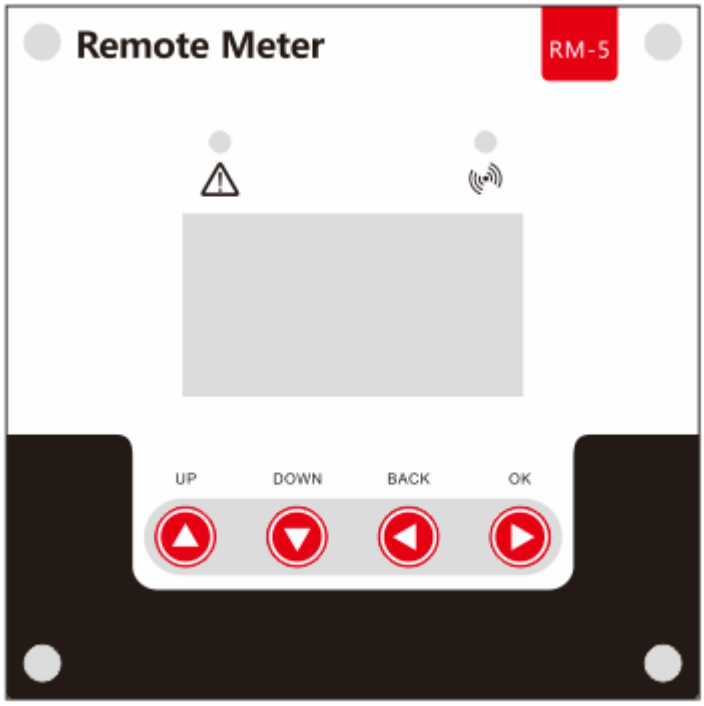
LCD Display Unit
User Manual



RM-5 (Standard version)
RM-5B (Bluetooth version)

(V1.01)

Dear users,

Thank you for choosing our product!

This user manual provides important information and advice on installation, usage, parameter settings, troubleshooting methods, etc. Before using the product, please read this manual carefully.

Table of Contents

1. Product Features

1) Adopts a 128*64 LCD screen, with the menus designed with numeric and graphic forms.

2) With a graphical design, the main menu is artistic as well as informative: it can display up to 10 parameters and states.

3) Able to read the historical data of a certain day.

4) A low-power-consumption BLE4.0 feature enables more powerful functions when pairing with a mobile APP (optional).

5) Employs two indicator lights to indicate controller abnormalities and communication errors respectively.

6) Features a controller abnormality voice alarm function which can be switched on/ off.

7) A backlight time setting function is available.

8) Able to monitor live data and operating statuses of the controller .On/ off switching, clearing of historical data and restoring to factory settings can all be done with this unit.

9) Adoption of standard Modbus communication protocol.

10) Features standard RJ12 as the communication interface.

11) With no need of an external power source, connection with a controller by means of a data cable will be enough to enable the unit to be powered .

12) Boasts an industrial grade design and excellent anti-interference capacity, the product can function well in various tough conditions.

2. Function Descriptions

With the menus and operations on the navigation keys, the following functions can be realized:

1) Real-time monitoring and checking of live data, charging and discharging parameters, load state, fault codes, historical data, device information, etc. of an individual controller;

2) Setting of related charging and discharging parameters;

3) Load mode setting, load on/ off switching (manual mode);

4) With the optional bluetooth-version display unit, more powerful functions can be realized with the help of a mobile App. (Model: RM-5B)

3. Usage Recommendations and Precautions

1) On receiving the product, carefully read all instructions and precautions in this manual so as to ensure correct usage of the product.

2) This LCD display unit is to be used only with our company's controllers, thus please make necessary confirmations with the sales person before purchasing.

3) If you want to purchase a data cable or make one by yourself, strictly observe the instructions in the "Data Cable Definition" part of this manual, otherwise you may damage the display unit or the controller.

4) The displayed data will be updated every 3 seconds, thus the data on the screen will slightly lag behind the real-time system data, which is a normal phenomenon.

5) Never put this product in environments subject to the influence of direct sunshine, rain, heavy dust, moisture, corrosion, strong electromagnetic interference, etc.

6) Never attempt to disassemble and repair this product by yourself.

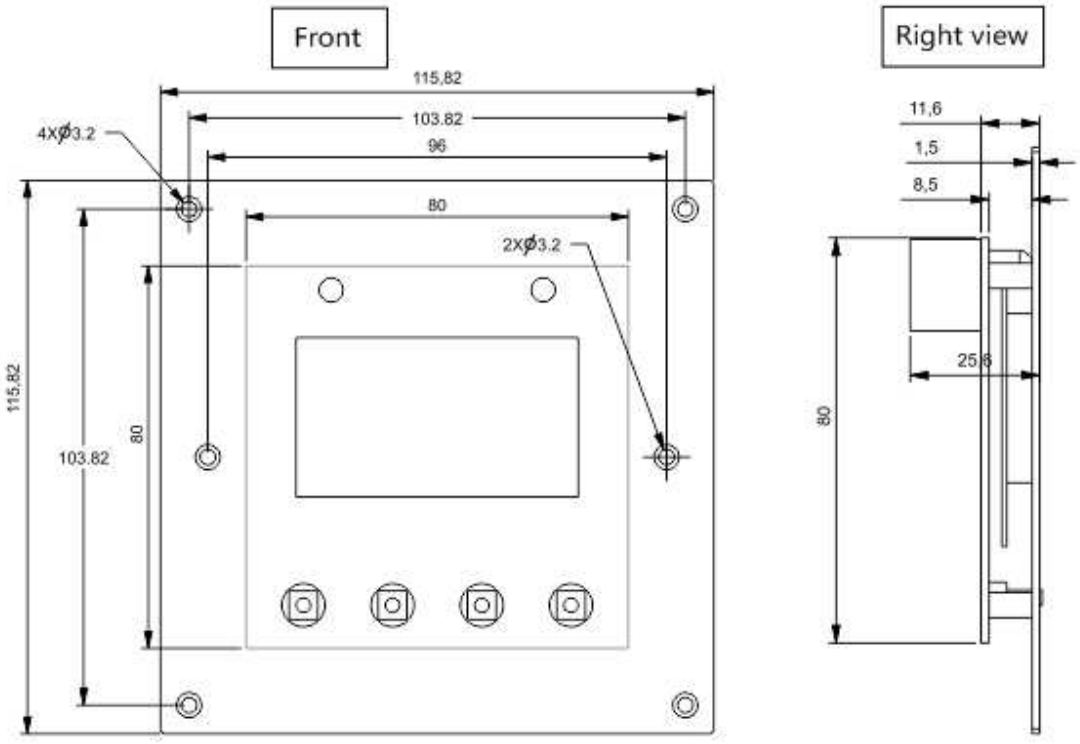
4. Packing List

Item	Quantity	Remarks
LCD display unit	1	
Data cable (2m)	1	6 cores, RJ12 at both ends
User manual	1	
KM3*8_black countersunk machine screws	2	For installation on a panel
Tapping screws KA4*25mm	4	For installation on a wall
Plastic expansion bolts M6*25mm	4	

5. Installation Instructions

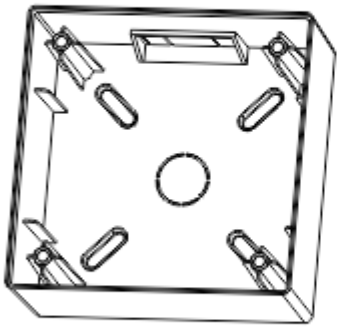
5.1、 Installation on a controller case or panel

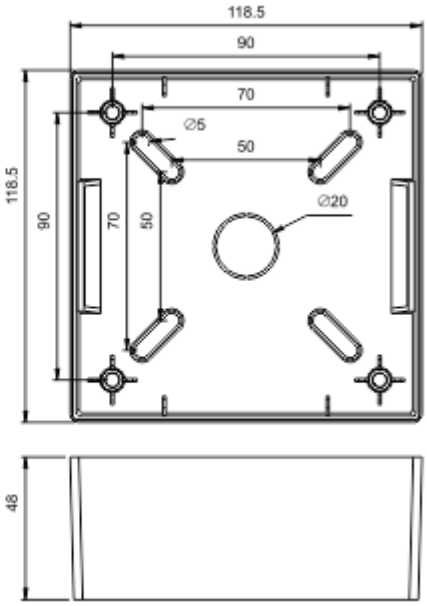
External dimensions: 115.82×115.82mm
Installation dimensions: 96mm or 103.82x103.82mm
Installation hole diameter: ₵3.5 (mm)



5.1 Installation on a wall

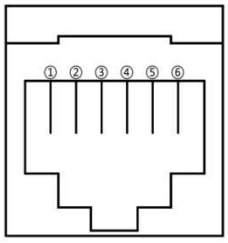
External dimensions: 118.5×118.5×48mm
Installation dimensions: 50×50mm or 70×70mm
Installation hole diameter: ₵5(mm)





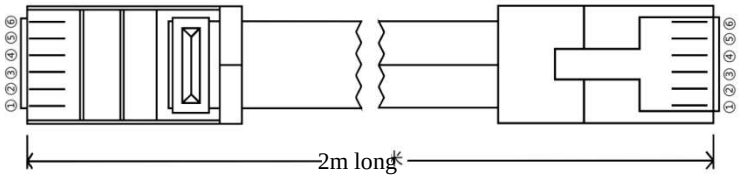
6. Data Cable Definition

Controller communication port RJ12 and the core Series number is as follows:



No. 序号	Definition
①	Receiving terminal RX
②	Transmitting terminal TX
③	Power supply grounding/ signal grounding
④	Power supply grounding/ signal grounding
⑤	Power supply positive
⑥	Power supply positive

Data cable, RJ12 (6-pin) connector



7. Parameter Details

Static power consumption	LCD backlight on <35mA/12V
	LCD backlight off <25mA/12V
Communication port	RJ12 (6-pin)
Baud rate	9600 bps
Communication port	RS232
Operating temperature	-35 to +65°C;
Product weight	0.5kg
Dimensions	115.82×115.82 (mm) (L×W)

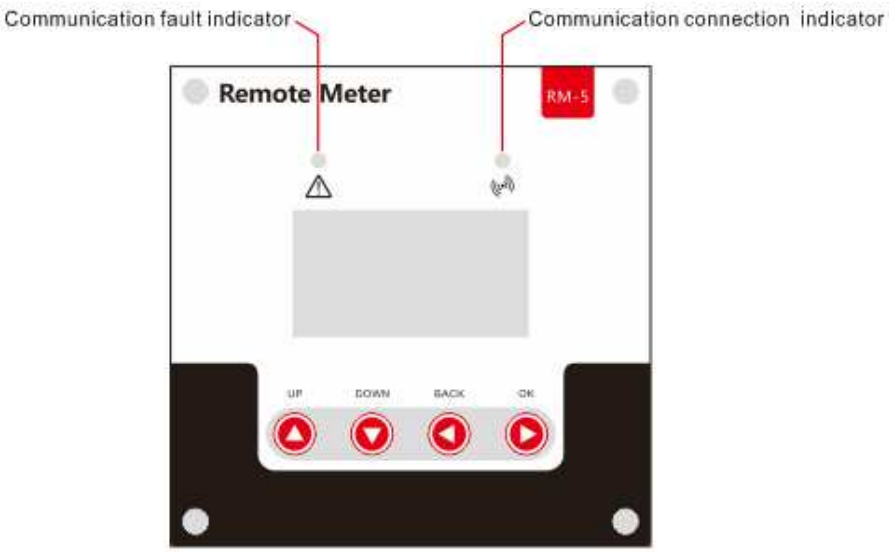
8. Usage of Navigation Keys

- The product design features 4 keys which, from left to right, are:
  "▲", " ▼", " ◀", " ▶"

They equal to ("**Up**", "**Down**", "**ESC**", "**OK**")

Key	Operation	Description
▲	Tap, press and hold	1) When **browsing a menu** , tap the key for a page up, 2) In **parameter setting**, tap the key to increase the value by a minimum unit; 3) Press and hold the key for quick page-up movement or value increasing.
▼	Tap, press and hold	1) When **browsing a menu** , tap the key for a page down; 2) In **parameter setting**, tap the key to decrease the value by a minimum unit; 3) Press and hold the key for quick page-down movement or value decreasing.
◀	Tap	1) When **browsing a menu**, tap the key to **return to the previous level**, until the main menu is reached; 2) In the **setting mode**, a tap on this key can **cancel the data modification in process and** exit the setting mode**.**
	Press and hold	In **any menu**, press and hold the key to **immediately skip to** the "**error code** page for convenient checkup.
▶	Tap	1) In a menu which contains submenus, tap the key to enter into a submenu; 2) In a menu with settable or adjustable parameters, tap the key to enter into or confirm parameter setting.
	Press and hold	If "manual mode" is selected as the load mode, a press-and-hold on the key to switch **on/ off** the load. If it's not in the manual mode, a press-and-hold will cause the display to skip to the load mode setting interface as a reminder. (Note: if no load is connected to the controller, this function and related load parameters will become inoperative.)

9. Fault Indication and Communication Indication

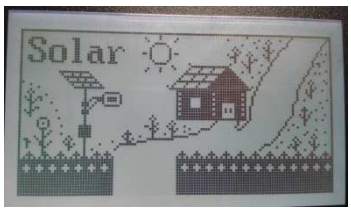


Indicator	State	Description
System fault indicator	Steady off	The controller system is normal
	Quick flashing	Abnormality occurs to the controller system(Please check the error code)
Communication	Steady off	Communication connection

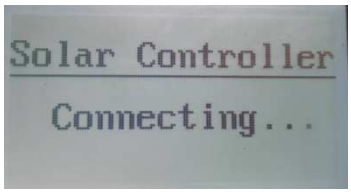
connection indicator		between the LCD display unit and controller is normal
	Slow flashing	Communication connection between the LCD display unit and controller abnormality

10. System Menu and Parameter Settings

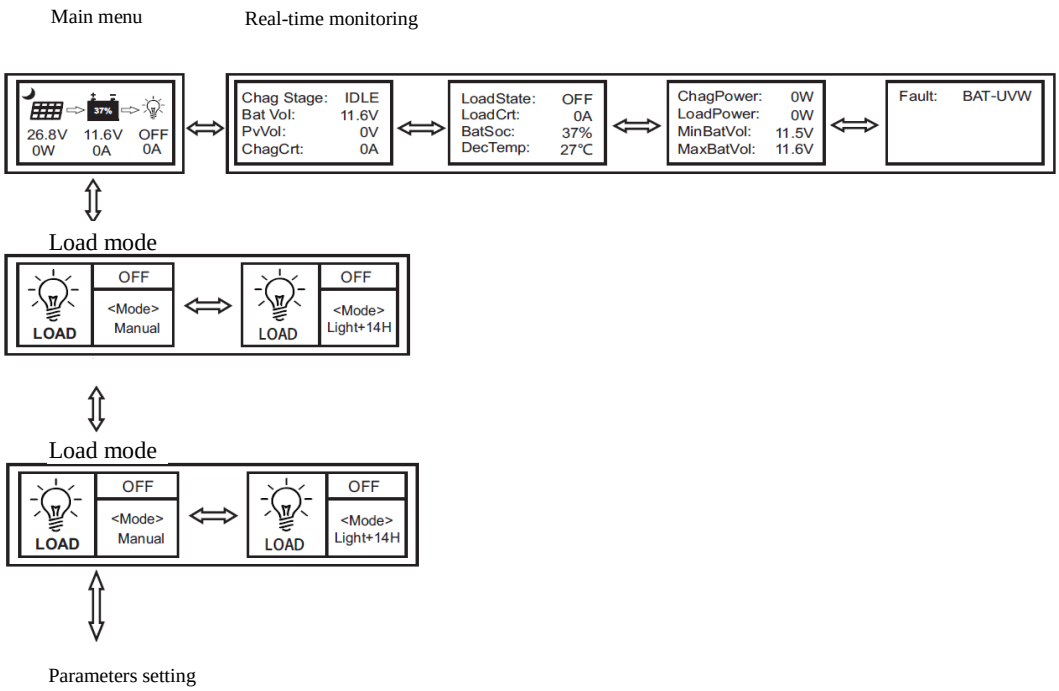
When the "**startup screen**" is displayed, tap any key to skip it. If no operation is detected within 5 seconds, a "**Connecting** " interface will ensue:

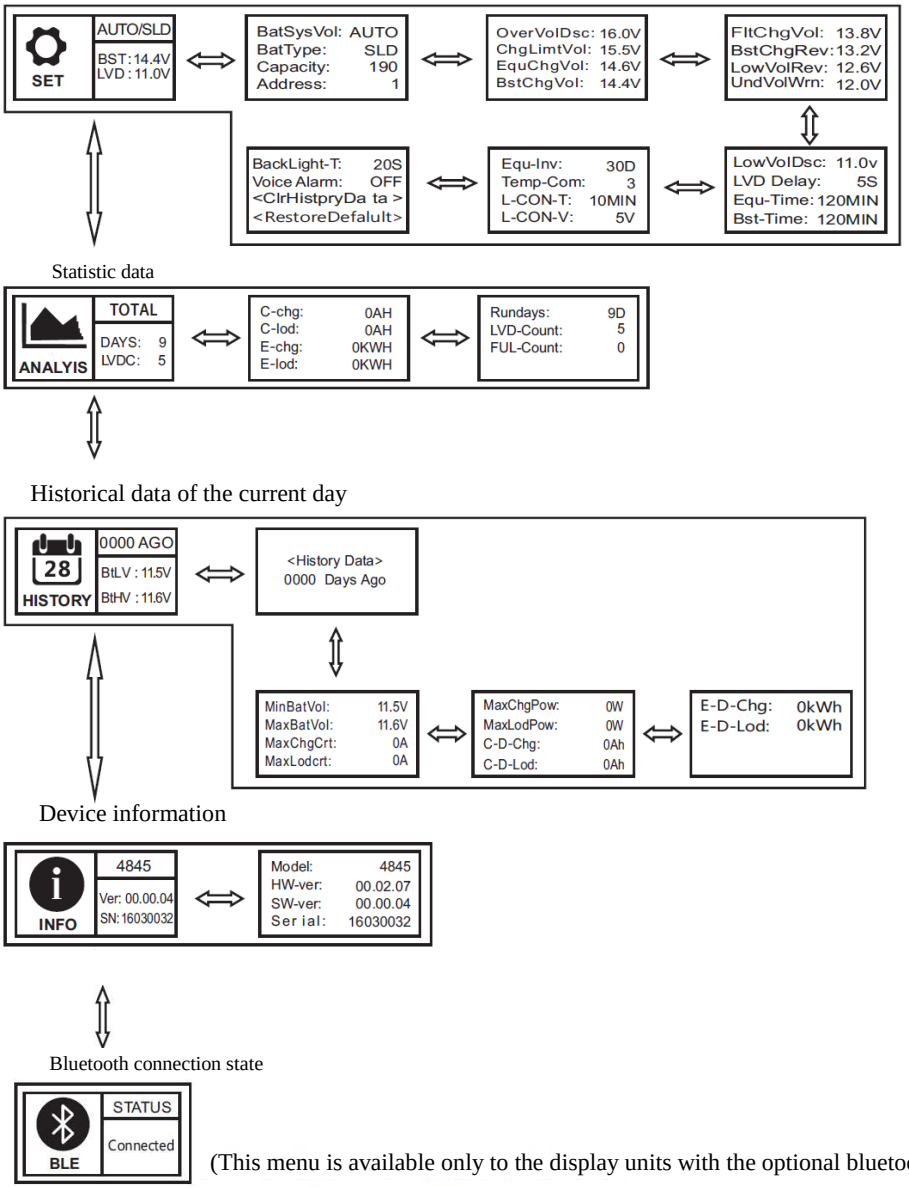


"**Connecting**" interface. When connection is successfully done, the "**main menu**" will appear:



10.1 Menu block diagram

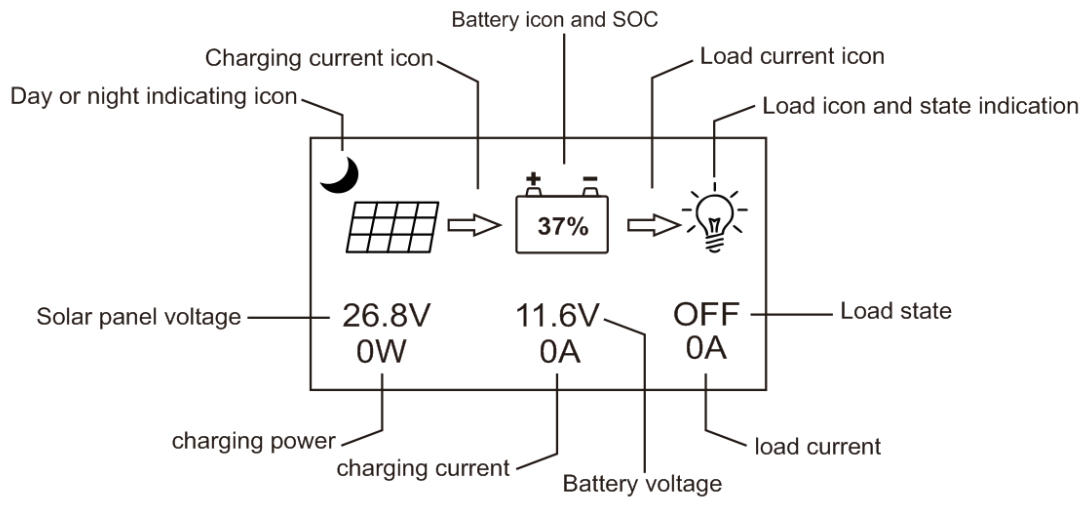




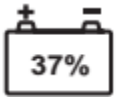
(This menu is available only to the display units with the optional bluetooth function)

Refer to "Usage of Navigation Keys" for operations including entering into and exiting each of the above menus, related parameters setting, etc.

10.2 Main menu



■ **Definitions of "main menu" icons**

Icon or value	State	Description	Remarks
	Steady on	Nighttime	Related to charging
	Steady on	Daytime	
	Steady on	A dynamic arrow indicates charging is in process, while a static one indicates otherwise.	
	"0 to 100%"	Current battery capacity	Related to battery
	"0%" in slow flashing	Battery over-discharged	
	"100%" in quick flashing	Battery over-voltage	
	Steady on	A bulb shown as left and a dynamic arrow indicate the load is switched on.	Related to load
	Steady on	A bulb shown as left and a static arrow indicate the load is switched off.	
	Quick flashing	Overload or short-circuit protection	

10.3 Real-time monitoring

(This menu is contained in and supplementary to information of the main menu)

In the "**main menu**", tap "▲" to enter into this menu; continue to tap "▲, ▼" to switch between menus; or tap "◀" to return to the "**main menu**". (Refer to "**8.** Usage of Navigation Keys" for operation)

Page	Project or parameter	Description	Remarks
1	ChagState: IDLE	Charging state indications: "IDLE", no charging "MPPT", MPPT charging "EQU", equalizing charging "BST", boost charging "FLT", floating charging "LIMIT", current-limited charging	
	BatVol: 11.6V	Battery voltage	
	PvVol: 0V	Solar panel voltage	
	ChagCrt: 0A	Charging current	
2	LoadState: OFF	Load in "ON" or "OFF" state	
	LoadCrt: 0A	Load current	
	BatSoc: 100%	Remaining battery capacity	
	DevTemp: 27°C	Controller temperature	
3	ChagPower: 0W	Charging power	
	LoadPower: 0W	Discharging power	

	MinBatVol: 12.5V	The current day's min. battery voltage	
	MaxBatVol: 13.0V	The current day's max. battery voltage	
4	Fault: NULL	Controller error codes: "BAT-LDV", over-discharge "BAT-OVD", over-voltage "BAT-UVW", under-voltage warning "L-SHTCRT", load short-circuit "L-OVRCRT", load over-current "DEV-OVT", internal over-temperature "BAT-OVT", battery over-temperature "P-OVP", solar panel overpower "P-SHTCRT', solar panel short-circuit "P-OC-OVD", solar panel over-voltage "P-MP-OVD", solar panel working over-voltage "P-REVERSE", solar panel reverse-connection	Not every controller has all of these error codes. For details, refer to the User Manual of the corresponding controller.

10.4 Parameter Settings

■ **Parameter settings list**

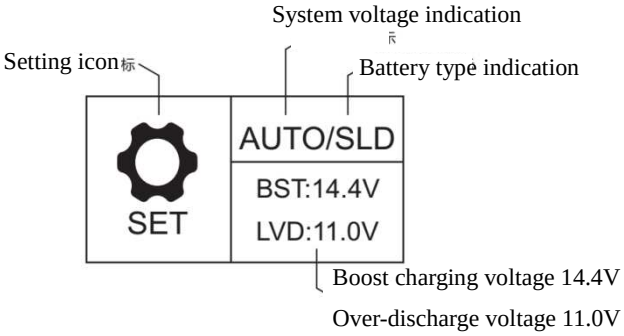
Menu level	Page	Item to set	Displayed item/ parameter	Parameter and setting range	Remarks
2nd-level menus	1	Battery system voltage	BatSysVol:	"12V", 12V system "24V", 24V system "36V", 36V system "48V", 48V system "AUTO", auto recognition	
		Battery type	BatType:	"SLD", sealed lead-acid battery "FLD", open lead-acid battery "GEL", gel battery "LI", lithium battery "USE", user defined	
		Nominal battery capacity	Capacity:	0 to 9999	±5
		Device address	Address:	1 to 60	±1

	2	Over-voltage threshold	OverVolDsc:	9.0 to 17.0V	*n, ±1
		Charging limit voltage	ChgLimtVol:	9.0 to 17.0V	
		Equalizing charging voltage	EquChgVol:	9.0 to 17.0V	
		Boost charging voltage	BstChgVol:	9.0 to 17.0V	
	3	Floating charging voltage	FltChgVol:	9.0 to 17.0V	
		Boost charging recovery voltage	BstChgRev:	9.0 to 17.0V	
		Over-discharge recovery voltage	LowVolRev:	9.0 to 17.0V	
		Under-voltage warning level	UndVolWrn:	9.0 to 17.0V	
	4	Over-discharge voltage	LowVolDsc:	9.0 to 17.0V	
		Over-discharge time delay	LVD Delay:	0 to 60s	±1
		Equalizing charging time	Equ-Time:	0 to 300MIN	±1
		Boost charging time	Bst-Time:	0 to 300MIN	±1
	5	Equalizing charging interval	Equ-Inv:	0 to 30D (days)	±1
		Temperature compensation	Temp-Com:	-(3 to 5) mV/ °C/ 2V	±1
		Light control time	L-CON-T:	0 to 60MIN	±1
		Light control voltage	L-CON-V:	5 to 11V	*n, ±1
	6	LCD screen backlight time	BackLight-T:	1 to 600s (ON indicates the screen is lit constantly)	±1
		Fault voice alarm;	Voice Alarm:	"ON", voice alarm enabled "OFF", voice alarm disabled	
		Clear historical data	<ClrHistoryData>	Select "YES" for execution	
		Reset to factory settings	<FoctoryDefault>	Select "YES" for execution	

Note:

1) In this manual, "n" assigned with a value of 1, 2, 3 or 4 denotes a battery system of 12V, 24V, 36V or 48V accordingly.

2) Before setting parameters, first refer to the User Manual of the corresponding controller. As some parameters are not settable, operation of setting these parameters on the display unit will be deemed as invalid or impossible by the controller.



- The "parameters setting" page will have a brief summary of the parameters already set in this menu:
- "AUTO": the battery voltage is the automatic recognition system
- "SLD": battery type is sealed lead acid battery;
- BST: charging voltage is 14.4V*n
- LVD: over-discharge voltage is 11.0V*n
- In the "**parameters setting** manual, tap "▶" to enter into the following submenus.

10.4.1 Controller charging and discharging related parameters setting

①All voltage values are to be set based on 12V system settings. For example, for a 24V system, if the over-discharge voltage is to be set to 22.0V, as n=24/12=2, the value needed in line with 12V system settings is 22.0V/2=11.0V, therefore the over-discharge voltage needs to be set to 11.0V.

②Tap "▲, ▼" to select the item to be set; then tap "▶", and the parameter or sign will flash; continue to tap "▲, ▼" to adjust the value, and tap "▶" again to confirm the setting. (For the setting ranges of related parameters, refer to "**Parameter settings list**")

③**For parameters on the current menu, those highlighted are settable, while those underlined are not)**

10.4.2 LCD screen backlight time setting

Characters displayed	Description
BackLight-T: ON	The LCD screen is lit constantly
BackLight-T: (1-600)S	The setting range of LCD screen backlight time is 1 to 600s

Enter into the setting menu, tap "▲, ▼" to move to **"BackLight-T：20S",** tap "▶"to enter into the setting mode, and tap "▲,▼" to modify the value within the setting range ("ON" indicates the screen will be constantly lit, and the range of backlight time is "1-600" S)。 Tap "▶" to confirm the modification, or tap "◀" to cancel the modification.

10.4.3 Controller abnormality voice alarm on/ off setting

Buzzer state	Alarm type
No Alarm	System running well or wa
Alarming 1min	Battery over-discharge, Load short circuit/overload, controller or battery over-temperature
Alarming 15s	Battery under-voltage
Alarming persistent	Battery over-voltage,solar panel reverse connection,solar panel over voltage

Characters displayed	Description
Voice Alarm: ON	Voice alarm enabled
Voice Alarm: OFF	Voice alarm disabled

Enter into the setting manual, tap "▲, ▼" to move to **"Voice Alarm: XXX",** tap "▶" to enter into the parameter setting mode, and again use "▲, ▼" to switch between "**ON**" and "**OFF**". Tap "▶" to confirm the modification, or tap "◀" to cancel the modification.

Factory settings disable the voice alarm function by default (the aforementioned faults will not trigger alarms with the voice alarm disabled).

10.4.4 "Clear historical data" and "Reset to factory settings"

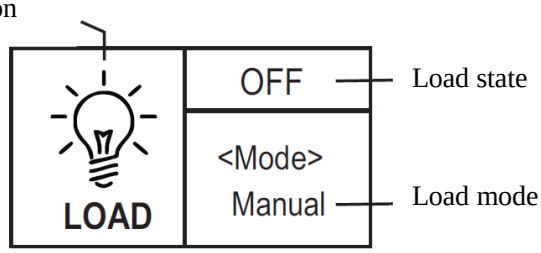
"**ClrHistoryData**" --> "**YES**", clear historical data

"**RestoreDefault**"--> "**YES**", reset to factory settings

Tap "▶" to enter into the submenu, and a "**NO**" and **YES**" selection menu will pop up. Use "▲, ▼" to select "**YES**", then tap "▶" again, and "**YES**" will flash a few times. If "**NO**" is selected, tap "▶" to directly return to the previous level.

10.5 Load modes

Load mode setting icon



◯,1. If the characters displayed on top of "<**Mode**>" are "**ON**", it indicates that the load is switched on, and "**OFF**" indicates the load is switched off.

◯,2. Tap "▶" to enter into the load setting mode, and right below the "<**Mode**>", the mode characters or digits will begin to flash. Use "▲, ▼" to select any one from the load modes listed in the following table, and tap "▶" again to complete the load mode setting.

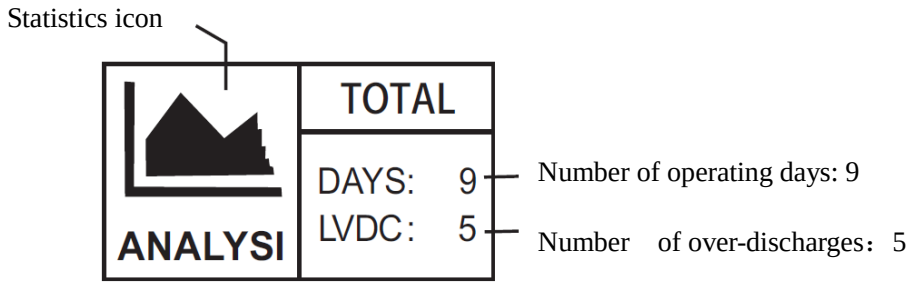
◯,3. Press and hold "▶" in any menu but not the setting mode: if the current load mode is "manual mode", pressing and holding the key will switch on/ off the load; if the current load mode is not "manual mode", pressing and holding the key will cause the display to skip to the load mode setting interface and a reminder will pop up telling the user in this mode, pressing and holding the key will not switch on/ off the load.

◯,4. Note: this parameter is ineffective for controllers without loads.

Load mode	Mode characters	Description
Sole light control mode	Light+On	The solar panel voltage is lower than the light control on voltage, and after a preset time delay , the controller will switch on the load; The solar panel voltage is higher than the light control off voltage, and after a preset time delay , the controller will switch off the load.
Light control + time control mode	Light+01H ... Light+14H	The solar panel voltage is lower than the light control on voltage, and after a time delay, the controller will switch on the load. From this point on, the load will work for a preset period of time (1 to 14 hours) before being

1 to 14H		switched off.
Manual mode	Manual	In this mode, whether it's day or night, users can press and hold the "OK" key to switch on or off the load; this mode is often used in some special occasions or during commissioning.
Debugging mode	Debug	As long as the solar panel voltage is lower than the light control on voltage, the controller will immediately switch on the load; As soon as the solar panel voltage gets higher than the light control off voltage, the controller will immediately switch off the load. This mode is usually used during system installation and commissioning.
Normal on mode	Normal On	This mode is suitable for applications requiring 24-hour operation, and after being switched on, the load keeps outputting in this mode.

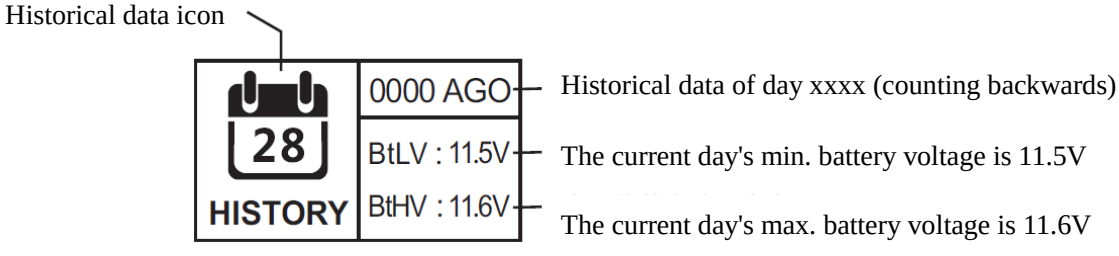
10.6 Statistic data



Including total charging amp-hrs, total discharging amp-hrs, total power consumption, numbers of operating days, over-discharges and full-charges

Menu level	Page	Displayed item/ parameter	Description
2nd-level menus	1	C-chg: 0AH	Total charging amp-hrs
		C-lod: 0AH	Total discharging amp-hrs
		E-chg: 0KWH	Total power generation
		E-lod: 0KWH	Total power consumption
	2	Rundays: 10D	Total number of operating days
		LVD-Count: 0	Total number of over-discharges
		FUL-Count: 0	Total number of full-charges

10.7 Historical data of the current day

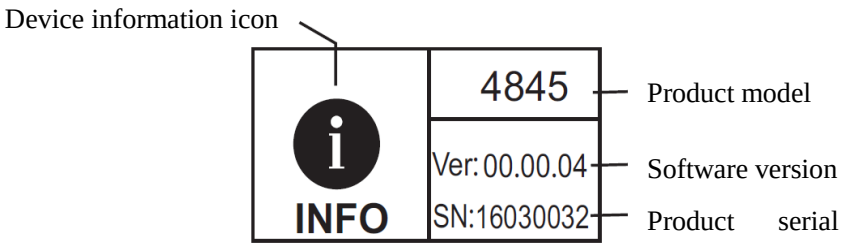


(Historical data **including: the current day's min. battery voltage, the current day's max. battery voltage, the current**

day's max. charging current, the current day's max. discharging current, the current day's max. charging power, the current day's max. discharging power, the current day's charging amp-hrs, the current day's discharging amp-hrs, the current day's total power generation and the current day's total power consumption)

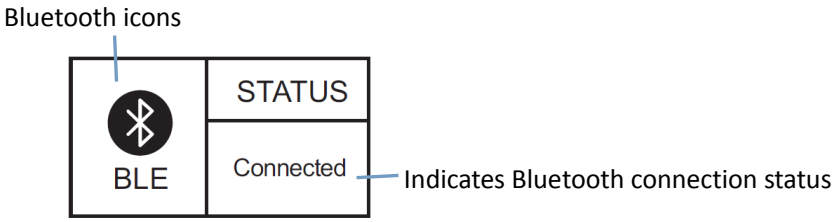
Menu level	Page	Displayed item/ parameter	Description
2nd-level menu	1	<History Data> xxxx Days Ago	Xxxx： select the historical data of day xxxx (counting backwards) 0000: the current day 0001: yesterday 0002: the day before yesterday ...
3rd-level menus	1	MinBatVol: 11.5V	The selected day's min. battery voltage
		MaxBatVol: 11.6V	The selected day's max. battery voltage
		MaxChgVol: 0A	The selected day's max. charging current
		MaxLodVol: 0A	The selected day's max. discharging current
	2	MaxChgPow: 0W	The selected day's max. charging power
		MaxLodPow: 0W	The selected day's max. discharging power
		C-D-Chg: 0AH	The selected day's total charging amp-hrs
		C-D-Lod: 0AH	The selected day's total discharging amp-hrs
	3	E-D-Chg: 0kWh	The selected day's total power generation
		E-D-Lod: 0kWh	The selected day's total power consumption

10.8 Device information



Menu level	Item	Description
2nd-level menus	Model: 4845	Controller model
	HW-ver: 00.02.07	Hardware version
	SW-ver: 00.00.04	Software version
	Serial: 160300032	Controller serial number

10.9 Bluetooth connection status



① When "**Disconnect**" is displayed on the screen, it indicates no Bluetooth device is currently connected.
② When "**Connected**", it indicates some Bluetooth device has been connected.
③ Bluetooth functions and this menu are only available to the "RM-5B" display unit, and not the "RM-5" unit.
④ The App is only compatible with Android phones with an OS version of 4.3 or above and iphones.

11. Common Problems and Solutions

Symptoms	Causes and solutions
The screen won't light up after being turned on	Check whether the communication cable has the right core order, the connection is properly done and the controller functions normally, etc.
The screen is stuck at "**Connecting...**"	
The fault indicator flashes quickly	Some abnormality occurs to the controller. Check the error code, pinpoint the cause, analyze and solve it.
The communication indicator flashes slowly	Communication between the display unit and controller is abnormal. Check the connection cable and controller.
The bluetooth interface displays: "**Disconnect**"	Bluetooth connection status indicator : 1) The mobile App is not connected to the controller; 2) The device is visible to the mobile App's search, but the problem still lingers on. Check the cable connecting the display unit and the controller; 3) The device is invisible to the mobile App's search. Check whether it has been paired with some other mobile phone; ***(Note: this menu is only available to the display units with the optional bluetooth function)***

The contents of this manual are subject to change without prior notice.

Code:1.1.24.01468

This installation assisting method is only applicable to panel installation. To ensure precision, drill holes according to the installation dimensions drawing in the User Manual.

Steps for usage:

①Tear this page down, and take care not to damage the film;

②Apply the paper closely to the panel;

③Position and mark the points for drilling with the help of the 4 holes in the film, and then conduct drilling;

④Retrieve the paper, and install RM-5