USER'S MANUAL
Solar Charger Controller

60A/80A/100A

Please download the software "SolarPowerMonitor2.2.81".

Download link: https://en.must-ee.com

Scan QR code for manual

Appliances -

| PC | TV | Air-conditioning | Fridge | Washing machine |

1.ABOUT THIS MANUAL

1.1 Purpose
This manual describes the assembly, installation and operation of this unit. Please read this manual carefully before installations and operations.

1.2 Scope
This manual provides safety and installation guidelines as well as information on tools and wiring.

The following cases are not within the scope of warranty:
    (1) Out of warranty.
    (2) Series number was changed or lost.
    (3) Battery capacity was declined or external damaged.
    (4) Solar charger controller was damaged caused of transport shift, remissness, ect external factor.
    (5) Solar charger controller was damaged caused of irresistible natural disasters.
    (6) Not in accordance with the electrical power supply conditions or operate environment caused damage.

1.3 Safety Instructions

⚠ WARNING: This chapter contains important safety and operating instructions. Read and keep this manual for future reference.
1. Before using the unit,read all instructions and cautionary markings on the unit,the batteries and all appropriate sections of this manual.
2. Do not disassemble the unit. Take it to a qualified service center when service or repair is required. Incorrect re-assembly may result in a risk of electric shock or fire.
3. To reduce risk of electric shock, disconnect all wirings before attempting any maintenance or cleaning. Turning off the unit will not reduce this risk.
4. **CAUTION**- Only qualified personnel can install this device with battery.
5. **NEVER** charge a frozen battery.
6. For optimum operation of this charger,please follow required spec to select appropriate cable size. It's very important to correctly operate this charger.
7. Be very cautious when working with metal tools on or around batteries. A potential risk exists to drop a tool to spark or short circuit batteries or other electrical parts and could cause an explosion.
8. Please strictly follow installation procedure when you want to disconnect PV or battery terminals.Please refer to INSTALLATION section of this manual for the details.
9. **GROUNDING INSTRUCTIONS**- This charger should be connected to a permanent grounded wiring system.Be sure to comply with local requirements and regulation to install this charger.
10. **NEVER** cause short circuited on battery output.
11. **Warning!!** Only qualified service persons are able to service this device. If errors still persist after following troubleshooting table, please send this charger back to local dealer or service center for maintenance.

2. INTRODUCTION

Thank you for selecting this solar charge controller. This solar charge controller is an advanced solar charger with maximum power point tracking. Applying intelligent MPPT algorithm, it allows solar charge controller to extract maximum power from solar arrays by finding the maximum power point of the array.

The MPPT battery charging process has been optimized for long battery life and improved system performance. Self-diagnostics and electronic error protections prevent damage when installation errors or system faults occur. This charger also features multifunctional LCD with communication ports for remote battery temperature and voltage measurement.

2.1 Features

- Intelligent Maximum Power Point Tracking technology increases efficiency 25%~30%
- Compatible for PV systems in 12V, 24V, 36V or 48V
- Three-stage charging optimizes battery performance
- Maximum charging current up to 60A/80A/100A
- Maximum efficiency up to 98%
- Battery temperature sensor(BTS) automatically provides temperature compensation
- Automatic battery voltage detection
- Support wide range of lead-acid batteries including flooded, AGM, GEL,LEAD,Lithium Ion, User-Defined batteries.
- Integrated intelligent slot compatible with 485/USB communication

2.2 Product Overview
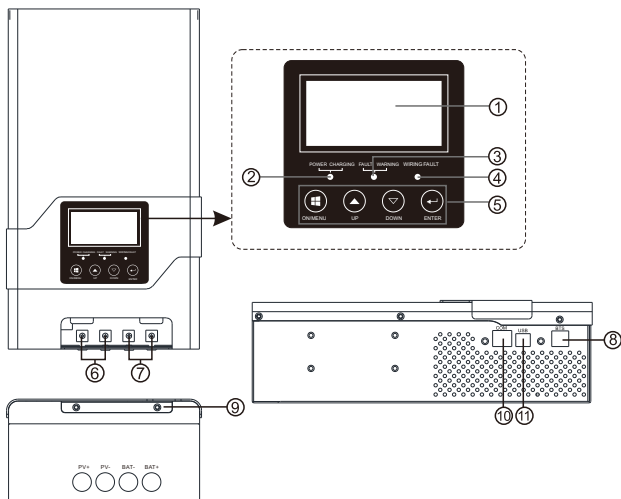
PC18-6015F/PC18-8015F
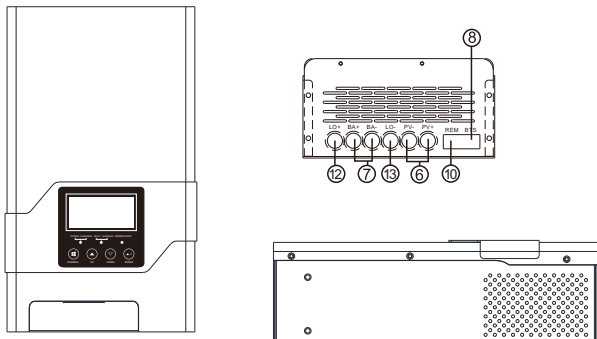
PC18-10015F

1.LCD display
2.Power ON/Charging indicator
3.Fault and warning indicator
4.Wiring fault indicator
5.Operation button
6.PV connectors
7.Battery connectors
8.Battery temperature sensor terminal
9.Wiring box cover
10.RS485 communication port
11.USB
12.The load positive terminal
13.The load negative terminal

3. INSTALLATION
### 3.1 Unpacking and Inspection
Before installation, please inspect the unit. Be sure that nothing inside the package is damaged. You should have received the following items inside of package:
- Solar charge controller×1
- User manual×1
- USB cable×1 (Only for 60A/80A)
- Communication cable×1 (Only for 100A)
- Battery Temperature Sense×1

3.2 Preparation
Before connecting all wirings, please take off wiring box cover by removing screws as shown below.
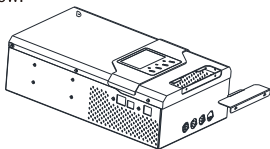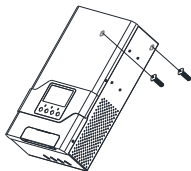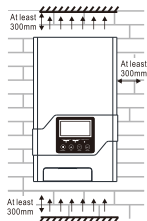

60A/80A
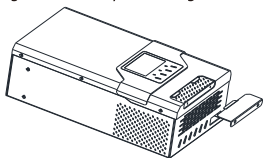
100A

3.3 Mounting the Unit

Consider the following points before selecting where to install:
- This solar charge controller is designed in IP20 for indoor applications only.
- Do not mount the unit on flammable construction materials.
- Mount on solid surface
- Install this charger at eye level in order to allow the LCD display to be read at all times.
- For proper air circulation to dissipate heat, allow a clearance of approx. 300 mm to the side and approx. 300 mm above and below the unit.
- The ambient temperature should be between -10℃ and 55℃ to ensure optimal operation.
- The recommended installation position is to be adhered to The wall vertically.

60A/80A
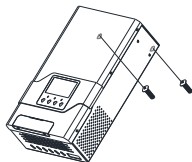
100A

Install the unit to the wall by screwing two screws.
Refer to right chart.

3.4 Power connection
Wire size
The four large power terminals are sized for 14-2AWG(2.5-3.5mm²) wire. The terminals are rated for copper and aluminum conductors. Use UL-listed Class B 300 Volt stranded wire only. Good system design generally requires large conductor wires for solar module and battery connections that limit voltage drop losses to 2% or less.

Minimum Wire Size
The table below provides the recommended minimum wire size allowed for the charger. Wire types rated for 75℃ and 90℃ are listed.
Recommended wire size:

Typical Amperage	Wire Type	75℃ Wire	90℃ Wire
60A	Copper	4 AWG(25 mm²)	6 AWG(16 mm²)
	Aluminum	2 AWG(35 mm²)	4 AWG(25 mm²)
80A	Copper	4 AWG(25 mm²)	6 AWG(16 mm²)
	Aluminum	2 AWG(35 mm²)	4 AWG(25 mm²)
100A	Copper	4 AWG(25 mm²)	6 AWG(16 mm²)
	Aluminum	2 AWG(35 mm²)	4 AWG(25 mm²)

Overcurrent Protection and Disconnects
CAUTION: Circuit breakers or fuses must be installed in both battery and solar circuits. The battery circuit breaker or fuse must be rated to 125% of the maximum current or more. The recommended breaker/fuse rating for use with the charger is listed in the below table.
recommended breaker rating:

Minimum battery circuit breaker / fuse rating	
8025F	10025F
1.25×80Amps=100.0Amps	1.25×80Amps=125.0Amps

A disconnect is required for the battery and solar circuits to provide means for removing power from the charger. Double pole switches or breakers are convenient for disconnecting both solar and battery conductors simultaneously.

Connect the Power Wires

WARNING:Shock Hazard
The solar modules can produce open-circuit voltage in excess of 100V(12Vdc); 245V(24Vdc, 36Vdc,48Vdc) when in sunlight. Verify if solar input breaker or disconnect has been opened (disconnected) before connecting system wires.

(common negative)

Connect terminals by following below steps(Refer to diagram above):
1. Make sure that the system input and output disconnect switches are both turned off before connecting power wires to the charger. There are no disconnecting switches inside the charger.
2. Make 4 power wires first. Remove insulation sleeve 10.5mm and the conductor should be plated Tin.Refer to the chart below.

10.5mm

Tin Plating

3. Pull all wires into the wiring box. The Battery Temperature Sensor can be inside the conduit with the power conductors. It is easier to pull BTS before the power cables.

WARNING:Risk of Damage
Be sure that the battery connection is made with correct polarity. Turn on the battery breaker/disconnect and measure the voltage on the open battery wires BEFORE connecting to the controller. Disconnect the battery breaker/disconnect before wiring to the controller.
4. Connect positive terminal(+) of battery to the battery positive terminal(+) on the controller.
5. Connect negative terminal(-) of battery to one of the common negative terminals(-)on the controller.

WARNING:Risk of Damage
Be sure that solar connection is made with correct polarity. Turn on the solar breaker/disconnect and measure the voltage on the open battery wires BEFORE connecting to the controller. Disconnect solar breaker/disconnect before wiring to the controller.

6. Connect positive wire(+) of solar module to the solar positive terminal(+) on the controller.
7. Connect negative wire(-) of solar module to one of the common negative terminals(-)on the controller.
8. Screw four(4) power terminals tightly with 50 in-lbs torque.(5.65Nm)

3.5 Grounding and Ground Fault Interruption
Use a copper wire to connect the grounding terminal in the wiring box to earth ground. The grounding terminal is identified by the ground symbol shown below that is stamped into the wiring box just below the terminal:

The minimum size of the copper grounding wire is 8AWG(10mm²).
**WARNING:Risk of Fire**
Do NOT bond system electrical negative to earth ground at the controller.

3.6 Battery Temperature Sensor
The included Battery Temperature Sensor(BTS) is recommended for effective temperature compensated charging. Connect the BTS to the 2-pole terminal(see figure as below). The BTS is supplied with RJ11,33ft(1m) of 22AWG(0.34mm²) cable.

NOTE: The BTS is optional package. Please check local dealer for the details.
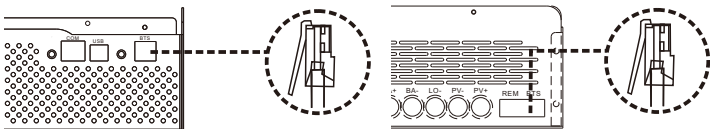
CAUTION: The controller will not activate temperature compensate charging function if the BTS is not used.

CAUTION: Equipment Damage

Never place the temperature sensor inside a battery cell. Both the BTS and the battery will be damaged.

NOTE: The BTS cable may be shortened if the full length is not needed.

3.7 Communication Connections

The default Communication of the controller is RS485 port. You can use supplied cable to connect RS-485,USB port of controller to PC. It can be used for monitoring or upgrade the fireware in short distance.
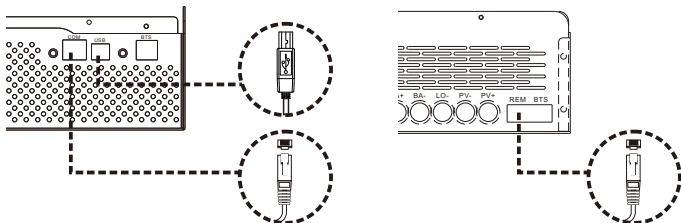
Please use supplied communication cable to inverter and PC. Download the software by link on the last page of this manual into computer and follow on screen instruction to install the monitoring software.

For the detailed software operation, please consult the seller if you have any questions.

WARNING: It's forbidden to use network cable as the communication cable to directly communicate with the PC port. Otherwise,the internal components of the controller will be damaged.

WARNING:RJ45 interface is only suitable for the use of the company's supporting products or professional operation.

Below chart is showned RJ45 Pins define

Pin	Define
1	RS-485-B
2	RS-485-A
3	GND
4	
5	
6	
7	
8	
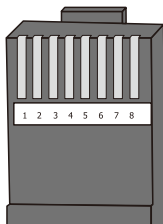
## 4.OPERATION

4.1 Power-up

WARNING: Risk of Damage

Connecting the solar module to the battery connector will permanently damage the controller.

● Confirm that the solar and battery polarities are correctly connected to the controller.

● A battery must be connected to the controller before operating it. The controller will not operate only with solar input. Solar input can trigger the controller to start up when the battery is connected without pressing the button.

- Turn on battery disconnect switch first. And press operation button for a while. Then , it will indicate a successful start-up in LCD display.
- Turn on solar disconnect switch. If the solar module is in full sunlight, the controller will begin charging.

4.2 Operation and Display Panel

The operation and display panel, shown in below chart, is on the front panel of the controller. It includes three indicators, one operation button and a LCD display, indicating the operating status and input/output power information.
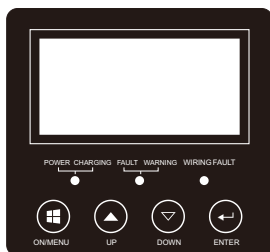
LED Indicator

LED Indicator			Messages
POWER ON/ CHARGING	**Green**	Solid On	The controller is on.
		Flashing	The controller is charging. Bulk charge stage : flashing every 0.5 second Absorption stage : flashing every second Equalize stage : flashing every 3 seconds Float stage : flashing every 5 seconds
FAULT/WARNING	**Red**	Solid On	Fault occurs.
		Flashing	Warning situation occurs.
WIRING FAULT	**Red**	Solid On	Battery polarities are not connected correctly.

Function Keys

Function Keys	Description.
ON/MENU	Power On or Enter reset mode or setting mode go to previous selection.
UP	Increase the setting data.
DOWN	Decrease the setting data.
ENTER	Enter setting mode and Confirm the selection in setting mode go to next selection or exit the reset mode.

4.3 LCD Display Icons
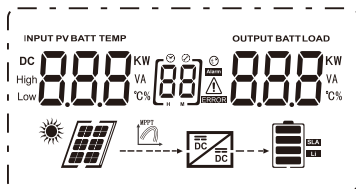
Icon	Function description
Input Source Information	
	Indicates the PV input voltage, battery voltage.
Configuration Program and Fault Information	
E9	Indicates battery equalization is activated.
	Indicates the setting programs.
	Indicates the warning and fault codes.
Output Information	
	Indicates the output charging current.
	Indicate output power.
	Indicates battery level by 0-24%,25-49%,50-74%,and 75-100% in battery mode and charging status in line mode.
	Indicates MPPT solar charge controller work pattern.

Battery Charging Status

Status	Battery voltage	LCD Display
Constant Current mode / Constant Voltage mode	<2V/cell	4 bar will flash in turns.
	2 ~ 2.083V/cell	The right bar will be on and the other bars will flash in turns.

	2.083 ~ 2.167V/cell	The two right bars will be on and the other two bars will flash in turns
	> 2.167 V/cell	The three right bars will be on and the left bar will flash.
Floating mode	Batteries are fully charged.	4 bars will be on.

4.4 LCD setting

After pressing and holding "ENTER" button for 3 seconds, the unit will enter setting mode. Press "UP" or "DOWN" button to select setting programs. And then, press "ENTER" or "MENU" button to confirm the selection and exit.

Setting Programs:

Program	Description	Selectable option	
00	Exit setting mode	Escape **00 ESC**	
01	Maximum charging current	**01 60.0** A	Setting range is form 10.0A to 60.0A.Increment of each click is 1A.
		01 80.0 A	Setting range is form 10.0A to 80.0A.Increment of each click is 1A.
		01 100 A	Setting range is form 10.0A to 100.0A.Increment of each click is 1A.
02	Battery type	AGM(Default) **02 AGn**	Flooded **02 Fld**
		GEL **02 GEL**	LEAD **02 LEA**
		Lithium Ion **02 Li**	User-Defined **02 USE**
		If "User-Defined" LI is selected, battery charge voltage can be set up in program 03 and 04.	
03	Absorption voltage	**03 14.1** V	The setting range is from 12.0V to 16.0V.
		03 28.2 V	The setting range is from 24.0V to 32.0V.

		`[03] 42.3`v	The setting range is from 36.0V to 48.0V.
		`[03] 56.4`v	The setting range is from 48.0V to 64.0V.
04	Float voltage	`[04] 13.5`v	The setting range is from 12.0V to 16.0V.
		`[04] 27.0`v	The setting range is from 24.0V to 32.0V.
		`[04] 40.5`v	The setting range is from 36.0V to 48.0V.
		`[04] 54.0`v	The setting range is from 48.0V to 64.0V.
05	Battery rated voltage	If change this setting, after exit setting mode, the machine automatic restar. Then the setting effect.	
		Auto(Default) `[05] AUO`	If "AUO" is selected, connected battery voltage system will be automatically detected.
		`[05] 12`v	If "12V" is selected, the unit is considered as 12V battery system.
		`[05] 24`v	If "24V" is selected, the unit is considered as 24V battery system.
		`[05] 36`v	If "36V" is selected, the unit is considered as 36V battery system.
		`[05] 48`v	If "48V" is selected, the unit is considered as 48V battery system.
06	Battery C.V. Charging duration	(Default) `[06] 150`	The setting range is form 5 minutes to 900 minutes. Increment of each short press is 5 minutes. It will jump back to 5 minutes after 900 is achieved.

07	BTS temperature compensation ratio	0mV(Default) [07] 0.0	The setting range is from 0mV to 60.0mV. Increment of each short press is 0.1mV. The value will jump back to 0mV after 60.0mV is achieved. For each 12V Battery, the derated battery charging voltage is followed the below formula: (Battery temperature-25℃) *BTS ratio
08	Battery equalization enable/disable	Disable(Default) [08] E9d	Enable [08] E9E
09	Battery equalization voltage	[09] 14.6 v	The setting range is from 12.0V to 16.0V.
		[09] 29.2 v	The setting range is from 24.0V to 32.0V.
		[09] 43.8 v	The setting range is from 36.0V to 48.0V.
		[09] 58.4 v	The setting range is from 48.0V to 64.0V.
10	The maximum current of battery equalization	15A(Default) [10] 15.0 A	The setting range is from 5A to 80A.Increment of each short press is 1A.The value will jump back to 5A after 80A is achieved.
11	Battery equalization time	60minutes(Default) [11] 60	The setting range is form 5 minutes to 900 minutes. Increment of each short press is 5 minutes. The value will jump back to 5 minutes after 900 minutes is achieved.
12	Battery equalization overtime	120minutes(Default) [12] 120	The setting range is form 5 minutes to 900 minutes. Increment of each short press is 5 minutes. The value will jump back to 5 minutes after 900 minutes is achieved.
13	Equalization interval	30days(Default) [13] 30d	The setting range is from 0 day to 90 days.

14	Equalization activated immediately	Disable(Default) `[14RdS`	If "Enable"is selected in this program, it's to activate battery equalization immediately and LCD main page will shows"E9" If "Disable"is selected, it will cancel equalization function until next activated equalization time arrives based on program 13 setting. At this time," E9 " will be shown in LCD main page too.
		Enable `[14REN`	
15	Auto turn page	(Default) `[15PtE`	If selected, the display screen will auto turn the display page.
		`[15Ptd`	If selected, the display screen will stay at latest screen user finally switches.
16	Backlight control	Backlight on `[16LON`	Backlight off(Default) `[16LOF`

After pressing and holding "MENU" button for 6 seconds, the unit will enter reset model. Press "UP" and "DOWN" button to select programs. And then, press "ENTER" button to exit.

`SEt`	(default) `[dt]ntt`	Reset setting disable
	`[dt]rSt`	Reset setting enable

4.5 Reference Code

Fault Code	Fault Cause	LCD Indication
01	Battery voltage class error	`[01` ⚠ ERROR
02	Hardware protection	`[02` ⚠ ERROR
03	Over current	`[03` ⚠ ERROR

04	Battery voltage is too low	
05	Battery voltage is too high	
06	Current is uncontrollable	
07	Over temperature	
08	Current sensor error	
09	PV voltage is too high	
10	Fan fault	
11	Voltage point setting error	

5.CHARGING LOGIC

5.1 3-stage Charging

In general, this solar charge controller is designed with 3-stage battery charging algorithm for fast, efficient, and safe battery charging. The following picture shows the sequence of charging stages.
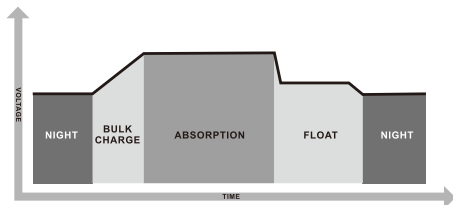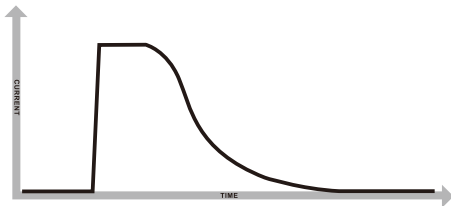
1) Bulk charge stage

In bulk charge stage, charge current begins to flow, typically at the maximum rate of The controller will supply solar power to charge battery as much as possible.

2) Absorption stage

When battery charging voltage is reached to Absorption voltage point, the charging stage changes from bulk charge to Absorption. Constant-voltage regulation is used to maintain battery voltage at the Absorption stage. No matter what the maximum charge current value is set, when the charging current drops to 10A, the charging status will change to Float stage.
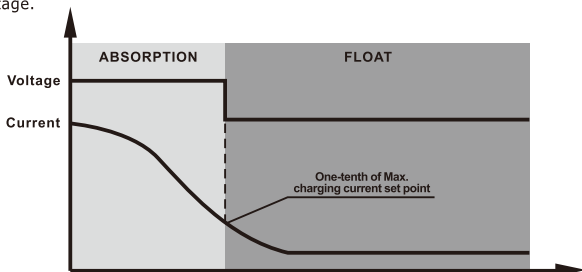
If the elapsed time of absorption stage is over setting value for C-V charging time, it will also transfer to Float stage.
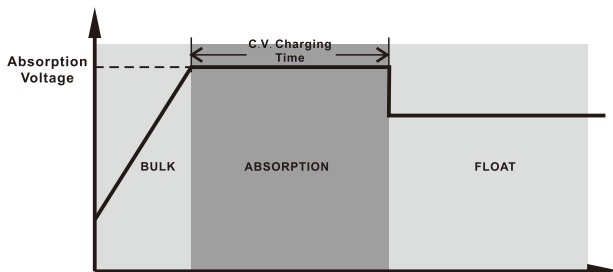
3) Float stage

After the battery is fully charged in the Absorption stage, the controller will reduces the battery voltage to the setting point of Float voltage.

Once in Float stage, constant-voltage regulation is used to maintain battery voltage at setting point of float voltage.

- **Float timeout**

If the battery voltage remains lower than the Float voltage for 30 minutes, the controller will return to Bulk charging stage.
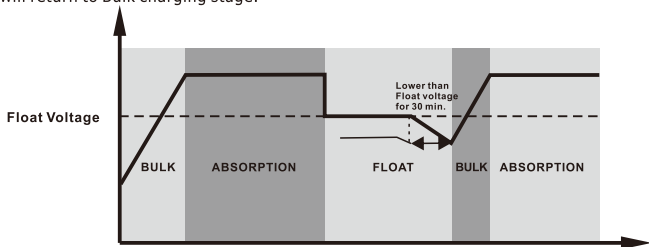
- **Float cancel voltage**

Once the battery voltage drops to setting point of Float cancel voltage, the controller also returns to Bulk charging stage.

Float cancel voltage=Floating charging voltage -- (1V × battery numbers in series)
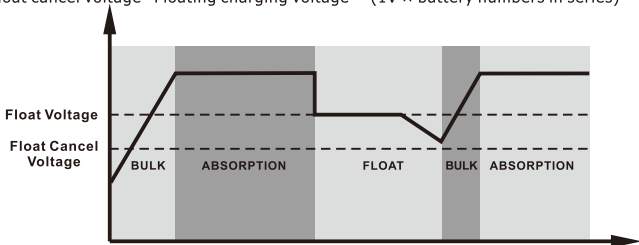
5.2 Equalize Stage

Equalization function is added into solar charge controller. It reverses the buildup of negative chemical effects like stratification, a condition where acid concentration is greater at the bottom of the battery than at the top. Equalization also helps to remove sulfate crystals that might have built up on the plates. If left unchecked, this condition, called sulfation, will reduce the overall capacity of the battery. Therefore, it's recommended to equalize battery periodically.
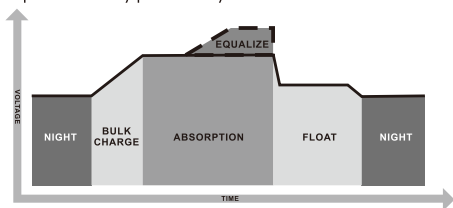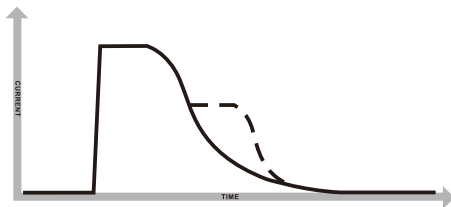
- **How to Apply Equalization function**
 You must enable battery equalization function in monitoring software first.

Then, you may apply this function in device by either one of following methods:
1. Setting equalization interval.
2. press the "confirm" button for 3 seconds until LCD shows "Eq"

- **When to Equalize**
  In Absorption stage, if the charging current drops lower than the maximum charging current of battery equalization, the controller will start to enter Equalize stage.
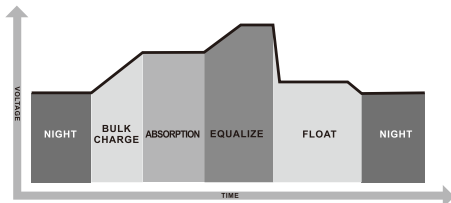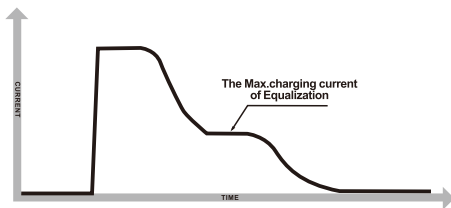
If solar charge controller is working in float stage, but at this time, the setting equalization interval (battery equalization cycle) is arrived, it will transfer to equalize stage.
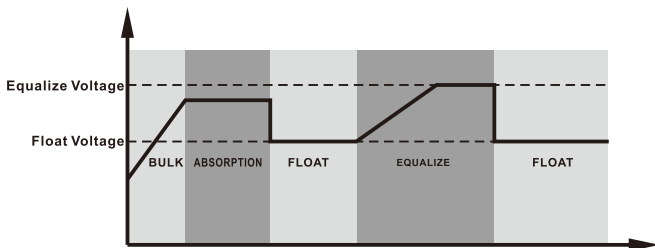

- **Equalize charging time and timeout**

In Equalize stage, based on maximum charging current of battery equalization, the controller will supply solar power to charge battery as much as possible until battery voltage raises to battery equalization voltage. Then, constant-voltage regulation is applied to maintain battery voltage at the battery equalization voltage. The battery will remain in the Equalize stage until setting battery equalized time is arrived.
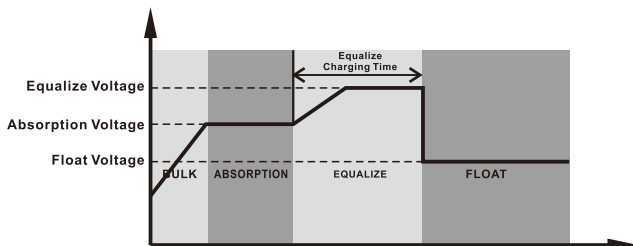
However, in Equalize stage, when battery equalized time is expired and battery voltage doesn't rise to battery equalization voltage point, the solar charge controller will extend the battery equalized time until battery voltage achieves battery equalization voltage. If battery voltage is still lower than battery equalization voltage when battery equalized timeout setting is over, the solar charge control will stop equalization and transfer to float stage.
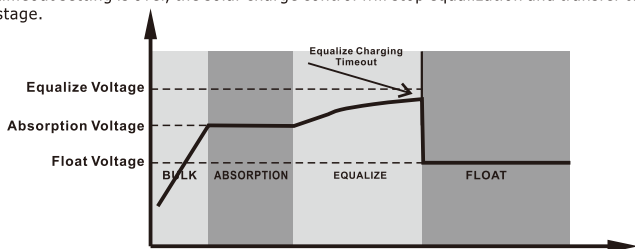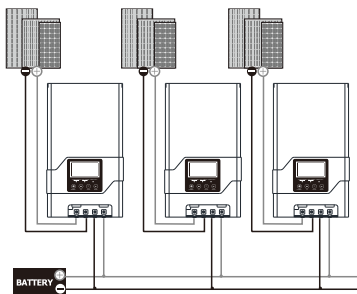

5.3 Setting parameter and Default Value

Recommended and default parameter setting are listed below.

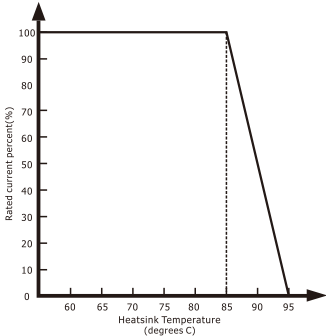| Parameter	Battery type	Absorp. Stage	Float Stage	Equalize Stage	Equalize Activation	Absorp. Time	Equalize Time	Equalize Timeout	Equalize Interval
Unit	——	volt	volt	volt	En/Disable	Minutes	Minutes	Minutes	Days
Default	AGM/Gel/LEAD	14.4V	13.7V	14.6V	Disable	150	60	120	30
Option	Flooded	14.2V	13.7V	14.6V	Disable	150	60	120	30
Option	Customized	14.1V	13.5V	14.6V	Disable	150	60	120	30

6.PARALLEL CHARGING FUNCTION

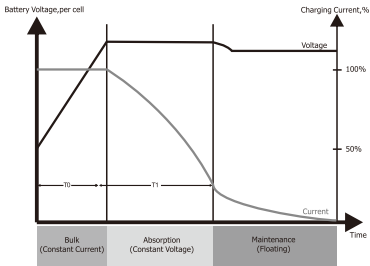Users can assign chargers in different groups, the same group will be parallel charged to the same batteries.

7.SPECIFICATIONS

Table 1 Electrical Specifications

MODEL	60A	80A	100A
Nominal System Voltage	12V,24V, or 48V(Auto detection);36V(setting)		
Maximum Battery Current	60Amps	80Amps	100Amps
Battery Voltage	12V	24V	36V	48V
Maximum Solar Input Voltage	100V	245V	
PV Array MPPT Voltage Range	95V	30~230V	45~230V	60~230V
Maximum Input Power	12 Volt-940W 24 Volt-1880W 36 Volt-2820W 48 Volt-3760W	12 Volt-1250W 24 Volt-2500W 36 Volt-3750W 48 Volt-5000W	12 Volt-1560W 24 Volt-3120W 36 Volt-4680W 48 Volt-6250W
Heatsink temperature &Battery current			
Protections	Solar high voltage disconnect Solar high voltage reconnect Battery high voltage disconnect Battery high voltage reconnect High temperature disconnect High temperature reconnect		

Table 2 Battery Charging

MODEL	60A/80A/100A	
Charging Algorithm	3-Step or 4-Step(LI)	
Charging stages	Bulk, Absorption, Float	
Temperature compensation coefficient	-5 mV/℃/cell(25℃ ref.)	
Temperature compensation range	0℃ to +50℃	
Temperature compensated set points	Absorption, Float	
Charging Set points	Absorption Stage	Float Stage
Flooded Battery	14.2V/28.4V/42.6V/56.8V	13.7V/27.4V/41.1V/54.8V
AGM/Gel/LEAD battery (Default)	14.4V/28.8V/43.2V/57.6V	13.7V/27.4V/41.1V/54.8V
Over-charging voltage	15.5V/30.0V/45.0V/60.0V	
Over-charging comeback voltage	14.5V/29.5V/44.5V/59.0V	
Battery defect voltage	10.0V/17.0V/25.5V/34.0V	
Charging Curve		

Table 3 Mechanical and Environment

Charger MODEL	60A/80A	100A
Product size(W×H×D,mm)	306.6x163.6x94.9	284x165x97
Product weight(Kg)	3.0Kg	4.0Kg
Ambient Temperature Range	-10℃ to 55℃	
Storage Temperature	-40℃ to 75℃	
Humidity	0%-90% RH(No condensing)	
Enclosure	IP20	

GUARANTEE CERTIFICATE

Serial No.: _____

Customer`s Name				Contact Person	
Address				Telephone No.	
Product/Model:		Post Code		Fax No.	
Date of purchase			Expire Date		
Dealer Signature			Customer Signature		

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GUARANTEE CERTIFICATE

Serial No.: _____