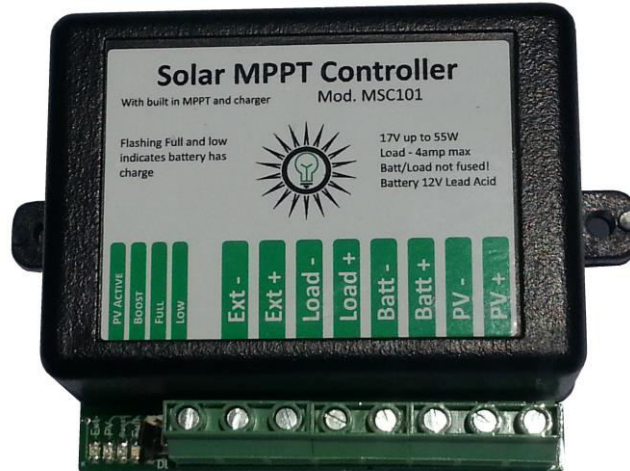


# ***MPPT Model MSC101®***

## ***Maximum Power Point Tracking Unit with external supply***

### ***User Manual***



Thank you for purchasing this state of the art product. This product has been designed to provide years of trouble free service.

#### **Introduction**

A microprocessor controls the MPPT operation and simultaneously charges and maintains the battery from a solar panel, and controls a load, with day/night switch capability. When the battery drops to 11.0V, the unit switches the load to the external supply. The unit can only provide energy into the battery in proportion to what it can collect from the solar panel or Photo Voltaic panel (PV). In the case that there is no external supply, then the load remains off until the next charge cycle. Once the battery is charged, the unit will switch the load back to the battery supply, and the cycle repeats itself. Note that the battery is not charged by the external supply, and is only charged via the PV energy.

There is routine maintenance required on the PV panel, to ensure that the PV panel works at it most highest efficiency.

#### **Installation**

For a long term service life, ensure that the unit is installed either in an IP65 environment, or in an area away from direct sunlight, rain and humidity.

Mounting can be performed by using the two ears protruding from either side.

#### **Electrical connection – Solar Panel**

Incorrect connection of the PV panel will void the MPPT unit warranty.

Connect the PV, ensuring that the PV wire polarity matches the unit to the terminals marked 'PV+' and 'PV-'. 'PV+' refers to the positive side and 'PV-' refers to the negative side of the PV panel.

If the polarity is correct, and the sun is shining directly on the PV panel, then the orange LED will be lit.

### **Electrical Connection – Battery**

Incorrect connection of the Battery will void the MPPT unit warranty.

The controller has no internal fuse for protection. For safety reasons and for protection, use 5Amp in line Fuse holder with a fast blowing fuse, In the case of capacitive loads, where switching on may blow the fuse, then use a slow blow fuse, but do not use a fuse greater than 10Amps. This fuse will protect the unit, the wires and the battery against fire in case of a load fault, wiring fault or a catastrophic failure of the unit.

Connect the battery, ensuring that the Battery wire polarity matches the unit to the terminals marked '**Batt+**' and '**Batt-**'. '**Batt+**' refers to the positive side of the battery, where the battery may have a number of marking types, depending on the manufacturer. A printed '+' or text '**Pos**' or a **Red** terminal washer will indicate the **Positive** side of the battery. '**Batt-**' refers to the negative side of the battery. A printed '-' or text '**Neg**' or a **Black** terminal washer will indicate the **Negative** side of the battery.

### **Electrical Connection – Load**

Incorrect connection of the load will void the warranty both to the MPPT unit and the load.

The unit uses a semiconductor, known as a FET to switch the load on and off. The FET makes a connection between the load negative line, and the battery negative line. On no circumstances do you connect the load to any other terminal of the MPPT unit than the 'Load+' and 'Load+' terminals. It is not necessary to have any fuse in line to the load for protection, as the fuse on the battery 'Positive' line will protect the system against any faults that may occur on the load side.

Connect the load, ensuring that the load wire polarity matches the unit to the terminals marked 'Load+' and 'Load-'. 'Load+' refers to the positive side of the load. 'Load-' refers to the negative side of the load.

### **Electrical Connection – External Supply**

Incorrect connection of the load will void the warranty to the MPPT unit, the load and external supply.

The controller has no internal fuse for protection. For safety reasons and for protection, use 5Amp in line Fuse holder with a fast blowing fuse, In the case of capacitive loads, where switching on may blow the fuse, then use a slow blow fuse, but do not use a fuse greater than 10Amps. This fuse will protect the unit, the wires and the supply against fire in case of a load fault, wiring fault or a catastrophic failure of the unit. Make sure that the external supply is rated to supply the load without overloading the external supply. Ensure that the external supply is not less than 10.5V DC and not greater than 15V D.C.

Connect the external supply, ensuring that the supply wire polarity matches the unit to the terminals marked 'Ext+' and 'Ext-'. 'Ext+' refers to the positive side of the external supply, and 'Ext-' refers to the negative side of the supply.

### Selecting Day/Night Switching

The MPPT unit has a built in Day/Night function, such as a night light or security light. This is done by moving the jumper shorting bar, located next the green connector on the left hand side, to the position marked 'DL' for Daylight – Off. At dusk, as soon as the sun goes down, the internal microprocessor will switch the internal FET on, and the load will be powered. As soon as dawn approaches, the internal microprocessor switches the FET off. In the case that during the night, if the battery discharges below the safety level of 11.0V, the internal microprocessor will switch the load off, and will only again switch the load on at the next night cycle, if the battery gets charged beyond 12V. There is an internal latch which will lock out the load till the battery is charged again. This prevents the load cycling On and Off as the battery voltage recovers from the switched off load and the discharge of the connected load.

### Selecting Load always on

The MPPT unit has the ability of supplying a load continuously provided the battery has not discharged past the 11.0V safety level. To select this function, move the jumper shorting bar, located next the green connector on the left hand side, to the position marked 'On' for always – On. In the case that the battery discharges below the safety level of 11.0V, the internal microprocessor will switch the load off, and will only again switch the load on at the next charge cycle, where the battery must be charged beyond 12V. in the case that the battery becomes discharged, there is an internal latch which will lock out the load till the battery is charged again. This prevents the load cycling On and Off as the battery voltage recovers from the switched off load and the discharge of the connected load.

### LED Indicators

Ext	– Red LED	Running on external power
PV	– Orange LED	Sun is shining on the PV panel and the battery is charging
Boost	– Orange LED	Battery is in boost mode charging. Usually from a discharged state
Full	– Green LED	Solid Green – Fully charged battery. Flashing green and red indicates battery with charge and above 11.0V
Low	– Red LED	Solid Red – Low battery. Flashing Red and Green indicates battery with charge above 11.0V

### Specifications

#### PV Input

PV Input Supply Voltage	0 – 27V D.C.
PV Current at full charge mode	10mA- 3.5A
PV Panel Rating	10W to 55W
PV maximum load voltage value	17 – 18V DC
MPPT Current with no load	10 - 15mA

#### Battery Input (We recommend an in line 5Amp fuse for protection, max 10Amp)

Voltage	9 – 16V DC
Maximum current absorbed at full charge	3.5A (PV Panel size and time of day dependant)
Current draw with no load and no PV voltage	10 - 15mA

**Load**

Voltage greater than 11.5V to Battery terminal voltage  
 Low voltage cut out Less than 11.0V DC  
 Current Maximum is 4Amps – not fused  
 Day/Night switch control or jumper over ride

**External Supply**

Voltage between 10.5V to 15V D.C.  
 Current to match load, not exceed 4A

**Charger** (Intelligent charger working in the parameters below)

If battery voltage below 11.0V then Boost mode till voltage reaches 14.5V

If voltage between 11.5V and 14.5V then trickle charge mode

**MPPT Mode** (Maximum Power Point Tracking)

The micro controller uses switch mode technology to ensure that the Solar Panel always operates at it most highest efficiency point at all times. Using this method it increases panel output by 30% over other conventional methods. Introducing this switching technology ensures that smaller PV panels can be used to achieve the same amount of power using a larger panel.

**Trouble shooting**

PV Light off	Night Time	PV works with sun light only
	Day time	Check wires & polarity - replace MPPT unit
No LEDs On	Replace fuse in battery and/or external supply. Check wires - replace MPPT Unit	
Battery weak	Clean solar panel. Ensure no shadows on panel when sun shines- Replace battery	
Load off	Check DL jumper - only night time load on	
	Replace load. Replace MPPT unit	

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