



360

EX-85ASC

MPPT Solar Charge Controller



# USER MANUAL

MODEL EX-85ASC



**Lets Get Started**





## Description

Your Expion360 Solar Charge Controller utilizes maximum power point tracking (MPPT) technology to optimize the energy captured from the sun. Solar charge controllers are essential to convert the energy from the solar panel(s) into energy that can be used to charge the batteries in your chosen energy storage solution. Our MPPT charge controller can increase solar charge utilization in excess of 30% over pulse width modulation (PWM) charge controllers. This translates to faster charging times using the same solar panels and more energy to power your adventures!

## Introduction

This unit has many beneficial features to protect the charge controller and provide added utility for the users of our leading-edge products. While our MPPT controllers are protected from damage due to excess internal temperature, we highly recommend installation in a well ventilated cabinet away from other devices that produce large amounts of heat. If the heatsink is unable to dissipate heat sufficiently, the charge controller will throttle the output current to your batteries. This is to protect the internal MPPT circuitry and prolong the lifespan of the unit.

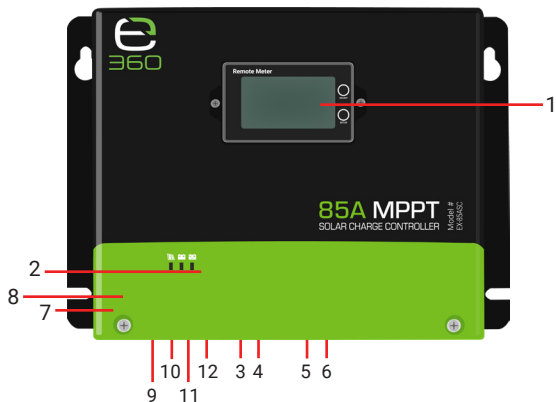
Use the Bluetooth app to connect your devices to the MPPT charge controller.

**Thank you for choosing Expion360!**

## Safety Instructions

1. Please read the manual carefully before using the charge controller.
2. There are no parts inside the controller that can be maintained or repaired. The user will void the warranty if the controller is disassembled.
3. Install the controller indoors to prevent exposure of components and prevent water from entering the controller.
4. Please install the controller in a well ventilated area to prevent the heat sink from being overheated.
5. Protecting the charge controller with a fuse or circuit breaker is recommended.
6. Disconnect the PV input at the fuse or circuit breaker near the battery terminal prior to installation or adjusting any wiring at the controller.
7. To complete the installation process, confirm that all wiring connections are tight. Insufficient torque will lead to heat build-up at the terminal connection points and will damage the charge controller.

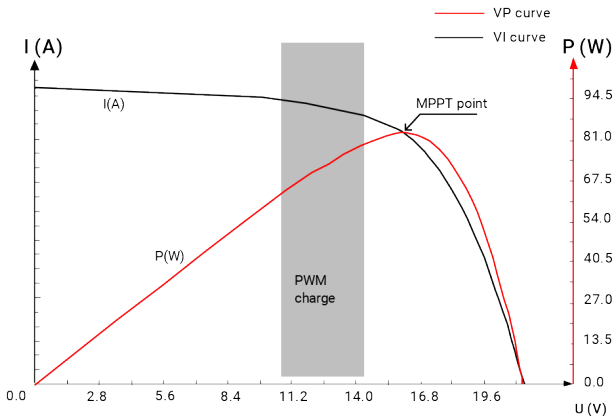
# SOLAR CHARGE CONTROLLER EX-85ASC



1. LCD screen with controls (remote mounting possible)
2. Bluetooth 4.0 BLE module built-in
3. Battery (+) terminal
4. Battery (-) terminal
5. Solar panel (-)
6. Solar panel (+)
7. RS485 communication interface
8. Button
9. TTL communication port
10. Battery temperature sampling port
11. Battery voltage sampling port
12. Relay output interface

## Product Features

- Maximum power point tracking (MPPT) technology with rapid response time, enabling higher efficiency up to 99.9%.
- Highly efficient internal conversion circuitry, offering up to 98% efficiency.
- Charging output has active voltage stabilization in the case of a sudden open circuit at the battery BMS controller.
- Thermal protection circuit will throttle performance when the ambient temperature surrounding the heat sink is high.
- Voltage compensation for charging line losses.
- Bluetooth connectivity for settings and live information.
- Parallel compatible with additional charge controllers, for added current handling with available accessory cable.

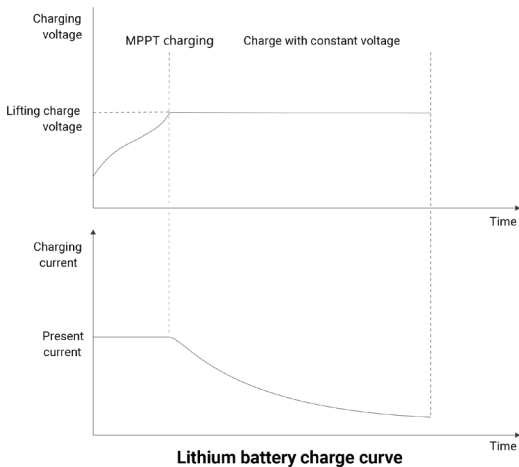


Solar panel output characteristics curve

## Output Characteristics

The maximum power point for photovoltaics often change throughout the day due to fluctuating ambient temperature and light conditions. The MPPT controller can rapidly adjust controller parameters to keep the system at its maximum efficiency. This process is fully automatic and does not require any adjustments by users.





## Lithium Charging Profile

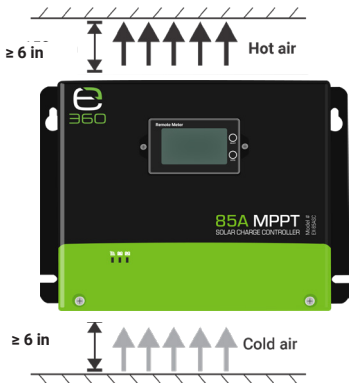
Charging your Expion360 lithium batteries with our MPPT solar charge controller is the optimal way to deliver energy. As the voltage of lithium batteries increases with additional charge from the charge controller, the MPPT technology is able to adjust the output current to maximize utilization of the solar power. Once the charge controller reaches the end of the constant current stage, the controller will automatically switch to constant voltage for the final stage of charging.

# SOLAR CHARGE CONTROLLER EX-85ASC

**WARNING:** Danger, explosion hazard!  
Never install the controller and a vented battery in the same enclosed space! Also, do not install in an enclosed place where battery gas may collect.

**WARNING:** Danger, high voltage hazard!  
Photovoltaic arrays may generate very high, open-circuit voltages. Disconnect the circuit breaker or fuse before wiring and be very careful during wiring.

**CAUTION:** When installing the controller, ensure there is enough air to flow through the controller's heatsink, leaving at least 6 inches above and below the controller for natural convection. If installing the controller in a closed box, ensure reliable heat dissipation through the box.



## Installation

### Step 1: Choose an installation location

Avoid installing the controller in a location with direct sunlight, high temperature, and water, and ensure good ventilation around the controller.

### Step 2: Mark the mounting position

According to the mounting dimensions of the controller, drill 4 mounting holes of the appropriate size at the 4 marks. Fix screws into the upper two mounting holes.

**Step 3: Fasten the controller**

Hang the controller up, then fix the lower two screws.

**Step 4: Wire for installation safety**

We recommend the wiring sequence as illustrated below:

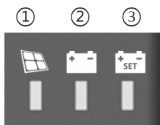


**WARNING:** Danger, electric shock hazard! We strongly recommend connecting a fuse or circuit breaker to the PV array and battery terminals to prevent electric shock hazards during wiring. Make sure the fuse or circuit breaker is disconnected before wiring.

**WARNING:** Danger, high voltage hazard! Photovoltaic arrays may generate very high, open circuit voltages. Disconnect the circuit breaker or fuse before wiring and be very careful during wiring.

**WARNING:** Danger, explosion hazard! If the positive and negative terminals of the battery, and the wires connected to them, are short-circuited, it may cause a fire or explosion. Connect the battery first before connecting the solar panel. When wiring the controller, connect the ( + ) positive terminal first before connecting the ( - ) negative terminal. Please be very careful during installation.

## LED Indicators



- ① PV Array Status
- ② Battery State
- ③ Battery Type

② Battery State Indicator	Charge State
Always on	MPPT charge
Slow flash	Absorption charge
Repeated flashing	Float charge
Quick flash	Equalization charge
Double quick flash	Current limiting charge
Off	No charge

<b>② Battery State Color</b>	<b>Charge State</b>
Green	Full battery voltage
Yellow	Normal battery voltage
Red, normal on	Battery voltage is below the undervoltage point
Red, slow flash	Over discharge
Red, quick flash	Battery overvoltage or over temperature

<b>③ Battery Type</b>	<b>Charge State</b>
Red	Flooded lead-acid
Yellow	Gel lead-acid
Green	Sealed lead-acid
Blue	12 V lithium
Purple	24 V lithium
Orange	36 V lithium
Cyan	48 V lithium
White	User-defined custom*

\*Custom settings should be used by industry professionals only.

## Protection Features

### Ingress protection

Rating: IP32

### Input power limited protection

If the power of the solar panel is higher than the rated value, the controller will limit the power of solar panel to prevent over current damage. Controller enters current-limiting mode.

### Battery reverse polarity protection

If the battery polarity is reversed, the system will not be operational.

### PV input overvoltage protection

If the voltage at the PV array input is too high, the controller will automatically shut off the PV input.

### PV input short circuit protection

If the voltage at the PV array input is short-circuited, the controller will turn off charging. Once the short circuit is removed, charging will automatically resume.

### PV input reverse polarity protection

If the polarity of PV array is reversed, the controller will not be damaged. Normal operation will continue after wiring is corrected.

### TVS lightning protection

If a lightning strike were to hit the PV array, the controller will protect the connected circuit from the high voltage spike.

### Over-temperature protection

When the temperature of the controller becomes too warm, the controller will throttle the charging rate or stop charging.

## System Maintenance

In order to maintain the best long-term performance of your charge controller, it is recommended to conduct the following inspections twice a year.

- Make sure the airflow around the controller is not obstructed. Remove any visible dust from the heat sink with a vacuum or compressed air.
- Verify that all exposed wires are undamaged due to friction with nearby objects, dry rot, destruction by insects or rodents, etc. These are common sources of unexpected damage to electrical devices. If any damaged wires are found, repair or replace the wires immediately.
- Check all wiring terminals for corrosion, insulation damage, signs of high temperature or burning/discoloration. Tighten terminal screws if there are signs of burning or discoloration after replacing the wire.

**WARNING:** Danger, electric shock hazard! Make sure that all power supplies to the controller have been disconnected before maintenance!

## Technical Parameters

Model	MPPT 85 A
System voltage	12 V / 24 V / 36 V / 48 V
Zero load loss (parasitic draw)	0.54 W
Battery voltage	9 V - 64 V
Max PV open circuit voltage	150 V
Max PV input current	70 A
Rated charging current	85 A
Charging current set window	0 A - 85 A
Max PV input (12 V battery bank)	1,100 W
Max PV input (24 V battery bank)	2,200 W
Max PV input (36 V battery bank)	3,300 W
Max PV input (48 V battery bank)	4,400 W
Charging conversion efficiency	≤ 98%
MPPT tracking efficiency	> 99%
Communications	Bluetooth, TTL/RS485; 9600 baud, digital bit 3, stop bit 1, no check bit

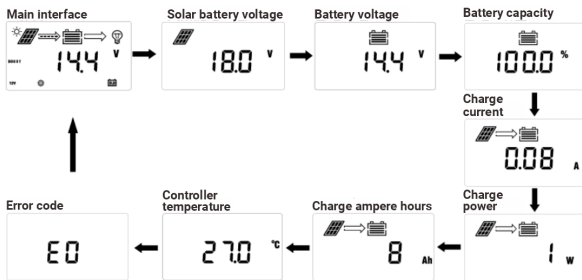
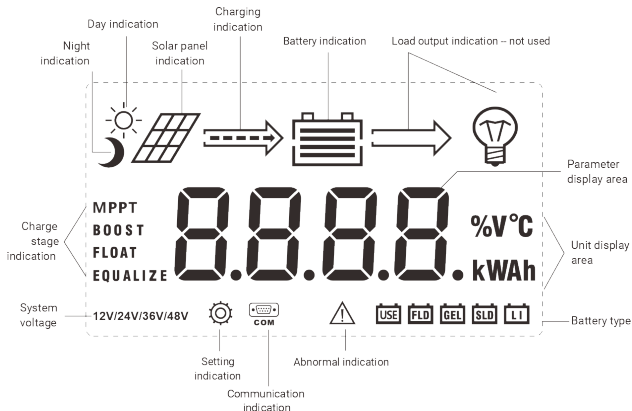


Bluetooth	Built-in Bluetooth 4.0 BLE module
Internal temperature protection	Linear power reduction to protect controller
Programmable relay	DPST 10 A / 250 VAC; 10 A / 30 VDC
Protection function	Battery overcharging protection, battery over discharge protection, PV input reverse polarity protection, over temperature protection of controller, over current protection of charging, TVS protection
Operation temperature	-30 °F up to 150 °F (derate above 100 °F) -34 °C up to 65 °C (derate above 37 °C )
Elevation	≤ 10,000 ft (≤ 3,000 m)
Protection grade	IP32
Weight	12.5 lb (5.7 kg)
Product dimensions	12.36 in x 8.95 in x 4.76 in (314 mm x 227 mm x 121 mm)

## Adjust Settings via LCD Screen

Press and hold **"ENTER"** to access the **"PARAMETER SETTINGS"** menu:

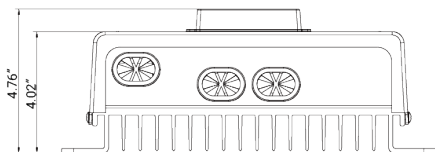
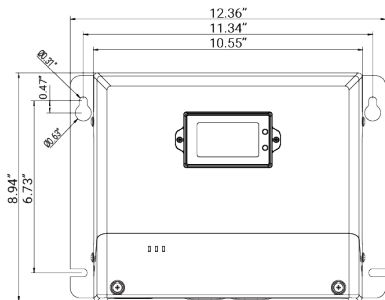
- (1) Press **"ENTER"** for a short time to adjust the parameter value
- (2) Press **"SELECT"** for a short time
- (3) Press **"ENTER"** for 2 seconds to save and exit from the settings mode
- (4) Select **"LI"** battery type for your Expion360 lithium battery and press **"SELECT"** to switch between **"system voltage"** and **"battery type"**
- (5) For customized battery settings select **"USE"**, press **"SELECT"** to move through the following settings **"system voltage/ equalizing charging voltage/ absorption charging voltage/ floating voltage/ overdischarge return voltage/ over discharge voltage"**



### **Adjust Settings via Button**

There is a button on the controller under the access cover which is used in conjunction with the battery type indicator to select the battery type. Generally this method is not used for adjusting settings. This exists as a backup, in case the LCD screen becomes damaged in any way.

Press the key for 8 seconds and the battery type indicator light starts flickering (the controller turns off the charge at this time). After each press, the battery indicator light turns another color and changes battery type. After the battery type is selected, press the button for 8 seconds once or 15 seconds after no operation, the controller will automatically save the battery type set at present, exit from the setting mode, and enter into the normal operation mode.



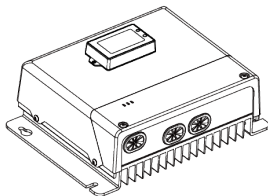
Product size: 12.36" x 8.94" x 4.76"

Installation size: 8.98" x 6.73"

Fixed hole diameter:  $\varnothing 0.31"$

Wire size at PV terminal: 5 AWG

Wire size at battery terminal: 4 AWG



**Error Codes**

Code	Fault Condition	System Status
E0	No error	System normal
E1	Battery overdischarge	Battery voltage rises to overdischarge return voltage and overdischarge prompt is released.
E2	Battery overvoltage	Battery voltage is above set value. No charging applied to battery.
E3	Battery undervoltage alarm	Battery voltage is lower than undervoltage alarm value.
E6	High controller internal temperature	Excessive internal temperature of controller. MPPT controller reduces power output. Normal power output will continue when internal temperature has dropped below 100 °F (37 °C).
E7	Battery over temperature	Battery temperature probe senses high temperature. Charging paused until battery temperature falls below the set level.
E8	Solar charge current above input charge rating	Solar charge controller cannot accept excess input current over the rated input current specification. Excess current will not be used.

E10	Solar input voltage above charge controller specification	Solar panel input voltage at the terminals is above 150 V. Charge controller will not accept any input from solar until input voltage is below this threshold.
E15	Battery not connected or BMS has shut off	Charge controller will continue charging as soon as BMS has been restored, or terminal connections are secured.
E16	Over temperature of battery	Charge controller will stop charging if temperature is sensed to be below temperature threshold.
E18	BMS overcharge protection	No charging
E19	Low temperature of battery	Charge controller will stop charging if temperature is sensed to be below temperature threshold

## Troubleshooting Guide

<b>Problem</b>	<b>Treatment Method</b>
Indicator light or LCD is not on	Confirm the battery and solar panel are correctly connected and properly torqued at all terminals.
No information on LCD	Poor communication signal; check the communication wire.
Voltage at the solar terminals, no voltage output at battery terminals, display code E1	No battery can be detected at the battery terminal. The charge controller will return to normal state after battery is connected or the BMS is connected due to internal battery state/conditions such as under or over voltage, low or high temperature cutoff. Please see the Expion360 battery manual for more information.
Connected with 12 V / 24 V / 36 V / 48 V normal voltage battery and the battery icon on the LCD flashes slowly, displaying error E1	Confirm the system voltage is properly set within the charge controller. After changes are made to the system voltage, the charge controller must re-start before the new settings will take effect.



Battery icon indicator light flashes quickly without charging. Error code E1 is displayed.	Overvoltage at battery side of terminals. Inspect the battery. Charging will resume after battery voltage falls below a set level.
The device cannot be found by mobile phone Bluetooth.	Determine whether other mobile phones are connected. Confirm Bluetooth is active on mobile device.
No charging from the controller.	Inspect all wires and ensure they are correctly connected. Confirm the solar panel voltage does not exceed the rated value for the charge controller. Inspect the battery voltage for high or low voltage cutoff. Confirm the battery is not exposed to extreme cold or heat, causing the BMS to shut off.
Any other problems.	Restore the factory settings and then set related parameters in accordance with system configuration.

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