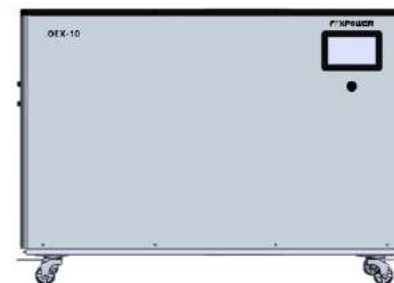
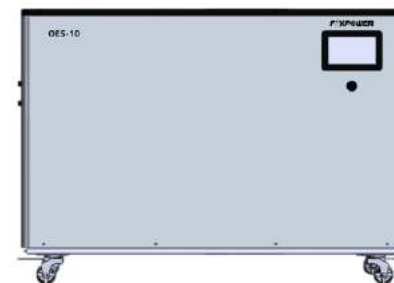
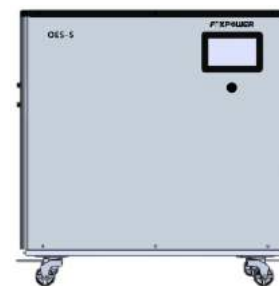




Energy Storage Systems User Manual

OES-5, OES-10, OEX-10



Foxpower Technology Co., Ltd

Add: 3F, Building 2nd, Selen Tech-park, Tangjia Rd,
Fenghuang Street, Guangming District, Shenzhen,
Guangdong, China

Tel: +86-755-23242321. Fax: +86-755-23242321

Email: sales@foxpowerups.com

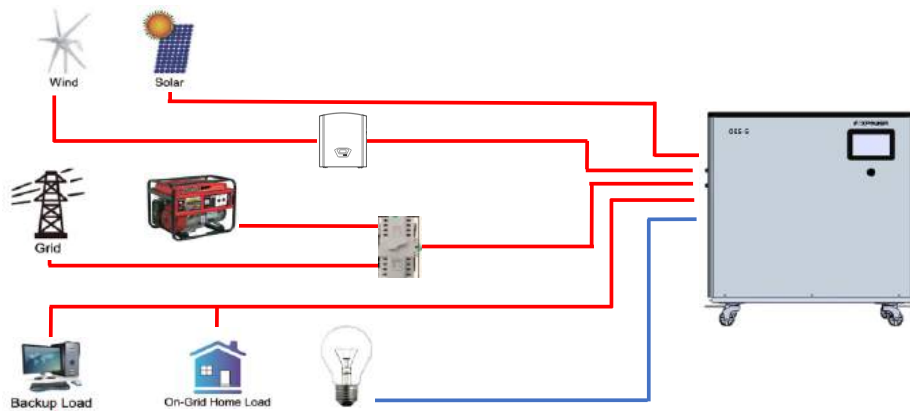
Website: www.foxpowerups.com

Website: www.fox-power.com

01 INTRODUCTION

1.1 System Introduction - Intelligent, Long-lasting and economical - All In One

Foxpower smart energy storage system is a high-tech storage system which combination of a PV system and a Foxpower LiFePO4 battery will allow you to cover about 75% of your yearly energy requirement with selfproduced and clean energy. Since your energy is being generated on your roof and not by some anonymous energy provider you are more independent than before. So take your energy future into your own hands and reduce your energy costs to a minimum. The decision for a Foxpower smart energy storage system is also a decision for the highest standards in safety and quality. With storage sizes 3kW with 5kWh, 3kW with 10kWh or 5kW with 10kWh, the Foxpower smart energy storage system will power a detached house, a multi-family house.



Basic System Architecture

1.2 Features

- Split phase output
 - MPPT solar input
 - Auto Gen start (AGS) function
 - Designed & engineered for small places
- Dimensions: 3 - 5kWh: 53/55/35
 Dimensions: 5 - 10kWh: 88/55/35

- Premium Guarantee
- Battery priority to optimize solar use
- Ready for wind controller input
- IP63 protection
- Lifecycle 4500@80% DOD
- Wheels mounted
- Mobile APP monitoring

02 Installation

2.1 Installation Precaution

This hybrid energy storage system is designed for indoor use, please make sure the installation site meets below conditions:

- Not in direct sunlight
- Not in areas where highly flammable materials are stored.
- Not in potential explosive areas
- Not in the cool air directly
- Not near the television antenna or antenna cable.
- Not higher than altitude of about 2000 meters above sea level
- Not in environment of precipitation or humidity (>95%)

2.2 Connect all wires

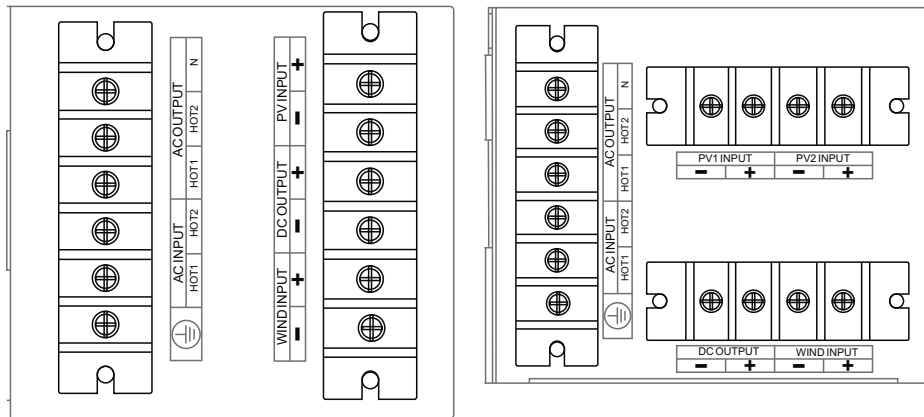
Please AVOID direct sunligh, rain exposure, snow laying up during installation and operation. Before connecting all wires, please take off the metal cover by removing screws as shown below:



OES-5



OES-10 and OEX-10



OES-5
B-B

OES-10/OEX-10
B-B

2.3 AC Input/Output Connection

● Before connecting to AC input power source, please install a separate AC breaker between system and AC input power source. This will ensure the system can be securely disconnected during maintenance and fully protected from over current of AC input.

● There are five terminal blocks with "AC Input" "AC Output", "DC Output", "PV Input" and "Wind Input" markings. Please do not misconnect input and output connectors.



All wiring must be performed by a qualified personnel. It is very important for system safety and efficient operation to use appropriate cable for AC input connection. To reduce risk of injury, please use the proper recommended cable as below.

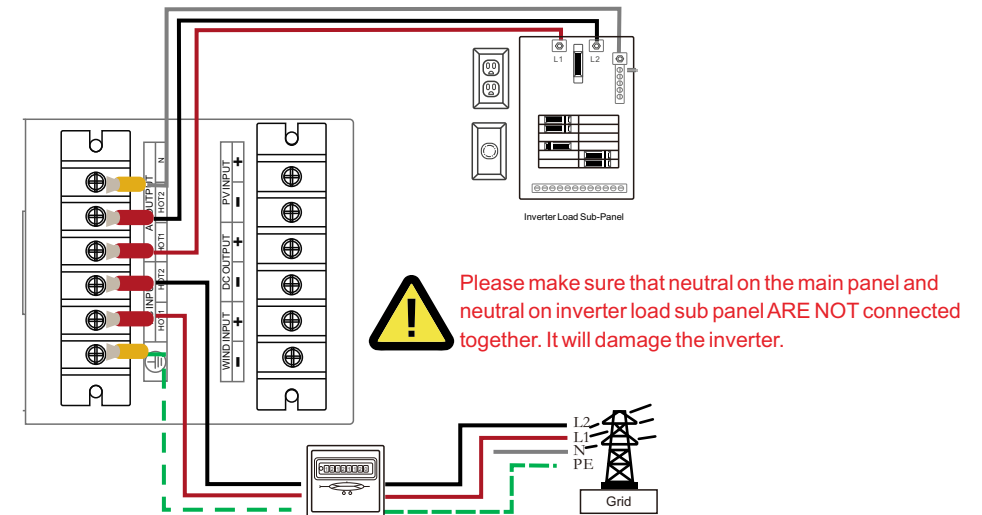
Recommend AC input and AC output connection cables:

| Model | Wiew size | cable(mm ²) | Torque value |
|--------|-----------|-------------------------|--------------|
| OES-5 | 10 AWG | 5 | 1.2Nm |
| OES-10 | 8 AWG | 8 | 1.2Nm |
| OEX-10 | 8 AWG | 8 | 1.2Nm |

Table 1

Please follow below steps to implement AC input/output connection:

1. Please choose a suitable AC input cable with correct connenctor which can well fit into the AC input terminals (see table 1)
2. Use a suitable screwdriver to unscrew the bolts and fit the AC input connectors in, then fasten the bolt by the screwdriver, make sure the bolts are tightened with torque of 1.2N.M.



! Be sure that AC power source is disconnected before attempting to wire it to the unit.

3. Make sure the wires are securely connected.

2.4 PV connection

Before connecting to PV modules, please install a separately DC circuit breaker between system and PV modules. It is very important for system safety and efficient operation to use appropriate cable for PV module connection. To reduce risk of injury, please use the proper recommended cable size as below.

| Model | Wire size | cable(mm ²) | Torque value |
|---------------------|-----------|-------------------------|--------------|
| OES-5/OES-10/OEX-10 | 10 AWG | 5 | 1.2Nm |

Table 2



To avoid any malfunction, do not connect any PV modules with possible current leakage to the system. For example, grounded PV modules will cause current leakage to the system. When using PV modules, please be sure NO grounding.



It is requested to use PV junction box with surge protection. Otherwise, it will cause damage on system when lightning occurs on PV modules.

2.4.1 PV modules selection:

When selection proper PV modules, please be sure to consider below parameters:

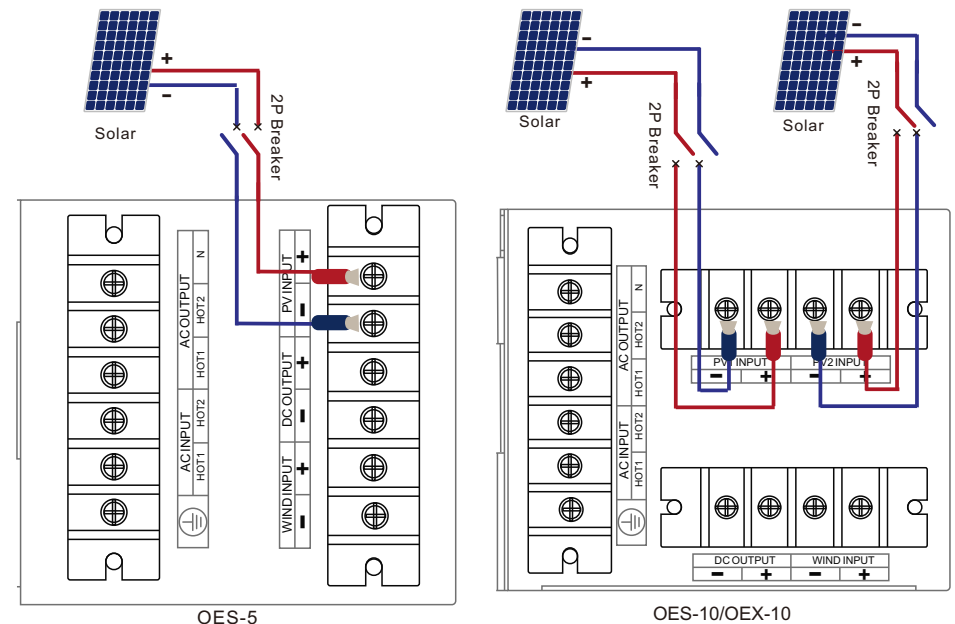
- 1) Open circuit voltage (Voc) of PV modules not exceeds max. PV array open circuit voltage of system.
- 2) Open circuit voltage (Voc) of PV modules should be higher than min. start voltage.

| System Model | OES-5 | OES-10 | OEX-10 |
|--------------------------|-----------|-----------|-----------|
| PV Input Voltage | 50-108Vdc | 50-108Vdc | 50-108Vdc |
| Max Open Circuit Voltage | 150Vdc | 150Vdc | 150Vdc |
| Max PV Input Power | 2080W | 4160W | 4160W |
| No. of MPPT Trackers | 1 | 2 | 2 |

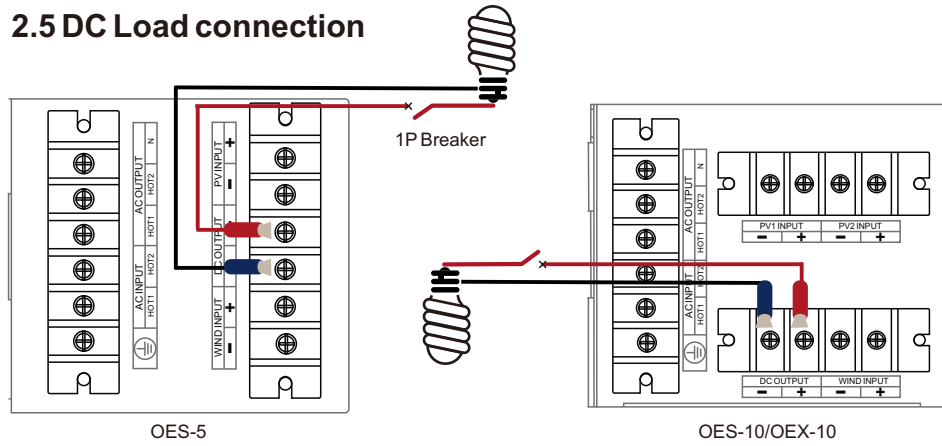
2.4.2 PV modules wire connection

Please follow below steps to implement PV module connection:

1. Please choose a suitable PV input cable with correct connector which can well fit into the PV input terminals
2. Check correct polarity of wire connection from PV modules and PV input connectors. Then, connect positive pole (+) of connection wire to positive pole (+) of PV input connector. Connect negative pole (-) of connection wire to negative pole (-) of PV input connector.
3. Use a suitable screwdriver to unscrew the bolts and fit the PV input connectors in, then fasten the bolt by the screwdriver, make sure the bolts are tightened with torque of 1.2N.M.

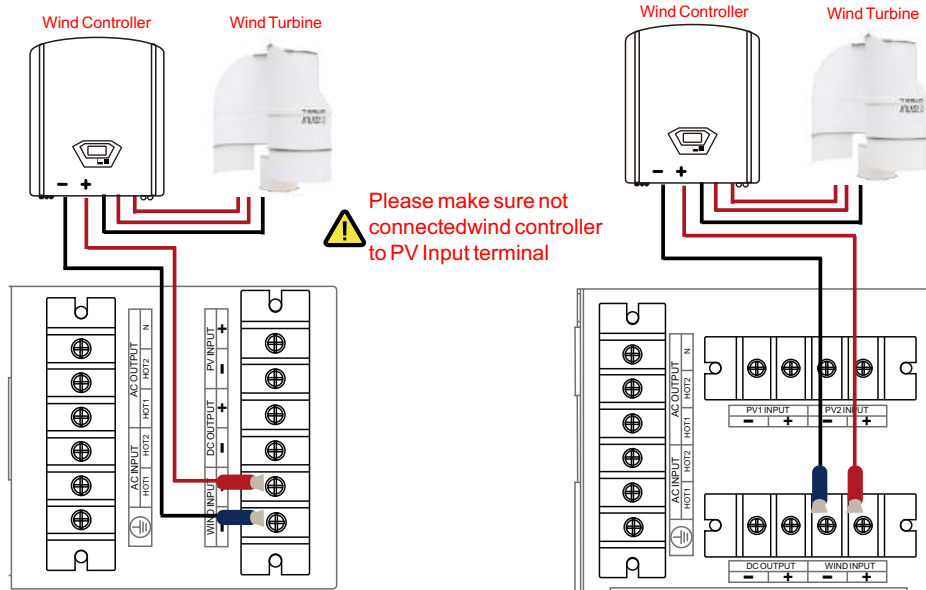


2.5 DC Load connection



⚠ Please note that DC load is available only with solar panel connections.

2.6 Wind Controller connection



03 Operation

3.1 Close All Breakers

Make sure all line/wires connection correctly and close all breakers in rear panel. Showing as below



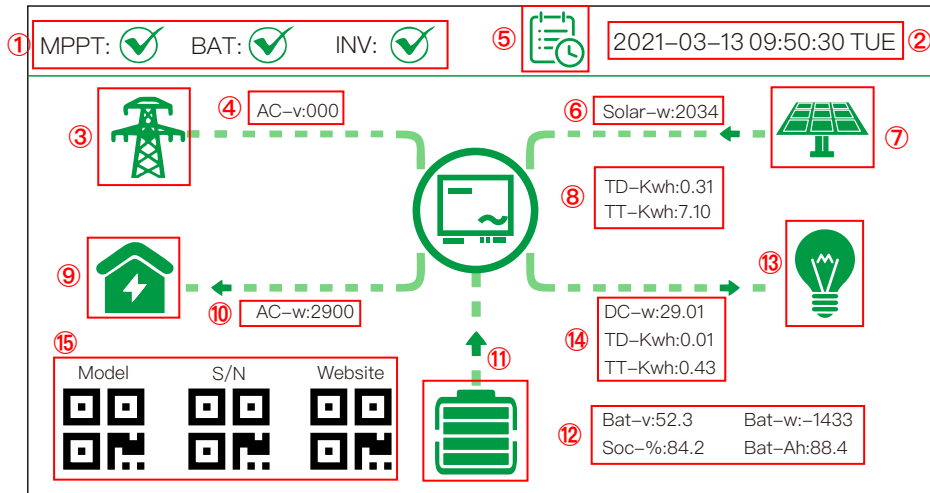
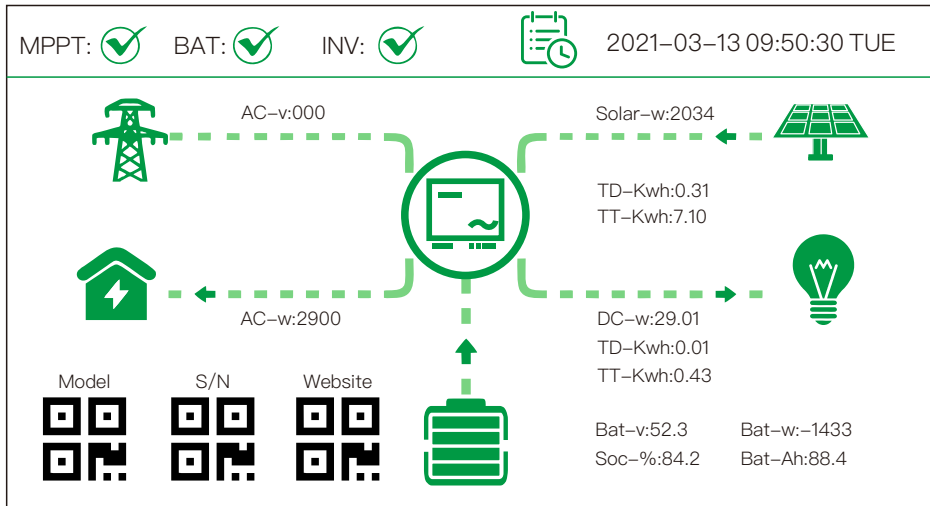
3.2 Power On/Off

Once the unit has been properly installed and the power cables are connected, simply press On/Off button to turn on the unit.



3.3 Main Screen

The LCD is touchscreen, below screen shows the overall information of the system.



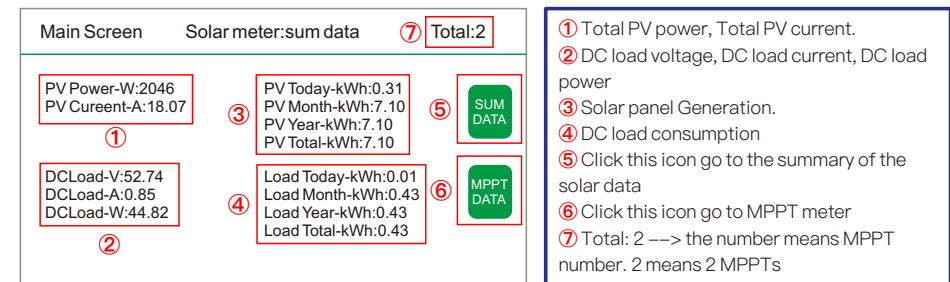
- ① The system status: It will display Normal, Alarm and so on based on the system status.
- ② Display the system time
- ③ Grid icon, click it go to the inverter meter
- ④ The real input voltage from grid
- ⑤ The time icon, click this icon go to the time synchronized of the system

- ⑥ The real input power by solar panel
- ⑦ Solar icon, click this icon will go to the solar meter which showing details of solar
- ⑧ Solar generate power details. TD-kWh: showing today energy generated by solar; TT-kWh: showing total energy generated by solar.
- ⑨ Inverter icon, click this icon will show the details of inverter
- ⑩ The inverter output real power
- ⑪ Battery icon. Click this icon will go to the details of the battery information
- ⑫ Real battery information.
- ⑬ DC load icon. Click this icon will go to the details of the DC load
- ⑭ DC load details. Showing the DC load consumption, today load consumption (TD-kWh) and Total load consumption (TT-kWh)
- ⑮ You can scan the QC code to get the model name, series number and go to our webiste

3.4 Meter Screen

3.4.1 Solar meter

Click the solar icon in main screen go to the solar meter which showing solar and load information. Shown as below.



- ① Total PV power, Total PV current.
- ② DC load voltage, DC load current, DC load power
- ③ Solar panel Generation.
- ④ DC load consumption
- ⑤ Click this icon go to the summary of the solar data
- ⑥ Click this icon go to MPPT meter
- ⑦ Total: 2 --> the number means MPPT number. 2 means 2 MPPTs

Main Screen **MPPT meter** ⑦ ID:1

PV Input-V:113.23
PV Current-A:18.07
PV Power-W:2046
Chg-V:52.71
Chg Current-A:39.6

PV Today-kWh:0.31
PV Month-kWh:7.10
PV Year-kWh:7.10
PV Total0kWh:7.10

DC Load-V:52.71
DC Load-A:0.55
DC Load-W:29.01
Unit Temp-C:48.30

Load Today-kWh:0.01
Load Month-kWh:0.43
Load Year-kWh:0.43
Load Total-kWh:0.43

PV Status:normal Chg Mode:CC Load Status:light

⑧ PV status
⑨ Charge mode
⑩ Load status

- ① PV input voltage, PV current, PV power, PV charge voltage, PV charge current
- ② DC load voltage, DC load current, DC load power, Unit temp
- ③ Solar panel Generation.
- ④ DC load consumption
- ⑤ Click ▲ or ▼ to go to different ID MPPT information
- ⑥ Click this icon go to solar SUM meter
- ⑦ ID: 1 --> ID 1 MPPT

3.4.2 Inverter meter

Click the inverter icon in main screen to the inverter meter. Shown as below.

Main Screen **Inverter meter** ④ RT-Power:3000

AC Input-V:000
AC Input Freq-Hz:000

AC Output-V:242
AC Output Freq-Hz:60.1
AC Output Power-W:2900

Work mode:Inverter
Alarm:No
Fault:No

- ① AC Input Voltage, Frequency
- ② AC output Voltage, Frequency and power
- ③ Inverter work mode, Alarm code and Fault code
- ④ Inverter rated power

3.4.3 Battery meter

Click the battery icon in main screen to the battery meter. Shown as below.

Main Screen **Battery meter:sum data** Total: 1

Mean Voltage-V:52.3
Total Current-A:-27.1
Total SOC-%:84.2
Remain Cap-Ah:88.4
Mean Temp-C:32.6

Rated Charge-V:54.4
Max Charge-A:50
Dis-charge Cut-V:46.0
Max Dis-charge-A:100
Rated Total Cap-Ah:105

Work Mode:Discharge
Total Power-W:-1460
Charge Time-h:--
Discharge Time-h:3.1

- ① Real parameters of the battery
- ② Work mode, charge time and discharge time of battery
- ③ Rated parameters of the battery
- ④ ⑤ ⑥ Selection icon:
Sum Data: Click this icon will show the battery sum data.
All Data: Click this icon will show the battery all data.
Cell Data: Click the icon will show cell data of battery

Click the "ALL DATA" icon in battery meter screen to the battery all data meter. Shown as below.

Main Screen **Battery meter: all data** ① Total:1

| D | Vol | Amp | SOC | Rem-C | Cyc-T | Max-V | Min-V | Max-T | Min-T | Status |
|---|------|-------|------|-------|-------|-------|-------|-------|-------|--------|
| 0 | 52.3 | -27.1 | 84.2 | 88.4 | 2 | 3.30 | 3.28 | 32.0 | 31.5 | 0000 |

- ① The quantity of battery pack in the system
- ② The battery pack details information:
ID: The pack ID in the system
Vol: The pack voltage in the system
Amp: The battery pack current
SOC: The battery pack SOC
Rem-C: The remain capacity of battery pack
Cyc-T: The battery pack lifecycle time
Max-V: The battery cell max voltage in the pack
Min-V: The battery cell min voltage in the pack
Max-T: The battery cell max temperature in the pack
Min-T: the battery cell min temperature in the pack
Status: the pack working status

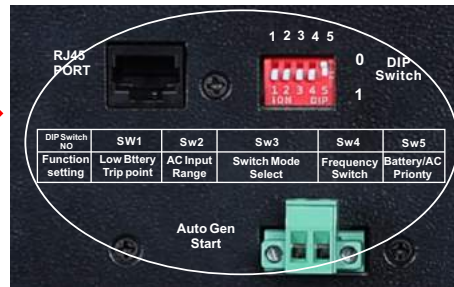
Click the "CELL DATA" icon in battery meter screen or press the Down or UP button to the battery cell data meter. Shown as below.

Main Screen **Battery meter:cell data** ① ID:0

| | | | |
|---------------------|---------|----------|-------------|
| Rated Cap-Ah:105 | C1:3221 | C9:3258 | Max V:3305 |
| Current Cap-Ah:88.4 | C2:3261 | C10:3256 | Min V:3273 |
| Current SOC-%:84.2 | C3:3261 | C11:3258 | Temp 1:31.9 |
| Voltage-V:52.3 | C4:3260 | C12:3261 | Temp 2:32.4 |
| Current-A:-27.1 | C5:3259 | C13:3265 | Temp 3:31.5 |
| Chg Time-h:-- | C6:3260 | C14:3266 | Temp 4:31.9 |
| Dischg Time-h:3.1 | C7:3261 | C15:3265 | Max T:32.4 |
| Cycle Times:2 | C8:3269 | C16:3272 | Min T:31.5 |
| Status:0000 | OVP-T:0 | OCP-T:0 | OTP-T:0 |

- ① This is all cells data of the ID: 0 battery pack
- ② The ID 0 battery pack information
- ③ All cells data in ID 0 battery pack
- ④ UP or Down to Change the battery pack ID to show another pack cells information.

4. Other Features



4.1 DIP Switch Function setting

Table 4 Dip Switch Function Setting

| DIP Switch No. | Switch Function | Position:0 | Position:1 |
|----------------|--|--|---|
| SW1 | Low battery trip point | 46.0Vdc | 48.0Vdc |
| Sw2 | AC Input Range | 184-253Vac(230Vac input) 100-135Vac(120Vac input) | 140-270Vac(230Vac input) 90-135Vac(120Vac input) |
| Sw3 | Switch Model select (Power save mode setting) | Night charger function | Detect load per 3 secs |
| Sw4 | Frequency switch(output frequency) | 50Hz | 60Hz |
| Sw5 | Battery/AC priority setting | Utility priority | Battery(solar)priority |

SW1: Low Battery Trip Volt:

The Low Battery Trip Volt is set at 46.0Vdc by typical deep cycle lead acid battery. It can be customized to 48Vdc using SW1 for sealed car battery, this is to prevent batteries from over-discharging while there is only a small load applied on the system.

SW2: AC Input Range:

There are different acceptable AC input ranges for different kinds of loads. For some relatively sensitive electronic devices, a narrow input range of 184-253V (100-135Vac for 120Vac model) is required to protect them. While for some resistive loads which work in a wide voltage range, the input AC range can be customized to 140-270VAC (90-135Vac for 120Vac model), this helps to power loads with the most AC input power without frequent switches to the battery bank.

In order to make the system accept dirty power from a generator, when the SW2 is switched to position "1", the system will bypass an AC input with a wide voltage and frequency(40Hz-70Hz for 50Hz/60Hz).

Accordingly, the AC charger will also work in a wide voltage and frequency range (43Hz-67Hz for 50Hz/60Hz). This will avoid frequent switches between battery and generator. But some sensitive loads will suffer from the low quality power.

SW3: Power Saver Auto Setting :

In Power Saver Mode, when the SW3 is switched to position "0", system will work in Unit Off Charging mode, it will stay in standby mode without sensing loads. It won't output any power even if a load is turned on. The system will not perform any function and only stay idle in this mode. When a qualified AC input present, it will switch to AC input power to charge the battery and supply the load at the same time. When the SW3 is switched to position "0", the system is initially in standby mode and sends a pulse to detect the presence of a load every 3 seconds. Each pulse lasts for 250ms. The system will remain in standby mode until a load has been detected. Then it will wake up from standby mode and start to inverter electricity from the battery bank to supply the load.

SW4: Frequency Switch:

The output frequency of the system can be set at either 50Hz or 60Hz by Sw4.

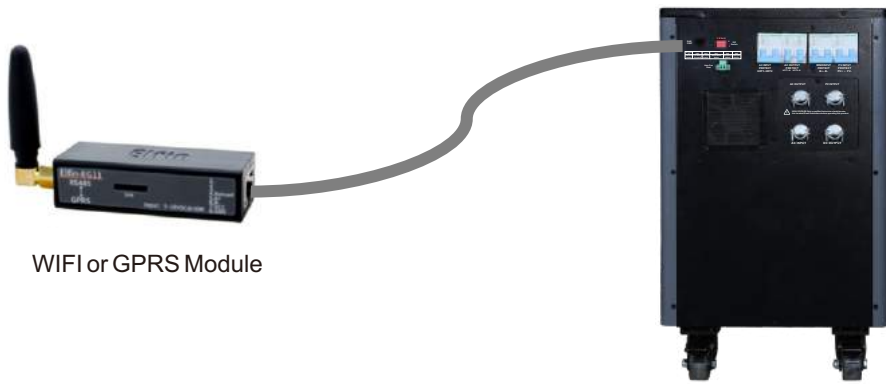
SW5: Solar Mode/AC Mode Priority:

Our system is designed with AC priority by default. This means, when AC input is present, the battery will be charged first, and the inverter will transfer the input AC to power the load. Only when the AC input is stable for a continuous period of 15 days, the system will start a battery inverting cycle to protect the battery. After 1 normal charging cycle ac through put will be restored. The AC Priority and Battery Priority switch is SW5. When you choose battery priority, the system will inverting from battery despite the AC input. Only when the battery voltage is reaches low voltage alarm point(10.5V for 12V), the system transfers to AC Input, charge battery, and switch back to battery when battery is charged full. This function is mainly for wind/solar systems taking utility power as back up

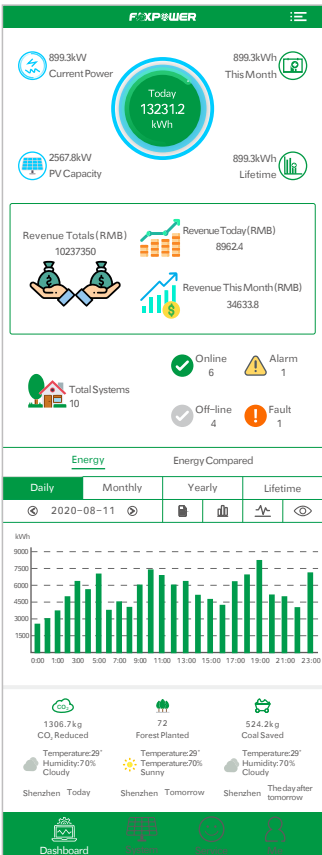
4.2 Automatic Generator Star (AGS)

The system can start up generator when battery voltage goes low. When the system goes to low battery alarm, it can send a signal to start a generator and turn the generator off after battery charging is finished. The auto gen start feature will only work with generators which have automatic starting capability. The generator must have start and stop controls [i.e., an electric starter and electric choke (for gasoline units)], and the safety sensors to be able to start and stop automatically. There is an open/close relay that will short circuit the positive and negative cables from a generator start control. The input DC voltage can vary, but the max current the relay can carry is 16Amp. The Auto Generator Start terminal pins are not polarized. In addition, these two pins can also be used as dry contacts to send out "Low Battery Voltage" signal to an external alarm device.

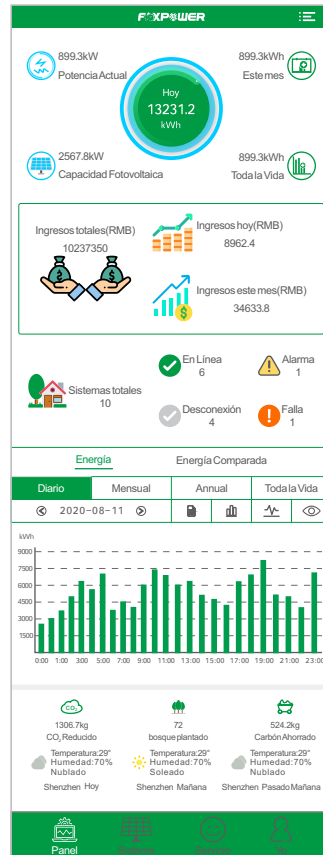
4.4 APP Monitoring



WIFI or GPRS Module



English Version



Spanish Version

4.4 Datasheet

| | OES-5 | OES-10 | OEX-10 |
|---------------------------------------|--|--------------------------------|--------------------------------|
| Rated energy capacity | 5.12kWh | 10.24kWh | 10.24kWh |
| Battery Rated Capacity | 100Ah | 200Ah | 200Ah |
| Rated charge voltage | 56.0Vdc±0.4Vdc | | |
| Max charge voltage | 56.8Vdc±0.4Vdc | | |
| Overcharge protection | 58.4Vdc±0.4Vdc | | |
| Battery Type | LiFePO4 | | |
| AC input voltage range | 184-253Vac(UPS mode) or 140-270Vac(Gen mode) | | |
| Max. charging current(A) | 50A | 100A | 100A |
| Max. discharging current(A) | 100A | 200A | 200A |
| Max PV input power | 2080W | 41600W | 41600W |
| PV input voltage | 50V-108V | 50V-108V | 50V-108V |
| Max PV open Circuit Voltage | 150V | 150V | 150V |
| AC Output | | | |
| Rated AC output power | 3kW | 3kW | 5kW |
| Surge Rating(20S) | 9kW | 9kW | 15kW |
| Capable of starting electric motor | 3HP | 3HP | 5HP |
| Output waveform | Pure sine wave | | |
| Nominal efficiency | >91%(Peak) | | |
| Line Mode efficiency | >95% | | |
| Output voltage | 120Vac(H-N)/240Vac(H-H) Split phase | | |
| Output frequency | 50/60Hz auto detectable | | |
| Grid type | Split phase | | |
| Output voltage regulation | ±10% RMS | | |
| Typical transfer time | 10ms (Max) | | |
| THD | <10% | | |
| General | | | |
| Cooling | Fan Cooling | | |
| Weight(approximate) | 80kg(176lb) | 100kg(220lb) | 110kg(242lb) |
| Dimension H/W/D(approximate) | 55x53x35cm 22"x21"x14" | 55x88x35cm 22"x35"x14" | 55x88x35cm 22"x35"x14" |
| Shipping Weight(approximate) | 90kg(198lb) | 120kg(264lb) | 130kg(286lb) |
| Shipping Dimension H/W/D(approximate) | 80/70/50cm 31.5"x27.5"x20" | 80/110/50cm 31.5"x43.5"x20" | 80/110/50cm 31.5"x43.5"x20" |
| Protections | short circuit, over voltage, over current, over charge | | |

5. Troubleshooting Guide

| Symptom | Possible Cause | Recommended Solution |
|---|---|---|
| System will not turn on during initial power up | Batteries are not connected, loose battery-side connections | Check the batteries and cable connections. Check DC fuse and breaker |
| | Low battery voltage | Charge the battery |
| No AC output voltage and no Indicator lights on | System has been manually transitioned to OFF mode | Press the switch to power the system |
| AC output voltage is low and the system turns loads OFF in a short time | Low battery | Check the condition of the batteries and recharge if possible |
| Charger is inoperative and unit will not accept AC | AC voltage has dropped out-of-tolerance | Check the AC voltage for proper voltage and |
| Charger is supplying a lower charge rate | Low AC input voltage | Source qualified AC power |
| | Loose battery or AC input connections | Check all DC/AC connections |
| Charger turns OFF while charging from a generator | High AC input voltages from the generator | Load the generator down with a heavy load. Turn the generator output voltage down |
| Sensitive loads turns off temporarily when transferring between grid | System's low voltage trip voltage may be too low to sustain certain loads | Choose narrow AC voltage in the DIP switch, or install a UPS if possible |
| Noise from transformer/case * | Applying specific loads such as hair drier | Remove the loads |

* The reason for the noise from transformer and/or case

When in inverter mode and the transformer and/or case of the system sometimes may vibrate and make noise.

The noise may come from transformer. According to the characteristics of our system, there is one type of load which will most likely to cause rattles of transformer, that is a half-wave load, load that uses only a half cycle of the power (see figure 1). This trends to cause imbalance of magnetic field of transformer, reducing its rated working freq from 20KHz to, say, maybe 15KHz (it varies according to different loads). This way, the freq of noise falls exactly into the range (200Hz-20KHz) that human ear can sense.

The most common load of such kind is hair drier. If the noise comes from case. Normally when loaded with inductive loads, the magnetic field generated by transformer keeps attracting or releasing the steel case at a specific freq, this may also cause noise. Reducing the load power or using an inverter with bigger capacity will normally solve this problem. The noise will not do any harm to the inverter or the loads.

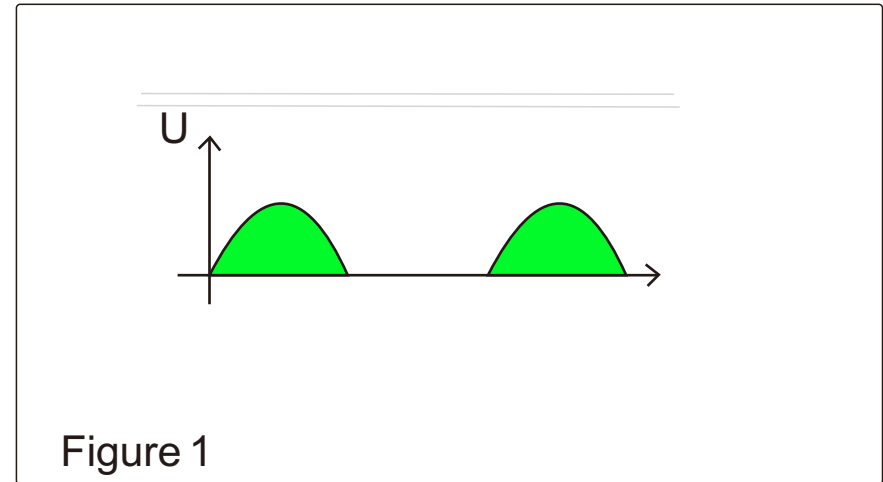


Figure 1

6. Synchronize Time as local time

Click the Calendar icon to synchronize the time as local time zone. Enter the year, month, day, Hour, Minute and second in order to synchronize the local time in the system.

MPPT: BAT: INV: 2021-03-13 09:50:30 TUE

AC-v:000

Solar-w:2034

AC-w:2

| | | | |
|---------------------|---|---|-----|
| ????-??-??-??-??-?? | | | |
| 1 | 2 | 3 | ESC |
| 4 | 5 | 6 | DEL |
| 7 | 8 | 9 | - |
| C | 0 | . | OK |

Model

S/N

Bat-v:52.3 Bat-w:-1433

Soc-%:84.2 Bat-Ah:88.4

Foxpower Technology Co., Ltd

Add: 3F, Building 2nd, Selen Tech-park, Tangjia Rd, Fenghuang Street, Guangming District, Shenzhen,

Tel: +86-755-23242321. Fax: +86-755-23242321

Email: sales@foxpowerups.com

Website: www.foxpowerups.com

Website: www.fox-power.com