

REMOTE METER

Model: MT52

INSTRUCTION MANUAL



For use with solar charge controllers PU, LS, VS, PTR, XTR,
Tracer series and other compatible controllers

Remote Meter

MT52

Please note: this remote meter should only be used with solar charge controllers PUxxxxB(P), LSxxxxB(P), VSxxxxBN, PTRxxxxN, XTRxxxxN, Tracer and other solar charge controller models. Before using this meter, please ensure that the user manual for your charge controller clearly states that the controller is compatible with this remote meter MT52.

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1 Important Safety Instructions

SAVE THESE INSTRUCTIONS:

This manual contains important safety, installation and operating instructions for the remote meter.

General safety information

- Please inspect the MT52 thoroughly after it is delivered. If any damage is seen, please notify the supplier immediately but not later than within 7 days after delivery, and provide a photo of the damage.
- Read all instructions and cautions in the manual before starting the installation.
- Install the product indoors in a dry and clean environment. Keep it away from rain, dust, vibrations, chemicals, heat and electromagnetic interference.
- Do not allow any water or liquids to come in contact with the remote meter.
- There are no user serviceable parts inside the remote meter. Do not disassemble or attempt to repair it.

2 General Information

2.1 Features

The new-generation remote display unit MT52 for PU, LS, VS, Tracer, PTR, XTR and other compatible controllers is an associated display device which supports both the latest communication protocol and the voltage standard of solar charge controllers. The product has many useful functions:

- Automatic identification of the type, model and relevant parameter data of various solar charge controllers
- Real-time display of the operational data and working status of the connection devices in digital, graphical and textual forms by a large-screen multifunctional LCD;
- Direct, convenient and rapid operation of six navigation and function keys;
- Both data and power supplied in the same cable, no need for external power;
- Real-time data monitoring and remote load switchover of the controllers, data browsing and modification of the device parameters, charge control parameters and load control parameters;
- Real-time display of failure information of the connected devices;
- Longer communication distance via RS485.

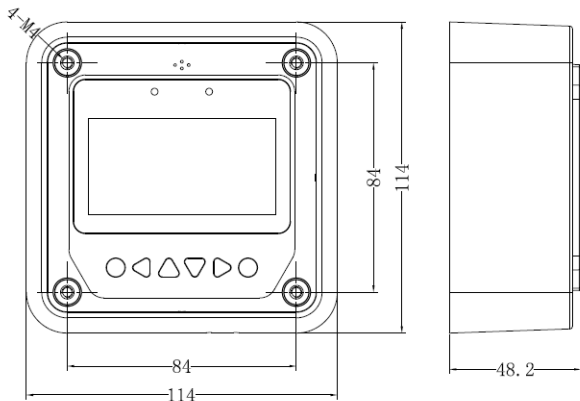
2.2 Main functions

The main functions of the remote meter are the real-time monitoring of the operational data and working status of the connected solar charge controller, browsing and modification of charge/discharge control parameters, setting of the device parameters and load control parameters and restoring factory defaults.

2.3 Recommendations

- Please note that this meter MT52 can only be used with PUxxxxB(P), LSxxxxB(P), VSxxxxBN, TracerxxxxBN(P), PTRxxxxN and XTRxxxxN controllers. It is not suitable for dual battery controllers DB series. Always double check and ensure that you have a compatible controller before purchasing and using this remote meter. The user manual for your controller should clearly state that your controller is compatible with a remote meter MT52.
- Depending on your controller model, you may need a different connection cable or an adapter to connect this meter to your controller.
- Please do not install the meter outdoors or any place with the risk of contact with water, or in a location where it may be affected by heat, or in a location with strong electromagnetic interference.

3 Installation



Frame mount dimensions (mm)

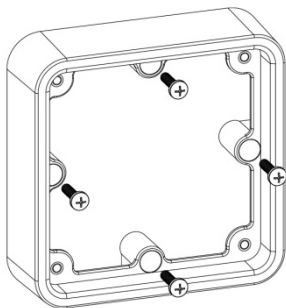
When choosing the installation location, **please note that the display screen can only be viewed clearly when the angle between the user's horizontal sight and the display screen is within 45°**. The screen information may not be seen clearly when the angle exceeds 45°. Do not mount the meter too high or too low compared to the sight level.

Mechanical parameter	Parameter
Overall dimension	114 x 114 x 48.2 mm
Mounting dimension	84 x 84 mm
Screw hole diameter	Φ5

Wall installation steps:

Step 1: Locate and drill holes for screws based on the frame mounting dimensions of the base, and fit the plastic expansion plugs;

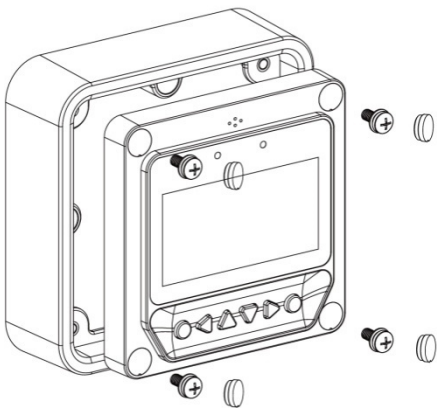
Step 2: Use four ST4.2×32 mm screws to fix the frame;



Frame mounting

Step 3: Use four M4×8 pan head screws to mount MT52 surface onto the frame;

Step 4: Mount the four associated screw plugs into the screw holes.



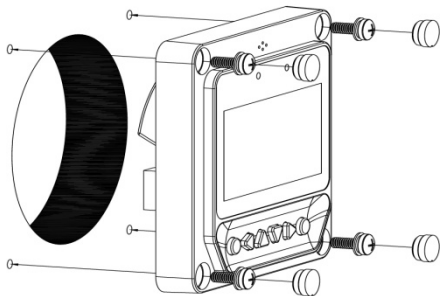
Frame mounting

Surface mounting steps:

Step 1: Locate and drill holes for screws based on the installation size of the remote meter;

Step 2: Use four M4×8 cross recessed pan head screws with M4 nuts to mount MT52 onto the panel (or suitable self-tapping screws);

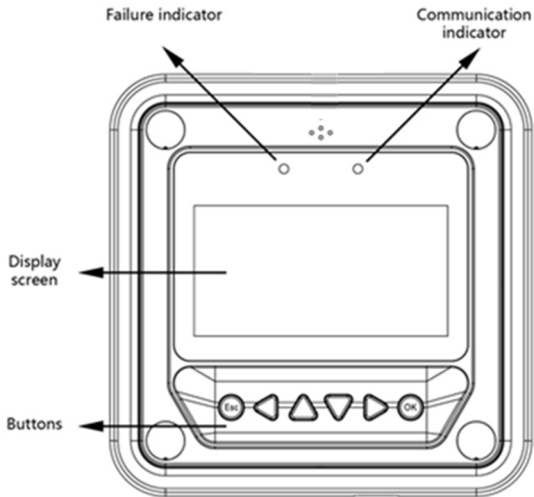
Step 3: Mount the four associated screw plugs into the screw holes.



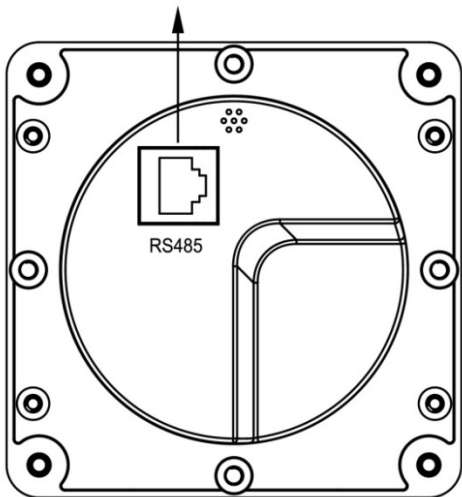
Surface mounting

Note: take full consideration of the plugging/unplugging space and the depth required for the communication cable behind the meter and the length of the cable before the installation.

4 Product Features



RS485 communication and power interface



Rear View

Failure indicator

Failure indicator flashes in case of failure of the connected device. For failure information please check the solar charge controller manual.

Communication indicator

Indicate communication status when MT52 is connected to the controller.

Display screen

User monitoring and operation interface.

Buttons

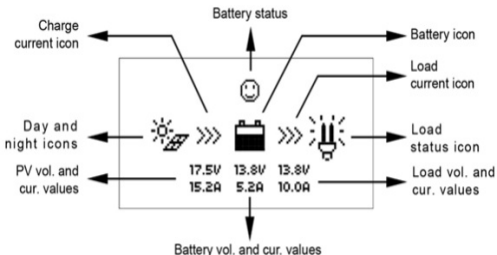
The meter buttons include four navigation buttons and two operational buttons. See specific instructions in the Operations section.

RJ45 communication and power interface



Communication and power supply socket used for connection to a solar charge controller.

Note: Please use the communication plug which is marked with “MT” to connect MT52

Monitoring screen



Day and night icons

 - Night,  - Day: The threshold voltage is 1V. Higher than 1V is daytime.

Charge current icon

The icon moves if the controller is currently charging the battery.

Battery icon

The estimated battery capacity is shown.

Note:

- The capacity is assessed based on the voltage reading and it can quickly jump up and down with the voltage, and may not be accurate during or shortly after a period of active charging or discharging.

- When the battery is over discharged, the icon displayed is “”.



Battery status icons

 - Normal voltage,  - Under voltage,  - Over discharge.

Load current icon

The icon moves if there is discharge current.

Load status icon

 - Load On,  - Load Off.

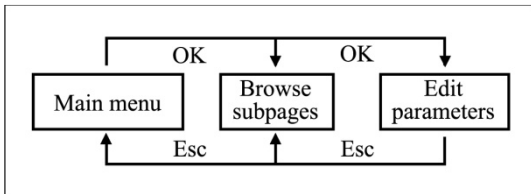
Note: In the Manual Mode of load control, pressing the "OK" button will switch the load "ON" and "OFF"

5 Operation








5.1 Buttons








The buttons are respectively (from left to right) “ESC”, “Left”, “Up”, “Down”, “Right” and “OK” . Use of these navigation buttons can be shown in the schematic operation diagram below:

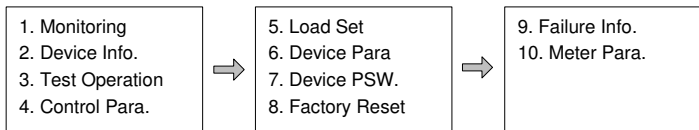


Schematic operation diagram

The default entry page is the browsing mode. Press the  button and input the correct password to enter the modification mode. Use  and  buttons to move the cursor, while  and  buttons can be used to modify the parameter values when the cursor has selected the parameter;  and  buttons can then be used to confirm or cancel the new value.

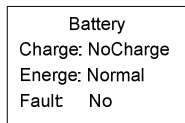
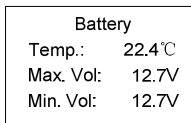
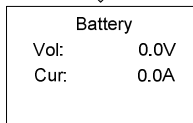
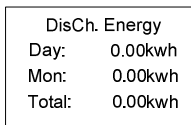
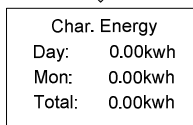
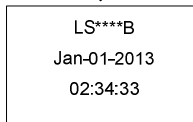
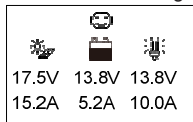
5.2 Main menu

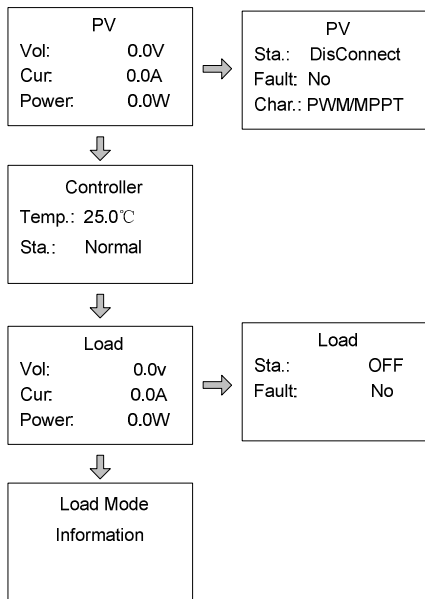
Enter the Main Menu by pressing .  and  buttons are used to move the cursor to select the menu items;  and  buttons are used to enter or exit the corresponding sections of the menu.







5.3 Real-time monitoring

There are 13 browsing screens available for real-time monitoring as below:

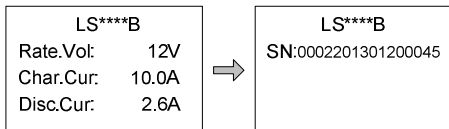




Operational tips: Move between rows by pressing  or  buttons. Move within each row by pressing  or  buttons.

5.4 Device information

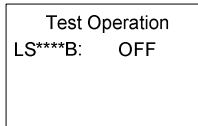
For some of the charge controller models, the product model, parameters and the serial number of the connected controller will be displayed as follows:







Note: this information may not be available for all solar charge controllers.

5.5 Test operation

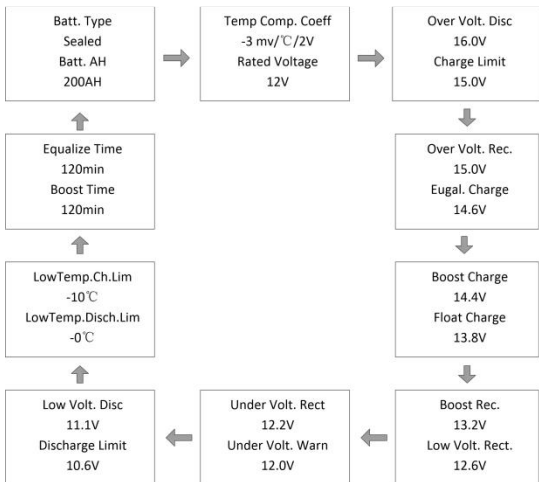
Load switch test operation can be conducted on the connected solar charge controller to see if the load output is normal. The test operation does not affect the working settings under the actual load, which means that the solar controller will exit from the test mode when exiting the operational interface of the test.



Operational tips: enter the page and input the correct password; use  and  buttons to modify the On/Off status values; use  and  buttons respectively to confirm or cancel the test operation.

5.6 Control parameters

The solar charge controller parameters can be viewed and modified in multiple screens following the diagram below:



Battery types

Depending on the controller model, the following battery types may be supported:

1	Lead-acid battery	Sealed (default)
		Gel
		Flooded
2	Lithium battery	LiFePO4 (LFP4S, LFP8S, LFP15S*, LFP16S*)
		Li(NiCoMn)O2 (LNCM3S, LNCM6S, LNCM7S, LNCM13S*, LNCM14S*)
3	User defined **	

* The battery type will display LiFePO4 15S/16S and Li(NiCoMn)O2 13S/14S only when the connected controller supports 48V system voltage.

** When setting the battery type to "USE", the default voltage point is the corresponding voltage before the battery type is modified.

Battery parameters

Parameters	Default	Range
Battery Ah	200Ah	1~9999Ah
Temperature compensation coefficient*	-3mV / °C / 2V	0 to -9mV / °C / 2V
Rated voltage*	Auto	Auto/12V/24V/36V/48V

* When the battery type is set to lithium (LiFePO4 and Li(NiCoMn)O2 series), the "Temperature Compensation Coef." and the "Rated Voltage" cannot be set.

Battery voltage parameters

(Parameters for 12V system at 25°C; use x 2 for 24V, x 3 for 36V, and x 4 for 48V system)

- **Lead-acid battery settings**

Battery charging settings	Sealed	Gel	Flooded	User
Over voltage disconnect voltage	16.0V	16.0V	16.0V	9~17V
Charging limit voltage	15.0V	15.0V	15.0V	9~17V
Over voltage reconnect voltage	15.0V	15.0V	15.0V	9~17V
Equalise charging voltage	14.6V	—	14.8V	9~17V
Boost charging voltage	14.4V	14.2V	14.6V	9~17V
Float charging voltage	13.8V	13.8V	13.8V	9~17V
Boost reconnect charging voltage	13.2V	13.2V	13.2V	9~17V
Low voltage reconnect voltage	12.6V	12.6V	12.6V	9~17V
Under voltage warning reconnect voltage	12.2V	12.2V	12.2V	9~17V
Under voltage warning voltage	12.0V	12.0V	12.0V	9~17V
Low voltage disconnect voltage	11.1V	11.1V	11.1V	9~17V
Discharging limit voltage	10.6V	10.6V	10.6V	9~17V
Equalise duration	120min	—	120min	0~180min
Boost duration	120min	120min	120min	10~180min.

Notes:

1. When the battery type is sealed, gel or flooded, the adjusting range of equalisation duration is 0 to180 mins and boost duration is 10 to180 mins.
2. The following rules must be observed when modifying the parameter

values for the user battery type (factory default value is the same as sealed type):

- a) Over Voltage Disconnect Voltage > Charging Limit Voltage ≥ Equalize Charging Voltage ≥ Boost Charging Voltage ≥ Float Charging Voltage > Boost Reconnect Charging Voltage.
- b) Over Voltage Disconnect Voltage > Over Voltage Reconnect Voltage
- c) Low Voltage Reconnect Voltage > Low Voltage Disconnect Voltage ≥ Discharging Limit Voltage.
- d) Under Voltage Warning Reconnect Voltage > Under Voltage Warning Voltage ≥ Discharging Limit Voltage.
- e) Boost Reconnect Charging voltage > Low Voltage Disconnect Voltage.



NOTE: Please refer to the battery user manual or contact the battery supplier / manufacturer for details on charging voltages and specific requirements.

• Lithium battery settings

Battery type Battery parameters	LFP				
	LFP4S	LFP8S	LFP15S	LFP16S	User*
Over voltage disconnect voltage	14.8V	29.6 V	55.5V	59.2V	9~17V
Charging limit voltage	14.6 V	29.2 V	54.7V	58.4V	9~17V
Over voltage	14.6 V	29.2 V	54.7V	58.4V	9~17V

reconnect voltage					
Equalise charging voltage	14.5 V	29.0 V	54.3V	58.0V	9~17V
Boost charging voltage	14.5 V	29.0 V	54.3V	58.0V	9~17V
Float charging voltage	13.8 V	27.6 V	51.7V	55.2V	9~17V
Boost reconnect charging voltage	13.2 V	26.4 V	49.5V	52.8V	9~17V
Low voltage reconnect voltage	12.8 V	25.6 V	48.0V	51.2V	9~17V
Under voltage warning reconnect voltage	12.2 V	24.4 V	45.7V	48.8V	9~17V
Under voltage warning voltage	12.0 V	24.0 V	45.0V	48.0V	9~17V
Low voltage disconnect voltage	11.1 V	22.2 V	41.6V	44.4V	9~17V
Discharging limit voltage	11.0 V	22.0 V	41.2V	44.0V	9~17V

** The battery parameters for the "User" battery type is 9~17V for LFP4S. Please multiply x2 for LFP8S, and x4 for LFP15S/LFP16S.*

Battery type Battery parameters	LNCM					
	LNCM 3S	LNCM 6S	LNCM 7S	LNCM 13S	LNCM 14S	User*
Over voltage disconnect voltage	12.8 V	25.6 V	29.8 V	55.4V	59.7V	9~17V
Charging limit voltage	12.6 V	25.2 V	29.4 V	54.6V	58.8V	9~17V
Over voltage reconnect voltage	12.5 V	25.0 V	29.1 V	54.1V	58.3V	9~17V
Equalise charging voltage	12.5 V	25.0 V	29.1 V	54.1V	58.3V	9~17V
Boost charging voltage	12.5 V	25.0 V	29.1 V	54.1V	58.3V	9~17V
Float charging voltage	12.2 V	24.4 V	28.4 V	52.8V	56.9V	9~17V
Boost reconnect charging voltage	12.1 V	24.2 V	28.2 V	52.4V	56.4V	9~17V
Low voltage reconnect voltage	10.5 V	21.0 V	24.5 V	45.5V	49.0V	9~17V
Under voltage warning reconnect voltage	12.2 V	24.4 V	28.4 V	52.8V	56.9V	9~17V
Under voltage warning voltage	10.5 V	21.0 V	24.5 V	45.5V	49.0V	9~17V

Low voltage disconnect voltage	9.3 V	18.6 V	21.7 V	40.3V	43.4V	9~17V
Discharging limit voltage	9.3 V	18.6 V	21.7 V	40.3V	43.4V	9~17V

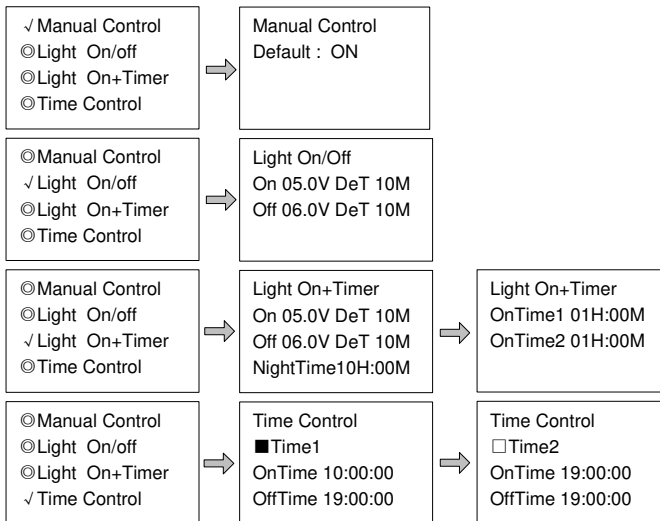
**The battery parameters for the "User" battery type are 9~17V for LNCM3S. Please multiply x2 for LNCM6S/LNCM7S, and x4 for LNCM13S/LNCM14S.*

The following rules must be observed when modifying the parameter values for the user battery type for lithium batteries:

- A. Over Voltage Disconnect Voltage > Over Charging Protection Voltage(Protection Circuit Modules(BMS))+0.2V;
- B. Over Voltage Disconnect Voltage > Over Voltage Reconnect Voltage=Charging Limit Voltage ≥ Equalize Charging Voltage=Boost Charging Voltage ≥ Float Charging Voltage > Boost Reconnect Charging Voltage;
- C. Low Voltage Reconnect Voltage > Low Voltage Disconnect Voltage ≥ Discharging Limit Voltage.
- D. Under Voltage Warning Reconnect Voltage > Under Voltage Warning Voltage ≥ Discharging Limit Voltage;
- E. Boost Reconnect Charging voltage > Low Voltage Reconnect Voltage;
- F. Low Voltage Disconnect Voltage ≥ Over Discharging Protection Voltage (BMS)+0.2V

5.7 Load setting

The load setting page can be used to set four load working modes of the connected solar charge controller (Manual, Light on/off, Light on+timer, Time control):



Note: for detailed instructions on load settings, please refer to the user manual for your solar charge controller.

Manual control

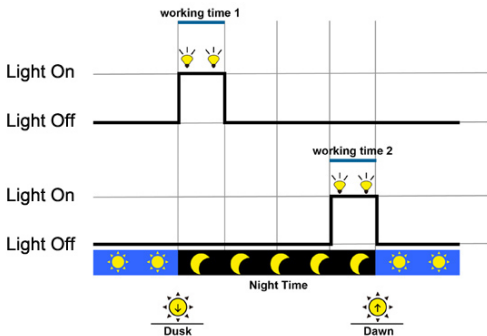
Mode	Notes
On	Load is on all the time (if the battery has enough charge and no abnormal conditions occur)
Off	Load is Off all the time

Light On/Off

Light On voltage (Night threshold)	When the input voltage of the solar module is lower than Light On voltage, it automatically turns on the load output (if the battery has enough charge and no abnormal conditions occur)
Light Off voltage (Day threshold)	When the input voltage of the solar module is higher than Light Off voltage, it automatically turns off the load output
Delay time	The delay time for load on/off actions. If during this period the Light On/Off voltage threshold criteria are met, a corresponding load on/off action will happen at the end of this period (the time adjustment range: 0~99 mins)

Light On + timer

Working time 1 (T1)	Load working period (the load is on), after the light control turns on the load	When the working time is set to "0", the load will not work for this period. The real working time of T2 depends on the Night time, and the length of T1 and T2.
Working time 2 (T2)	Load working period (the load is on), before the light control is due to turn off the load	
Night time	Total reference night time length ($\geq 3h$) to calculate when Working time 2 should start	

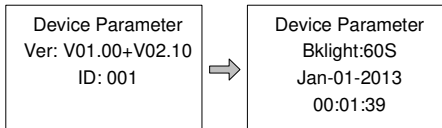


Time control

Working time 1 (T1)	Control the on/off time of load through the real-time clock mode.	Working time 1 is the compulsory load working time interval. Working time 2 is optional.
Working time 2 (T2)	Second working period (dual timer function of the load) through the real-time clock mode.	

5.8 Device parameters

The software version information and device data of the solar charge controller can be checked via the page of device parameters. Data like device ID, device LCD backlight time and device clock can be checked and modified. The pages with device parameter are shown below:



Note: the bigger the ID value of the connected device, the longer the meter communication identification interval (the maximum interval <6 mins).

Type	Notes
Ver	Solar charger controller software and hardware version numbers.
ID	Solar charger controller communication ID numbers.
Bklight	Solar charger controller LCD backlight working time.
Month-Day-Year H:M:S	Solar charger controller internal clock.

5.9 Device password

The password of the solar charge controller can be modified via the page of device password. The password is a 6-digit figure which is required for entering the menu sections “Control parameter”, “Load setting”, “Device parameter”, “Device password”, “Factory reset”. The page of the device password is shown below:

Device PSW OriPsw:xxxxxx NewPsw:xxxxxx
--

Note: the default password for solar charge controllers is “000000”

5.10 Factory reset

The default parameter values of the solar charge controller can be restored via the Factory reset page. The “Control parameter”, “Load setting”, “Charge mode” and “Device password” of the devices will be restored to the factory defaults if ‘Yes’ is chosen (the factory default password for the devices is “000000”).

Factory Reset Yes No

5.11 Failure information

The current failure information of the solar charge controller can be checked via the Failure information page (max. 15 failure messages could be displayed). When the failures of solar charge controller are resolved, the corresponding failure information will also be automatically removed.

Failure Info
1. Over voltage
2. Over load
3. Short circuit

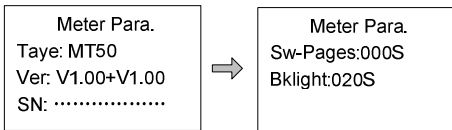
Common failure information

Failure type	LCD display	Instructions
Charging device failures	Load MOS-Short	The MOSFET of the load driver is short-circuited.
	Load Circuit	The load circuit is short-circuited.
	Load O. cur.	The load circuit is over current.
	Input O. cur.	The PV input current exceeds the rated current.
	RPP Short	The MOSFET of the reverse polarity protection (RPP) is short-circuited.
	RPP Break	The MOSFET of the reverse polarity protection (RPP) breaks.
	Char. MOS-Short	The MOSFET of the charge driver is short-circuited.

	No Input Power	The input power is not connected successfully.
	Input vol. High	The input voltage is very high.
	Input vol. Low	The input voltage is very low.
Controller failure	Ctrlr O. Temp.	The controller is over-temperature.
Communication failure	Comm. Timeout	The communication is timeout.
Battery failures	Batt. O. Hi. Temp.	The battery is over high temperature.
	Batt. O. Lo. Temp.	The battery is over low temperature.
	Batt. I. R. Eorr	The internal resistance of the battery is in error.
	Rated Vol Err.	The rated voltage is in error.
	Batt. OVD	The battery voltage exceeds the over voltage disconnect (OVD) voltage value.
	Batt. UVW	The battery voltage is lower than the under voltage warning (UVW) voltage value.
	Batt. LVD	The battery voltage is lower than the low voltage disconnect (LVD) voltage value.
	Batt. Err	The battery type is in error.

5.12 Meter parameters

The meter model, software and hardware version, and SN NO. can be checked via the Meter parameter page. Meter functions such as “Switch pages” timer and “Backlight” can also be modified.



Note: When the setup is completed, the auto switch page will require ten minutes to take effect.

Parameters	Default	Range	Details
Sw-Pages	0	0~120 secs	Set the timer to automatically switch back to the previous page
Bklight	20	0~999 secs	LCD backlight time

6 Technical Specifications

Electrical parameters

Self-consumption	Backlight ON <23mA
	Backlight OFF <15mA

Mechanical parameters

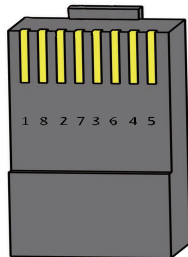
Main meter unit dimensions	98 × 98 mm
Frame dimensions	114 × 114 mm
Connector type	RJ45
Meter cable length	Standard 5m, maximum 50m
Meter weight	Simple package: 0.23 Kg Standard package: 0.32 Kg

Environmental parameters

Ambient temperature	-20°C ~ +70°C
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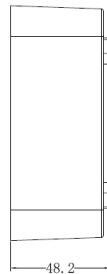
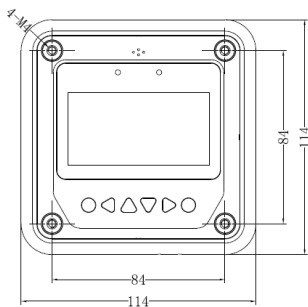
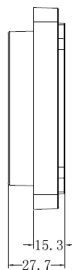
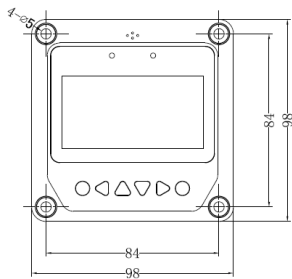
Definitions of interface pins

Pin No.	Definition
1	Power input +5 ~ 12V
2	Power input +5 ~ 12V
3	RS485-B
4	RS485-B
5	RS485-A
6	RS485-A
7	GND
8	GND



Data cable pin definitions

Remote meter dimensions (mm)



Changes to this manual can be made without prior notice. Version number: v9.5

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