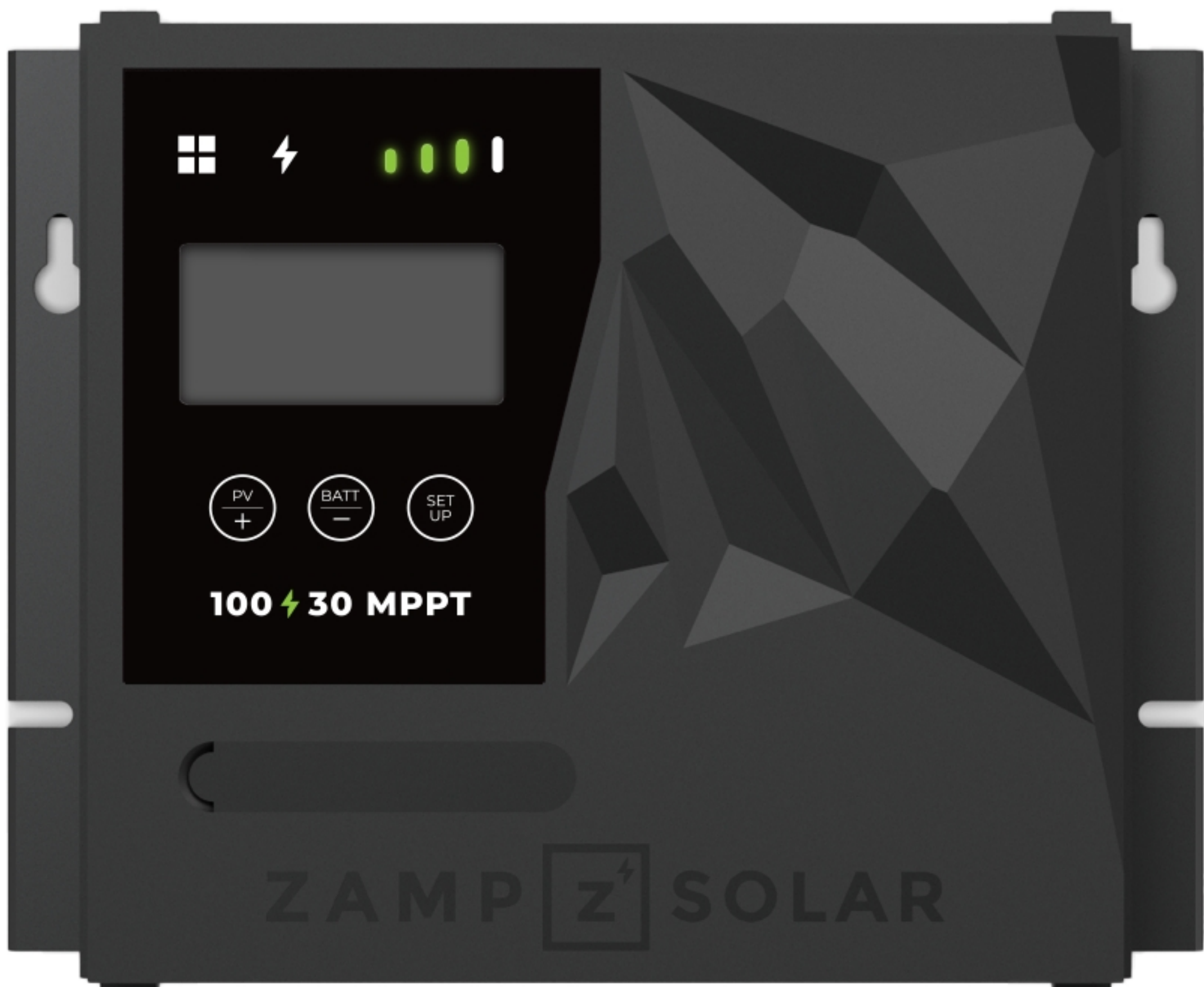


SCC1012

MPPT SOLAR CHARGE CONTROLLER USER MANUAL

INPUT: DC 100V MAXIMUM

OUTPUT: DC 12V / 24V 30A



THIS MANUAL CONTAINS IMPORTANT SAFETY AND OPERATING INSTRUCTIONS. PLEASE READ AND FOLLOW INSTRUCTIONS TO ENSURE PROPER OPERATION.

FEATURES

- PV open circuit voltage up to 100V
- The latest Maximum Power Point Tracking (MPPT) algorithm
- Unique multiple peaks detected technology for maximum power point tracking
- MPPT tracking efficiency above 99.5%
- Wider MPP operating voltage range
- Common negative grounding connection
- Suitable for most rechargeable batteries, up to 9 battery types preset plus custom setting
- Extensive internal electronic circuit protection
- Reliable operating safety protection overcharging or undercharging protection, short circuit protection, reverse polarity protection, thermal protection
- Automatically detect 12V or 24V DC system voltages.
- Informative display Interface to show Solar parameter, battery charging parameter, battery type, battery temperature, custom presetting and faulty codes
- (Optional) Provides plug in remote digital display meter.
- (Optional) Provides external battery temperature sensor.
- Splash proof IP43 Rated
- Rubber mask for connecting terminals protection
- Conformal coating for internal boards
- Designed according to UL1741, EN/IEC 62109 1 ; EMI standard : EN61000 61/EN61000 63 and FCC standard: 47 CFR Part 15, Subpart B

WARNINGS

**WARNING**

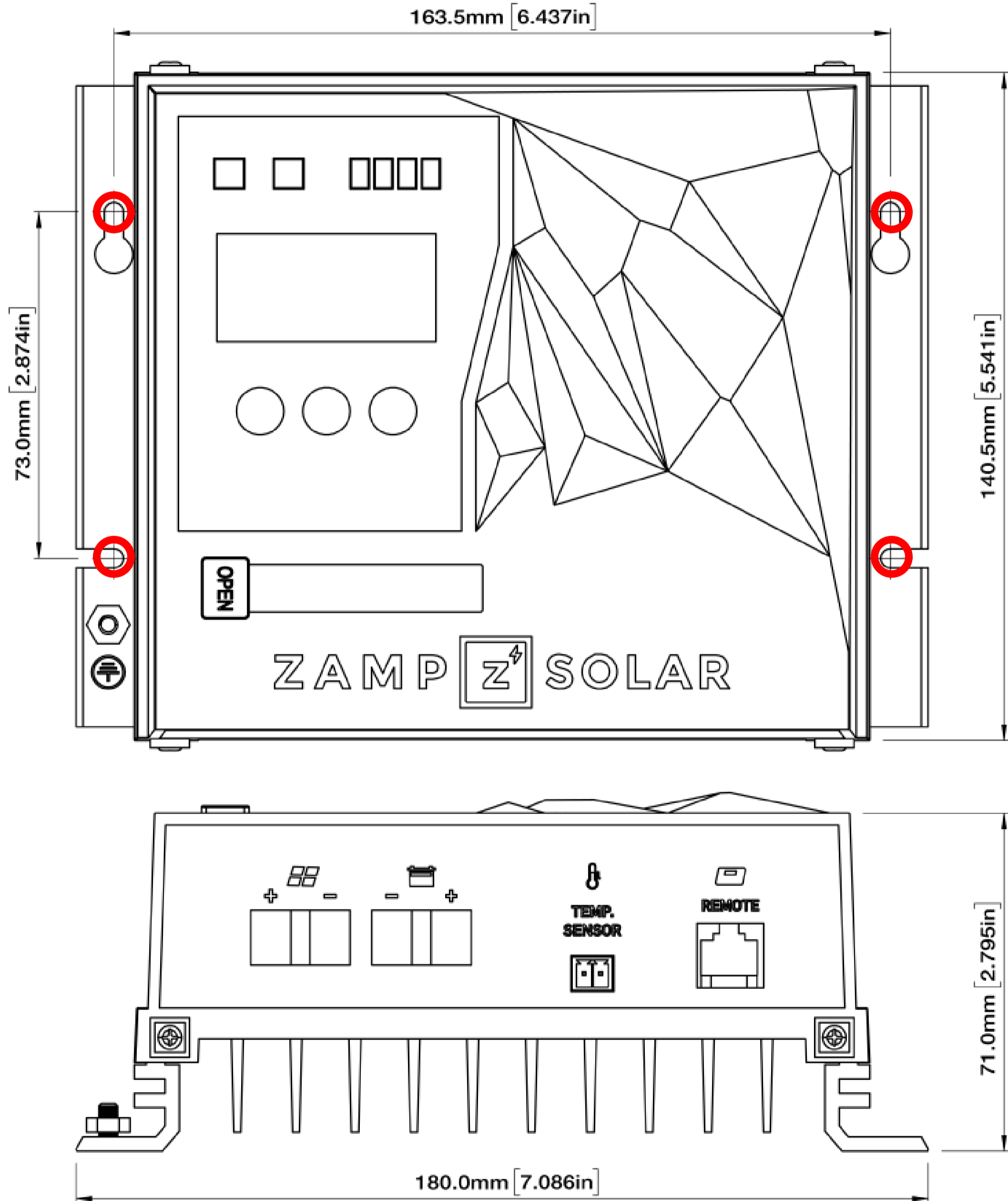
RISK OF EXPLOSIVE GASES WORKING IN VICINITY OF A LEAD ACID BATTERY.
DANGEROUS EXPLOSIVE GASES DEVELOP DURING NORMAL BATTERY OPERATION.

- This charger is designed for indoor use only and should never be exposed to rain.
- Do not disassemble the controller. Contact Zamp Solar support if the unit requires attention.
- Lead acid, LCO, LiFePO₄, LTO, LI-95 batteries can be dangerous. Ensure no sparks or flames are present when working near batteries.
- Eye protection should always be used. Never short circuit the battery.
- Given sufficient light solar panels always generate energy even when they are disconnected.
- Accidental 'shorting' of the terminals or wiring can result in sparks causing personal injury or a fire hazard. We recommend that you cover up the panel(s) with cloth or cardboard so you can block all incoming light during the installation. This will ensure that no damage is caused to the Solar Panel or Battery if the wires are accidentally short circuited.
- Always install a battery fuse on each circuit including the solar controller
- Do not reverse connect the wires to the solar panel or battery

MOUNTING THE CONTROLLER

The Solar Controller should be mounted using the mount points highlighted in red shown in the image below

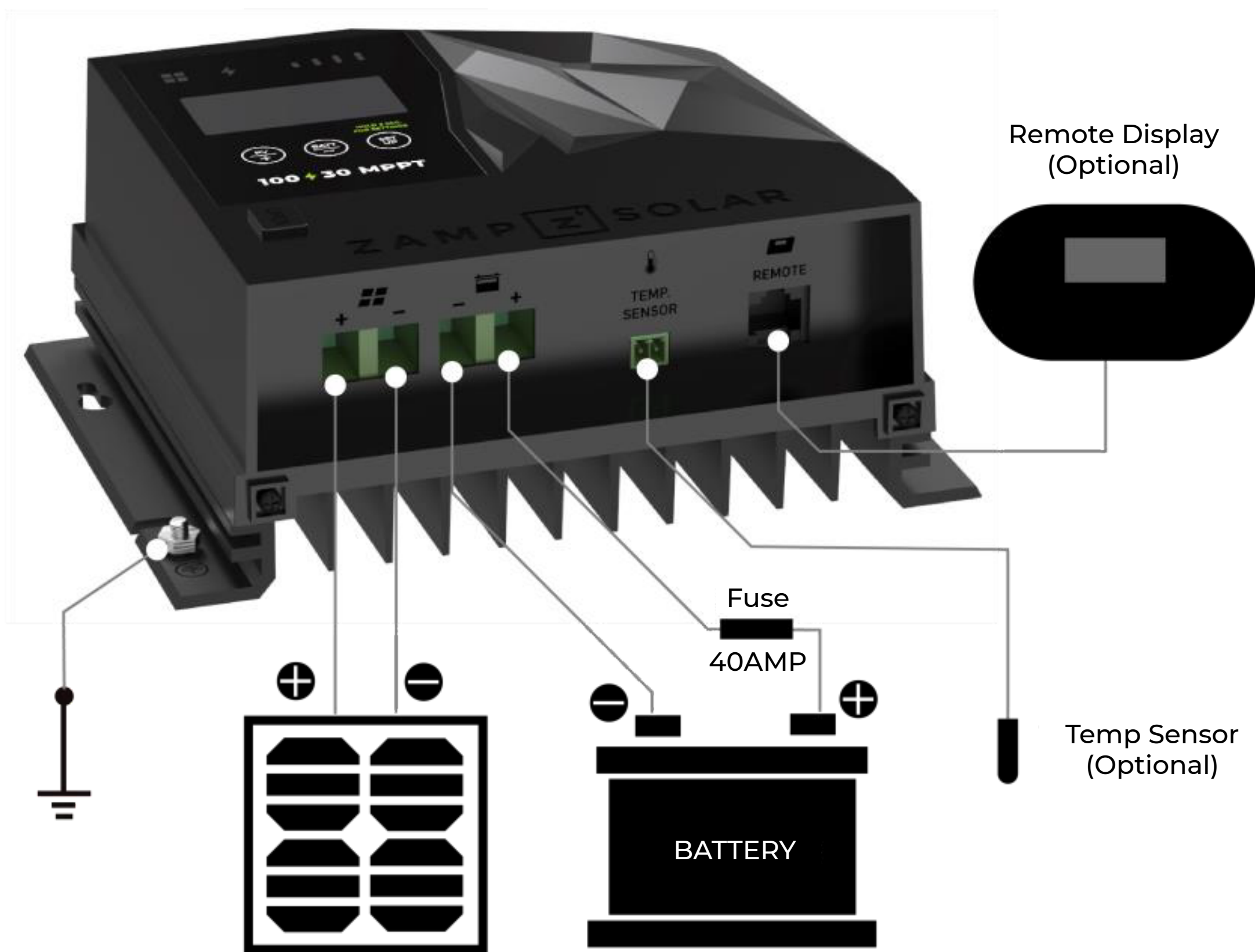
Mount the unit to a flat surface



WIRING CONNECTIONS

To protect the Battery and the Solar Panel, it is strongly recommend that you place an inline fuse on the positive wire on both the “Solar” and “Battery” Circuits. 40A fuse for 30A controller, (As close to the Battery /Panel as possible)

Refer to the below drawing, please cover the solar panel before connecting cables.



CORRECT WIRE SIZE:

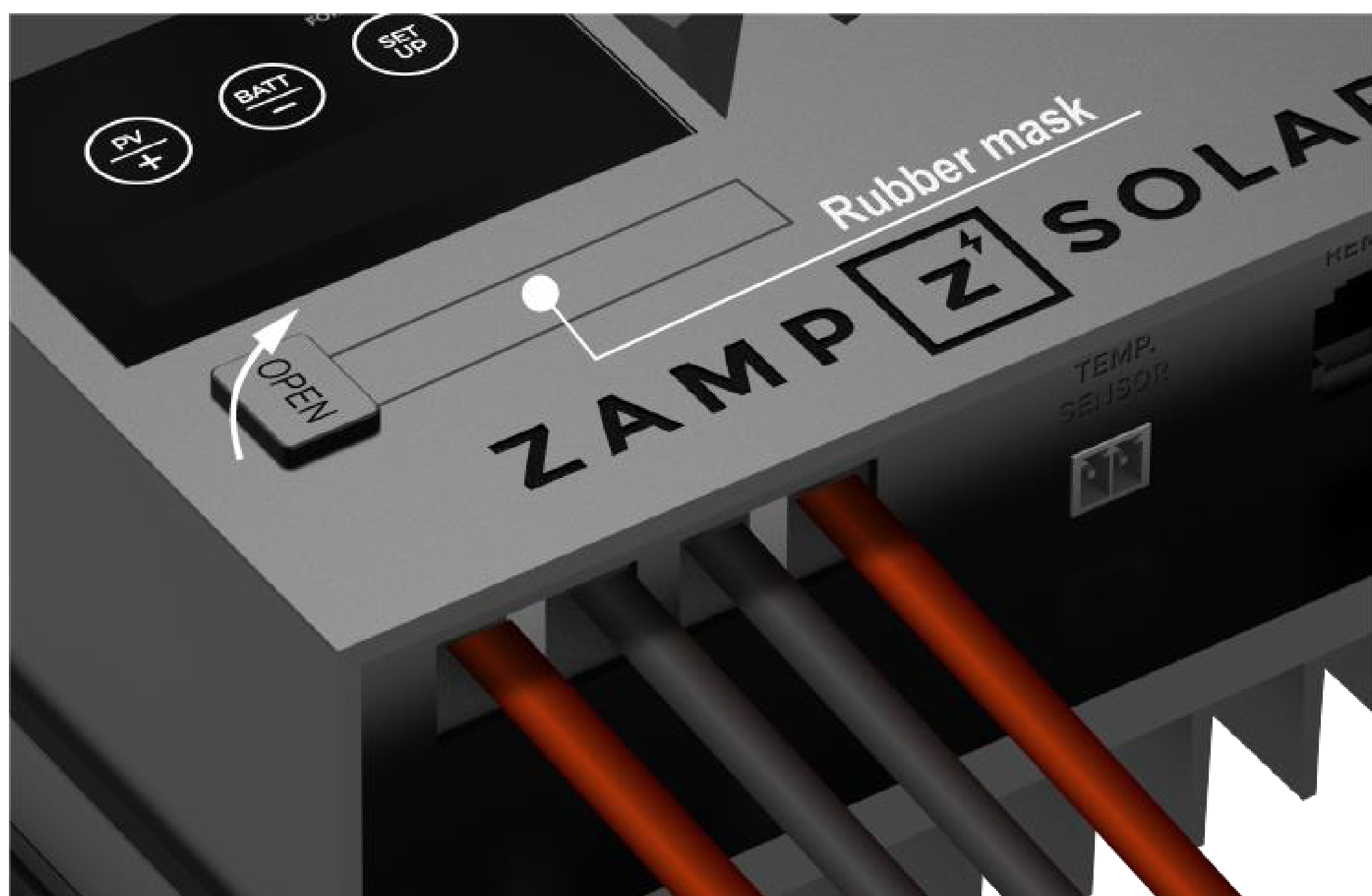
Please refer to the wire size chart below to determine the minimum size wire needed for each connection. This will also ensure you get the best performance out of your solar controller.

Rated Current	Total cable length	Solar Panel → Controller → Battery		
		< 3M	3-4.5M	6M
Rated Current	Total cable length	Solar Panel → Controller → Battery (meter)		
		< 3M	3-4.5M	6M
30 Amp	Total cable size (AWG)	10AWG	8AWG	6AWG

Rated Current	Total cable length	Solar Panel → Controller → Battery		
		< 10FT	10-15FT	20FT
Rated Current	Total cable length	Solar Panel → Controller → Battery (meter)		
		< 10FT	10-15FT	20FT
30 Amp	Total cable size (AWG)	10AWG	8AWG	6AWG

It is recommended to install the solar charge controller as close to the battery as possible.

1. Take off the rubber mask plate at OPEN end on the top face, you will see the four screws, loosen the screws.
2. After ensuring wires are not yet attached to solar or batteries, Insert the battery and solar cables in the correct terminals and securely tighten.
3. Connect battery wires to the charge controller, then to the battery. The Solar Charge Controller will now power on.
4. Set the battery type to the proper profile or setup a custom profile if desired.
5. Connect solar wires and uncover solar panels. You are now ready to charge!



DO NOT REVERSE THE CONNECTIONS WITH THE SOLAR PANEL AND BATTERY WHEN INSTALLING THE CABLES

CONTROLLER OPERATION – LCD DISPLAY

When the controller powers on, the unit will run self-qualify mode and automatically show below items on LCD before going into charging process

8888	Self-test starts, digital meter segments test
r001	Software version test
12V 30A	System battery voltage and current test
rT5 25°C	External battery temperature sensor test (if connected)
Ab5U 1420	Absorption voltage test
FLrU 1330	Float voltage test
End	Self-test completed

SYSTEM BATTERY VOLTAGE SETTING

Press and hold the **SET UP** button for 3 seconds to go into the system battery voltage setting mode, press **PV / +** or **BATT / -** button to select your desired system battery voltage 12V, 24V or AUTO, press the **SET UP** button again to confirm the battery voltage setting.

THE DISPLAY IN SEQUENCE:



The controller will automatically memorize your previous battery voltage setting, If AUTO mode selected, the controller will automatically detect 12V or 24V battery connected.

SYSTEM BATTERY TYPE SETTING

Please check your battery manufacturer's specifications to select correct battery type. The unit provides 9+1 custom battery types for selections: LI-95, LCO, LTO, LFP, Crystal (Lead crystal), Gel, AGM, WET (Conventional lead acid) and Calcium (Calcium contented) battery plus Custom setting.

To set the battery type, press the **SET UP** button to go into your battery type setting mode, the battery type you select will be flashed on the LCD meter, the default setting is AGM Battery; the controller will automatically memorize your battery type setting.

LCO BATTERY TYPE SETTING IS ONLY RECOMMENDED WORKING WITH 3-SERIES LITHIUM COBALT OXIDE LICO2 BATTERY

LFP battery shown in LCD indicates Lithium Iron Phosphate battery, LiFePO4 battery. LI-95 shown in LCD indicates the battery profile keeps your LiFePO4 battery charged at 95% LTO battery shown in LCD indicates Lithium titanate oxidized, Li4Ti5O12 battery.

CAUTION: INCORRECT BATTERY TYPE SETTING MAY DAMAGE YOUR BATTERY.

Press **PV / +** or **BATT / -** button to navigate your desired battery type as below:



Press the **SET UP** button again, the selected battery type will be solid On and confirmed.

CUSTOM SETTING

This solar controller provides a CUSTOM mode to meet your special battery charging demand, the users can preset the Absorption voltage level and duration, Equalization voltage level, duration and periodical cycle, Float voltage level and Reset voltage level for your targeted battery charging parameters.

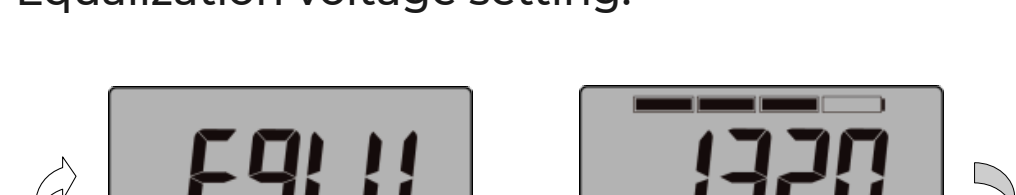
Alternatively display Absorption Voltage character **AbS.U** and voltage data when going into CUSTOM mode



Absorption voltage setting range from 13.20V ~ 15.50V, press **PV / +** or **BATT / -** button for once +/- 0.05V variation, press the **SET UP** button again to confirm the absorption voltage level you preset, then move to next Absorption duration setting.



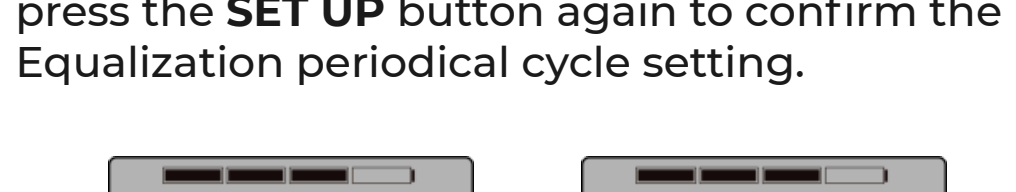
Alternatively display Absorption Time character **AbS.T** and duration data; Absorption duration setting lasted from 5 – 500 minutes, press **PV / +** or **BATT / -** button for once +/- 5 minutes variation, press the **SET UP** button again to confirm the absorption duration setting, then move to next Equalization voltage setting.



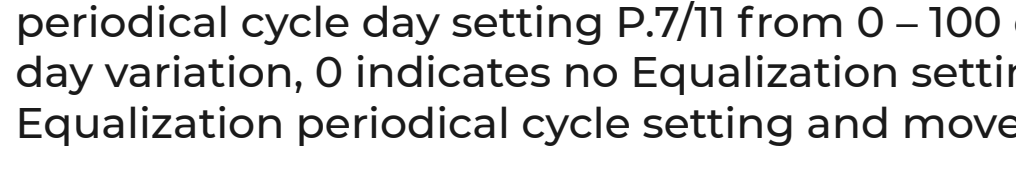
Alternatively display Equalization voltage character **EqL.U** and voltage data; Equalization voltage setting range from 13.20V ~ 16.2V, press **PV / +** or **BATT / -** button for once +/- 0.05V variation, press the **SET UP** button again to confirm the Equalization voltage and then move to next Equalization duration setting.



Alternatively display Equalization Time character **EqL.T** and duration data; Equalization duration setting lasted from 5 – 500 minutes, press **PV / +** or **BATT / -** button for once +/- 5 minutes variation, press the **SET UP** button again to confirm the Equalization duration setting and then move to next Equalization periodical cycle setting.



Alternatively display Equalization periodical cycle character **EqL.P** and cycle day; Equalization periodical cycle day setting P.7/11 from 0 – 100 days, press **PV / +** or **BATT / -** button for once +/- 1 day variation, 0 indicates no Equalization setting; press the **SET UP** button again to confirm the Equalization periodical cycle setting and move to next Float voltage setting.



Alternatively display Float voltage character **FLr.U** and voltage data; Float voltage setting range from 13.00V ~ 14.00V, press **PV / +** or **BATT / -** button for once +/- 0.05V variation, press the **SET UP** button again to confirm the Float voltage and then move to next Reset/Rstart setting.

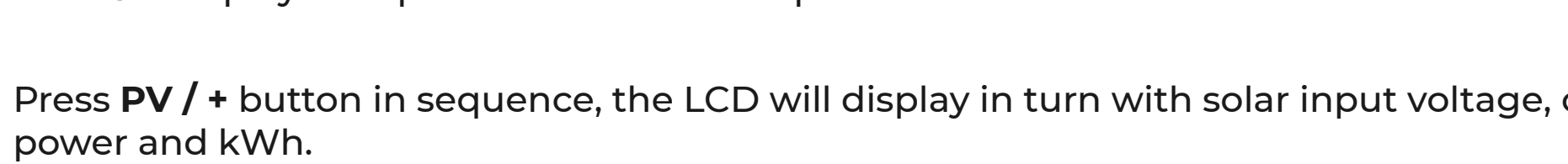


Alternatively display Reset/ Restart voltage character **rST.U** and voltage data; Reset voltage setting range from 12.50V ~ 13.50V, press **PV / +** or **BATT / -** button for once +/- 0.05V variation, press the **SET UP** button again to confirm the Reset/ Restart voltage and all settings will be automatically stored.

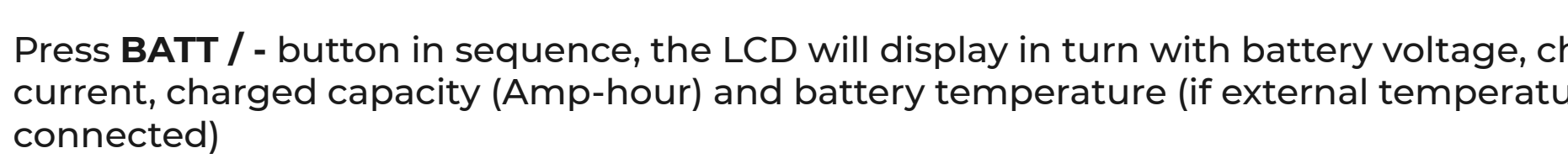
SOLAR INPUT PARAMETER DISPLAY

Once the settings are completed, the solar controller will automatically go into charging process, the LCD displays the parameters of solar input as below:

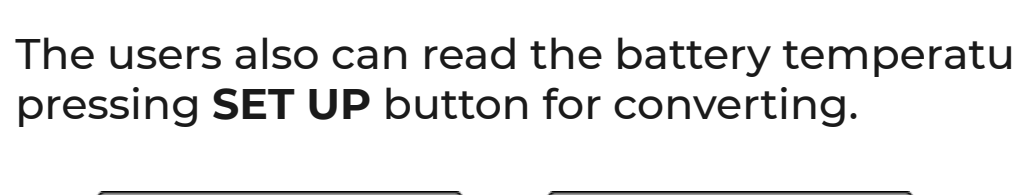
Press **PV / +** button in sequence, the LCD will display in turn with solar input voltage, current, and kWh.



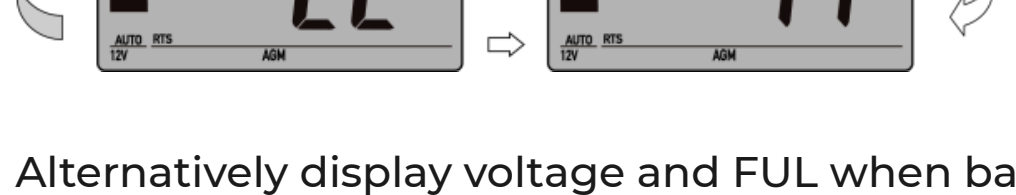
Press **BATT / -** button in sequence, the LCD will display in turn with battery voltage, charging current, charged capacity (Amp-hour) and battery temperature (if external temperature sensor connected)



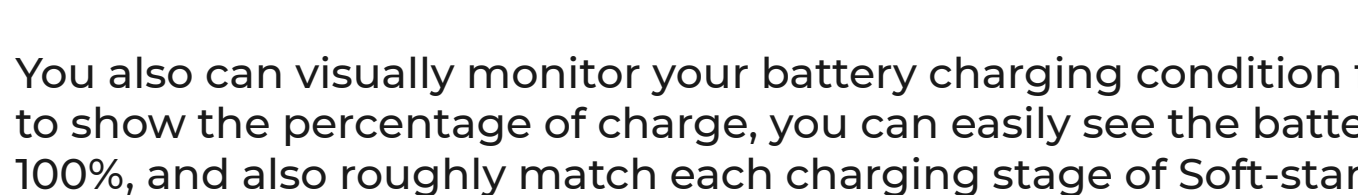
The users also can read the battery temperature as degree centigrade or Fahrenheit degree by pressing **SET UP** button for converting.



Alternatively display voltage and FUL when battery is fully charged



You also can visually monitor your battery charging condition for each battery; there is an LCD bar to show the percentage of charge, you can easily see the battery is charged to 25%, 50%, 75% or 100%, and also roughly match each charging stage of Soft-start, Bulk, Absorption and Float.



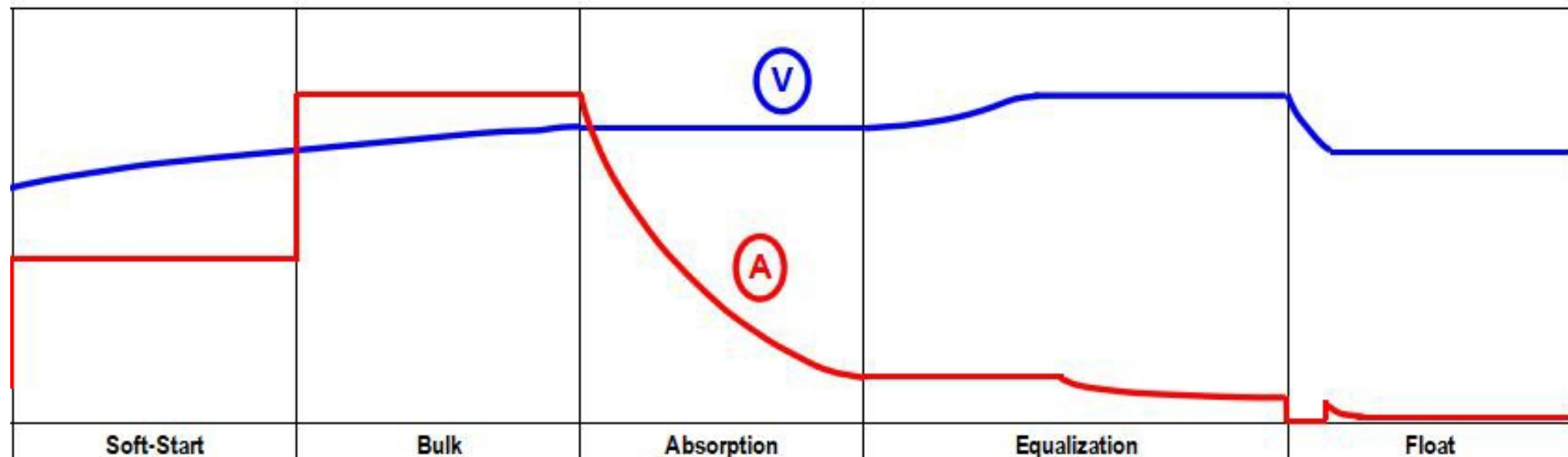
The LCD also can be treated as an independent voltage meter or thermometer at night.

CHARGING STAGE

This solar controller provides multiple charging stages with smart charging algorithm.

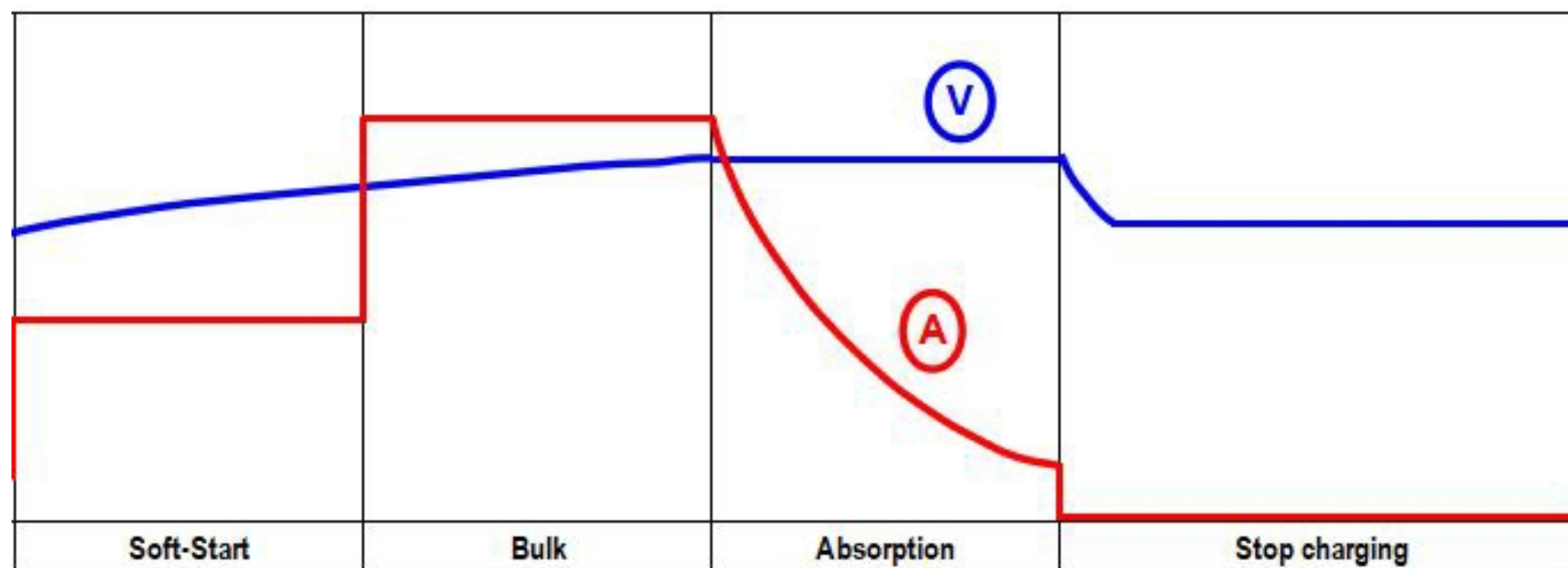
For Lead acid battery (Crystal, Gel, AGM, WET and Calcium battery):

Soft Charge – Bulk Charge - Absorption charge - Equalizing Charge* - Float charge



For Lithium battery (LCO, LI-95, LFP, LTO battery)

Soft Charge – Bulk Charge - Absorption charge – Stop and Restart charge*



Soft start - When batteries suffer an over-discharge, the controller will softly ramp the battery voltage up to 10V.

Bulk Charge - Maximum current charging until batteries rise to Absorption level. *For Lead crystal battery type*, the charge controller will deliver two step level of Bulk charge, when the first level rises the battery voltage up to 14.4V, then switch into the second level of the 10% of the first bulk charge rate, until the Lead crystal battery voltage up to 14.7V.

Absorption - Constant voltage charging and battery is over 85% for lead acid battery; the Lithium battery (LCO, LFP and LTO battery) will close fully charged after absorption stage, for LI-95 Lithium battery will be charged 95% Capacity.

Equalization * - Only for WET or Calcium battery type, when the battery is deeply drained below 10V or every 28 days cycle, it will automatically run this stage to bring the internal cells as an equal state and fully complement the loss of capacity. (Lead crystal, Gel, AGM battery or Lithium batteries do not run Equalization charge)

Float Charge or Re-Start charge* - Battery is fully charged and maintained at a safe level. A fully charged Lead acid battery (Crystal, GEL, AGM, WET or Calcium battery) has a voltage of more than 13.6 Volts; if the lead acid battery voltage drops to 12.7V at float mode, it will return to Bulk charge, Lithium battery will stop charge after Absorption stage, it will restart to bulk charge if the voltage discharge less than 12.0V for LCO battery, 13.0V for LTO battery, 13.3V for LFP or LI-95 battery.

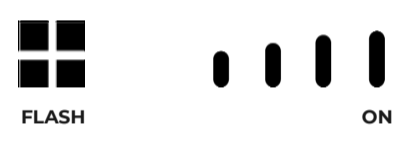

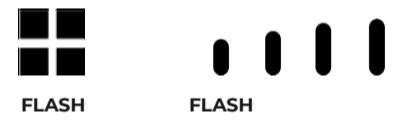

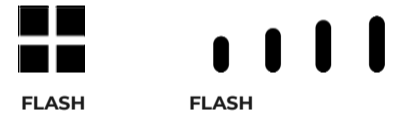
Remarks - This controller provides an override function (force output delivery) for some heavily discharged Lead acid batteries (Low to 0V), or for some LiFePO₄ batteries which are protected by BMS due to over-discharged. Press **BATT / -** button for 3 seconds to wake up the Lithium battery (activate the BMS against protection) or override the Lead acid battery.






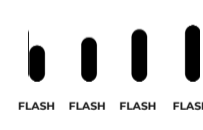

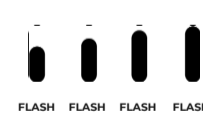


LED INDICATORS

NORMAL CHARGE

LED INDICATRIONS						
LED COLOR	GREEN	BLUE	WHITE	WHITE	WHITE	WHITE
SOFT-START	ON	FLASH	FLASH	OFF	OFF	OFF
BULK CHARGE	ON	ON	ON	FLASH	OFF	OFF
ABSORBTION/ EQUALIZATION	ON	ON	ON	ON	ON	FLASH
FLOAT CHARGE	ON	OFF	ON	ON	ON	ON

ABNORMAL CHARGE

SOLAR PANEL ABNORMAL MODE	LCD DISPLAY	LED INDICATION	LCD BACKLIGHT
SOLAR PANEL WEAK <15V			ON
SOLAR PANEL REVERSE CONNECTION			FLASH
SOLAR PANEL OVER VOLTAGE (>95V)			FLASH

BATTERY ABNORMAL MODE	LCD DISPLAY	LED INDICATION	LCD BACKLIGHT
Solar panel is connected, battery disconnected			ON
Battery reverse connection			FLASH
Battery over voltage than > 17V			FLASH
Battery temperature over 65°C			FLASH
The controller over temperature protection			FLASH

SAFETY PROTECTIONS

- Reverse polarity solar and battery connection.
- Against reverse current from battery to solar panel at night.
- Transient over voltage protection, a varistor or transient voltage suppressor (TVS) at the solar input and battery output against surge voltage.

MAINTENANCE

Occasionally check that the wire terminals are securely tightened. Inspect wiring to ensure nothing is or has become exposed. Repair if necessary.

Occasionally, clean the case using a damp cloth and mild cleaning agent.

SPECIFICATIONS

1	Electrical Parameters			
1-1	Maximum PV open circuit voltage at 2°C	100	MAX.	VDC
1-2	Normal input PV voltage at 25°C	92	MAX.	VDC
1-3	Max. PV input current	30	MAX.	AMP
1-4	Max. PV input current	35	MAX.	AMP
1-5	Rated charging current	30	MAX.	AMP
1-6	Conversion efficiency	98	MAX.	%
1-7	Tracking efficiency	99.5	MIN.	%
1-8	Maximum Solar Wattage	440@12V / 880@24V		WATT
1-9	Selfconsumption from battery when PV is disconnected	10		mA
1-10	Output open circuit voltage when battery is disconnected	0.5	MAX	VDC
1-12	MPP Voltage Range	15-72	+/- 0.5	VDC
2	Charging Characteristics			
2-1	Minimum battery start charging voltage	5	MIN	VDC
2-2	Soft start charging voltage	5-10	+/- 0.2	VDC
2-3	Soft start charging current	15		AMP
2-4	Bulk charge	30	MAX	AMP
2-5	Absorbtion Charging Voltage at 25°C			
	LCO Battery	12.6	+/- 0.2	VDC
	LI95 Battery*	13.7	+/- 0.2	VDC
	LTO Battery	14.0	+/- 0.2	VDC
	LFP Battery	14.2	+/- 0.2	VDC
	Gel Type Battery	14.1	+/- 0.2	VDC
	AGM Type Battery (default setting)	14.4	+/- 0.2	VDC
	WET Type Battery	14.7	+/- 0.2	VDC
	Lead Crystal Battery	14.7	+/- 0.2	VDC
	Calcium Battery	14.9	+/- 0.2	VDC
	Custom Setting Range	13.2 15.5	+/- 0.2	VDC
2-6	Absorption transits to Equalizing or Float Stop condition			
	Charging current drops to	1.5	+/- 0.1	AMP
	Absorption charging timer timed out for Lead acid battery	4		HOUR
	Absorption charging timer timed out for Lithium battery	0.5		HOUR
	Battery voltage discharged less than	10	+/- 0.2	VDC
	Automatic equalizing charging periodical	28		DAY
2-8	Equalization Charging Voltage at 25°C	15.5	+/- 0.2	VDC
2-9	Equalization charging timer timed out	2		HOUR
2-10	Equalization charging voltage for CUSTOM setting	13.2 - 16.2	+/- 0.2	VDC
2-11	Float voltage for Crystal, GEL, WET, AGM and Calcium battery) at 25°C	13.6	+/- 0.2	VDC
2-12	Restart Voltage			
	Crystal, GEL, WET, AGM and Calcium battery)	12.7	+/- 0.2	VDC
	LCO Battery	12.0	+/- 0.2	VDC
	LTO Battery	13.0	+/- 0.2	VDC
	LFP / LI 95 battery	13.3	+/- 0.2	VDC
	for CUSTOM setting range	12.5 - 13.5	+/- 0.2	VDC
2-13	Voltage control accuracy	+/- 1%		
2-14	Battery temperature compensation coefficient	-24		mV/°C
2-15	Temperature compensation range	-20~+50		°C
3	Electrical Parts			
3-1	Input Output Terminal	Rated 50A connector		
4-1	Controller Material	Plastic, PC		
4-2	Mounting	Surface mounting		
4-3	IP grade	IP43		
4-4	Net Weight	Approx. 0.8 KG		
5	Environmental Characteristics			
5-1	Operating temperature	25 ~ 50°C / 13 ~ 122°F		
5-2	Storage temperature	-40 ~ 85°C / -40 ~ 185°F		
5-3	Operating humidity range	0-85% RH		

Remarks: Battery Voltage settings for 12V mode, x2 for 24V mode. *The LI95 battery profile keeps your LiFePO4 battery charged at 95%. Evidence suggests that charging your Lithium battery to less than 100% can increase longevity of your battery.