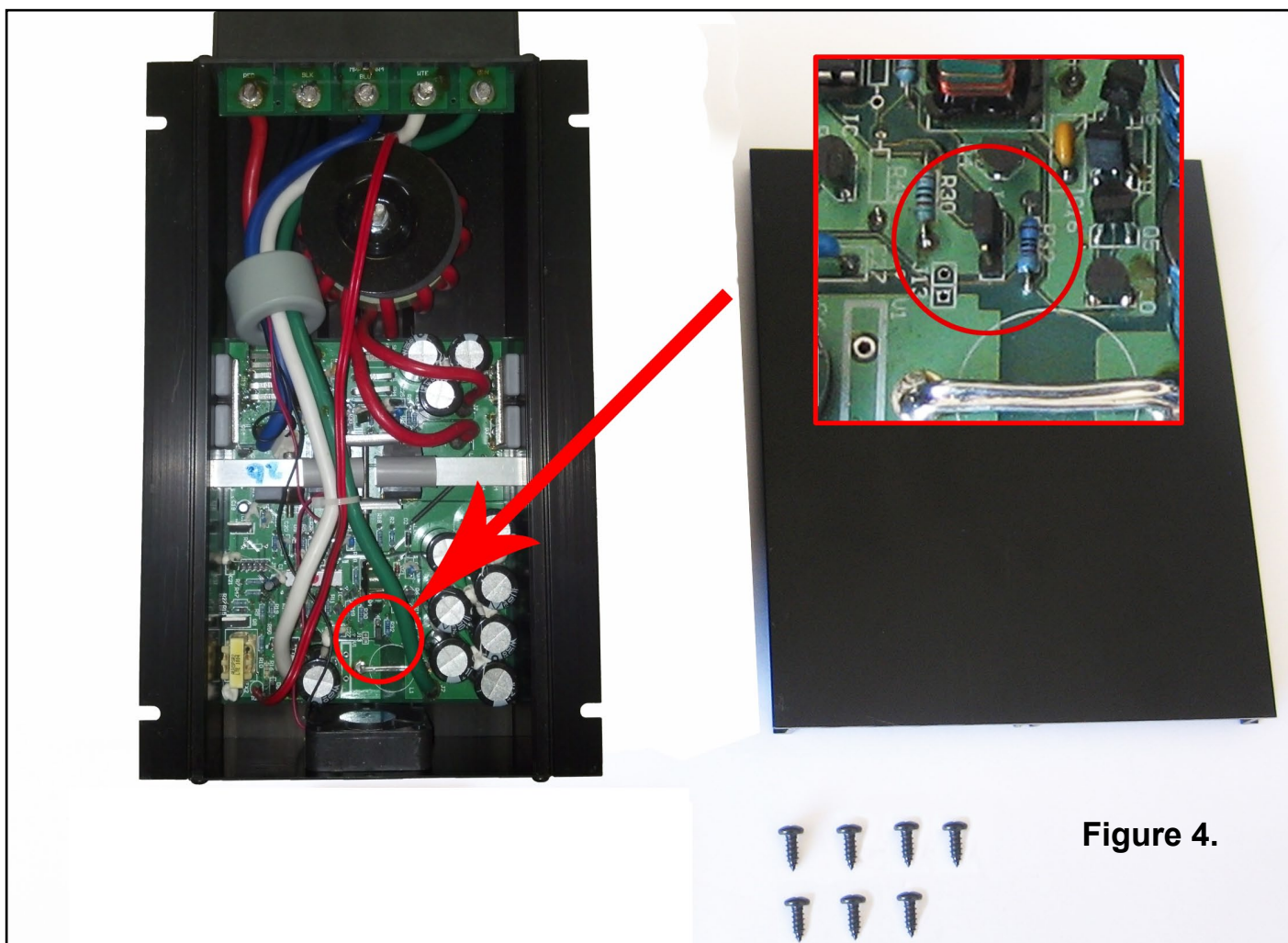
For more details please refer to MCM Manual.

For optimal performance from panel and MPPT please use the following table to determine the best setup for your situation.

Panel Configuration	V _{OC}	V _{MP}	12V Charging	24V Charging	48V Charging
"Battery Panel"					
1x12V Battery Panel	21	16			
2x12V Battery Panel	42	32	✓		
3x12V Battery Panel	63	48	✓	✓	
4x12V Battery Panel	84	64	✓	✓	
1x24V Battery Panel	42	32	✓		
2x24V Battery Panel	84	64	✓	✓	
Grid Connect Panel (size = no. cells in grid)					
1x18 Cell Grid	10	8			
1x48 Cell Grid	28	23	✓		
2x48 Cell Grid	56	46	✓	✓	
3x48 Cell Grid	84	69	✓	✓	
1x52 Cell Grid	31	25	✓		
2x52 Cell Grid	62	50	✓	✓	
3x52 Cell Grid	93	75	✓	✓	✓
1x54 Cell Grid	32	26	✓		
2x54 Cell Grid	64	52	✓	✓	
3x54 Cell Grid	96	78	✓	✓	✓
1x60 Cell Grid	36	29	✓		
2x60 Cell Grid	72	58	✓	✓	
1x72 Cell Grid	44	36	✓	✓	
2x72 Cell Grid	88	72	✓	✓	
1x96cgsp	65	55	✓	✓	

Changing Battery Type Setting Procedure

1. Ensure all the MPPT wires are disconnected.
 2. Remove 7 front panel screws and the front panel and slide out cover – **see Figure 4.**
 3. Locate connector J4. By default this will be Jumperless (Nominal Setting) – **see Figure 4.**
 4. Shift link on J4 to desired battery setting (High Capacity – **see Figure 5**, Long Life - **See Figure 6**) .
 5. Slide back cover and fit in front panel carefully, ensuring led is still visible through the faceplate and screw back the 7 mounting screws.
- The above procedure can be repeated to return to Nominal Setting by removing the jumper.



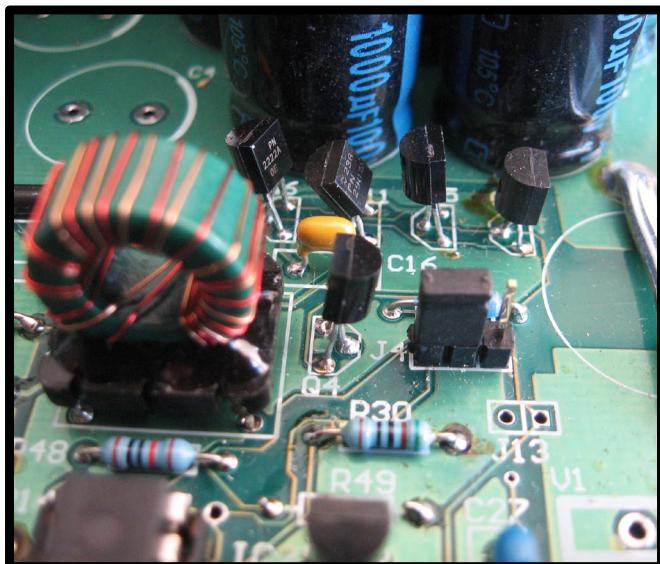


Figure 5 (Above): High Capacity Setting

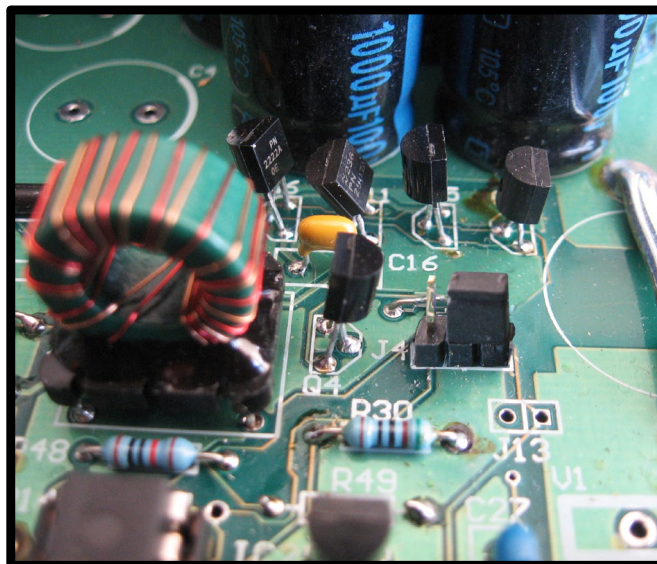


Figure 6 (Above): Long Life Setting

MPPT FAQs

Q: What is an MPPT?

MPPT stands for Maximum Power Point Tracker and is a specialized converter designed to maintain the PV voltage at the level in which it delivers maximum power to the load or battery. The panel's nominal output power can only be obtained with the use of an MPPT.

Q: What are the MPPTs advantages compared to standard solar regulators?

1. About 20% higher current in a typical application which can be used for higher loads or longer run times or cutting PV system cost.
2. Suitable for lower cost non battery type PV since the MPPT can efficiently charge the batteries from relatively high voltage, say 12V batteries from 40V MPP panels.
3. Less interference and more accurate voltages during saturation and maintenance.

Q: What happens at low PV currents?

The MPPT will outperform the conventional regulator above 3% of nominal panel power. Below 3%, about 10W in a 400W panel, the MPPT will have a slightly lower output current than a non MPPT.

Q: Why are MPPT not more common in standalone solar systems?

Until now and despite their overwhelming advantages MPPTs have not been commonly used in standalone solar systems because of cost. The new GSL MPPT specifically addresses this issue making economic sense in a wide range of solar systems.

Q: What sort of batteries should I use?

1. A deep cycle battery is a must due to the cyclical nature of the solar system with a recommended battery capacity of at least 360AH.
2. A larger battery will not only give longer run time during low light but also will be able to avoid available PV power being unstored such as when the battery reaches the maintenance stage.

Q: How do PV temperatures affects charge current?

Temperature increase brings down the PVs maximum power point voltage reducing the MPPTs current gain available. In principle at 25C it is possible to achieve 30% gain but at 40C, a more realistic average temperature, about 20% is still available.

Q: What sorts of loads can I power with the MPPT60?

1. The maximum bulk charge current with the MPPT60 on a 12V battery and 800W panel is approximately 60A, so you can expect about 200AH per day which means a 200W load for about 10 hours daily.
2. Following the same reasoning with a 24V 1600W panel the MPPT60 will supply a daily load of 400W for about 10 hours.
3. Following the same reasoning with a 48V 3200W panel the MPPT60 will supply a daily load of 800W for about 10 hours.

Q: Is interference possible? and If so what do I do?

GSL's MPPTs produce far less interference than a conventional solar regulator during the absorption and float stages, that is during most of its operating time, and it is designed to comply with local and international EMI standards however some interference is still possible. If interference occurs first try and reorient the aerial or move the sensitive equipment away from the MPPT wires. Ensure the MPPT chassis is grounded. Grounding a battery terminal may also help and finally you can try adding ferrite clamps.

Warranty Conditions: Our products come with guarantees that cannot be excluded under the Australian Consumer Law. The customer is entitled to a replacement or refund for a major failure and compensation for any other reasonably foreseeable loss or damage. The customer is also entitled to have the products repaired or replaced if the products fail to be of acceptable quality and the failure does not amount to a major failure.

GSL Electronics (GSL) warrants that its products will, under normal use and service, be free of defects in material and workmanship for a period of two (2) years from the date of the original purchase by the customer as marked on the customer's original invoice. Please refer to our website for full warranty and return information which can be found at <http://www.gsl.com.au/faq.html>