PPM R1E
Operation Manual

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Smarter. Greener. Together.

Table of Contents

Safety Instructions

WARNING !

- Do not open this product or insert tools due to shock and fire hazard which may cause injury.

- When installing this product you must adhere to the following instructions:
  - Do not power up the device before installation is complete.
  - All circuit breakers must be in the OFF position before commencing installation.

- Unsuitable installation locations which will void the product warranty:
  - Do not install in direct sunlight.
  - Do not expose to high humidity.
  - Install in a safe place where it is inaccessible for children.
  - Do not install in poorly ventilated area.
  - Do not expose to water vapor, oil vapor, smoke, dust, salt, corrosive substances, explosive / flammable GAS, chemicals.
  - Do not install above 1000m mean sea level.
  - Do not expose to extreme temperature fluctuation.
  - Do not expose to high levels of noise, electrical noise.
  - Do not expose to vibration.
  - Not suitable for installation in medical equipment, communication equipment, marine, automotive.

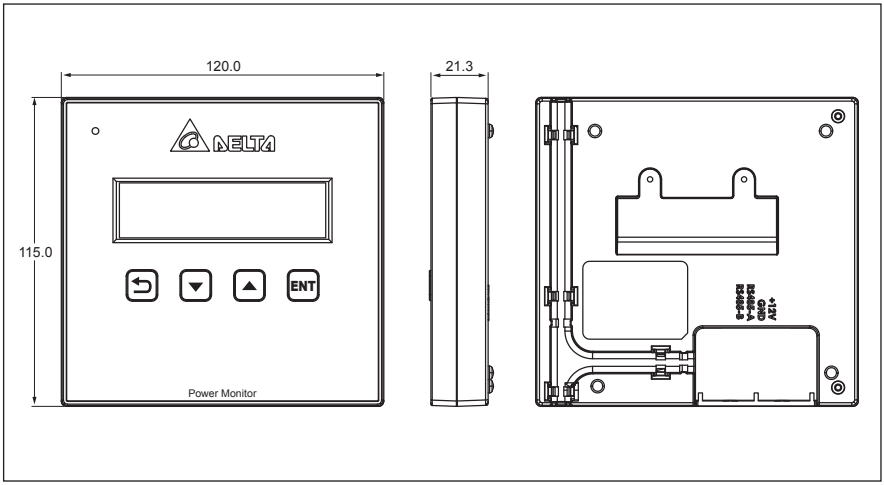
DANGER!

- Do not work on electrical installation when standing on wet ground.
- Power monitor is a precision electronics. Please handle with care!
- Do not use product if insulation of any wire is broken.

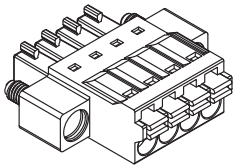
1 Product introduction

1.1 Product appearance

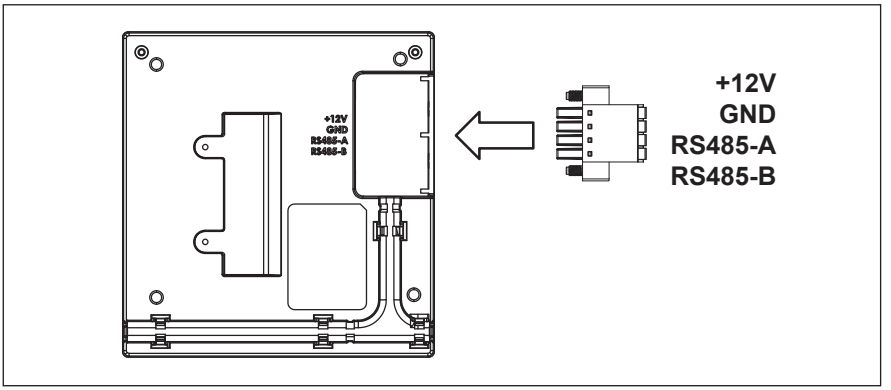
- **Power monitor**

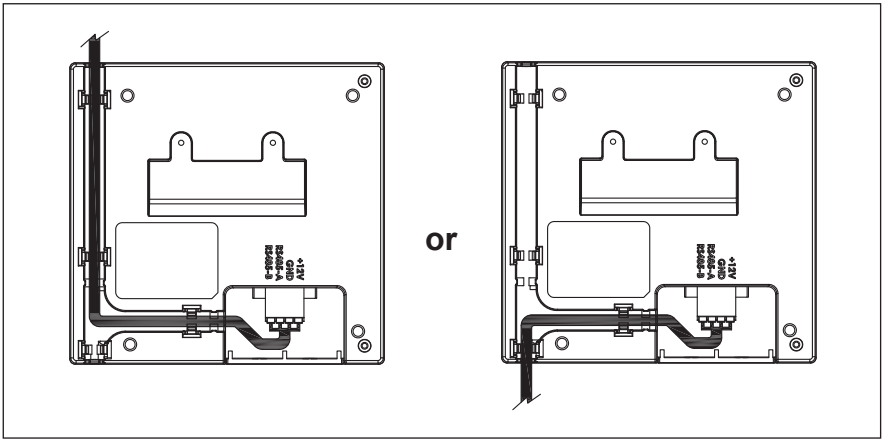


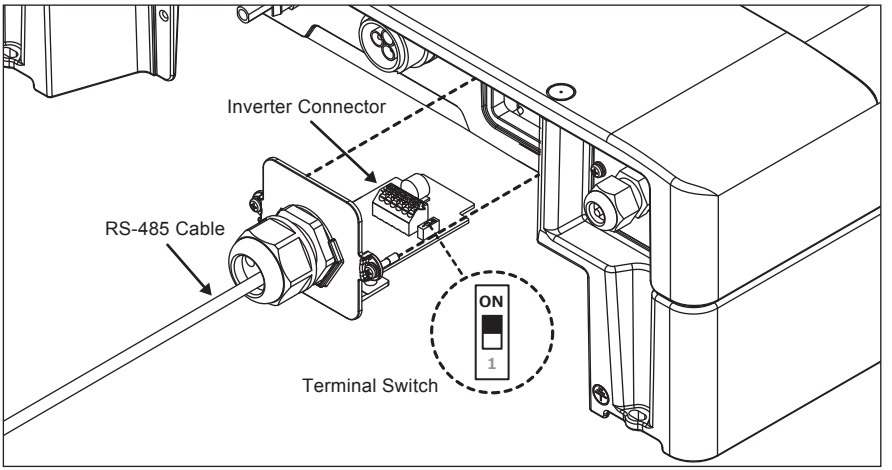
- **Connector**

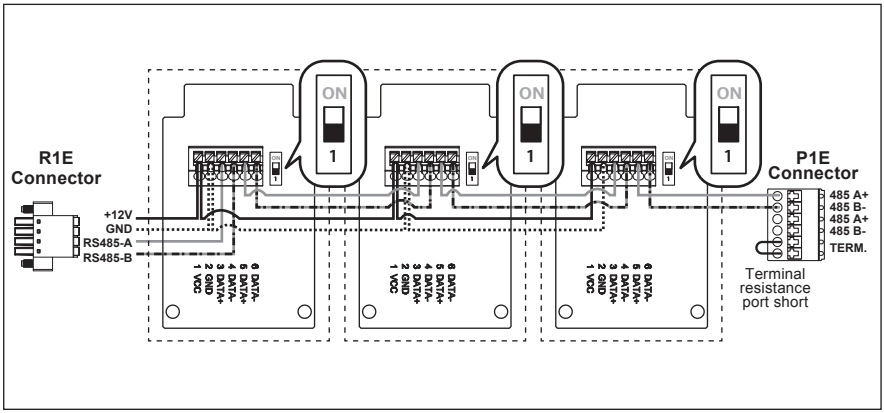


1.2 Connector setup

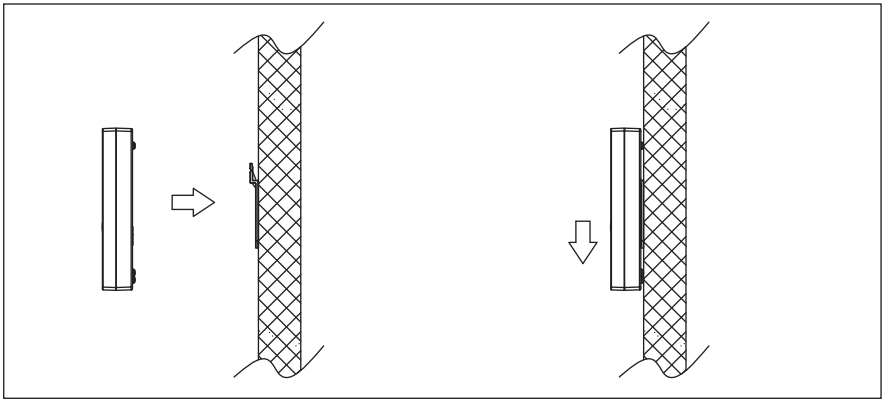




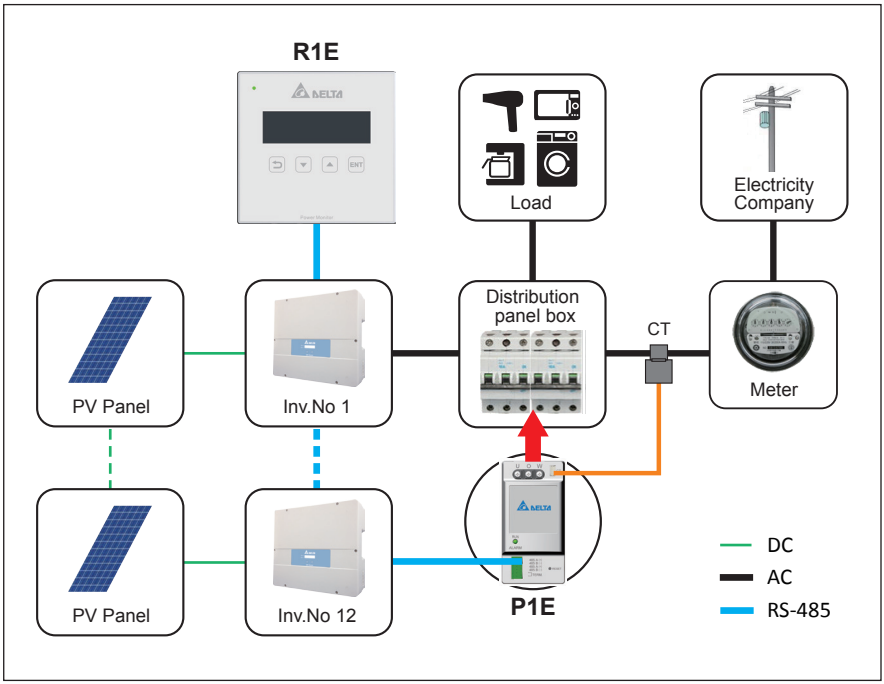




1.3 Wall mount



1.4 System diagram



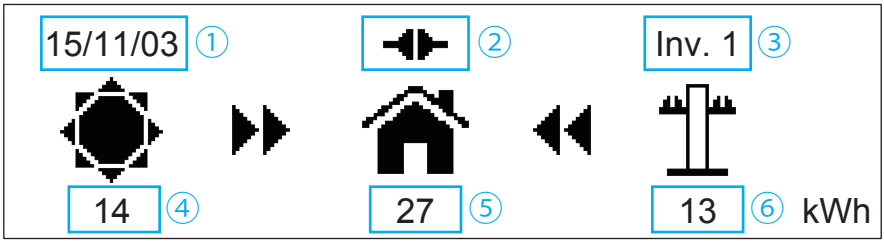
2 Hardware Specifications

Category	Item		Description
HW spec	Rated Operating voltage		12Vdc
	Operating voltage range		12Vdc ~ 16Vdc
	Power Consumption		< 1 Watt
Regulatory	Safety Standard		EN 62109-2 CE compliance
	Emission		EN 55022 class B
	Immunity		EN 61000-6-2
Information	LED Indicator	Green LED Flash	Inverter no output power
		Green LED On	Inverter generating power
		Red LED Flash	Communication error between Inverter
		Red LED On	Inverter Error / Fault
	LCD Display		Today energy Day / Month / Year energy log Setting Power limit
Communication	RS-485 Communication		Delta Protocol
Connection	Wired		4 pin terminal block for RS-485
Environment	Operation temperature		-20℃ ~ 50℃
	Storage temperature		-20℃ ~ 60℃
	Relative humidity		30% ~ 85%
Dimension	Height		115 mm
	Width		120 mm
	Depth		21.3 mm
	Weight		160 g

3 Function description

3.1 Home page

Home page screen shown as below:



Index	Item	Description
①	Date and time	Automatically switches the screen every three seconds
②	Status	Inverter connected
③	Number of inverter connected	When there are 0-12 inverter connected
④	Power generation	Power generated today, unit: kWh
⑤	Power consumption	Power consumed today, unit: kWh
⑥	Power purchased	Power purchased today, unit: kWh

Basic operations:

Press any key to enter menu page

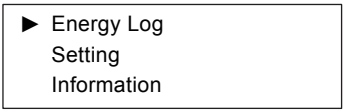
Arrow keys to move up and down

ENT to choose an enter page

back to the previous page

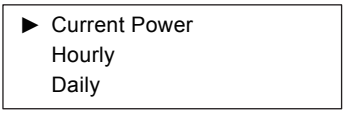
3.2 Check power generation

From menu page enter **[Energy Log]**

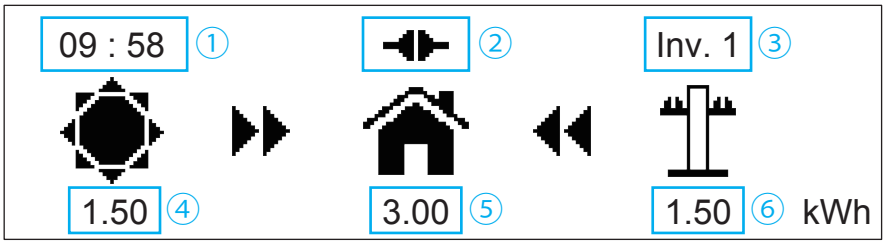


3.2.1 Check current power output

From **[Energy Log]** to enter **[Current Power]**



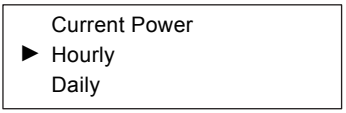
Current power screen is shown as below:



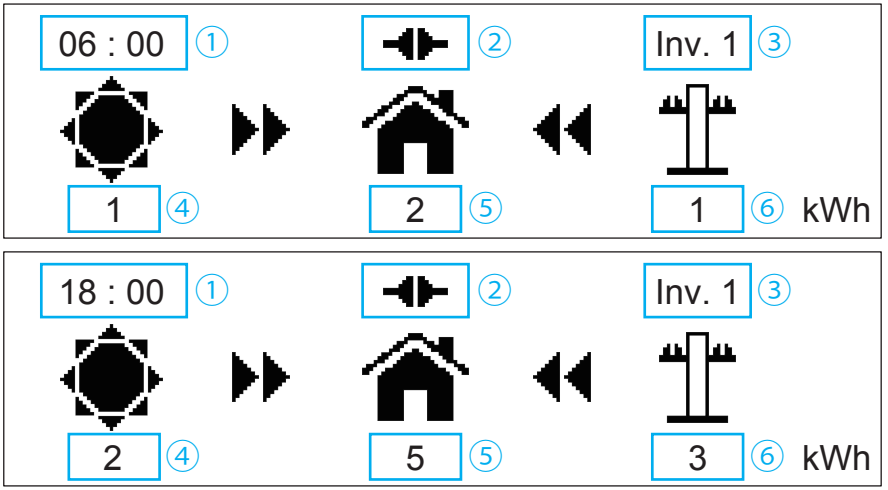
Index	Item	Description
①	Current time	
②	Status	Inverter connected
③	Number of inverter connected	The number of inverter which are connected (0 – 12)
④	Power generation	Current power generated, unit: kW
⑤	Power consumption	Current power consumed, unit: kW
⑥	Power purchased	Current power purchased, unit: kW

3.2.2 Check hourly power generation

The number of inverter which are connected (0 – 12) From **[Energy Log]** enter **[Hourly]**



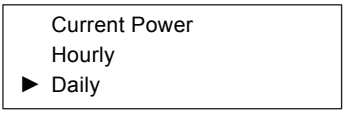
Hourly power generation screen shot is shown as below:



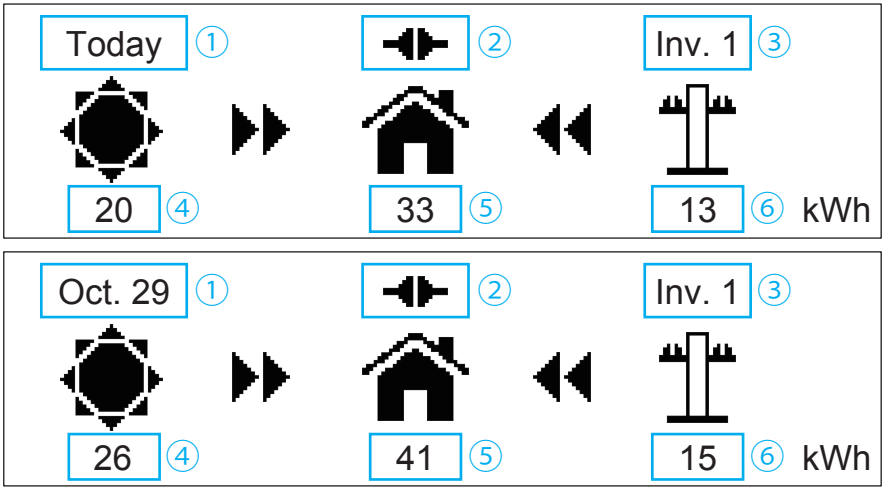
Index	Item	Description
①	Time	Arrow keys to go up or down to check data in a different time
②	Status	Inverter connected
③	Number of inverter connected	The number of inverter which are connected (0 – 12)
④	Power generation	Hourly power generated, unit: kWh
⑤	Power consumption	Hourly power consumed, unit: kWh
⑥	Power purchased	Hourly power purchased, unit: kWh

3.2.3 Check daily power generation

You can view data of the recent 31 days (including today)
Use **[Energy Log]** to enter **[Daily]**



Daily power generation screen is shown as below:

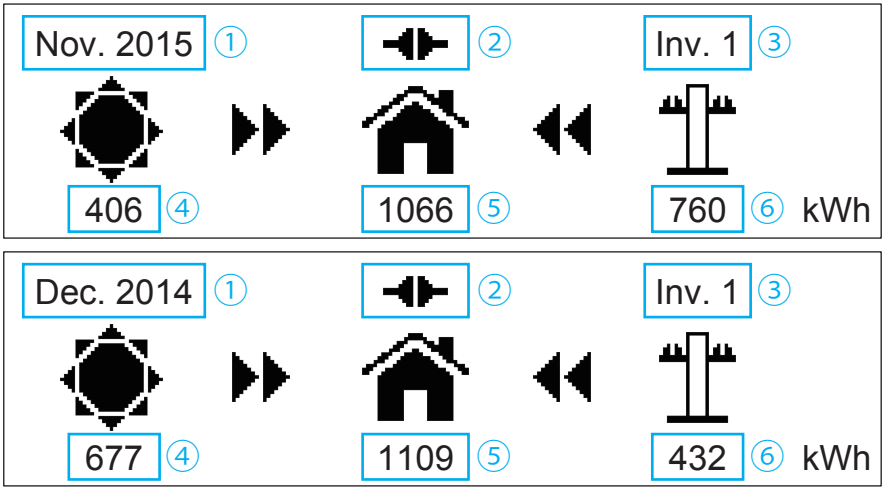


Index	Item	Description
①	Date	Click on up or down key to check data in a different day
②	Status	Inverter connected
③	Number of inverter connected	The number of inverter which are connected (0 – 12)
④	Power generation	Daily power generated, unit: kWh
⑤	Power consumption	Daily power consumed, unit: kWh
⑥	Power purchased	Daily power purchased, unit: kWh

3.2.4 Check monthly power generation

You can view data for the past 12 months (including this month).
Use **[Energy Log]** to enter **[Monthly]**

Monthly power generation screen is shown as below:



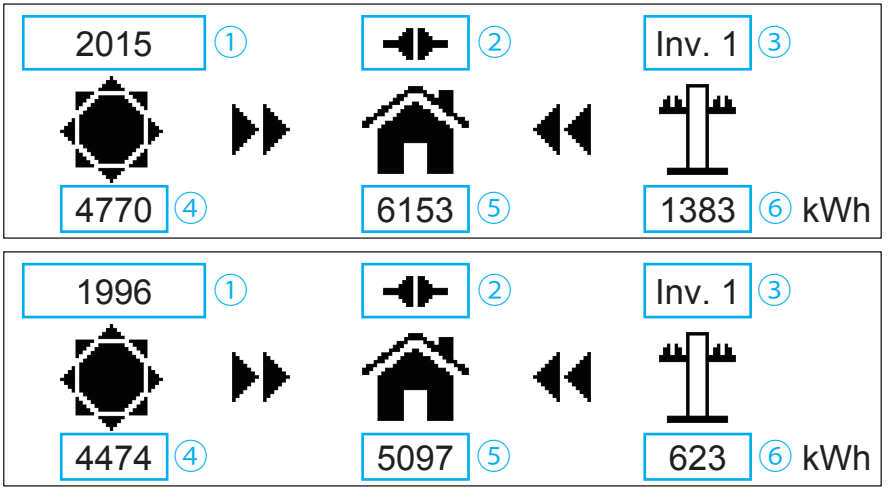
Index	Item	Description
①	Month	Click on up or down key to check data in a different month
②	Status	Inverter connected
③	Number of inverter connected	The number of inverter which are connected (0 – 12)
④	Power generation	Monthly power generated, unit: kWh
⑤	Power consumption	Monthly power consumed, unit: kWh
⑥	Power purchased	Monthly power purchased, unit: kWh

3.2.5 Check yearly power generation

You can view data for the past 20 years (including this year).

Use **[Energy Log]** to enter **[Yearly]**

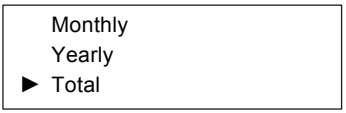
Yearly power generation screen is shown as below:



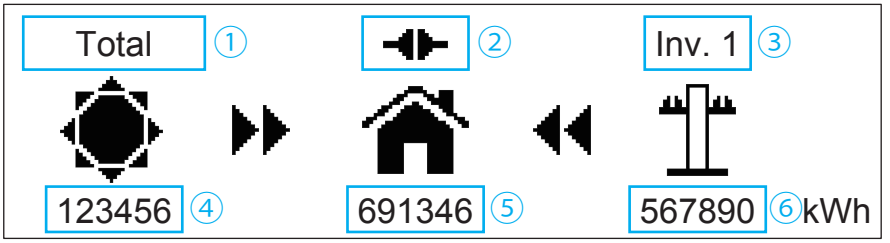
Index	Item	Description
①	Year	Click on up or down key to check data in a different year
②	Status	Inverter connected
③	Number of inverter connected	The number of inverter which are connected (0 – 12)
④	Power generation	Yearly power generated, unit: kWh
⑤	Power consumption	Yearly power consumed, unit: kWh
⑥	Power purchased	Yearly power purchased, unit: kWh

3.2.6 Check accumulated power generation

Use **[Energy Log]** to enter **[Total]**



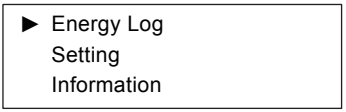
Accumulated power generation screen is shown as below:



Index	Item	Description
①	Total	
②	Status	Inverter connected
③	Number of inverter connected	The number of inverter which are connected (0 – 12)
④	Power generation	Accumulated power generated, unit: kWh
⑤	Power consumption	Accumulated power consumed, unit: kWh
⑥	Power purchased	Accumulated power purchased, unit: kWh

3.3 Check single inverter power generation

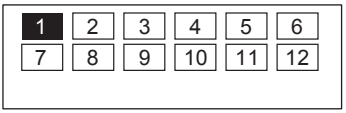
Use Menu page to enter **[Energy Log]**



Then enter **[Inverter Log]**

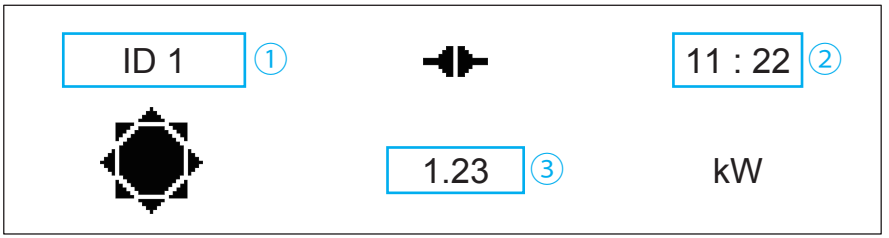
You can choose ID to enter and check single inverter power generation, when ID turns reverse type it is connected.

Move ▲ ▼ to choose ID, ENT to enter



3.3.1 Check single inverter current power generation

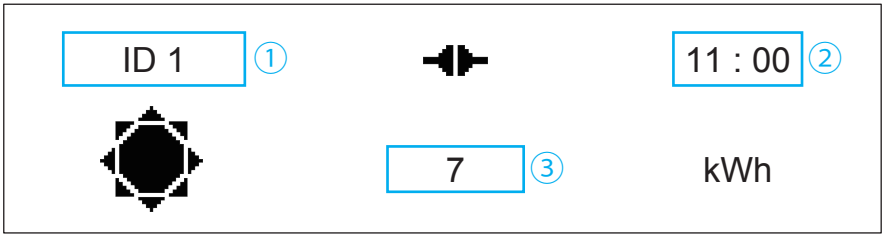
The display of a single inverter's current power output is shown as below:



Index	Item	Description
①	Inverter ID	
②	Current time	
③	Power generation	Current power generated, unit: kW

3.3.2 Check single inverter power generation today

The display of a single inverter's hourly power produced is shown as below:

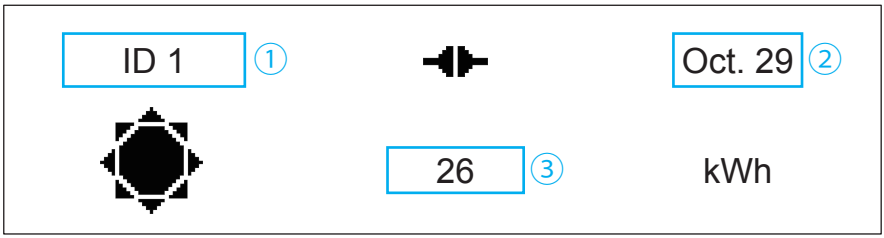


Index	Item	Description
①	Inverter ID	
②	Time	Press the up or down key to check data in a different time
③	Power generation	Hourly power generated, unit: kWh

3.3.3 Check single inverter daily power generation

You can view data for the past 31 days (including today).

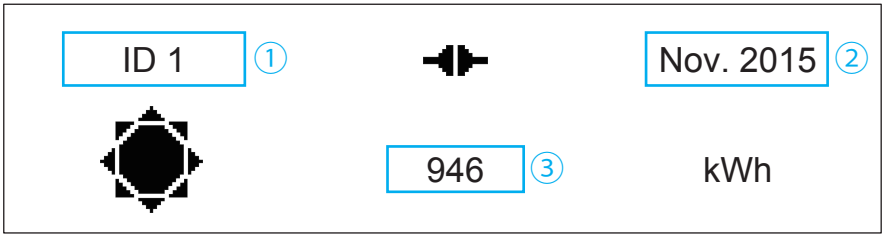
Single inverter daily power generation screen is shown as below:



Index	Item	Description
①	Inverter ID	
②	Date	Press on up or down key to check data in a different day
③	Power generation	Daily power generated, unit: kWh

3.3.4 Check single inverter monthly power generation

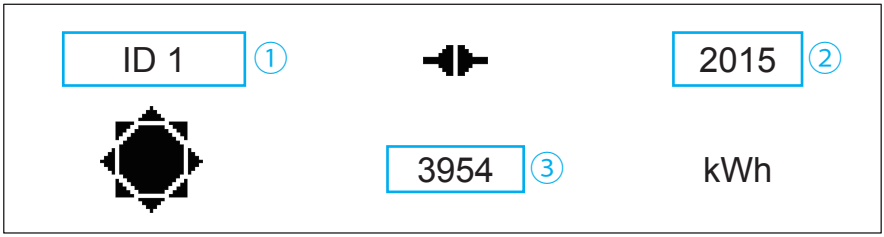
You can view data for the past 12 months (including this month).
Single inverter monthly power generation screen is shown as below:



Index	Item	Description
①	Inverter ID	
②	Month	Press the up or down key to check data in a different month
③	Power generation	Monthly power generated, unit: kWh

3.3.5 Check single inverter yearly power generation

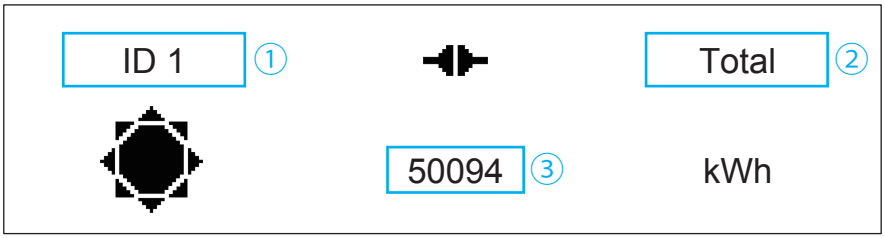
You can view data for the past 20 years (including this year).
Single inverter years power generation screen is shown as below:



Index	Item	Description
①	Inverter ID	
②	Year	Press the up or down key to check data in a different year
③	Power generation	Yearly power generated, unit: kWh

3.3.6 Check single inverter accumulated power generation

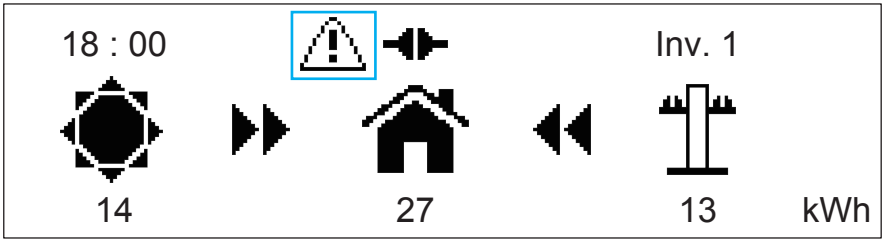
Single inverter accumulated power generation screen is shown as below:



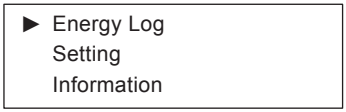
Index	Item	Description
①	Inverter ID	
②	Total	
③	Power generation	The total power generated from the start of the inverter, unit: kWh

3.4 Check error event

When an error event occurs, the icon below will appear on the Home page:



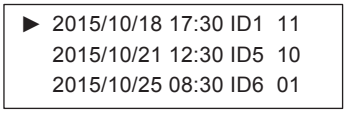
Use Menu page to enter **[Energy Log]**



Then enter **[Event log]**

1. No error event screen is shown as below:

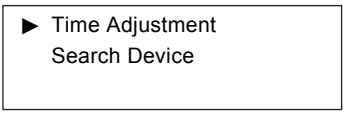
2. With error event screen is shown as below:



Choose error event to check data

3.5 Setting

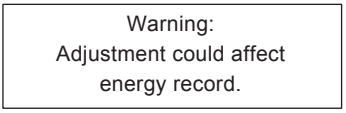
Use menu page to enter **[Setting]**



3.5.1 Time adjustment

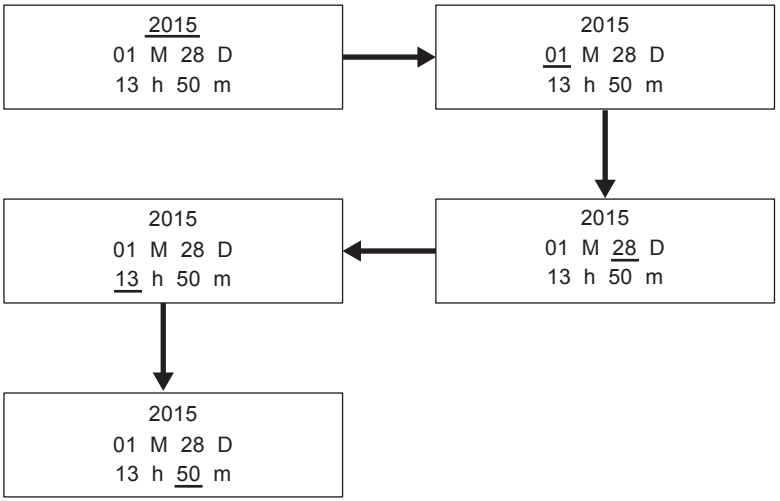
Enter **[Time Adjustment]**

Warning: Time adjustment will affect the power generation record.

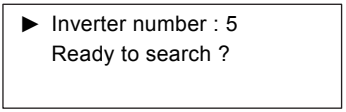


Click on enter key again to enter time adjustment page, and adjust year, month, day, hour and minute in order.

Operation:  to change value,  to confirm.

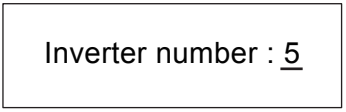


3.5.2 Search device

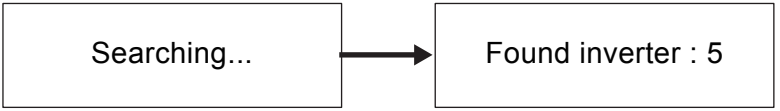


Enter **[Inverter number]** to set up search inverter quantity.

Operation: ▲ ▼ to change value, ENT to confirm.

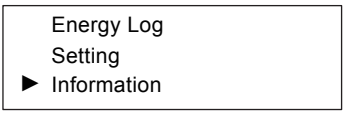


Enter **[Ready to search?]** and inverter search will start immediately; quantity of inverter connected will show up after 3 seconds.

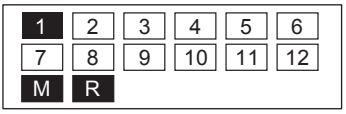


3.6 Information

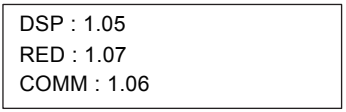
Use Menu page to enter **[Information]**



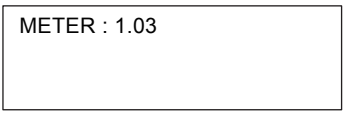
You can choose ID to enter and check information, when ID turns into reverse type, it is connected.
ID1 ~ 12 is inverter, M is Meter, R is Remote Control.



Enter inverter screen shown as below:



Enter M screen shown as below:



Enter R screen shown as below:

3.7 Zero Export

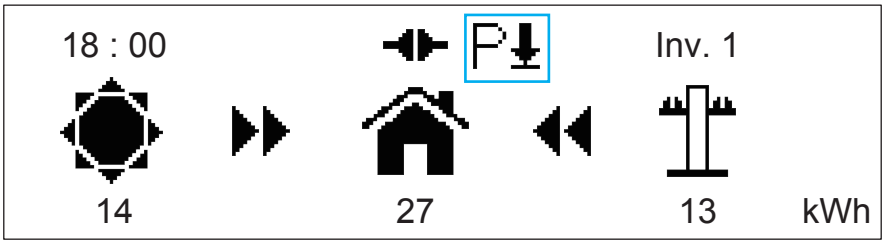
Zero Export aims to make the total inverter power generation close to total power consumption to avoid the over generated power flowing back to the city grid. It can be done through the following steps.

Through RS-485 and Meter communications, RC reads the current total power generation of inverter and the difference between power generation and consumption. It also reads single generation by communicates with inverter.

Calculate inverter target total power generation via Zero Export algorithm, and then assign the total generating capacity to the connected inverter to instantly control a single inverter generation through RS-485.

When power consumption increases, power generation will also increase; when power consumption is reduced, power generation will also be reduced.

The following icon appears when power de-rating:



Use Menu page enter **[Power Limit]**, you can check single inverter target power generation.

ID1 50%	ID4 51%
ID2 50%	ID5 50%
ID3 51%	ID6 51%

If there are more than 6 inverter connected, you can press  to show the next page.

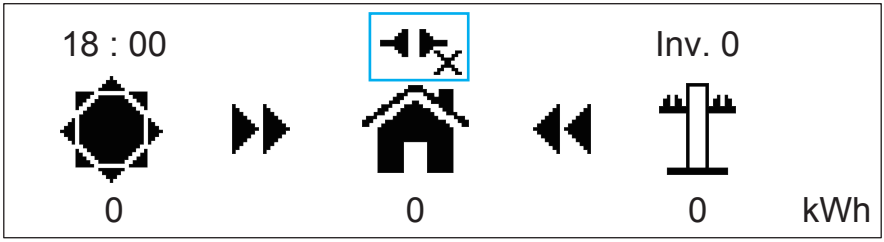
ID7 50%	ID10 51%
ID8 50%	ID11 50%
ID9 51%	ID12 51%

You can enter **[Moment Power]** to check current power change.

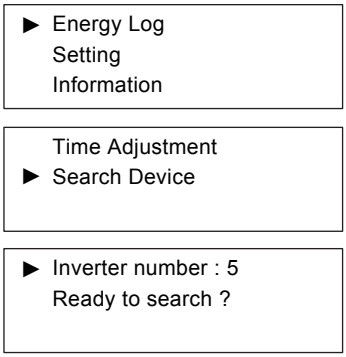
4 Trouble shooting

4.1 No connection to inverter

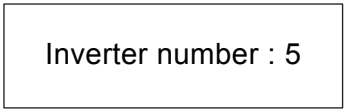
If the icon below appears on home page, please run the following steps and search inverter again.



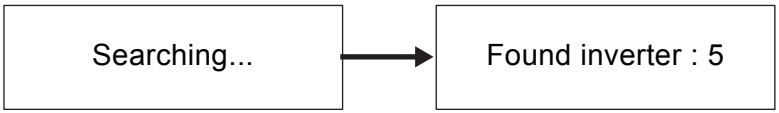
1. Click on any key on home page to enter menu page, enter **[Setting]**, then enter **[Search Device]**



2. Choose **[Inverter number]** to set up search inverter quantity, ▲ ▼ to change value, ENT to confirm.

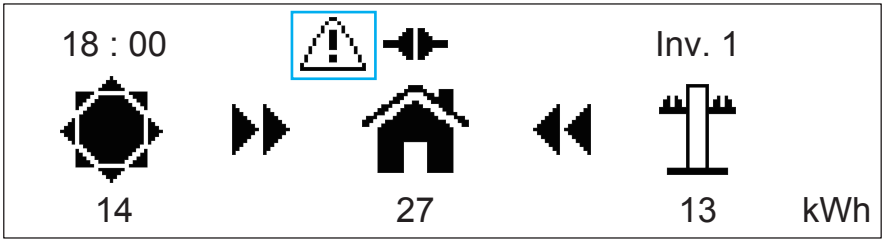


3. Choose **[Ready to search?]** to start search inverter, quantity of inverter connected will show up after 3 seconds.



4.2 Error event

When error event occurs, the icon below will appear on the Home page:



Error event definition:

Event	Description
1	DC Injection
5	NTC Over Temperature
6	NTC0 Circuit Fail
7	NTC Low Temperature
8	Heat Sink Ntc1 Circuit Fail
9	Heat Sink Ntc2 Circuit Fail
10	Heat Sink Ntc3 Circuit Fail
11	Inverter Choke Over Temperature
13	Relay Open
14	Firmware Incompatibility
15	DSP ADC Vgrid/Iout Bias Fail
16	ADC Vin/Vbus Bias Fail
17	ADC Iin/Iboost Bias Fail
18	Red. ADC Vgrid Bias Fail
19	ADC Iout_dc Bias Fail
20	Efficiency Abnormal
21	Fan Fail
22	Internal Communication Fault (between Redundant)
23	Internal Communication Fault (between Display)
24	Residual Current Over Rating
25	Insulation
27	RCMU Circuit Fail
28	Relay Test Short
29	Relay Test Open
30	Bus Unbalance

31	Bus P Over Voltage Rating
32	Bus P Under Voltage Rating
33	Bus N Over Voltage Rating
34	Bus N Under Voltage Rating
35	Bus Voltage Over Rating
36	Output Current Transient Over Rating
37	Output Current Over Rating
42	CT current sensor Fail (A)
43	CT current sensor Fail (B)
44	CT current sensor Fail (C)
45	HW OOCP Circuit
46	Inverter Failure
50	Zero Cross Circuit Fail
60	PV1 Current Over Rating
61	PV2 Current Over Rating
70	PV1 Current Transient Over Rating
71	PV2 Current Transient Over Rating
74	External Communication Fail
129	Over Frequency Range
130	Under Frequency Range
134	Phase Jump
135	Grid Quality
136	Ac Connected Fail
137	No Grid
138	Under Voltage Range
139	Over Voltage Range
140	Over Transient Voltage Range
141	Slow Over Voltage Range
153	EPO
158	PV input voltage too high
159	PV input voltage too high
162	Insulation
209	Solar1 UVR
210	Solar2 UVR
212	PID Relay Fail
213	PID Over Current Range
215	De-rating
219	Fan Fail
223	SPD

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