MPPT solar charge controller

358-010491-01

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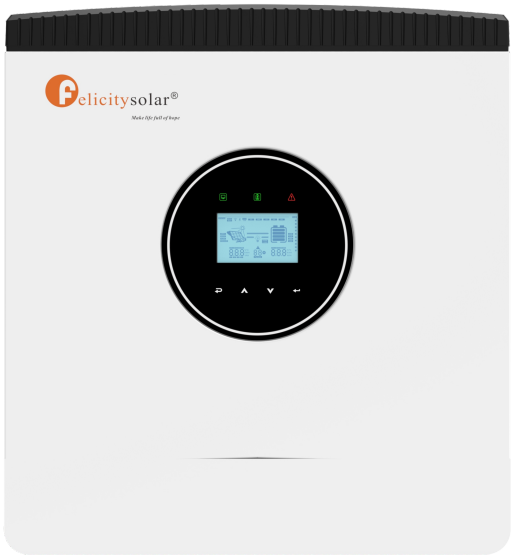
USER GUIDE

MPPT solar charge controller



Contents

1. ABOUT THIS MANUAL

1.1 Purpose

This manual describes the assembly, installation, operation and troubleshooting of this unit. Please read this manual carefully before installations and operations. Keep this manual for future reference.

1.2 Scope

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

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.

1.4 Parallel Connection

1.The system can be connected in parallel, not in series.
2. Each controller is connected to different solar photovoltaic panels, and connected to the same battery to achieve parallel connection.
3.The maximum number of parallel machines is 8.

1.5 Bluetooth and WiFi

1. This machine have built-in Bluetooth and WiFi.

2. INTRODUCTION

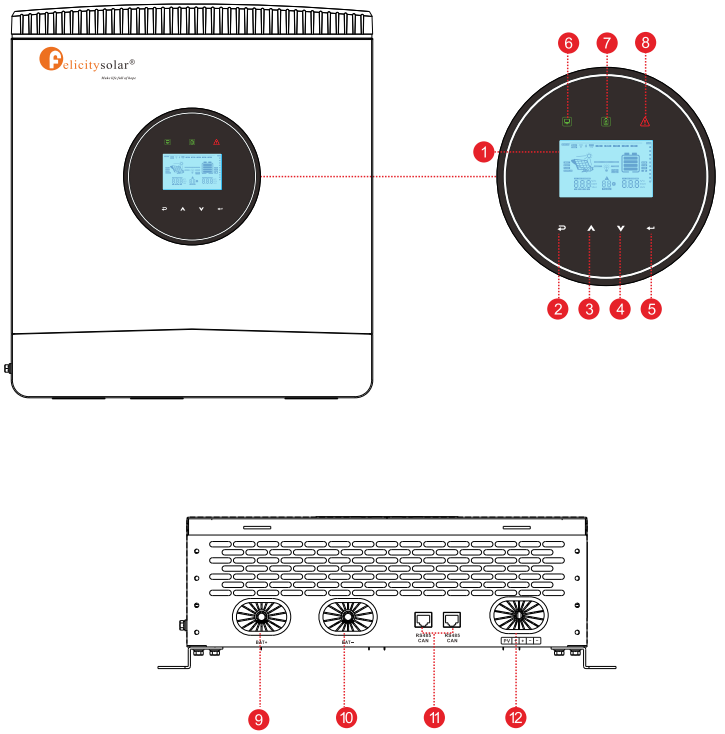
Thank you for selecting this solar charge controller. This solar charge controller is an advanced solar charger with maximum power point tracking. Applying intelligent MPPT algorithm, it allows solar charge controller to extract maximum power from solar arrays by finding the maximum power point of the 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%
•Three-stage charging optimizes battery performance (Two-stage charging in lithium battery mode)
•Maximum charging current up to 150A
•Maximum efficiency up to 98%
•Automatic battery voltage detection(Lithium battery voltage needs to be set manually)
•Supports lithium battery and various lead-acid batteries, AGM and GEL battery
•Integrated intelligent slot compatible with MODBUS&CAN communication.

2.2 Product Overview



1. LCD Display
2. ESC Button
3. UP Button
4. DOWN Button
5. ENTER Button
6.System On Indicator
7. Charging Indicator
8. Fault Indicator
9. Battery Positive +
10. Battery Negative -
11. Communication Port
12. PV Port

3. INSTALLATION

3.1 Unpacking and Inspection

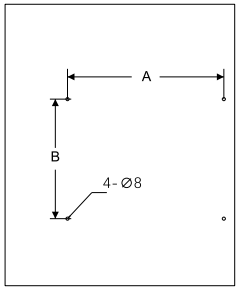
Before installation, please inspect the unit. Be sure that nothing inside the package is damaged. You should have received the following items inside of package:

- •Solar charge controller x 1
- •User manual x 1
- •Installation hole map x 1
- •Parallel communication cable x 1
- •Wall-mounted fixing screws x 8
- •ST5 screws x 4
- •Expansion tubex 4
- •Hanging flatx 4

3.2 Preparation

please install the mounting holes according to the mounting hole position diagram

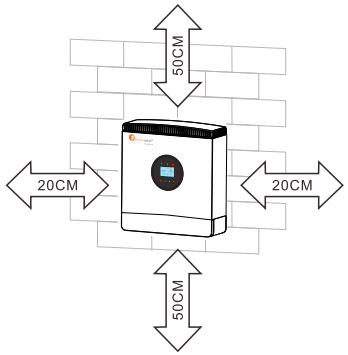
Model	A	B
SCCM15048	399	304.5

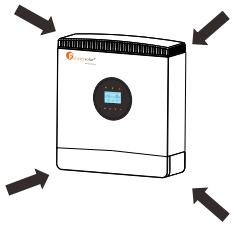


3.3 Mounting the Unit

Consider the following points before selecting where to install:

- This solar charge controller is designed in IP54 for both indoor and outdoor applications.
- Do not mount the unit on flammable construction materials.
- Mount on a 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. 20 cm to the side and approx. 50 cm above and below the unit.
- The ambient temperature should be between 0°C and 55°C to ensure optimal operation.
- The recommended installation position is to be adhered to the wall vertically.





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

3.4 Power Connection

Wire size

The four large power terminals are sized for 14 - 2 AWG (2.5 - 35mm 2) wire. The terminals are rated for copper and aluminumconductors. Use UL-listed Class B 300 Volt stranded wire only. Good system design generally requires large conductor wires for solar module and batteryconnections 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°C and 90°C are listed.

Recommended wire size:

Typical Amperage	Wire Type	75°C Wire	90°C Wire
150A	Copper	1/0 AWG (54 mm²)	1 AWG (43 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:

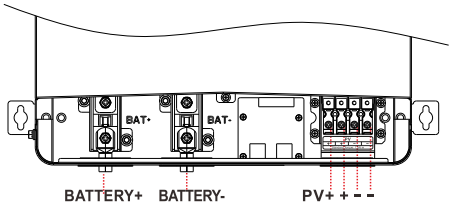
Minimum battery circuit breaker/fuse rating
1.25×150Amps = 187.5Amps

A disconnect is required for the battery and solar circuits to provide a 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

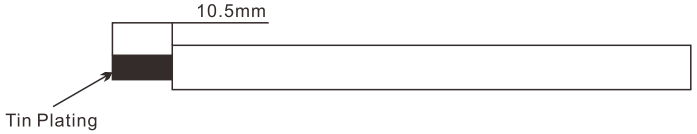
WARNING: Shock Hazard

The solar modules can produce open-circuit voltages in excess of 100 Vdc when in sunlight. Verify if solar input breaker or disconnect has been opened (disconnected)before connecting system wires.

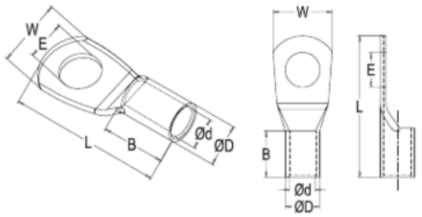


Connect terminals by following below steps (Refer to diagram above):

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 PV input power wires first. Remove insulation sleeve 10.5mm and the conductor should be plated Tin. Refer to the chart below.



3. Then make 2 power wires. It's very important for system safety and efficient operation to use appropriate cable for battery connection. To reduce risk of injury, please use the proper recommended cable and terminal size as below.



Recommended battery cable and terminal size:

Typical Amperage	Wire Type	75°C Wire	90°C Wire	Ring Terminal				
				Item No.	Dimensions(mm)			
					E	DΦ	dΦ	WBL
150A	Copper	1/0AWG(54mm²)	1AWG(43mm²)	SC50-8	8.4	12.4	9.5	17.8 16.0 45.0

Please assemble battery ring terminal based on recommended battery cable and terminal size.

Battery Connection

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 the battery negative terminal (-) on the controller.

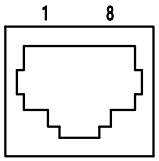
PV Connection

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

6. Check the input voltage of PV array modules. Exceeding the maximum input voltage can destroy the unit! Check the system before wire connection.
7. Please connect positive pole (+) of connection cable to any positive pole (+) of PV input connector, and negative pole (-) of connection cable to any negative pole (-) of PV input connector.
8. Screw four PV source terminals tightly with 13.28 in-lbs torque(1.5 Nm) and two battery source terminals tightly with 26.55 in-lbs torque(3 Nm).
9. Make sure the wires are securely connected.

3.5 RS485/CAN

1. RS485/CAN port Used for communication between MPPT and BMS or between MPPT.
2. CAUTION - If the battery type of the MPPT is set to Lib mode, the MPPT must be properly communicated with the battery pack to charge.

Picture	PIN	Description
	1	Trigger-GND
	2	/
	3	CANL-SCCM
	4	CANH-SCCM
	5	RS485-B
	6	RS485-A
	7	CANL-BMS
	8	CANH-BMS

3.6 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 8 AWG (10 mm²).

WARNING: Risk of Fire

DO NOT bond system electrical negative to earth ground at the controller.

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 prior to its operation. The controller cannot function solely with solar input. Solar input may activate the controller automatically when a battery is connected, even without pressing the startup button.

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, four touch buttons and a LCD display, indicating the operating status and input/output power information.

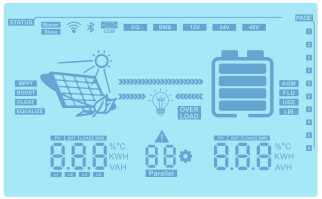
LED Indicator

LED Indicator			Messages
POWER ON	Green1	Continuously lit	The controller is on.
CHARGING	Green2	Continuously lit	The controller is charging
FAULT	Red	Continuously lit	Fault occurs

Button Operation

Function Key	Icon	Description
ESC	↩	To previous page
UP	∧	To go to previous selection
DOWN	∨	To go to next selection
ENTER	↵	To confirm the selection or go to next page

4.3 LCD Display Icons



Icon	Function description
Input Source Information	
PAGE	Show page numbers
OVER LOAD	Indicates output overload
88	Display fault code
88	Display system setting code
88 Parallel	Display parallel status and parallel number
8.8.8 %°C KWH VAH	Representing their respective corresponding data
STATUS Master Slave COM	Connection mode and master-slave state
	Display charging status in charging mode and battery level at 0-24%, 25-49%, 50-74% and 75-100% in other modes.

	Direction of current
EQ	Battery equalization enable status
BMS	BMS connection status Battery type is set to Lib mode,if BMS is not connected, the icon will flash
48V	Rated voltage of battery status
AGM FLD USE LIB	Battery type
	PV status
MPPT BOOST FLOAT EQUALIZE	Charging status

Battery Charging Status.

Status	Battery voltage	LCD Display
Constant Current mode / Constant Voltage mode	< 2V/cell	4 bars will flash in turns.
	2 ~ 2.083V/cell	The bottom bar will be on and the other three bars will flash in turns.
	2.083 ~ 2.167V/cell	The two bottom bars will be on and the other two bars will flash in turns.
	> 2.167 V/cell	The three bottom bars will be on and the top bar will flash.
Floating mode	Batteries are fully charged.	4 bars will be on.

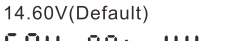
4.4 Setting Page

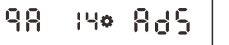
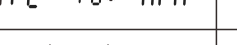
Press "Up" or "DOWN" button to select setting programs. And then, press "ENTER" button to confirm the selection or ESC button to exit.

Setting items:

Program	Description	Options
00	Exit setting mode	Escape 00 ESC

01	Maximum charging current	150A(Default) CHG 01 150A	Setting range is from 150A. Increment of each short press is 5A. The value will be back to 10A once the value is a 150A.
02	Battery type	Use-Defined(Default) bAt 02 USE	If "Use-Defined" is selected, the battery charging voltage can be set in setting items 03 and 04. If "LIb" is selected, the battery charging voltage can be set in setting item 03.
		AGM bAt 02 AGn	
		Flooded bAt 02 FLd	
		LIB bAt 02 LIb	
03	Absorption voltage	57.6V (Default) CV 03 57.6	If “Use-Defined” is selected in program 02, this program can be set up. If “LIb” is selected in program 02, the setting range is from 48.0V to 60.0V
		If this program is selected to modify,the changeable figure will be shown as below. CV 03 57.6	Increment of each short press is 0.1. Once the value is achieved 60V, the value will jump back to 48V.
04	Float voltage	54.4V (Default) FLV 04 54.4	If “Use-Defined” is selected in program 02, this program can be set up. The setting range is from 12.0V to 15.0V. If “LIb” is selected in program 02,this parameter is consistent with Absorption voltage
		If this program is selected to modify, the changeable figure will be shown as below. FLV 04 54.4	Increment of each short press is 0.1V. The value will jump back to 48V after 60V is achieved.
05	Battery rated voltage	48V(Default) bFV 05 48V	If “48V” is selected, the unit is considered as 48V battery system.
06	Battery C.V. charging duration	150 minutes(Default) CVt 06 150	The setting range is from 5 minutes to 900 minutes. Increment of each short press is 5 minutes. It will jump back to 5minutes after 900 is achieved.

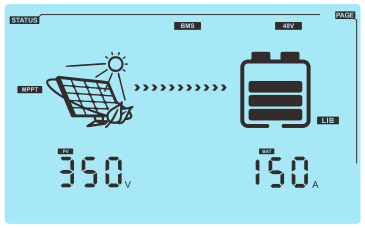
07	BTS temperature compensation ratio	0mV (Default) 	The setting range is from 0mV to 60.0mV. Increment of each short press is 0.2 mV. The value will jump back to 0mV after 60.0mV is achieved. For each 12V battery, the derated battery charging voltage is followed the below formula:(Battery temperature - 25°C) * BTS ratio.
08	Battery equalization enable/disable	Disable (Default) 	In lithium battery mode, it is disabled by default and cannot be set
		Enable 	
09	Battery equalization voltage	14.60V(Default) 	The setting range is from 12.0V to 15.5V.
		If this program is selected to modify, the changeable figure will be shown as below. 	Increment of each short press is 0.1V. The value will jump back to 12.0V after 15.5V is achieved.
10	The maximum current of battery equalization	150A(Default) 	Setting range is from 150A.Increment of each short press is 1A.The value will be back to 10A once the value is 150A.
11	Battery equalized time	60 minutes(Default) 	The setting range is from 5 minutes to 900 minutes. Increment of each short press is 5 minutes. The value will jump back to 5 minutes after 900 minutes are achieved.
12	Battery equalized timeout	120 minutes(Default) 	The setting range is from 5 minutes to 900 minutes. Increment of each short press is 5 minutes. The value will jump back to 5 minutes after 900 minutes are achieved.
13	Equalization interval	30 days (Default) 	The setting range is from 0 day to 90 days.

14	Equalization activated immediately	Disable (Default) 	If equalization function is enabled in program 08, this program can be set up. If "Enable" is selected in this program, it's to activate battery equalization immediately and LCD main page will shows " **EQ** ". If "Disable" is selected, it will cancel equalization function until next activated equalization time arrives based on program 13 setting. At this time, " **EQ** " will not be shown in LCD main page.
		Enable 	
15	Battery voltage compensation line resistance setting	0 milliohm (Default) 	Battery voltage compensation line resistance setting, unit milliohm, setting range 0~50; The default is 0 milliohm
16	Low-noise mode	Smart mode(Default) 	If selected, the fan is unrestricted and operates at maximum speed.
		Low-noise mode 	If selected, the fan's maximum speed is limited to half of its original value.
		Super-low noise mode 	If selected, the fan's maximum speed is limited to one-fifth of its original value.

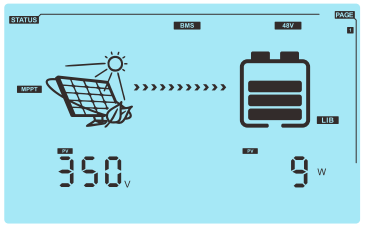
4.5 Base information Page

The base information will be switched by pressing "UP" or "DOWN" key. The selectable information is switched as below order:

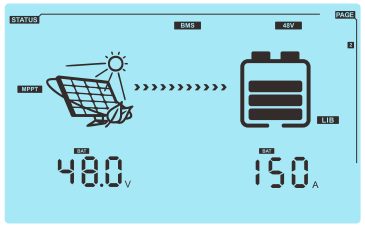
PV voltage / Charging current
PV voltage is 350V , Charging current is 150A



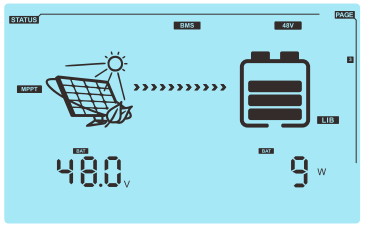
PV voltage / PV power
PV voltage is 350V , PV power is 9w



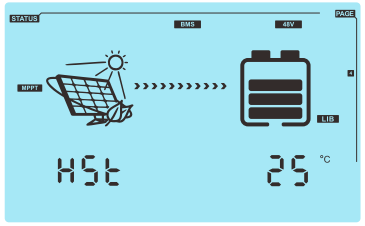
Battery voltage/ Charging current
Battery voltage is 48.0V , Charging Current is 150A



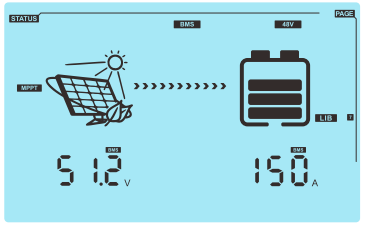
Battery voltage/ Battery power
Battery voltage is 48.0V , Battery power is 9w



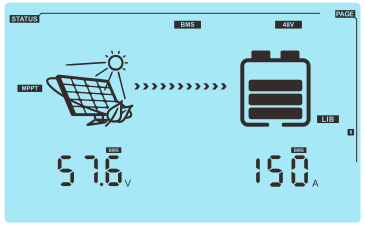
Heat sink temperature
Heat sink temperature is 25 ℃



BMS voltage/ BMS current
BMS voltage is 51.2V,BMS current is 150A

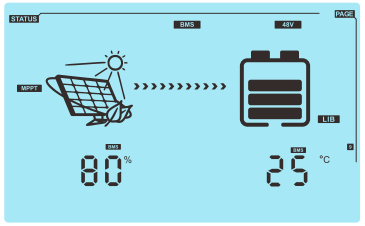


BMS charge voltage limit/ BMS charge current limit
BMS charge voltage limit is 57.6V, BMS charge current limit is 150A

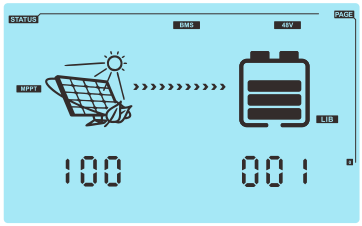


BMS SOC /BMS average cell temperature

BMS SOC is 80%,BMS average cell temperature is 25℃



Firmware Version /Iap Version
Firmware Version is 100,Iap Version is 001



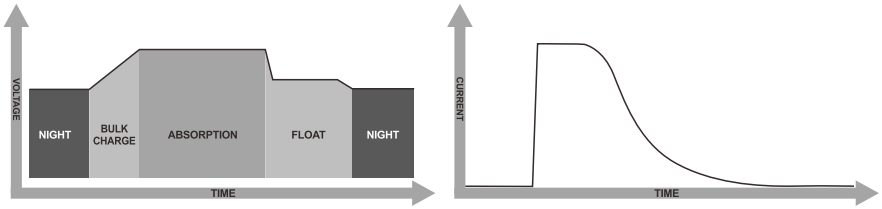
4.6 Reference Code

Type	Code	Event
Fault	01	Battery charging overcurrent
	02	Radiator 1 over temperature
	04	Battery voltage is high
	05	PV overvoltage
	13	Radiator 2 over temperature
	17	Eeprom is fault
	40	DC-DC soft start timeout
	41	PV over current
	43	Battery short circuit
	45	Radiator 3 over temperature
	46	DSP bootload fault
	47	Bus over voltage
	49	Bus soft start lose
	50	Radiator 4 over temperature
	51	PV hardware overcurrent
	52	Fan lockup
Warning	01	PV loss
	02	Battery open circuit
	03	Battery voltage is too low

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.

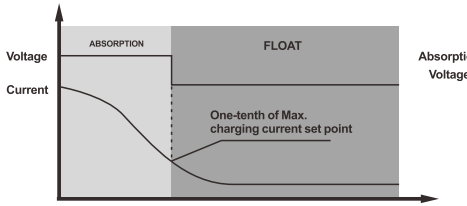


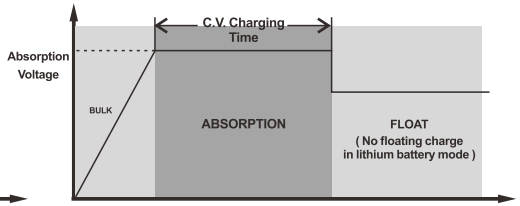
1) Bulk charge stage

In bulk charge stage, charge current begins to flow, typically at the maximum rate of the charge source. 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. If the charging current drops to one-tenth of the maximum charging current setting point, 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.

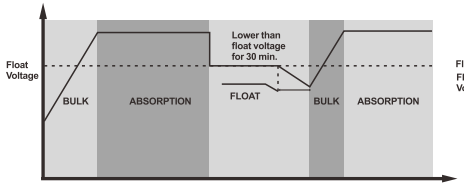
3) Float Stage

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.

In lithium battery mode: the charging logic has no floating charge stage

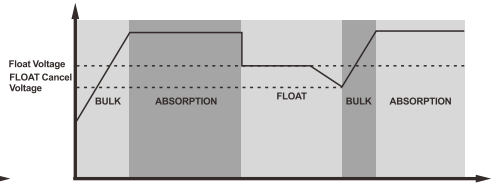
• *Float timeout*

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



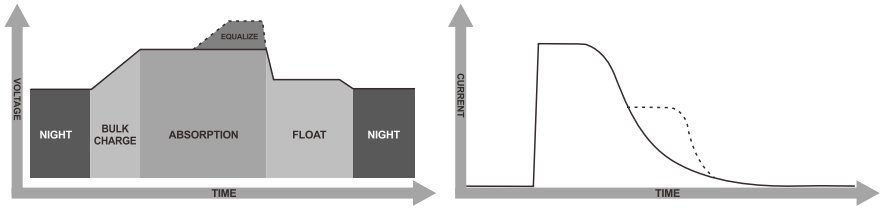
• *Float cancel voltage*

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 x battery numbers in series)



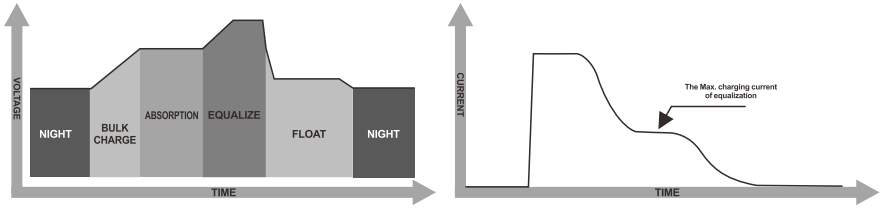
5.2 Equalize Stage

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.

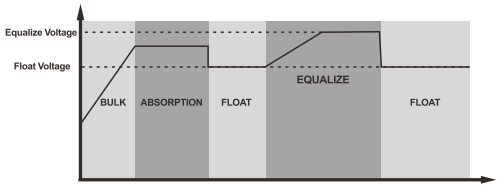


• *When to Equalize*

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.

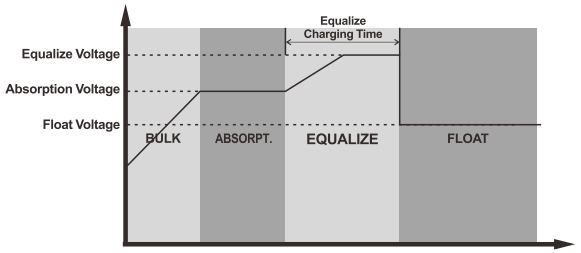


If solar charge controller is working in float stage, but at this time, the setting equalization interval (battery equalization cycle) is arrived, it will transfer to equalize stage.

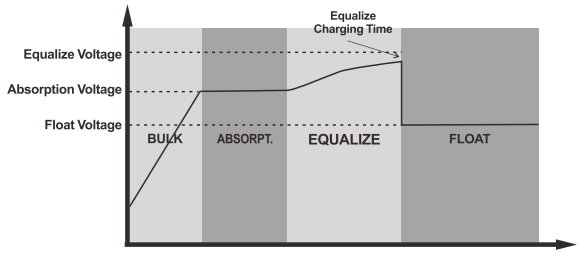


• *Equalize charging time and timeout*

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 settings are listed below.

Parameter	Battery type	Absorp. Stage	Float Stage	Equalize Stage	Equlize Activation	Absorp. Time	Equalize Time	Equalize Timeout	Equalize Interval
Unit	-	Volt	Volt	Volt	En/Disable	Minutes	Minutes	Minutes	Days
Option	AGM	14.4	13.6	14.6	Disable	150	60	120	30
Option	Flooded	14.6	13.8	14 .6	Disable	150	60	120	30
Default	Customized	-	-	-	Disable	150	60	120	30
Option	LIb	-	-	-	Disable	-	-	-	-

6. TROUBLE SHOOTING

Situation		Situation
Fault Code	Fault Event	
01	Battery charging overcurrent	1.Restart the charger. 2.If the problem remains, please contact your installer.
02	Radiator 1 over temperature	1.Keep the charger in the cool environment. 2.If the problem remains, please contact your installer.
04	Battery voltage is high	1.Reconnect the battery to the charger. 2.If the problem remains, please contact your installer.
05	PV overvoltage	1.Please check the voltage of the solar panel, it should be less than 500V. 2. If the voltage is ok, please contact your installer.
13	Radiator 2 over temperature	1.Keep the charger in the cool environment. 2.If the problem remains, please contact your installer.
17	Eeprom is fault	1.Restart the charger. 2.If the problem remains, please contact your installer.
40	DC-DC soft start timeout	1.Restart the charger. 2.If the problem remains, please contact your installer.
41	PV over current	1.Restart the charger. 2.If the problem remains, please contact your installer.
43	Battery short circuit	1.Check the external wiring and equipment 2.Restart the charger. 3.If the problem remains, please contact your installer.
45	Radiator 3 over temperature	1.Keep the charger in the cool environment. 2.If the problem remains, please contact your installer.
46	DSP bootload fault	1.Restart the charger. 2.If the problem remains, please contact your installer.
47	Bus over voltage	1.Restart the charger. 2.If the problem remains, please contact your installer.
49	Bus soft start lose	1.Restart the charger. 2.If the problem remains, please contact your installer.
50	Radiator 4 over temperature	1.Keep the charger in the cool environment. 2.If the problem remains, please contact your installer.
51	PV hardware overcurrent	1.Restart the charger. 2.If the problem remains, please contact your installer.
52	Fan lockup	1.Check whether there are any foreign objects blocking the fan. 2.If the problem remains, please contact your installer.
No display in LCD screen.		1. Check battery wire connection. 2. Push the button, if the problem remains, please contact your installer.

7. SPECIFICATIONS

Table 1 Electrical Specifications

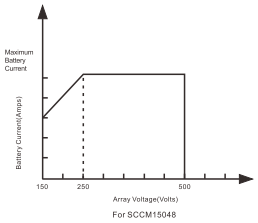
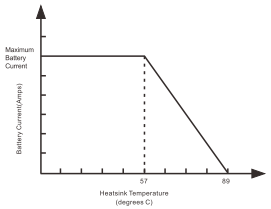
MODEL	SCCM15048
Maximum Charge Current	150Amps
Nominal System Voltage	48V
Maximum Solar Input Voltage	500V
PV Start-up Voltage	120 V
MPPT Voltage Range	150-450Vdc
PV Limiting Current	30A
Maximum Input Power	9000W
PV Voltage & Charge Current	
Heatsink Temperature & Charge Current	
Transient Surge Protection	2* rated power for 5s
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

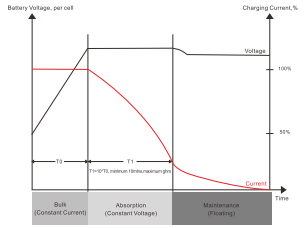
MODEL	SCCM15048
Charging Algorithm	3-Step
Charging Stages	Bulk, Absorption, Float
Charging Curve	

Table 3 Mechanical and Environment

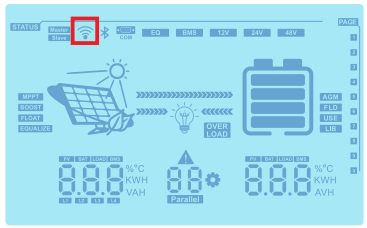
Model	SCCM15048
Product Size (W x H x D,mm)	422x370x140
Product Weight (Kg)	9.7
Outter Carton Size (W x H x D,mm)	485x464x198
Outter Carton Weight(Kg)	12(1PCS)
Ambient Temperature Range	0°C to 55°C
Storage Temperature	- 25°C to 75°C
Humidity	0%-90%RH(No condensing)
Ingress Protection	IP54

8. WIFI OPERATION GUIDE IN APP

8.1 Introduction

Wireless communication between SCCM15048 and the APP can be realized through the Wi-Fi module.The APP supports Android and iOS devices.

Delivers device status during normal operation.
Allows device Settings to be configured on the APP.
Notifies users when a warning or alarm occurs.



The status of the Wi-Fi sign on the LCD display
After the APP is successfully connected,Wi-Fi indicator light remains constantly on

8.2 Download and install APP

Operating system requirement for your smart phone:

iOS system supports iOS 11.0 and above

Android system supports Android 5.0 above

APP Download
Please scan the following QR code with your smartphone to download the App.

The QR code supports Android system and iOS system

Operation Manual
Please scan the following QR code with your smartphone to view the App Operation Manual

The QR code supports Android system and iOS system

MPPT solar charge controller