eSMART

MPPT Solar Charge Controller

Product Manual

Parameters

Output Discharge Characteristics		
Output Discharge Characteristics	PC(communication port)	
Low voltage output Protection point	Default 10.5V; Recovery 11V; It can be adjustable.	
Rated output Current	30A	
The output control	On mode, Off mode, PV voltage control mode	
Output control set mode	Controller button or PC software	
Display		
LED digital tube display	Battery voltage, Charge current	
LED light display	Charging indicator light, LOAD indicator light	
PC (communication port)	RS232	
Protection		
Low input voltage protection	Check the input characteristics	
High input voltage protection	Check the input characteristics	
Charge overpower protection	yes	
Discharge low voltage protection	yes	
Discharge high current protection	yes	
Temperature protection	yes	
Other Parameters		
Noise	⩽40dB	
Thermal heat-dissipating method	Itself cooling	Fan cooling
Components	Imported material With EU standards.	
Certification	CE\FCC\RoHS	
Physical		
Measurement DxWxH (mm)	205*168*60	
package size D x W x H(mm)	265*196*110	
N.G(kg)	1. 8	
G.N(kg)	2. 0	
Mechanical Protection	IP25	
Environment		
Humidity	0~90%RH (no condense)	
Altitude	0~3000m	
Operating Temperature	−20℃ ~ + 50℃	
Storage Temperature	−40℃ ~ +75℃	
Atmospheric Pressure	70~106kPa	

Introduction

This manual contains the contents of the installation, operation and usage of the controller. Please read it carefully before installation. Professionals should be responsible for the equipment operating in order to make sure normal running of the controller. Please take good care of this manual for future reference whenever necessary. The followings are some symbols and marks used in this manual:

Symbol and Signs

Following symbol and signs will be used in the manual.

Warning

If you violate the operation rules, it would endanger personal safety, affect the reliability of the equipment or cause loss of data;

Danger

If you violate the operation rules, it would endanger personal safety, affect the reliability of the equipment or cause loss of data;

Attention

▶ Indicating additional data and information

Contents

12. Technical Parameters

MPPT solar controller modes : eSMART-12V/24V/48V-series		15A	20A	25A	30A	40A
Charge Mode	MPPT (maximum power point tracking)					
Method	Three stages: constant current (MPPT), constant voltage, floating charge.					
System Type	DC 12V/24V/48V	Automatic recognition				
System voltage	12Vsystem	DC9V~DC15V				
	24Vsystem	DC18V~DC30V				
	48Vsystem	DC36V~DC60V				
Soft Start Time	12V/24V/48Vsystem	≤3S				
Dynamic Response Recovery Time	12V/24V/48Vsystem	500us				
MPPT efficiency	12V/24V/48Vsystem	≥96.5%,≤99%				
INPUT CHARACTERISTICS						
MPPT working voltage range	12Vsystem	DC14V~DC100V				
	24Vsystem	DC30V~DC100V				
	48Vsystem	DC60V~DC100V				
Low input voltage protection point	12Vsystem	DC14V				
	24Vsystem	DC30V				
	48Vsystem	DC60V				
Low input voltage Recovery point	12Vsystem	DC18V				
	24Vsystem	DC34V				
	48Vsystem	DC65V				
High input voltage protection point	12V/24V/48Vsystem	DC110V				
High input voltage recovery point	12V/24V/48Vsystem	DC100V				
Maximum PV power	12Vsystem	213W	284W	355W	426W	568W
	24Vsystem	426W	568W	710W	852W	1136W
	48Vsystem	852W	1136W	1420W	1704W	2272W
CHARGE CHRECTRESTICS						
Selectable Battery Types (Default Gel battery)	12V/24V/48Vsystem	Sealed lead acid, vented, Gel, NiCd battery (Other types of the batteries also can be defined)				
Constant Voltage	12V/24V/48Vsystem	Please check the charge voltage according to the battery type form.				
Floating Charge Voltage	12V/24V/48Vsystem					
Rated Output Current	12V/24V/48Vsystem	15A	20A	25A	30A	40A
Current-limiting Protection	12V/24V/48Vsystem	20A	25A	30A	35A	45A
Temperature Factor	12V/24V/48Vsystem	±0.02%/℃				
Temperature Compensation	12V/24V/48Vsystem	14.2V-(The highest temperature-25℃)* 0.3				
Output Ripples(peak)	12V/24V/48Vsystem	200mV				
Output Voltage Stability Precision	12V/24V/48Vsystem	≤±1.5%				

10.Storage and waste disposal.

10.1 Store the charge controller in a dry place with ambient temperatures between -40 °C and +75 °C.

10.2 Disposal

Dispose of the solar charge controller at the end of its service life in accordance with the disposal regulations for electronic waste at the installation site at that time.

11.Recovery Processing and Warranty

11.1Recovery Processing

When the controller mal-functions, please check the following questions and contact our customer service representative if you need assistance.

11.1.1Controller failure mode：

Please check the fault tips in the failure mode, and then proceed to the appropriate troubleshooting;

11.1.2When the controller does not start properly:

1. Check the controller external solar panels with the correct polarity.
2. Check Battery Connection;
3. Check Battery;
4. Check circuit breaker;
5. Check internal fuse;

If the problem persists, please contact customer service；

Please offer the following information: Equipment information: Model, Order No., serial-number (Stickers on the rear plate); Detailed description of the problem

(Type of system, occasionally/frequent problems, indicator light, data display, and so on).

11.2 Warranty

Within the warranty period, it is free to repair for the non-human fault. Otherwise, should charge the cost of repairs.

1.Notes on this Manual

This manual describes how to install and service your Aims Power MPPT solar charge controller.

1.1 Validity

This manual applies to MPPT solar charge controller models produced by our company:

1.2 Target Group

This manual is intended for the installer and the operator.

1.3 All manuals for the device and installed components should be stored in the immediate vicinity of the charge controller and must be accessible at all times.

1.4 Symbols Used

The following types of safety messages and general information appear in this document:

Warning!

WARNING indicates a hazardous situation which, if not avoided, could result in machine stoppage or serious injury.

Warning!

WARNING indicates a hazardous situation which, if not avoided, could result in machine stoppage or serious injury.

Note!

In order to operate this device well, please read the operation instructions carefully.

2.Safety Instructions

2.1General Safety Instructions

Warning!

The input voltage of this device may be extremely high and life threatening.

• All work on the charge controller must only be carried out by an electrically skilled person.

•The Controller is not to be used by children or persons with reduced physical sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction.

•Children should be supervised to ensure that they do not play with the appliance.

Caution!

Surface may be extremely hot and may cause burns.

• Do not touch the enclosure of the charge controller during operation. If possible keep in a cool environment.

Caution!

Unit may emit some radiation which may be harmful.

•Do not stay within 1 foot of controller for any extended period of time.

2.2Explanation of Symbols

Below is the explanation for all the symbols shown on the device and label.

Symbol	Explanation
	Risk of electric shock Energy stored in capacitors will remain for 5 minutes; don't touch within this period after disconnecting Both input and output lines have power, disconnect both and don't operate for at least 5 minutes after disconnection.
	No self-serviceable parts are inside the enclosure, don't attempt to remove the cover. Only qualified persons are permitted to operate and maintain the equipment. Only insulated tools are permitted for use to reduce risks of hazard to individuals.
	Beware of hot surface. The solar charge controller can become hot during operation. Avoid contact during operation. Never put any goods onto the controller.

9.Maintenance and Cleaning

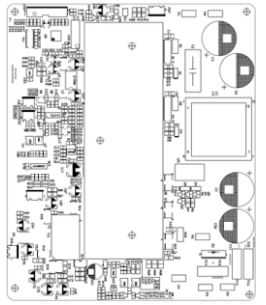
9.1Replacing the Thermal Fuses

Using incorrect thermal fuses may irreparably damage the solar charge controller.

• Only use the thermal fuses included in the scope of delivery

1. Open the solar charge controller as described in section "Opening the solar charge controller"
2. Remove the broken thermal fuses from the sockets (A and B).
3. Insert new thermal fuses (included in the scope of delivery).
4. Close the solar charge controller as described in section "Closing the solar charge controller".
5. Remember always connect the batteries before the solar panels or you will permanently damage the controller.

Note: To clean simply wipe the outside with a lightly dampened cloth. If unit has been opened use an air spray such as a keyboard cleaner to blow out the internal dust that may accumulate inside the controller.



Replacing the Thermal Fuses

9.2Cleaning the Cooling Fin

Clean the Fan air vents and internal cooling fan regularly by using a dry or slightly damp cloth to wipe.

Attention:

• Liquid detergent or corrosive solvent cleaning are forbidden.

• Liquid is not allowed in the device.

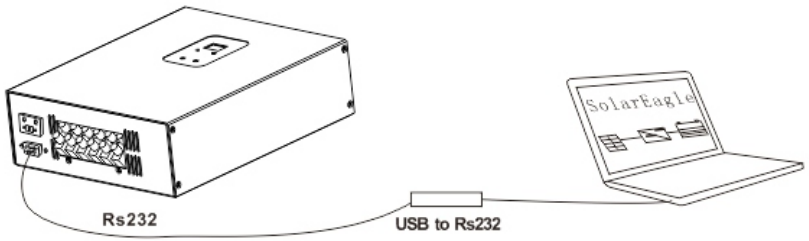
• clear the air vent passage.

•Carefully remove dirt with a suitable soft brush if deemed necessary.

MPPT and PC Connection

2) NO RS232 port?

If you do not have an RS232 port, then you need to prepare a USB to RS232 connector such as below:



Step 1: Please install USB to RS232 driver software and make sure it's communicating. The other steps are the same as above.

Safety Instructions

● Symbols Label

Symbol	Explanation
CE FC CB	CE FCC CB ROHS mark ; The controller complies with the requirements of the applicable CE FCC CB ROHS guidelines.

●Important Safety Instructions

When using the product, please do remember the below information to avoid fire, lightning or other personal injury:

⚠	Warning! Ensure input DC voltage is no more than Max. DC voltage (Voc) .Over voltage may cause permanent damage to solar charge controller or other losses, which will not be covered by the warranty! This chapter contains important safety and operating instructions. Read and keep this operation guide for future reference.
⚠	Warning! Authorized service personnel must disconnect both DC and battery bank power from the solar charge controller before attempting any maintenance or cleaning or working on any circuits connected to the solar charge controller.

● Before using the solar charge controller, please read all instructions and cautionary markings on the solar charge controller, and all corresponding sections of this guide.

● Contact AIMS Power for any questions or concerns about your controller. Trying to modify or repair it may result in a fire, electric shock, or injury.

● To reduce risk of fire and electric shock, make sure that existing wiring is in good

condition and that all wire is properly sized. Do not operate the solar charge controller with damaged or substandard wiring.

● Do not disassemble the solar charge controller. It contains no user-serviceable parts.

See Warranty for instructions on obtaining service. Attempting to repair the solar charge controller by yourself may result in a risk of electric shock or fire and will void your warranty.

● To reduce the risk of electric shock, authorized service personnel must use insulating tools when connecting or working on the controller.

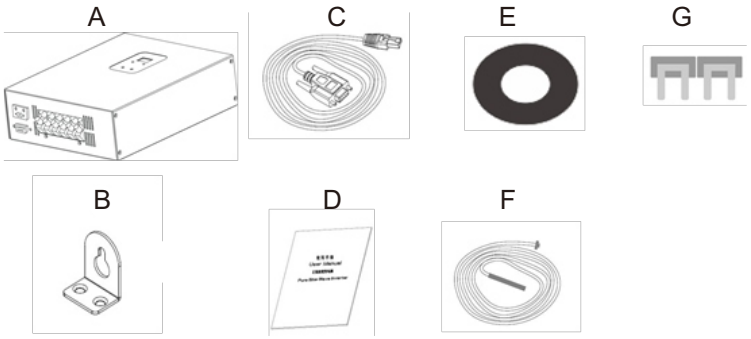
● Keep away from flammable, explosive materials to avoid fire.

If at all possible keep away for excessively humidity to avoid corrosion.

● To reduce the chance of short-circuits, authorized service personnel must use insulated tools when installing or working on this equipment.

3.Unpacking

3.1 Parts List：



Object	Quantity	Description
A	1unit	Charge controller
B	2pcs & 4pcs	Hang bracket & screws
C	1pce	RS232 to RJ45 comm cable
D	1pce	Manual
E	1pce	CD
F	1pce	Bat Temp Sensor
G	2pcs	Spare Fuses

If there is any part missing, please contact your dealer.

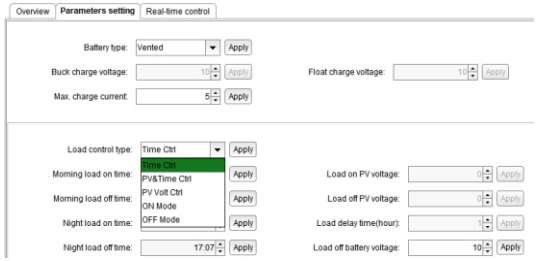
3.2Check for Transport Damage

Check the charge controller for visible external damage, such as dents on the enclosure. Contact your dealer.

3.3Identifying the Charge Controller

You can identify the charge controller by the label. The label is in the enclosure.

Setting: battery type set and load control set interface

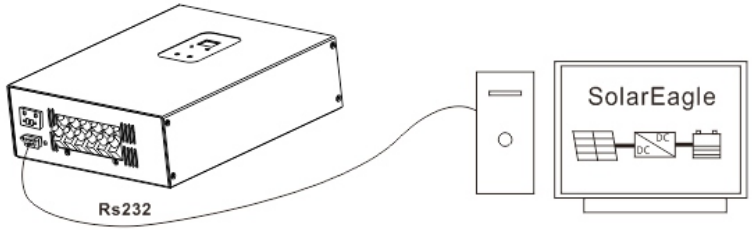


Remarks: this eSMART series have DC output LOAD control pattern, users can set on mode, off mode and PV voltage control mode.

Login ：Some parameters set need administrator’s password .

8.2Then connection of MPPT and software.

8.2.1Connect through RS232 (COM)



Step 1 : Please install software. For details please check install steps .

Step 2 : Once software is installed and controller is connected properly, allow controller to turn to on state (connected controller to battery will automatically start)

Step 3:Connected PC and controller with RS232 and PC will notice the communication, at this time the PC will chose COM1

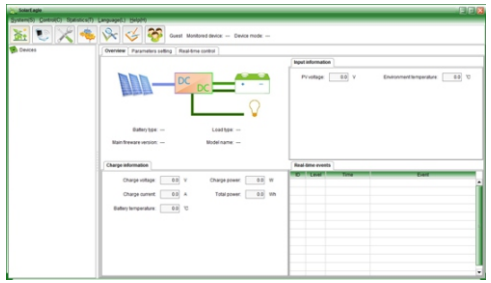
Step 4:Open the software as administrator (WIN 7 of 8), then press to choose COM communication and enter. It will automatically connect.

Step 5 : A The software is now ready to be used.

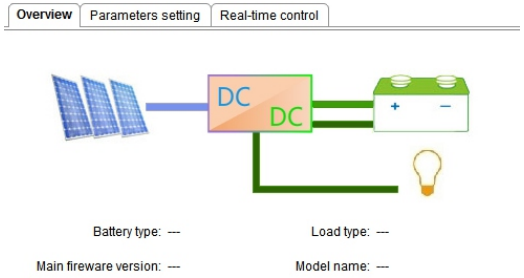
8.MPPT and PC Connection

8.1Included software introduction

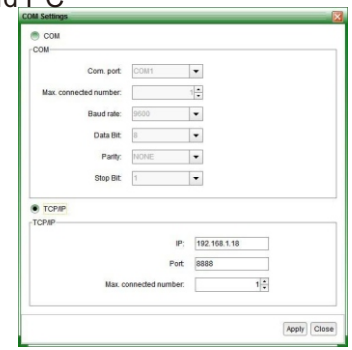
We have developed software that completely monitors and allows for many parameter changes via a computer. Below are some pics of what we've created:



Overview: Access main interface as follows:



Com Setting (Com):Setting up the connection between software and PC



4.Assembly

4.1Operator：technical personnel;

4.2Selecting the Mounting Location

Danger:

Possible fire and explosion hazard.

The charge controller enclosure can become hot during operation.

•Do not mount the charge controller on flammable construction material.

•Do not mount the charge controller near highly flammable materials.

•Do not mount the charge controller in potentially explosive areas.

•Do not expose the charge controller to direct sunlight to avoid power loss due to overheating.

Caution:

Enclosure may become hot to the touch and may cause burns.

•Mount the charge controller in such a way that it cannot be touched inadvertently during operation.

4.2.1Dimensions

L * W * H: 10.63*5.91*3.46 in / 270mm*150mm*88mm

4.2.1Net Weight

Weight: 6.6Lbs or 3kg

4.2.3Ambient Conditions

•The mounting location and method must be suitable for the weight and dimensions.

•Mount on a solid surface.

•The mounting location must be accessible at all times.

•The charge controller must be easy to remove from the mounting location at any time.

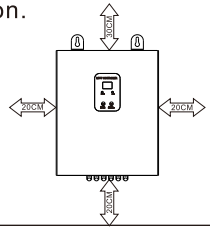
•The ambient temperature should be between -20 °C and +60 °C to guarantee optimal operation.

•Do not expose the charge controller to direct sunlight to avoid power losses due to overheating.

4.2.4Safety Clearance

Observe the following safety clearance to wall, other devices or objects to ensure sufficient heat dissipation.

Direction	Safety clearance
Sides	8in or 20cm
Top	12in or 30cm
Bottom	8in or 20cm



5.MPPT Controller Connection

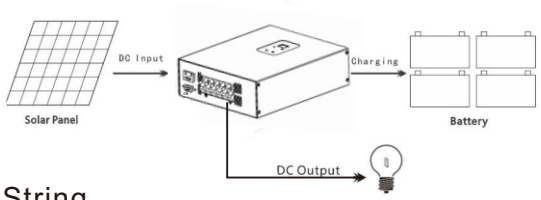
5.1Safety

Danger!
High voltages are present and dangerous.
• Disconnect the PV array using a disconnection unit and secure it against
accidental reactivation.
• Disconnect the circuit breaker and ensure that it cannot be reconnected.
• Ensure that no voltage is present in the system.

Warning:
Risk of injury due to electric shock.
If all cables with different voltages are routed in parallel, damaged cable insulations may lead to a short circuit.
• Route all cables separately if possible.

Warning:
Over voltage can destroy the system.
• Use an external over voltage protector in areas with an increased risk of lightning.

5.2Connections of the PV power system



5.2.1PV String

Solar charge controller device can be connected in parallels to charge the same battery bank. Please select PV modules with excellent function and reliable quality. Solar panels may be connected in series or in parallel. Open-circuit voltage (Voc) of module arrays connected in series should be less than Max. DC input Voltage (100V) of the e-Smart charge controller; operating voltage (Vmax) should conform to MPPT voltage range.
Please use PV cable to connect modules to the charge controller. It should be outdoor uv rated and we recommend 10Awg to prevent excessive losses due to distance. It is beneficial to increase the dc voltage to optimize performance and decrease inefficiencies.

7.Parameter Setting

When controller is connected to the battery bank and it is in the on state, the controller will show the Work Status information.
You can set battery types, DC output in on mode or off mode.

7.1 Setting commonly used battery types:

Press ENTER1 button for 3 seconds, the LED display is flashing, LCD shows battery types(00,01,02,03,04),then you can chose the right one, then press ENTER1 button for 3 seconds again, the battery type is setted by you.

Number	Types
00	User defined （by PC software）
01	Gel
02	NiCd
03	Sealed
04	Vented

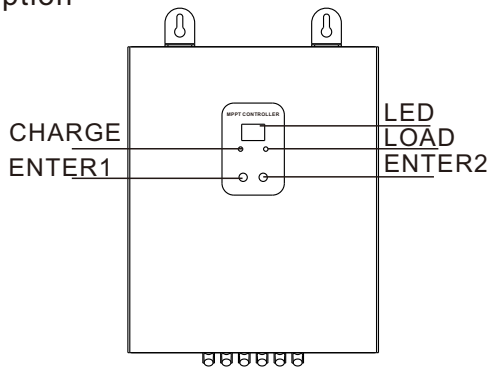
Remarks: Battery Type is defaulted to Gel. settings is 01..

7.2 Setting DC output control mode:

Press ENTER2 button for 3 seconds, change on mode or off mode the LOAD indicator light changes at the same time.
The LOAD indicator light, DC output on.
The LOAD indicator dark, DC output off.

6.Meaning of LED/LCD and function key

6.1Panel Description



Meaning of LED and function key

LEDs and Buttons	Instruction
CHANGE(Blue)	Controller is charging
LOAD(Green)	DC load turn on
ENTER1	Inquiry battery voltage and setting battery types
ENTER2	Inquiry charge current and setting output types

6.2 Smart Charge Modes

When you are pressing ENTER1 button, it shows two digital battery voltage; for example: the battery voltage or charge voltage is 13.3V, it shows 13V.

When you are pressing ENTER2 button, it shows two digital battery charge current; for example: the charge current is 20.5A, it shows 20A.

Note:
Do not connect the PV panel positive or negative to ground.

Warning:
PV module voltage may be very high! Electrical shock and fire may result due to improper connections. Please comply with electric safety rules when connecting.

5.2.2The voltage and type of battery

1) This controller can charge DC: 12V, 24V and 48V battery systems. It will automatically recognize the system voltage

2) The controller has been pre-programmed to properly charge 4 battery types. See chart below. Any other types may be programmed using included software.

Selected Battery Type						
Battery Type	Bulk Voltage			Floating Voltage		
	12V	24V	48V	12V	24V	48V
Vented	14.2V	28. 6V	57. 2V	13.2V	26. 4V	52. 8V
Sealed	14.2V	28. 6V	57. 2V	13.4V	26. 8V	53. 6V
Gel	14.2V	28. 6V	57. 2V	13.7V	27. 4V	54. 8V
NiCd	14.2V	28. 6V	57. 2V	14. 0V	28. 0V	56. 0V
Other	user-defined (using included software)					
Battery Type is defaulted to Gel. To change use the keypad on the display						

5.2.3DC direct load and max current:

The Load voltage is based on the battery system voltage. A 48Vdc battery bank will make the load output 48Vdc etc.

1) Output Load control:

The Load output may be controlled in 6 different ways. It may be programmed through the charge controller or the included software. Modes: ON Mode / OFF Mode / Time Control Mode /PV Volt Ctrl / PV&Time Ctrl.

2) How to set the low voltage protection of DC Load output ?

The low voltage shut off for the Load output is set at 10.5Vdc per 12Vdc. So a 24Vdc system is set at 21.0Vdc. When the output Load voltage drops below this level, the output will shut off. It will turn back on once the output Load voltage reaches 0.5Vdc higher than this shutoff voltage.

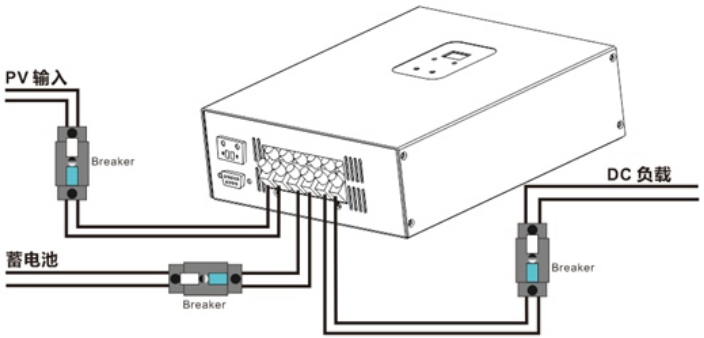
3) Max DC Load output current

The maximum Load current is set at 30Amps. If exceeded an internal set of fuses will blow and will have to be replaced. A smaller external fuse is recommended.

5.2.4Specification for cable and micro-breaker

Model	SCC60MPPT	SCC60MPPT	SCC60MPPT
Cable (Cu)	≥4mm/(0.16 in)	≥4mm/(0.16 in)	≥4mm/(0.16 in)
Micro-Breaker	63A	63A	63A

Micro-breaker should be installed between DC input and outputs. Kindly check the following picture (we do not provide external breakers):



5.2.5MPPT controller work step

Caution: Please follow the steps to ensure proper programming.

Please make sure the controller is properly wired.

Step 1: Close the battery breaker or make connection with the battery bank. Some led's and the lcd should illuminate.

Step 2: Now make the PV connection. If the PV module voltage is in the charging range, then the controller will start to work .

Step 3: If the DC Load will be used, set to proper settings and make the connection.

5.2.6 Steps for Proper Shutdown

Caution: Follow the steps for shutdown to avoid damage

Step 1: Open the PV breaker to disconnect panels from controller.

Step 2: Open the battery breaker or disconnect controller from battery bank. This will completely shut the controller to off.

Warning：

NEVER disconnect the battery while charging. This will cause permanent damage to the controller and is not covered under the warranty. Always disconnect PV panels first.