Solis Export Power Manager

Installation and Operation Manual

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Please adhere to the actual products in case of any discrepancies in this user manual.

Please record the serial number of your inverter and quote this when you contact us.

Ver 1.4

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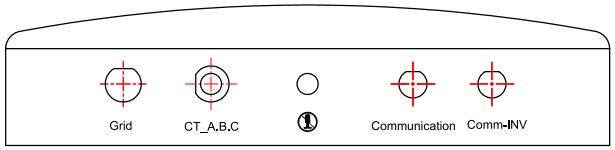
1. Introduction

1.1 Product Descriptions

Solis Export Power Manager can monitor and control the backflow power from the inverter to the grid thus providing export power control of inverters.
The export power manager is suitable for use with all solar PV grid tie inverters.
Model: Solis-EPM1-2G is for single phase systems.
Model: Solis-EPM3-2G is for use on three phase systems.

▲ Figure 1.1 Front side view

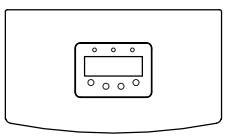


▲ Figure 1.2 Bottom side view

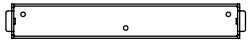
1. Introduction

1.2 Packaging

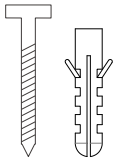
When received the EPM, please check if all the parts listed below are included:



Export power manager x1

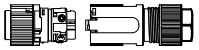


Bracket x1

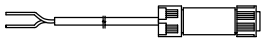


Expansion screw set x3

Fixing screw(M4) x3



Grid input terminal x1



Rs485 Communication terminal
(single phase x2 and three phase x7)

AC current sampling cable with CT
(single phase x1 and three phase x3)

Manual x1

2.Safety Instructions

Improper use may result in potential electric shock hazards or burns. This manual contains important instructions that should be followed during installation and maintenance. Please read these instructions carefully before use and keep them for future reference.

2.1 Safety Symbols

Safety symbols used in this manual, which highlight potential safety risks and important safety information, are listed as follows:

WARNING:
WARNING symbol indicates important safety instructions, which if not correctly followed, could result in serious injury or death.

NOTE:
NOTE symbol indicates important safety instructions, which if not correctly followed, could result in some damage or the destruction of the inverter.

CAUTION:
CAUTION, RISK OF ELECTRIC SHOCK symbol indicates important safety instructions, which if not correctly followed, could result in electric shock.

CAUTION:
CAUTION, HOT SURFACE symbol indicates safety instructions, which if not correctly followed, could result in burns.

2.2 General Safety Instructions

WARNING:
Electrical installations must be done in accordance with the local and national electrical safety standards.

CAUTION:
Risk of electric shock. Do not remove cover. There is no user serviceable parts inside. Refer servicing to qualified and accredited service technician.

2.Safety Instructions

CAUTION:
Risk of electric shock from energy stored in capacitors.
Do not remove cover until 5 minutes after disconnecting all sources of supply expect service technician. Warranty may be voided if any unauthorized removal of cover.

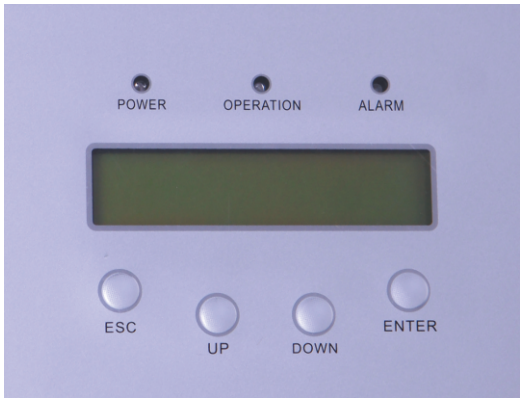
2.3 Notice For Use

The Export Power Manager has been constructed according to the applicable safety and technical guidelines. Use the Export Device in installations that meet the following specification ONLY:

1. Permanent installation is required
2. The electrical installation must all the applicable regulations and standards.
3. The Export Power Manager must be installed according to the instructions stated in this manual.
4. The Export Power Manager must be installed according to correct technical specification.
5. To install the Export Device you should notice the phase of sampling voltage and the direction of sampling current, then you can connect sampling wires and CT(current transformer).

3. Overview

3.1 Front Panel Display



▲ Figure 3.1 Front Panel Display

3.2 LED Status Indicator Lights

There are three LED status indicator lights in the front panel of the inverter. Left LED: POWER LED (red) indicates the power status of the inverter. Middle LED: OPERATION LED (green) indicates the operation status. Right LED: ALARM LED (yellow) indicates the alarm status. Please see Table 3.1 for details.

Light	Status	Description
POWER	ON	Export Device power on
	OFF	Export Device power off
OPERATION	ON	Communication with inverter
	OFF	No communication with inverter
ALARM	ON	Backfeed power over 100W or inverter fault
	OFF	No alarm

▲ Table 3.1 Status Indicator Lights

3. Overview

3.3 Keypad

There are four keys in front panel of the Export Power Manager (from left to right): ESC, UP, DOWN and ENTER keys. The keypad is used for:

- Scrolling through the displayed options (the UP and DOWN keys);
- Access to modify the adjustable settings (the ESC and ENTER keys).

3.4 LCD

The two-line Liquid Crystal Display (LCD) is located at the front panel of the inverter, which shows the following information:

- Export Power Manager operation status and data;
- Service messages for operator;

4. Installation

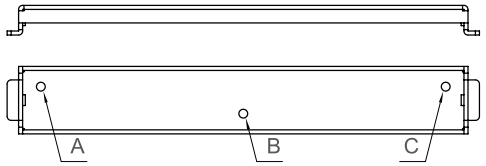
4.1 Select a Location for the EPM

To select a location for the EPM, the following criteria should be considered:

- The temperature of the EPM could up to 75℃.
- The EPM is designed to work in extreme temperature range is from -25℃ to 60℃.
- The EPM should be kept minimum 300mm clearance from the other device.
- The EPM cannot be placed in direct sunlight.

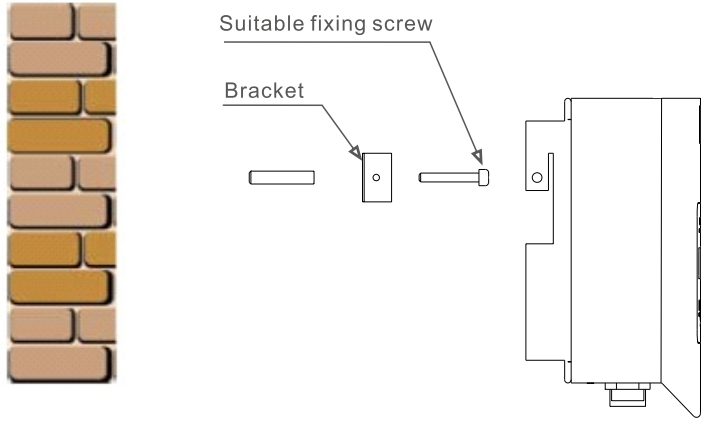
4.2 Mounting the EPM

Please attach mounting plate on to wall horizontally where to install the product. Then mark A , B and C to fix mounting plate.(see Figure 4.1)



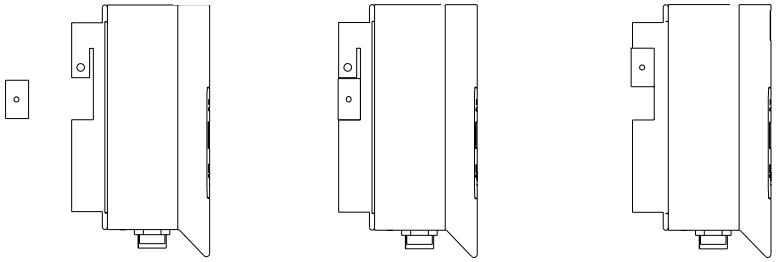
▲ Figure 4.1 Bracket

Drill three ϕ8 holes and insert expandable shell into the holes which make the bracket alignment. After that fix the bracket on the wall.(see Figure 4.2)



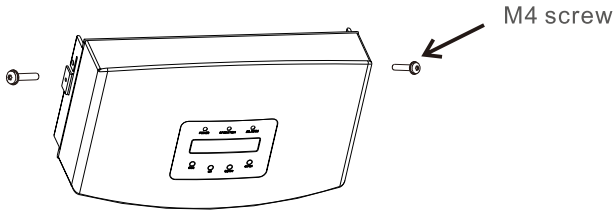
▲ Figure 4.2 Fix the bracket on the wall

Hang the EPM in the bracket by the steps below .(see Figure 4.3)



▲ Figure 4.3 Hang the EPM in the bracket

Fix the two screw at the side of bracket.(see Figure 4.4)



▲ Figure 4.4 Fix the two screw

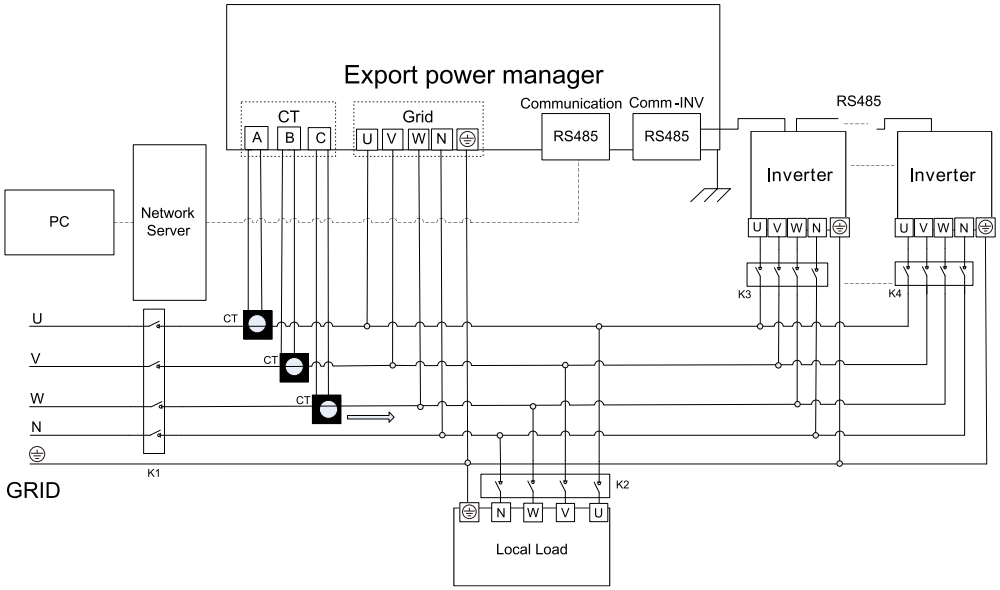
4.3 Electrical Connections

The Export Power Manager is designed for electrical connection without removing the cover. The meaning of the symbols located at bottom of the EPM is listed in Table 4.1.

Grid_U.V.W.N	AC voltage sampling terminal
CT_A.B.C	AC current sampling terminal
Comm_INV	Connect to solis inverters
Communication	Connect to WIFI stick

▲ Table 4.1 The meaning of the symbols located at bottom of the EPM

System connection diagram is as follows(see Figure 4.5):



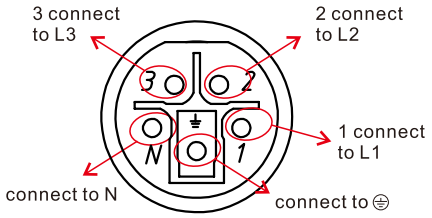
▲ Figure 4.5 System diagram

In order to short length of CT and grid input cable, the EPM is recommended to be installed near the customer distribution box.The 5m CT cable is provided for installation.

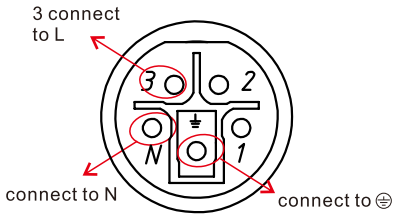
1 Make the Grid input cable

a. Measure the distance from EPM to power distribution box. And find proper cable for grid input. 5 core cable for Solis-EPM3-2G and 3 core cable for Solis-EPM1-2G.

b. For three phase inverter installation connect L1, L2, L3 to pin1, 2,3 and connect N to pin4, connect PE to ⏚ (see figure4.6).For single phase installation, connect L to pin3 and N to pin4, connect PE to ⏚ (see figure4.7).

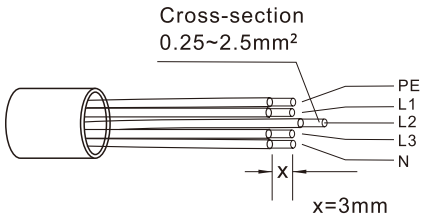


▲ Figure 4.6 Three phase connection



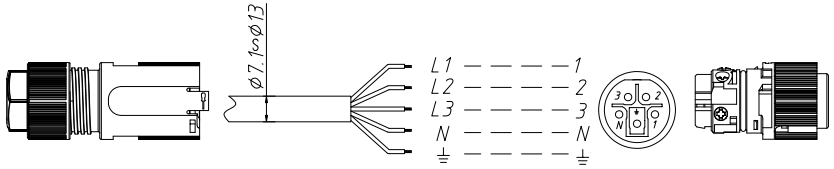
▲ Figure 4.7 Single phase connection

c. Strip the end of cable to 3mm (see Figure 4.8)



▲ Figure 4.8 Strip the cable

d. Through the cable to the washer and use a suitable screw driver to fix the wire to the connector (see Figure 4.9).



▲ Figure 4.9 Welding wire to connector

e. Assemble the connector (see Figure 4.10)

▲ Figure 4.10 Assemble connector

2. Make RS485 cable

a. Refer to figure 4.11, the RS485 terminals for inverter and EPM are already assembled. RS485A is connected to yellow and RS485B to blue cable.
Tips:RS485 cable: preferred 0.2-1.5mm.

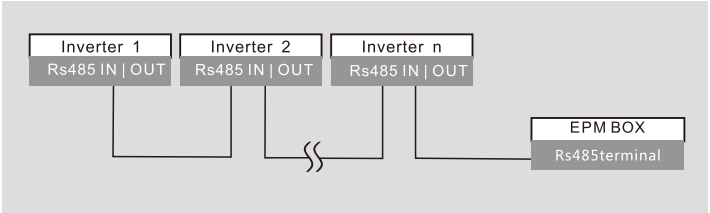
.

4. Installation

1. VCC_5V
2. GND
3. RS485_A
4. RS485_B

▲ Figure 4.11 RS485 terminal

b. Refer to figure 4.12, connect communication cable between inverter with EPM, and then measure the distance from EPM to inverter. Use proper cable for RS485 connection. (0.2-1mm)



▲ Figure 4.12 RS485 cable connection

c. Follow step1 to assemble 2 connectors to each end of cable.

3. Connect and fix the CT

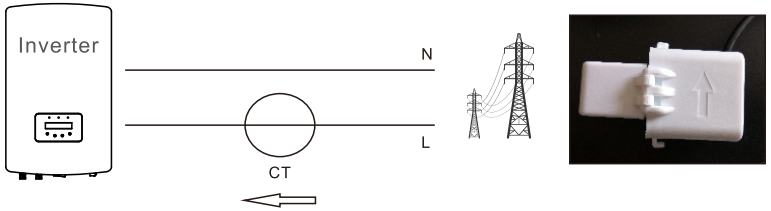
In order to detect the backflow current, the CT should be installed just below the customer main switch (see figure 4.5).

For single phase, CT must be through line cable. For three phase inverter the CT1, CT2 and CT3 must corresponding the grid input L1, L2 and L3. Otherwise the EPM can not detect the right power.

a. Switch off the main switch, disassemble line cable.
b. Through the cable to the CT. The direction of CT is very important.
Refer to Figure 4.13, the CT should through Line cable and side with words should be towards load side.
c. Reconnect the line cable to the main switch.

Notice:
If the CT installed in wrong direction, the EPM can not work normally.

4. Installation



▲ Figure 4.13 CT current pointing to inverter

5.Connect the grid input to the distribution box.

The grid input cable can be connect together with inverter grid breaker or an independent breaker.

Notice:
Do not connect the grid input cable to the load breaker, which causes inverter out of control when load inverter breaker trip.

Please follow figure 4.5 system diagram to connect grid input cable to the main switch.

The cable sequence must match the EPM grid terminal sequence.

6. Muti inverter connection

Please follow figure 4.5 system diagram to connect muti-inverters. EPM can control maximum 6 inverters. Due to control logic, the inverter connected to EPM must be the same model.

The inverter address must be set to different value. Please set address from 01 to 06. Before start up inverter please follow 6.5.1 to set inverter number in EPM.

Notice:
The inverters connected to EPM must be the same model.

7. Monitoring

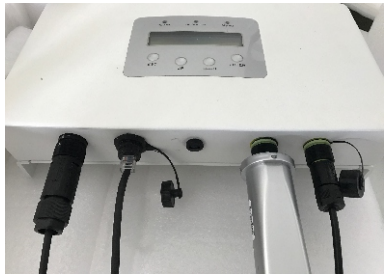
Inverters that connected to EPM can be monitored by Ginlong WiFi/GRRS stick or box. WiFi/GPRS stick is used for single inverter monitoring. **Multi-inverters must use WiFi/GRRS box to monitor.**

Notice:
When inverter connected to EPM, no other monitoring device is allowed to be connected to the inverter.

5. Commission and decommission

5.1 Commissioning

1. Connect CT connector, grid input terminal, RS485 terminal(INV) and monitoring device (if needed) to the EPM. Connect the other end or RS485 cable to inverter.



▲ Figure 5.1 Cable connection

2. Close the breaker of grid input and start up EPM.
3. The power LED(red) light, after the start up interface, press up or down check if the active power is positive or 0. If the active power is negative please check the direction of CT.
4. Please set inverter number for muti-inverters connection.
5. Follow the instruction of inverter to start up inverter. If EPM communicate with inverter successfully, the green LED will light.
6. The default allowed backflow power is 0. Please follow 6.5 to change the allowed backflow power if needed.

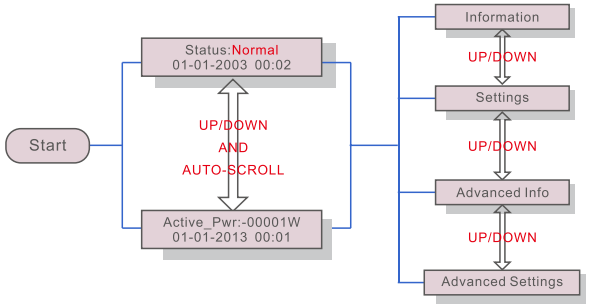
5.2 Decommissioning

In order to aovid the backflow power to grid, please stop the inverter before stop the EPM.

1. Turn off the inverter output AC breaker.
2. Turn off inverter input DC breaker or pull out PV cable to stop inverter.
3. Turn off the grid input breaker of EPM.
4. Disconnect all cable of EPM, disassemble EPM after 5mins.

6. Operation

During normal operation, the display alternately shows the power of grid side and the operation Status .Screens can also be scrolled manually by pressing the UP and DOWN keys. Press the ENTER key to access to the Main Menu.



▲ Figure 6.1 Operation Overview

There are 3 status :

Normal :The system work normally.

Backflow :There is backflow power going to grid. Comm.

Fault :EPM fault or EPM detect Inverter fault.

6.1 Main Menu

There are four submenus in Main Menu

1.Information

2.Settings

3.Advanced Info.

4.Advanced Settings

6.2 Information

Display	Description
Vac A_Grid: 220V Iac A_Grid: 000.0A	Grid voltage and current.
Vac B_Grid: 220V Iac B_Grid: 000.0A	
Vac C_Grid: 220V Iac C_Grid: 000.0A	
Active_Pwr: 000000W	Power flows through CTs. "+" indicates Load (Inv) to Grid. "-" indicates Grid to Load.
Total_PINV: 000000W	Total output power of inverters.
Export Limited: 000%	Inverter output power percentage.
Freqency: 50.0Hz	Grid frequency.
Active_APwr: 00000W	Single phase power of the power grid.
Active_BPwr: 00000W	
Active_CPwr: 00000W	
Active_TPwr: 00000W	Same with "Active_Pwr". Power flows through CTs.

▲ Table 6.1 Information list

6.2.1 Lock screen

Pressing the ESC key returns to the Main Menu. Pressing the ENTER key locks (Figure 6.2(a)) or unlocks (Figure 6.2 (b)) the screen.

(a) (b)

▲ Figure 6.2 Locks and Unlocks the Screen of LCD

6.3 Settings

The following submenus are displayed when the Settings menu is selected:

1.Set Time

2.Set Address

6.3.1 Set Time

This function allows time and date setting. When this function is selected, the LCD will display a screen as shown in Figure 6.3.

▲ Figure 6.3 Set Time

Press the UP/DOWN keys to set time and data. Press the ENTER key to move from one digit to the next (from left to right). Press the ESC key to save the settings and return to the previous menu.

6.3.2 Set Address

This function is used to set the address when muti inverters are connected to single monitor. The address number can be assigned from “01”to “99”(see Figure 6.4). The default address number of Solis Single Phase Inverter is “01”.

▲ Figure 6.4 Set Address

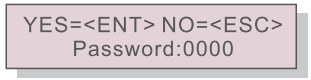
Press the UP/DOWN keys to set the address. Press the ENTER key to save the settings. Press the ESC key to cancel the change and return to the previous menu.

6.4 Advanced Info - Technicians Only

NOTE:

To access to this area is for fully qualified and accredited technicians only. Enter menu “Advanced Info.” and “Advanced settings” （need password）.

Select “Advanced Info.” from the Main Menu. The screen will require the password as below



▲ Figure 6.5 Enter password

The default password is “0010". Please press “down” to move the cursor, press “up” to select the number.

After enter the correct password the Main Menu will display a screen and be able to access to the following information.

1. Inverter Power 2. CT connect status 3. Version

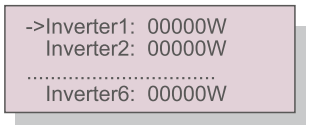
4. Model Inverter 5. Communication Data

The screen can be scrolled manually by pressing the UP/DOWN keys. Pressing the ENTER key gives access to a submenu. Press the ESC key to return to the Main Menu.

6.4.1 Inverter Power

The screen shows the information of Inverter Power for each inverter which connected to the EPM.

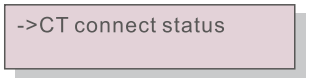
▲ Figure 6.6 Inverter Power



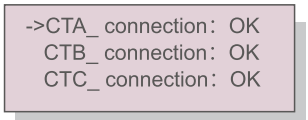
▲ Figure 6.7

6.4.2 CT Connect Status

The position of three-phase CT installation and direction of current detection refer to 4.3, The arrow on CTs should be towards the Inverters, then EPM detection will display OK, as shown in figure 6.9. Otherwise, the status will display "NG" which indicates wrong CT direction.



▲ Figure 6.8 CT connect status



▲ Figure 6.9

6. Operation

6.4.3 Version

The screen shows the model version and the software version of the Inverter (see Figure 6.10).

▲ Figure 6.10 Model Version and Software Version

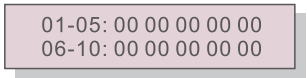
6.4.4 Inverter Model

The screen shows the Rated power of inverters that are connected to the EPM (see Figure 6.11).

▲ Figure 6.11 Inverter Model

6.4.5 Communication Data

The screen shows the internal communication data of the Inverter (see Figure 6.12), for service technicians only.



▲ Figure 6.12 Communication Data

6.5 Advanced Settings - Technicians Only

NOTE:
To access to this area is for fully qualified and accredited technicians only.
Please follow 6.4 to enter password to access this menu.

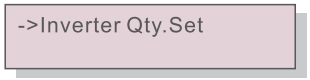
The default password is “0010". Please press “down” to move the cursor, press “up” to select the number.

Select Advanced Settings from the Main Menu to access the following options:

1. Inverter Qty.Set 2. Set Backflow Power 3. Set CT Para
4. Fail safe ON/OFF 5. Backflow Work Mode 6. PELD ON/OFF
7. System Upgrade 8. Set Password 9.Restore settings

6.5.1 Inverter Qty.Set

This submenu is used for setting inverter number.



▲ Figure 6.13 Set the Inverter number

▲ Figure 6.14

Enter the screen ,it shows all the number of inverters which conected to the EPM.（see Figure 6.14）
The number(01~06) can be select by pressing the UP/ DOWN keys. Press the ENTERkey to set the inverter number ESC key to return to the previous menu.

6.5.2 Set Backflow Power

This submenu is used for setting allowed power that inverter can generate to grid .

▲ Figure 6.15 Set the backflow power of the EPM

▲ Figure 6.16

Press the UP/DOWN keys to set data.Press the ENTER key to set backflow power
Then press UP/DOWN keys to change the number(the times of 100).
Press the ESC key to save the settings and return to the previous menu.

6.5.3 Set CT Para

This function is used to change CT parameter if customer select different CT.
The default CT para is 1000 : 1.

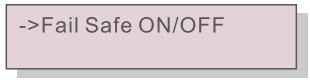
▲ Figure 6.17 Set the CT Para of the EPM

▲ Figure 6.18

Press the UP/DOWN keys to set data.Press the ENTER key to set CT Para .
Press the ESC key to save the settings and return to the previous menu.

6.5.4 Fail safe ON/OFF

The submenu is used for setting fail Safe ON/OFF. Fail Safe indicates the communication status between EPM and inverters. The default setting is "Run". DON'T change it without technicians.



▲ Figure 6.19 Set the Fail Safe ON/OFF

▲ Figure 6.20

When the Fail Safe is set as "Run". If some of inverters lost communication with EPM , EPM's LCD screen will display " RS485 fail"; if all inverters lost communication with EPM, then the LCD screen of EPM will display "fail safe". And The inverter stops output power.

When the Fail Safe is set as "Stop", communication lost between EPM and inverters will not affect the output of inverters.

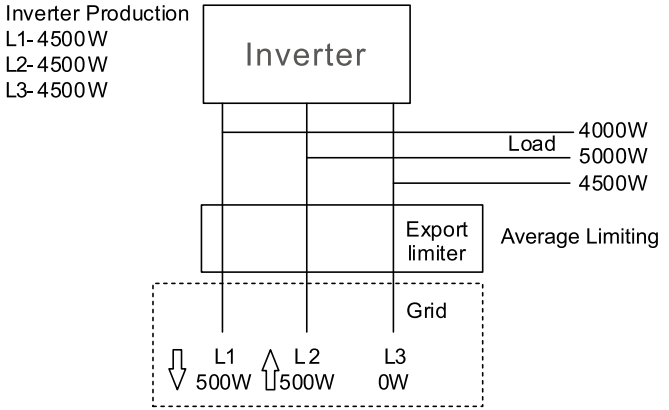
6.5.5 Backflow Work Mode

This submenu is used for set backflow work mode: 01, 02. "01" is the default mode.

▲ Figure 6.21 Set the Backflow work mode

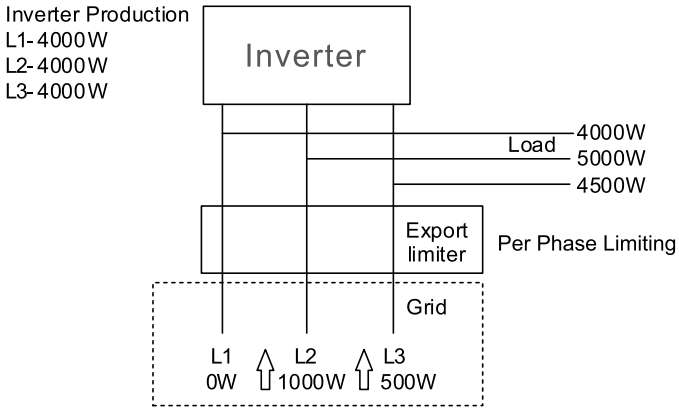
▲ Figure 6.22

Mode "01", As shown in the figure 6.23, the average limiting mode, the output power of each phase is the average of the three-phase load power, and it is more than the phase of the lowest power in three phases.



▲ Figure 6.23

Mode "02", As shown in the figure 6.24 the per phase limiting mode, the inverter only generate the power that equals to one of three-phase load power that is the lowest load power of a certain phase.



▲ Figure 6.24

6.5.6 PELD ON/OFF

This submenu is used for set PELD on/off. PELD decides EPM works or not.

▲ Figure 6.25 Set the PLED ON/OFF

▲ Figure 6.26

Set PELD is on, EPM can monitor and manage the working condition of inverters in real time, and it prevents backflow generated. Set PELD is off, which means EPM shutdowns the function of controlling backflow power.

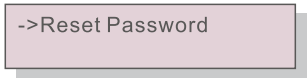
6.5.7 System Upgrade

The upgrade of EPM's system can realize by external wire.
Please consult our technical engineer for more details.

▲ Figure 6.27 System Upgrade

▲ Figure 6.28

6.5.8 Reset Password



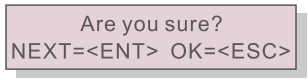
▲ Figure 6.29 Reset Password

▲ Figure 6.30

Firstly, input the origin password and press Enter button; Second, input the new password, press Enter button to save it. UP/DOWN button can be used to move the cursor.
Third, Press ESC button to get to the previous page.

6.5.8 Restore Settings

When Restore Settings is selected, the LCD will display as shown in Figure 6.31.



▲ Figure 6.31 Set Restore

Press the ENTER key to execute the setting.
Press the ESC key to return to the previous menu.

7. Trouble Shooting

The EPM is designed in accordance with the most important international safety and EMC requirements. Before delivering to the customer, the EPM has been subjected to several tests to ensure its optimal operation and reliability.

In case of failure, the LCD screen will display alarm message.

The EPM can show Alarm it self or alarm from inverter. There are 4 alarm can be showed on LCD:

1. Backflow

   There are backflow current to grid, customer need to stop inverter. and check the connections for the RS485 cable between EPM and inverter.

2. INV. fault

   There are fault alarm in inverter, need to check inverter status.

3. Comm. fault

   EPM can't communicate with inverter, need to check the RS485 cable to inverter .

4. Fail safe

   If some of inverters lost communication with EPM , EPM's LCD screen will display " RS485 fail"; if all inverters lost communication with EPM, then the LCD screen of EPM will display "fail safe".

8. Specifications

Model	**Solis-EPM1-2G**
Communication	
Inverter communication	RS485
Monitoring	WiFi/GPRS
Connections	
Inverter connection	Single Phase Ginlong inverters
Max. inverter number	2 (must be the same model)
Monitoring connection	Wifi stick or GPRS stick for single inverter connection Wifi box or GPRS box for 2-6 inverter connection
Grid connection	L/N+PE
CT specification	
CT connection	RJ45 connector for single
Size of CT through hole	16mm for single phase
Max. CT current	100A for single phase
CT Ratio	3000:1
Max. range for communication	
Totally RS485 cable length	200 m
Standard CT cable length	10m
Voltage supply	
Voltage supply	Grid
Input voltage	L to N: 100~ 277 Vac, 50 / 60 Hz
Power consumption	<5 W
Ambient conditions during operation	
Ambient temperature	-25°C to +60°C
Degree of protection (according to EN IEC 60529)	IP65
Maximum permissible value for relative humidity (non-condensing)	5 % to 95 %
General data	
Dimensions (W / H / D)	150 / 337 /80mm
Weight	1.8kg
Mounting location	Indoor and outdoor
Deployment options	Wall mounting
Features	
Operation	Via LCD
Warranty	5 years
Control time	5 s
Fail safe function and control time	Yes, 5 s
Accuracy	3%
Remote upgrade	Support
Accessory	
Current transformer	Single phase optional
RS485 connector	2 for single phase

8. Specifications

Model	Solis-EPM3-2G
Communication	
Inverter communication	RS485
Monitoring	WiFi/GPRS
Connections	
Inverter connection	Three phase Ginlong inverters
Max. inverter number	6 (must be the same model)
Monitoring connection	Wifi stick or GPRS stick for single inverter connection Wifi box or GPRS box for 2-6 inverter connection
Grid connection	3L/N+PE
CT specification	
CT connection	RJ45 connector for three phase CT
Size of CT through hole	35mm for three phase
Max. CT current	600A for three phase
CT Ratio	3000:1
Max. range for communication	
Totally RS485 cable length	200 m
Standard CT cable length	10m
Voltage supply	
Voltage supply	Grid
Input voltage	L to N: 100~ 277 Vac, 50 / 60 Hz
Power consumption	<5 W
Ambient conditions during operation	
Ambient temperature	-25°C to +60°C
Degree of protection (according to EN IEC 60529)	IP65
Maximum permissible value for relative humidity (non-condensing)	5 % to 95 %
General data	
Dimensions (W / H / D)	150 / 337 /80mm
Weight	1.8kg
Mounting location	Indoor and outdoor
Deployment options	Wall mounting
Features	
Operation	Via LCD
Warranty	5 years
Control time	5 s
Fail safe function and control time	Yes, 5 s
Accuracy	3%
Remote upgrade	Support
Accessory	
Current transformer	Three phase optional
RS485 connector	7 for three phase