

# Apollo Maxx Series

## All in One Solar Inverter

A2.1



5min



**WARNING: HIGH VOLTAGE INSIDE**

**CAUTION: THE DC FUSE MUST HAVE BEEN TURNED OFF BEFORE SERVICING**

**MADE IN CHINA**

## Disclaimer

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- Take no warranty as to the accuracy, sufficiency and suitability of any technical or other information provided in this manual or other documentation.
- Assumes no responsibility or liability for loss or damage, whether direct, indirect, consequential or incidental, which might arise out of the use of such information.
- TBB offer standard warranty with its products, taking no responsibility for direct or indirect loss due to equipment failure.

## About this Manual

This manual describes our product features and provides procedure of installations. This manual is for anyone intending to install our equipment.

## General Instruction

Thanks for choosing our products and this manual are suitable for Apollo Maxx All in One Solar Inverter. This chapter contains important safety and operation instructions. Read and keep this User Guide well for later reference.

The Apollo Maxx All in One Solar Inverter needs to be installed by professionals and please pay attention to the following points prior to installation:

Please check the input voltage or voltage of battery is the same to the nominal input voltage of this inverter.

- Please connect the positive terminal “+” of the battery to “+” the input of the inverter.
- Please connect the negative terminal “-” of the battery to “-” the input of the inverter.
- Please use the shortest cable for connection and ensure the secure connection.
- While connecting, please secure the connection and avoid the short circuit between the positive terminal and the negative terminal of the battery, to protect the battery from damage.
- The inverter will have high voltage inside. Only authorized electrician can open the case.
- The inverter WAS NOT designed to use in any life retaining equipment.

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# 1. General Safety Instruction

## 1.1 Safety Instruction

As the dangerous voltage and the high temperature exist within the Apollo Maxx All in One Solar Inverter, only the qualified and authorized maintenance personnel is permitted to open and repair it. Please make sure Apollo Maxx All in One Solar Inverter is turned off before opening and repairing it.

This manual contains information concerning the installation and operation of the Apollo Maxx All in One Solar Inverter. All relevant parts of the manual should be read prior to commencing the installation. Please follow the local stipulation in the meantime.

Any operation against safety requirement or against the design, manufacture, safety standard are out of the manufacturer warranty.

## 1.2 General precaution

- DO NOT expose the inverter to the dust, rain, snow or liquids of any type, it is designed for the indoor use. DO NOT block off ventilation, otherwise the Apollo Maxx All in One Solar Inverter would be overheating.
- To avoid the fire and the electric shock, make sure all cables selected with right gauge and connected well. Smaller diameter and broken cable are not allowed to use.
- Please do not put any inflammable goods near to the inverter.
- NEVER place the unit directly above batteries, the gases from the battery will corrode and damage the Apollo Maxx All in One Solar Inverter.
- DO NOT place battery over Apollo Maxx All in One Solar Inverter.

## 1.3 Precaution regarding battery operation

- Use plenty of fresh water to clean in case the battery acid touches the skin, the clothing, or eyes and consult with doctor as soon as possible.
- The battery may generate flammable gas during charging. NEVER smoke or allow a spark or a flame in the vicinity of the battery.
- DO NOT put the metal tool on the battery, a spark and a short circuit might lead to an explosion.
- REMOVE all personal metal items such as rings, bracelets, necklaces, and watches while working with batteries. Batteries can cause short-circuit current high enough to make metal melt, and could cause severe burns.

## 2. Instruction

### 2.1 Brief Instruction

#### 2.1.1 General Description

Apollo Maxx is a new generation of all in one solar inverter designed for various type of off grid system including DC Couple system and generator hybrid system. It can provide UPS class switching speed and with capability to support parallel as well as composing three phase system.

Apollo Maxx delivers high reliability, performance and industry leading efficiency for mission critical application. Its distinguishing surge capability makes it capable to power most demanding appliances, such as air conditioner, water pump, washing machine, freezer, etc.

With the function of power assist & power control, it can be used to work with a limited AC source such as generator or limited grid. Apollo Maxx can automatically adjust its charging current avoiding grid or generator to be overloaded. In case of the temporary peak power appears, it can work as the supplement source to the generator or the grid.

#### 2.1.2 Naming Rules

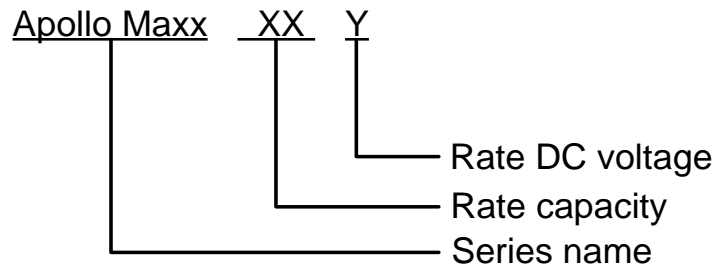


figure	explanation	
Apollo Maxx	series name	
2.0	Represent rate capacity	2000W
3.0		3000W
5.0		5000W
M	Represent rate DC voltage	24VDC
S		48VDC

Naming example : Apollo Maxx 3.0S  
 Apollo Maxx All in One Solar Inverter  
 Rate capacity :3000W  
 Rate DC voltage : 48V

## 2.2 Structure

### 2.2.1 Front



Apollo Maxx 2.0M, Apollo Maxx 2.0S, Apollo Maxx 3.0M, Apollo Maxx 3.0S



Apollo Maxx 5.0S

Figure 2-1 Front View of the All in One Solar Inverter Structure

### 2.2.2 Control panel

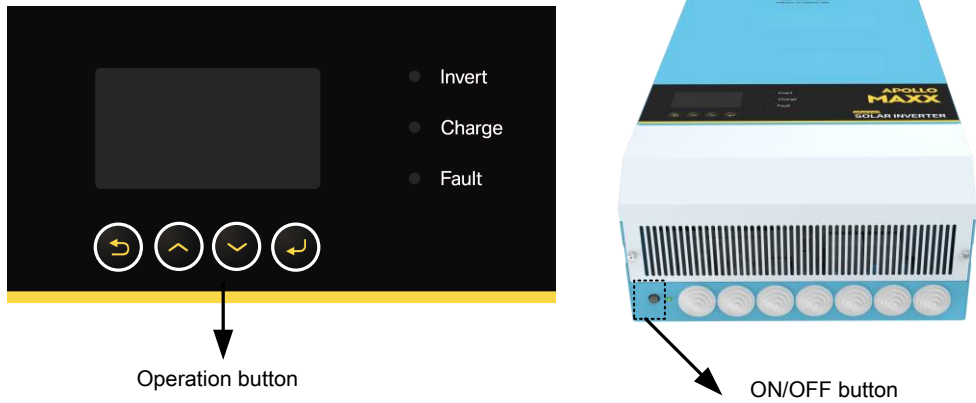
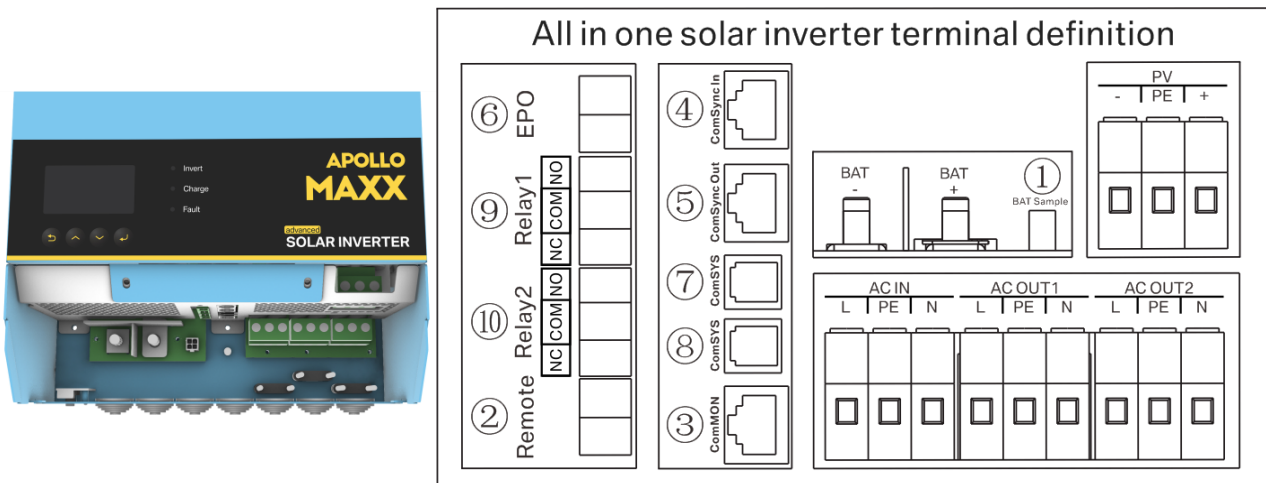
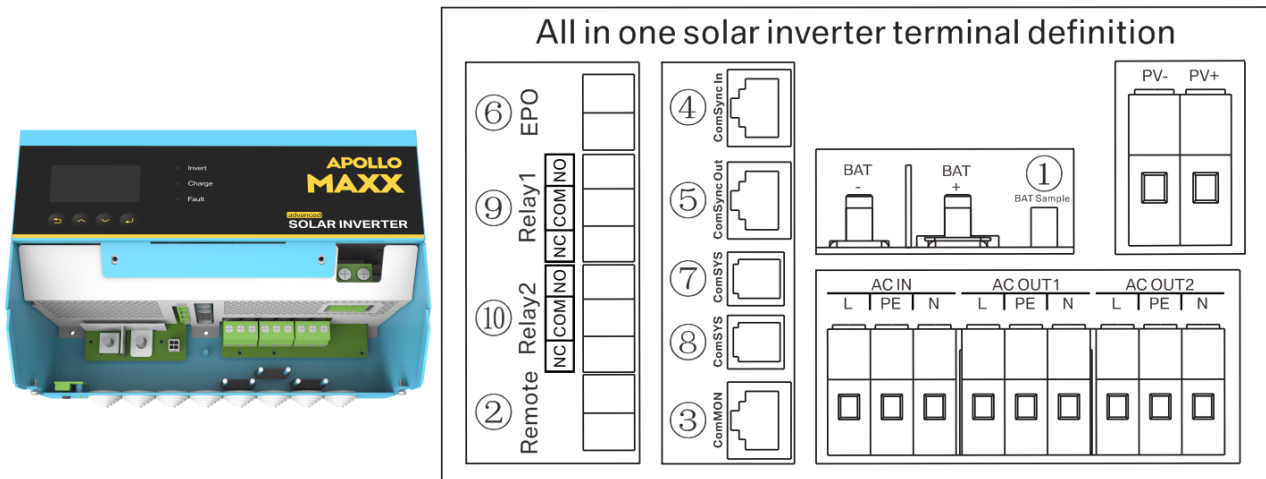


Figure 2-2 All in One Solar Inverter Control Buttons

### 2.2.3 Connection compartment



Apollo Maxx 2.0M, Apollo Maxx 2.0S, Apollo Maxx 3.0M, Apollo Maxx 3.0S



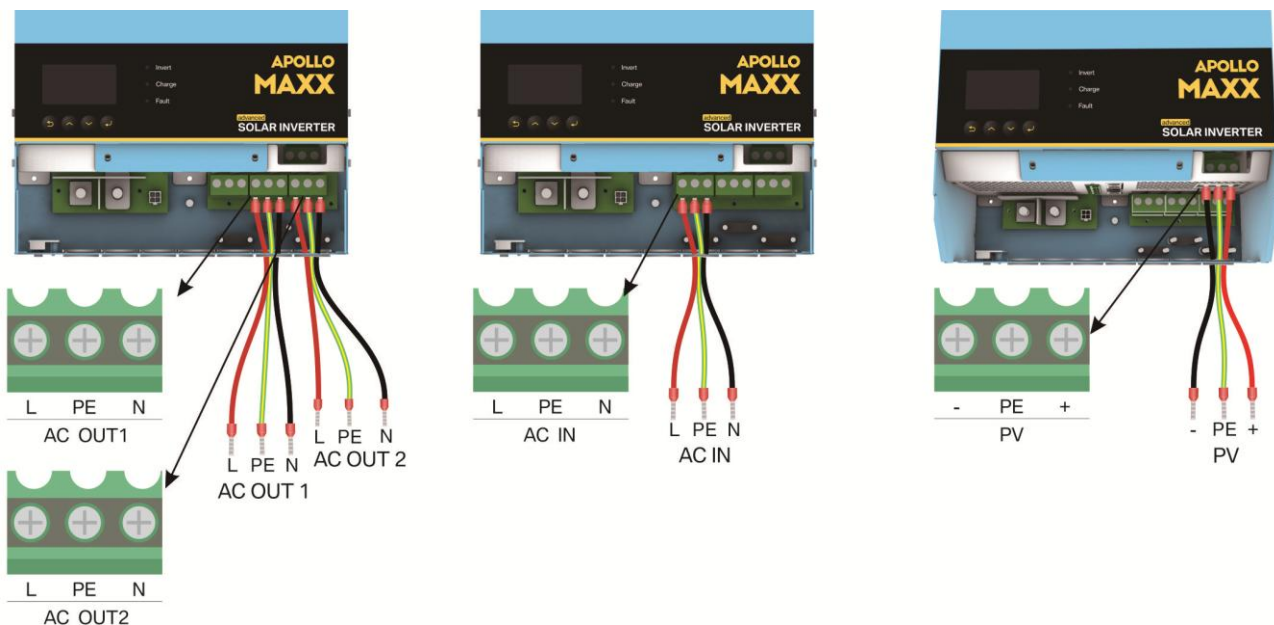
Apollo Maxx 5.0S

Figure 2-3 Signal Terminals

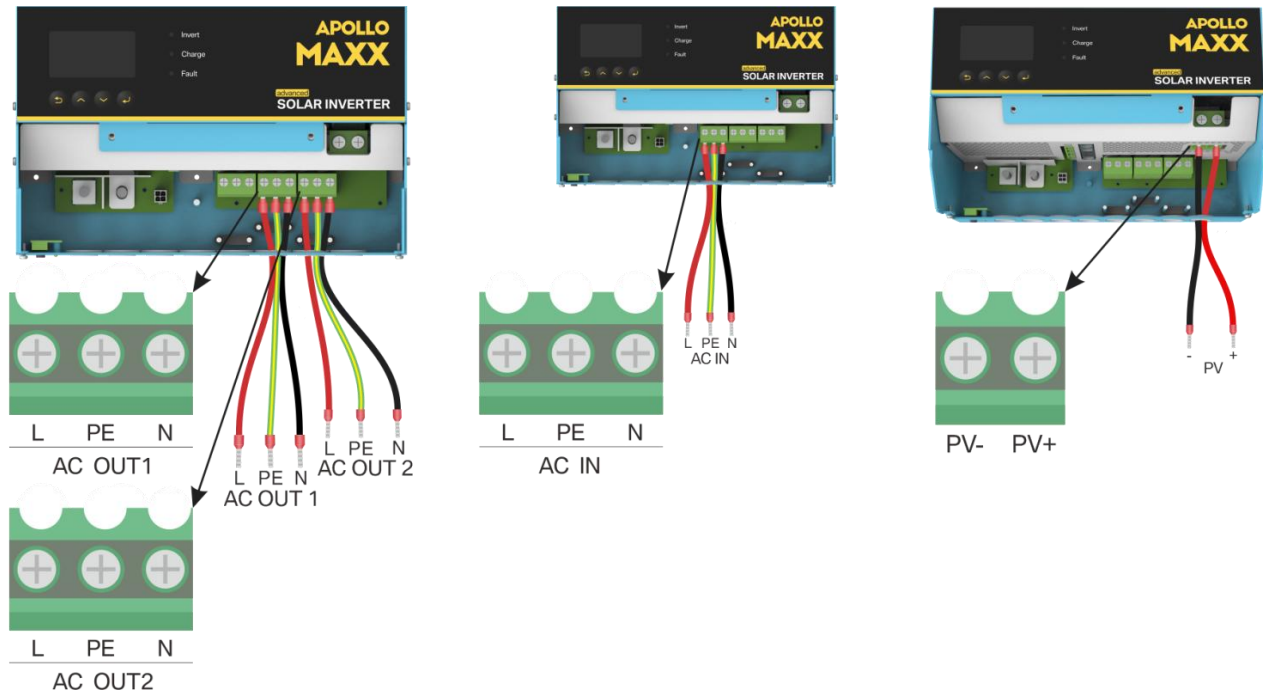


Table 2-1 Signal Terminals Introduction

No.	Silk-screen	Definition
①	BAT Sample	Battery temperature and voltage sample.
②	Remote	Dry contact input control, remote ON/OFF control.
③	ComMON	RS485 port for external monitor such as MCK, SNMP, Kinergy, etc.
④	ComSync In	Parallel synchronous communication input(CAN) .
⑤	ComSync Out	Parallel synchronous communication output(CAN) .
⑥	EPO	Dry contact input control, emergency power off.
⑦	ComSYS	System communication(RS485), connected to SP or BGK.
⑧	ComSYS	System communication(RS485), connected to SP or BGK.
⑨	Relay1	Dry contact output control 1(NO,C,NC) .
	(NO,C,NC)	
⑩	Relay2	Dry contact output control 2(NO,C,NC) .
	(NO,C,NC)	



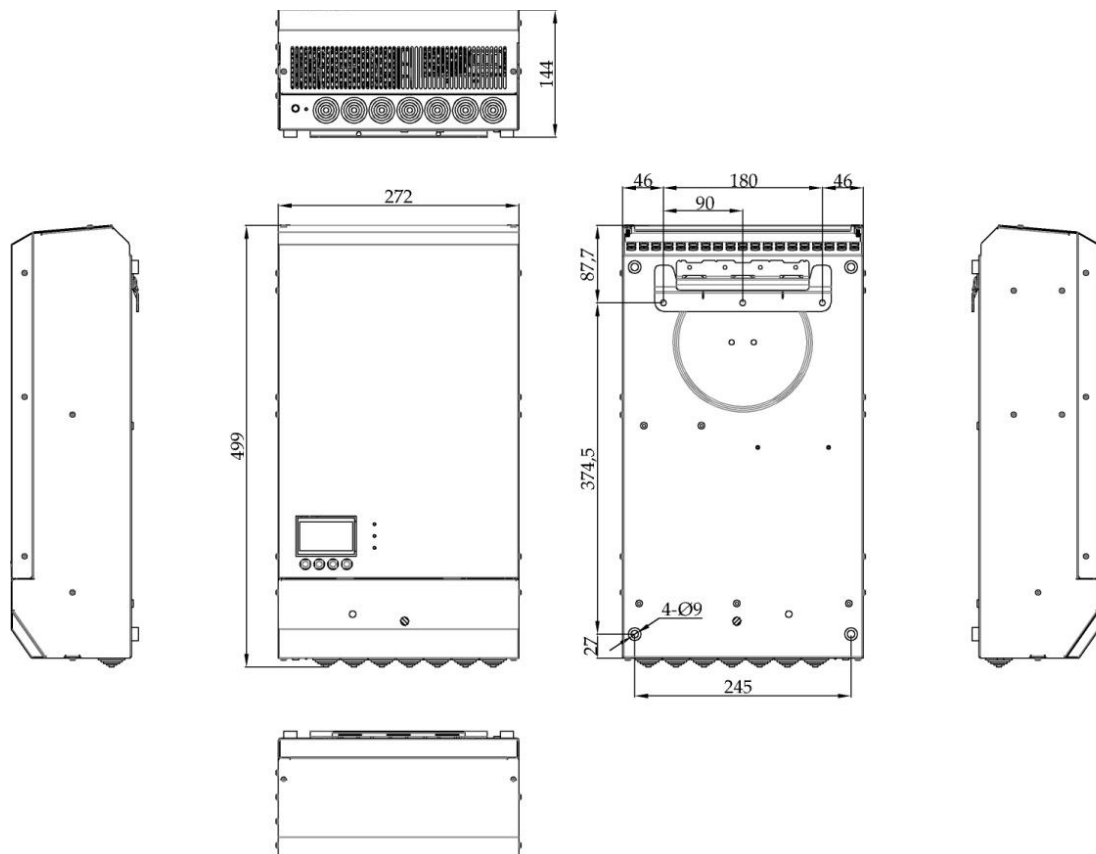
Apollo Maxx 2.0M, Apollo Maxx 2.0S, Apollo Maxx 3.0M, Apollo Maxx 3.0S



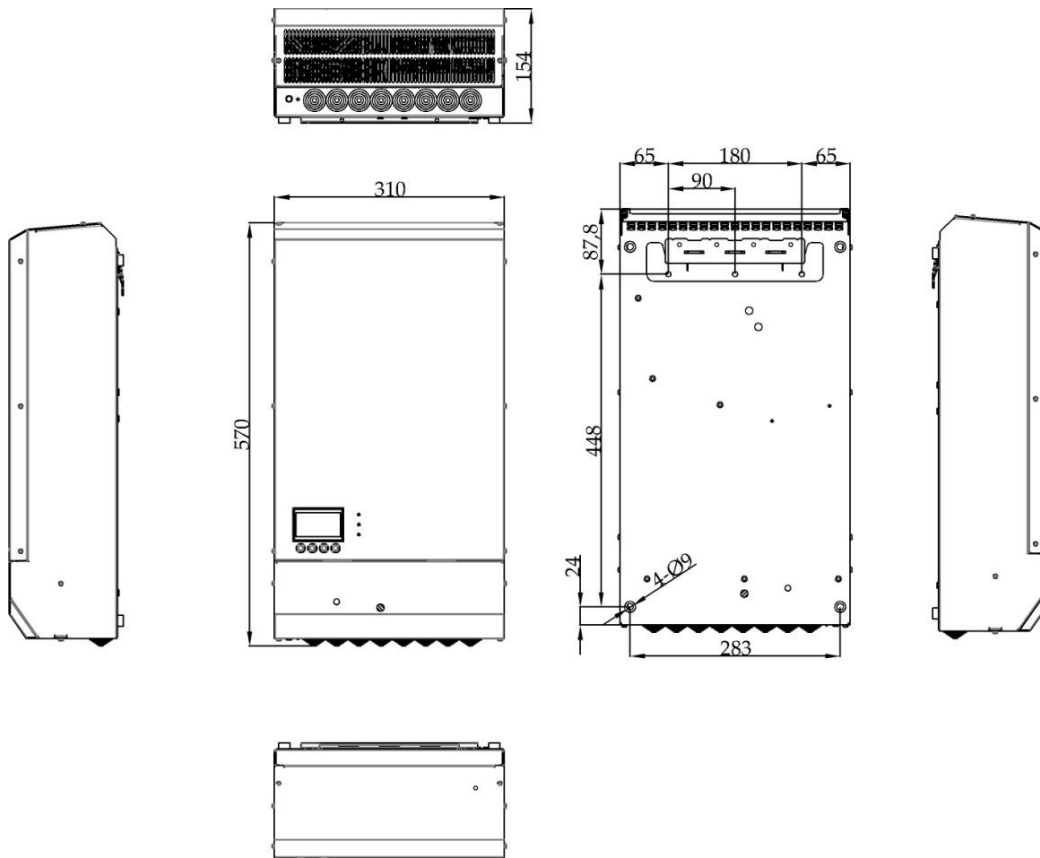
Apollo Maxx 5.0S

Figure 2-4 Power terminal

### 2.2.4 Dimension



Apollo Maxx 2.0M, Apollo Maxx 2.0S, Apollo Maxx 3.0M, Apollo Maxx 3.0S



Apollo Maxx 5.0S

Figure 2-5 Dimension of the All in One Solar Inverter

## 2.3 Function

### 2.3.1 DC Couple System

Using the Apollo Maxx together with the external MPPT solar control charger from TBB Power, you can compose a DC Couple system.

### 2.3.2 Parallel and Three Phase

Two or more units can be connected in parallel to compose a single-phase parallel system or a three-phase parallel system, which is convenient for system expansion or to construct a micro-grid system. For single phase system, max three units can be connected in parallel. For three phase system, max seven units can be connected together.

### 2.3.3 Power Control and Power Assist

Apollo Maxx offers a unique feature of power control & power assist, which is very useful when you have a limited grid supply or working with the generator. Apollo Maxx will take control of energy flow automatically, using extra power to charge the battery or inverting as the supplement to the grid or generator. With this feature, you can avoid the air switch trip and do not have to use oversize generators.

### **2.3.4 System Working Mode**

Apollo Maxx offers powerful functions for users to program for different systems, such as power backup, solar hybrid, ESS, ESS with peak tariff shaving, etc.

### **2.3.5 Built in Load Management**

There are two outputs built in the Apollo Maxx. The AC output 1 is used to connect the critical loads, which will be a backed up solution with the battery connected to the inverter. The AC OUT2 is the secondary outputs and you can configure it with different function (Only can be set by the NOVA and TBB Link.), such as grid only, base on specific time zone or specific battery voltage or SOC.

### **2.3.6 Powerful and Reliable Inverter**

#### **High Performance Pure Sine Wave**

Apollo Maxx is a pure sine wave inverter generating a near perfect sinusoidal AC wave power output that is very similar or even better to what you can get from your utility grid. Pure sine wave can guarantee the correct function of the sensitive equipments (computer, laser printer, TV, etc.). Also, your home appliances such as fridge, microwave and power tools will work more efficiently.

#### **High Surge Power Capability**

Provided with outstanding surge power capability and low frequency transformer, Apollo Maxx is suitable for heavy inductive load like fridge, coffee maker, microwave, power tools, air conditioner, etc.

#### **Battery Low Voltage/SOC Protection**

Apollo Maxx provides configurable battery low voltage/SOC protection.

### **2.3.7 Professional Battery Charger**

#### **Multi Stage Sophisticated Charging Algorithm for Lead Acid Battery**

Fitted with multistage charging algorithm (bulk-absorption-float-recycle), the built-in charger of the Apollo Maxx is designed to charge battery quickly and fully. Microprocessor controlled charging algorithm with variable absorption charging timer could guarantee the optimal charging for the batteries of different discharged states.

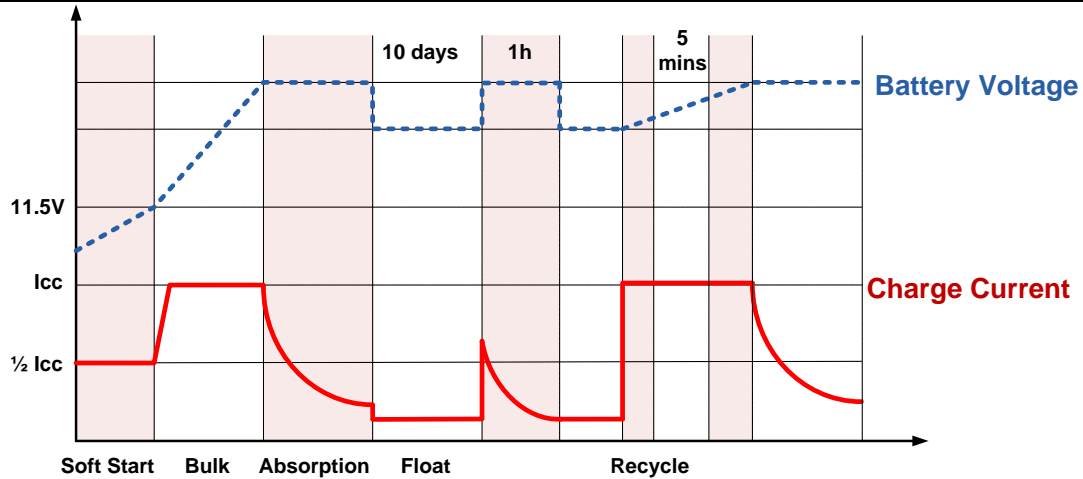


Figure 2-6 Multi Stage Sophisticated Charging Algorithm for Lead Acid Battery

Float charging and recycle charging program guarantee your battery getting proper maintenance in case of long time connected and less aging in case of long time connected with no use.

**Battery Sample Cable (Temperature and Voltage)**

Battery temperature is a key factor in correct charging for lead acid battery, the charging formula must be adjusted (automatically and in real time) according to the actual battery temperature to ensure that the batteries are fully charged but not overcharged or undercharged. All charging voltages recommended by the battery manufacture are in fact ONLY applied at 20°C-25°C.

The Bat sample cable (battery temperature and voltage sensor) supplied with Apollo Maxx measures the temperature of the battery and automatically makes adjustments at real time to properly charge your batteries at compensation rate of – 4mV/°C/cell. In case of the lacking of the Bat sample cable, Apollo Maxx will use 25°C as default setting. This feature is especially recommended for sealed batteries and/or when an important temperature fluctuations occurs on the battery.

**Multi Chemical Batteries Available**

Apollo Maxx offers premium charging algorithm for the common chemical acid batteries including AGM, GEL, Flooded, lead-carbon and Lithium battery. You can set the battery parameters through the LCD interface and the TBB Link software.

**Lithium Battery Compatible**

Apollo Maxx has built in communication protocol compatible with for Super L lithium battery from TBB.

## Manual Equalization



It is strongly recommended to read this section carefully before you start the EQ charging and Don't leave the battery unattended while performing desulfuration.



Always check if your battery supplier recommend the EQ charging. Only start when it is suitable.



If the battery type was set at AGM, GEL or Lead-Carbon , this charging profile can't be triggered on.

Over a period of time, the cells in a flooded battery can develop uneven chemical states. This will result in a weak cell which in turn can reduce the overall capacity of the battery. To improve the life and performance of the flooded battery, Apollo Maxx provides a manual equalization program that can be used. If it is recommended by the battery manufacturer, you can initiate the desulfuration program manually. Once you trigger on the equalization program, the Apollo Maxx will perform equalization charging.

After 30 minutes, it will quit EQ and enter into float charging.

- Check the electrolyte level and refill the battery with the distilled water if necessary.
- If you want to come to normal charging, you need to stop equalization charging and switch off the unit.
- Switch on the unit again, then you will have your equipment back to normal charging.



During equalization, the battery generates potentially flammable gases. Follow all the battery safety precautions listed in this guide. Ventilate the area around the battery thoroughly and ensure that there are no sources of flame or sparks in the vicinity.



Turn off or disconnect all loads on the battery during equalization. The voltage applied to the battery during equalization may be above the safe levels for some loads.

### Frequency:

Maximum once a month, for heavily used battery, you may wish to equalize your battery. For battery with light service only need to be equalized every 2-3 months.

### Important:

- Equalization may damage your batteries if it is not performed properly. Always check battery fluid before and after equalization. Fill the batteries only with the distilled water.
- Always check the equalization switch is set back to OFF after each time's equalization.
- Follow the battery manufactures' recommendations on equalization vary. Always follow the battery manufacturer's instructions to properly equalize the batteries. According to the guide, a heavily used battery may require equalization once a month while a battery in light duty service only needs equalizing once every 2 to 4 months.
- Battery type: as a kind of protection, equalization charging can be performed if and only if you set the battery to be a traction, Flooded /OPzV batteries. If you choose the AGM, GEL or Lead-Carbon, EQ charging can't be performed.

### 2.3.8 Transfer

#### Uninterrupted AC Power

In case of voltage/frequency/waveform of AC input match the minimum quality, the voltage will be switched directly to the AC output. The Apollo Maxx All in One Solar Inverter will work as a battery charger and the loads will be powered by AC input. The voltage of the AC output and the AC input will be the same.

In case of the AC input failure or excessive AC input current set by the user, the Apollo Maxx All in One Solar Inverter will initiate a quick switching to the inverter, which will guarantee an undisturbed power. Once the AC input resumes or matches the quality, it will switch back again. Due to its ultra quick transfer design, as quick as 0ms, Apollo Maxx All in One Solar Inverter could be used as an UPS.

#### Ground Relay

The neutral output of the Apollo Maxx All in One Solar Inverter is automatically connected to the earth when no external AC sources is available. Once the external AC sources presents, the ground relay will open. You can disable this feature through the TBB Link.

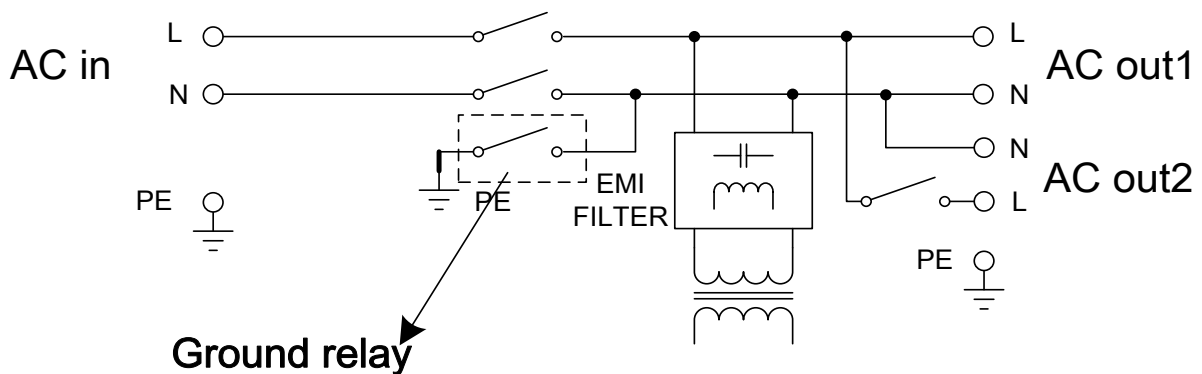


Figure 2-7 Ground Relay Schematic

### 2.3.9 Protect Function

The Apollo Maxx All in One Solar Inverter is equipped with a series of complete hardware and software protection functions to ensure its stable and reliable operation.

#### Overload Protection

When overload protection is triggered on, it will restart automatically after 60s. And after three consecutive overload shutdown protections, the equipment will not restart automatically. At this time, the user needs to manually restart.

#### Over Temperature Protection

When the internal temperature is too high, Apollo Maxx will enter into the over-temperature protection. After the internal temperature returns to normal, it can automatically resume normal operation.

#### Short Circuit Protection

The equipment will automatically shut down when the AC output is shorted and needs to be manually activated.

### **Battery over Temperature Protection**

During the charging, the equipment will continuously monitor the battery temperature. When the battery temperature is too high, the equipment will automatically reduce the charging current. When the battery is severely heated, the charger will automatically turn off to protect the battery.

### **Battery Low Voltage/SOC Protection**

To prevent the permanent damage caused by the over discharge of battery, the equipment will automatically cut off the output according to the low voltage/SOC protection point set by the user.

## **2.3.10 Communication**

### **Dry Contact Input**

Apollo Maxx is equipped with two dry contact inputs for remote on/off and EPO control.

### **Dry Contact Output**

Apollo Maxx is equipped with two NO/NC relay type dry contact outputs. The user can set specific functions through the LCD. Following is the default setting.

- Relay1: The relay is closed when the battery is under voltage.
- Relya2: The relay is closed when a fault or a overload occurs.

### **RS485**

Equipped with two RS485 interfaces.

### **CAN**

Equipped with a CAN interface.



### 3. Installation and Wiring

Please refer to "Quick Installation Guide".



Keep away from the fire, avoid direct sunlight and rain; do not store flammable, explosive or corrosive gases or liquids in the working environment. Don't install in a working environment with the metal conductive dust.

- Please install the equipment in a dry, clean and cool location with good ventilation.
- Operating temperature: -20~65°C
- Storage temperature: -40~70°C
- Cooling: Force fan
- Relative humidity in operation: 95% without condensation.
- Altitude: 2000m

#### 3.1 Recommended DC cables

Please find the following minimum wire size. If the DC cable is longer than 5m, please increase the cross section of the cable to reduce the loss.



Use a torque wrench with insulated box spanner in order to avoid shorting the battery. Avoid shorting the battery cables.

**Maximum torque: 12 Nm.**

Model	Recommended cross section φ 8 aperture copper terminal (Length<5m)
Apollo Maxx 2.0M	35mm <sup>2</sup> ~50mm <sup>2</sup>
Apollo Maxx 2.0S	25mm <sup>2</sup> ~50mm <sup>2</sup>
Apollo Maxx 3.0M	50mm <sup>2</sup>
Apollo Maxx 3.0S	25mm <sup>2</sup> ~50mm <sup>2</sup>
Apollo Maxx 5.0S	50mm <sup>2</sup>

## 4. Configuration

### 4.1 Check before Operation

Please check before Operation according to the following.

- The inverter is installed correctly and steady.
- Reasonable cable layout to meet customer requirements.
- Make sure the grounding is reliable.
- Make sure the ground wire is properly connected and firm and reliable.
- Double check the battery breaker is OFF.
- Make sure the cables are properly connected and firm and reliable.
- Reasonable installation space, clean and tidy environment, no construction residue.

### 4.2 Power ON Test



Make sure the battery voltage is within the permissible range before turning ON the breaker.

Please follow the following instructions step by step.

- Step 1: Turn on the circuit breaker between the battery and the inverter.
- Step 2: Press the On/Off button for 2 seconds to turn on the inverter into the standby mode, the power LED will light up and the LCD will enter into the self diagnostic mode.
- Step 3: Wait in the standby mode for 30 seconds, then press the On/Off button again for 1 second to turn on the inverter into the inverting mode and observe the LCD and invert LED to make sure the inverter is running normally.

### 4.3 Power OFF



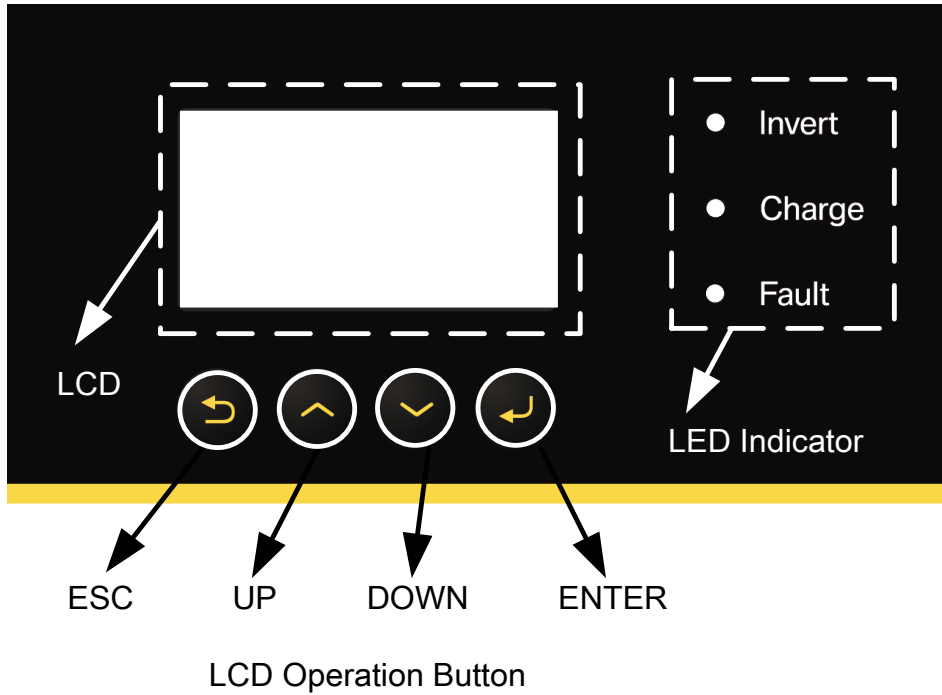
After the inverter is power OFF, there is still residual power and heat in the chassis, which may lead to electric shock or burning. Therefore, after the MPPT charger is powered off for 5 minutes, you should wear protective gloves before removing the MPPT charger.





- Step 1: When the inverter is in the inverting mode or charging mode, press the On/Off button for 2 seconds to turn off the inverter into the standby mode.
- Step 2: When the inverter is in the standby mode, press the On/Off button for 5 seconds to turn off the inverter into the complete off mode.
- Step 3: Turn off the circuit breaker between the battery and the inverter.

## 5. Operation

### 5.1 Operation and Display Panel

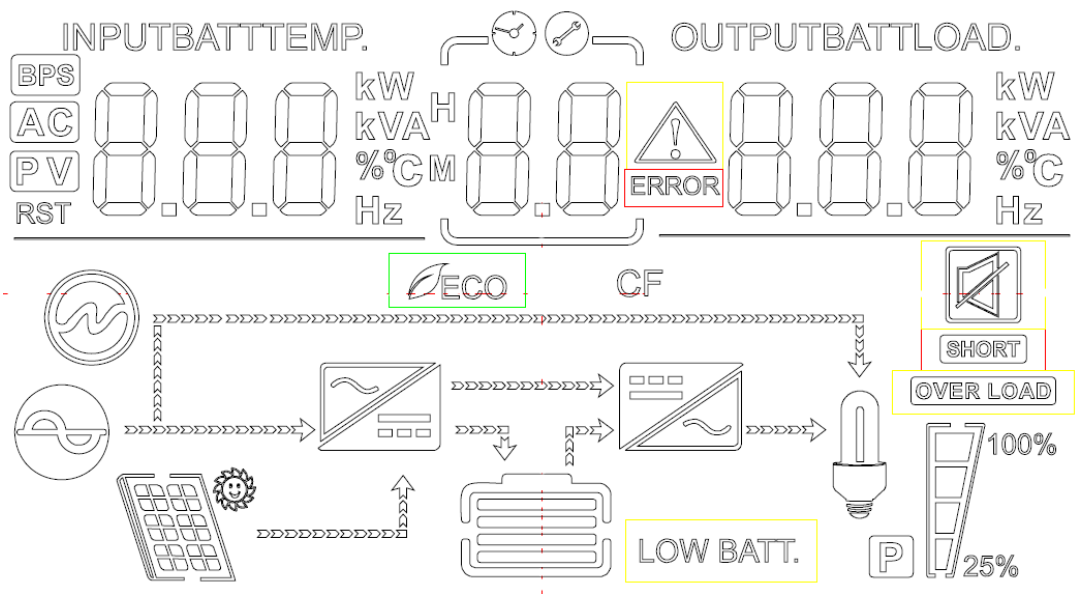
The operation and display includes four buttons and a LCD display, indicating the operating status and input/output power information.



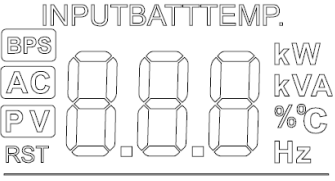
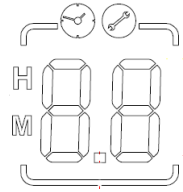
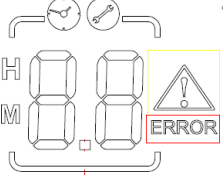
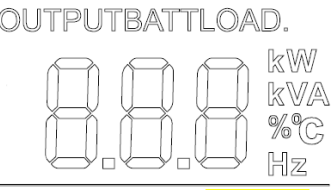
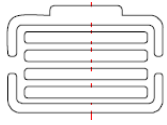
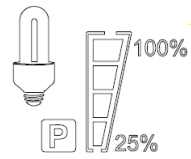
Button	Function
	➤ To exit the setting mode or confirm the fault code
	➤ To go to the previous selection.
	➤ To go to the next selection.
	➤ To enter the setting mode or confirm the selection.


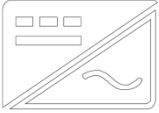

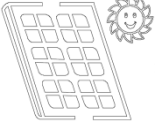
LED Indicator			Function
Invert	Green	Solid on	Inverting mode
		Flashing	Power Assist mode
Charge	Green	Solid on	The battery is Charging.
		Flashing	The battery is fully Charged.
Fault	Red	Solid on	Fault occurs
		Flashing	Warning occurs

## 5.2 LCD Display Icons



Icon	Function description
Input Source Information	
	Indicates the AC input
	Indicates the PV input

 <p>INPUTBATTEMP. BPS AC PV RST kW kVA %C Hz</p>	<p>Indicates input voltage, input frequency, PV voltage, charge current, charge power, battery voltage.</p>
<p><b>Configuration Program and Fault Information</b></p>	
 <p>H M</p>	<p>Indicates the setting programs</p>
 <p>ERROR</p>	<p>Warning: flashing every 2 seconds. Press &lt;ESC&gt; button to view the warning code. Fault: flashing every 1 second. Press &lt;ESC&gt; button to view the warning code.</p>
<p><b>Output Information</b></p>	
 <p>OUTPUTBATTLLOAD. kW kVA %C Hz</p>	<p>Indicates output voltage, output frequency, load percent, load in Watt, load in VA, and discharging current.</p>
<p><b>Battery Information</b></p>	
	<p>Indicates the battery level by 0~24%, 25~49%, 50~74%, 75~100% in battery mode and charging status in line mode.</p>
<p><b>Load Information</b></p>	
 <p>100% 25%</p>	<p>Indicates the load level by 0~24%, 25~49%, 50~74%, 75~100%.</p>
<p><b>Mode Operation Information</b></p>	

	<p>Indicates the inverter working in a charging mode</p>
	<p>Indicates the inverter working in a inverting mode</p>
	<p>Indicates the inverter connecting to the mains or generators.</p>
	<p>Indicates the inverter connecting to the PV panel.</p>

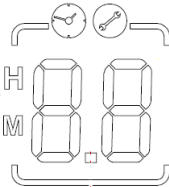
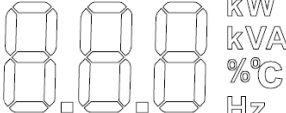
### 5.3 LCD Setting

After press and holding the <ENTER> button for 3 seconds, the inverter will enter the setting mode. Press <UP> or <DOWN> button to select setting programs. Then press the <ENTER> button to confirm the selection of the setting programs, or press the <ESC> button to exit the setting mode.

After confirm the selection of the setting programs, press the <UP> and <DOWN> button to modify the parameters. Press the <ENTER> button to confirm the modification, or press the <ESC> button to cancel.

The digital tube on the left side of LCD displays [PA] standing for PASS when the parameters are set successfully, otherwise it will display [FA] standing for FAIL.

#### Setting item

Item	Description	Setting Range
	<p>OUTPUTBATTLOAD.</p> <p>   kW kVA % °C Hz         </p>	<p>/</p>
<b>Inverter Parameter</b>		
<p>00</p>	<p>Output voltage</p>	<p>220~240V Step:10V Default:230V</p>

01	Output frequency	50~60Hz Step:10Hz Default:50Hz (only in standby mode)
02	Parallel mode	0-Stand-alone 1-Parallel 2-Three-Phase Default:0 (only in standby mode)
03	Parallel phase	1-Phase-U (L1) 2-Phase-V (L2) 3-Phase-W (L3) Default:1 (only in standby mode and parallel system)
04	Synchronize parallel parameters	1 (Press <ENTER> to trigger the effect once) Default:0
05	Fault unlock	1 (Press <ENTER> to trigger the effect once) Default:0
06	Fan dedusting	1 (Press <ENTER> to trigger the effect once) Default:0
07	Parallel address	1~Max (U: 3 / V: 2 / W: 2) Default:1
08	Independent mode selection at battery bank of parallel system	0-Disable 1-Enable Default:0
<b>ACin Parameter</b>		
10	AC in source selection	0-Grid 1-Generator Default:0 (only in standby mode)
11	Power assist current	0~Max(Rate AC input Current) Step:1A Default: Max
12	AC in source priority	0-AC First 1-BATT First 2-Time Ctrl 3-Ubat Ctrl/ SOC Ctrl 4-AC IN backup Default:0

13	Maximum AC in charging current	0~Max(Rate AC charge current) Step:1A Default: Max
14	Maximum AC in voltage	240~265V Step:1V Default:265V
15	Minimum AC in voltage	145~200V Step:1V Default:175V
16	Maximum AC in frequency	51~55Hz (@50Hz) 61~65Hz (@60Hz) Step:1Hz Default:55Hz
17	Minimum AC in frequency	42~49Hz (@50Hz) 52~59Hz (@60Hz) Step:1Hz Default:45Hz
18	AC wave harmonic adaption	0-Normal 1-Weak AC Input Default:0
21	AC in connect delay	20~990s Step:10s Default:20s
23	Low AC in alarm control	0-Display 1-Shield Default:1
24	Maximum ACin charging current in the ACin backup mode under the low battery voltage condition	0~Max(Rate AC charge current) Step:1A Default: Max
25	Searchload enable	0-Disable 1-Enable Default:0
26	Searchload gate	25~500W Step:1W Default: 80W
<b>Battery parameter</b>		



30	Battery type	0-GEL/OPzV 1-AGM 2-Lead-Carbon 3-Flooded 4-Traction 5-Customerize 6-TBB SUPER-L Default:0
31	Maximum system charging current	5~Max (Max DC Couple system charge current) Step:5A Default:30A
32	Bulk charging voltage (C.V voltage)	Step:0.1V Default:14.1V/(12V/cell) (≥Floating charging voltage )
33	Floating charging voltage (C.F voltage)	Step:0.1V Default:13.6V/(12V/cell) (≤Bulk charging voltage )
34	Low battery alarm voltage	10.0~13.0V Step:0.1V Default:11.0V/(12V/cell) (≥Low battery protect voltage)
35	Low battery protection voltage	9.5~12.0V Step:0.1V Default:10.5V/(12V/cell) (≥Low DC cut-off voltage) (≤Low battery alarm voltage)
36	Low DC cut-off voltage	9.0~11.0V Step:0.1V Default:9.9V/(12V/cell) (≤Low battery protect voltage)
37	Minimum bulk charging time	10~600min Step:5min Default:30min
38	Maximum absorption charging time	1~120h Step:1h Default:8h
39	Charging cycle time	8~960h Step:8h Default:240h

40	Charging temperature compensation coefficient	0~30mV/°C (for 12V) 0~60mV/°C (for 24V) 0~120mV/°C (for 48V) Step:1 mV/°C Default:18 mV/°C/(12V/cell)
41	Charging temperature compensation control	0-Disable 1-Enable Default:1
42	Low battery alarm recover voltage	11.0~14.0V Step:0.1V Default:13.0V/(12V/cell)
43	Low SOC alarm threshold	15~90% Step:1% Default:15% (≥Low SOC protect threshold)
44	Low SOC protect threshold	3~50% Step:1% Default:5% (≤Low SOC alarm threshold)
45	Battery over temperature threshold	25~65°C Step:1°C Default:55°C
46	Battery equalization control	0-OFF 1-ON Default:0 (Only in charge mode)
47	Battery equalization voltage	15.5~16.3V Step:0.1V Default:15.5V/(12V/cell)
48	Battery equalized time	30~90min Step:5min Default:30min
49	Battery Ah	50~5000Ah Step:50Ah Default:200Ah
50	BMS over voltage alarm Control BMS	0-Display 1-Shield Default:0

51	ACin stop charging voltage in the ACin backup mode	11.5~14.5V Step:0.1V Default:13.0V/(12V/cell) ( $\leq$ Float charging voltage - 0.1) ( $\geq$ Low battery alarm voltage + 0.1)
52	BMS lower charge voltage	0~2.0V Step:0.1V Default:0V
53	ACin stop charging SOC in the ACin backup mode	30~99% Step:1% Default:80% ( $\geq$ Low SOC alarm threshold + 1)
54	SOC enough threshold	30~99% Step:1% Default:80% ( $\geq$ Low SOC alarm threshold + 1)
<b>Mode Setting</b>		
60	Common neutral line	0-Disable 1-Enable Default:0 (only in standby mode)
61	Connect Neutral to GND Inside	0-Disable 1-Enable Default:1 (only in standby mode)
62	Bypass supply control	0-Disable 1-Enable Default:1
63	N2G voltage detect (The voltage between the Neutral and the GND)	0-Disable 1-Enable Default:1
64	Main switch selection	0- Default 1- Mobile 2- REGO System Default:0
65	Input Dry Contact EPO Function	0-Disable 1-Enable Default:1 (only in standby mode)

66	Charging current optimization	0-Disable 1-Enable Default:0 (only in standby mode)
67	MPPT charger number	1~6 Step:1 Default:1
68	BGK_Module	For48V: 0-N/A 1-BGK-12 For24V: 0-N/A 1-BGK-Balancer Step:1 Default:0 (Not lithium-ion batteries for 24V and 48V system)
69	BGK_RESTART	1 (Press <ENTER> to trigger the effect once) Default:0
70	Dry contact function	0-Default 1-User Define Default:0
71	Dry contact 1 define	0- Ubat Low 1- OverLoad/OT 2- INV Fault 3- ACin Error 4- ACin Charging 5- ACin Ready 6- ACin Voltage (>40V) 7- Fan Running Default:0
72	Dry contact 2 define	0- Ubat Low 1- OverLoad/OT 2- INV Fault 3- ACin Error 4- ACin Charging 5- ACin Ready 6- ACin Voltage (>40V) 7- Fan Running Default:0

73	Remote control enable	0-Disable 1-Enable Default:1
74	Remote update enable	0-Disable 1-Enable Default:0
75	MPPT Offline alarm control	0-Display 1-Shield Default:0
76	Error restart enable	0-Disable 1-Enable Default:0
77	LCD backlight keep-on enable	0-Disable 1-Enable Default:1
<b>Version</b>		
80	Software version	(Ready only)
81	Firmware version	(Ready only)
82	MPPT Software version	(Ready only)
83	Year	20~99 Default:N/A
84	Month	1~12 Default:N/A
85	Day	0~ The last day of this month Default:N/A
86	Hour	0~23 Default:N/A
87	Minute	0~59 Default:N/A

## 6. FAQ

### 6.1 Fault code

When inverter fault occurs, press the ESC button to view the fault code. The digital tube in the middle of LCD displays the fault code, and the digital tube on the left side of LCD displays the "Err".

#### 6.1.1 Inverter Fault

Fault Code	Description	Solution
01	The DC bus is over voltage	Check the battery voltage.
02	The DC bus is under voltage	Check the battery connection and the voltage.
03	Hardware protection against DC bus over voltage	Check the battery voltage and the charger output voltage
04	Abnormal auxiliary power supply	Restart the inverter. Contact the installer in case it still exists
05	The heat sink's temperature is too high	Check and assure the inverter has good ventilation
06	The transformer's temperature is too high	Too high ambient temperature.
07	Abnormal sampling	Restart the inverter. Contact the installer in case it still exists.
08	Abnormal ROM	
09	Output short circuit	Check if there is a short circuit at the loads.
10	Output over load	Reduce the loads.
11	Abnormal cooling system	Checking if fan is working properly.
12	Battery is severely under voltage	Connect to a valid grid or generator. Restart the inverter and charge the battery.
14	Instantaneous over current	Check if there is a short circuit at the loads.
15	Emergency stop	Check the EPO Dry Input.
16	Abnormal Relay	Restart the inverter. Contact the installer in it case it still exists.

## 6.1.2 MPPT Fault

Fault Code	Description	Solution
17	The DC bus is over voltage	Check the PV input voltage.
18	The battery is under voltage	Check the battery voltage.
19	Hardware protection against DC bus over voltage	Check the battery voltage and the charger output voltage
20	Buck short circuit	Check if there is a short circuit at the MPPT output.
21	The Buck 1 is over current	Check the MPPT output connection. Restart the equipment, contact the installer in case the error still exists.
22	The Buck 2 is over current	
23	The control board's temperature is too high	Check fan ventilation.
24	The heat sink's temperature is too high	Too high ambient temperature.
25	Abnormal auxiliary power supply	Restart the MPPT. Contact the installer in case the error still exists.
26	Abnormal auxiliary power supply (hardware)	
27	Abnormal sampling	
28	Abnormal ROM	

## 6.2 Warning code

When inverter fault occurs, press the ESC button to view the warning code. The digital tube in the middle of the LCD will display the warning code.

### 6.2.1 Inverter Warning

Warning Code	Description	Solution
01	The battery is over voltage	Check the battery voltage.
02	The battery is under voltage	Check the battery voltage.
03	The battery is under voltage protection	Check the battery voltage.
04	Overload warning	Reduce the loads.
05	Heat sink NTC fail	Power off the inverter and check the

06	Transformer NTC fail	internal NTC connection. Contact the installer if the fault still exists.
07	The battery temperature is too high	Check battery sensor connection; Check battery temperature; Check battery connection
08	Abnormal Fan	1.Check whether the fan is blocked.
		2.Open the case, check the fan connection. Contact the installer if the fault still exists.
09	Abnormal parallel connection	Check the connection of the parallel communication cable.
10	Abnormal CAN communication	Check the parallel parameter setting.
11	Parallel address conflict	Check the parallel parameter setting (ID address)
12	Parameters do not match	Check the parameter setting or trigger the Parameter Sync.
13	synchronization overtime	
14	The system mode and the parameter setting do not match	Check the parameter setting (Lithium battery)
15	Abnormal AC output in the parallel system or the three systems	Check the output wire connection
16	Abnormal internal communication of the LCD	Open the case, check the LCD wire connection. Contact the installer if the fault still exists.
20	AC input is over voltage	Check the AC input voltage and the connection
21	AC input is under voltage	
22	AC input is over frequency	
23	AC input is under frequency	
24	Abnormal AC input phase sequence	
25	Abnormal voltage between the N and the GND	1.Check the ACin L-N connection.
		2.Check the GND connection.
30	Abnormal Communication between the inverter and the DSP	Open the case, check all the inner connections. Contact the installer if fault still exists.
31	Software and hardware matching error	Restart the inverter. Contact installer if the fault still exists.



### 6.2.2 MPPT Warning

Warning Code	Description	Solution
62	MPPT current limitation alarm	Check if there is a short circuit at the output
64	Heat sink NTC fail	Power off the inverter and check the internal NTC connection. Contact the installer if the fault still exists.
66	Abnormal Fan	1.Check whether the fan is blocked.
		2.Open the case, check the fan connection. Contact the installer if the fault still exists.
79	Communication off line	Check the comm connection with the inverter at the DC Couple system

### 6.2.3 BMS Warning

Warning Code	Description
40	The lithium module is over voltage protection.
41	The lithium module is under voltage protection.
42	The lithium module's temperature is too high.
43	The lithium module's temperature is too low.
44	The lithium module's discharging current is over normal value.
45	The lithium module's charging current is over normal value.
46	Fault occurs on the lithium Battery Module.
50	The lithium module is over voltage.
51	The lithium module is under voltage.
52	The lithium module's temperature is too high.
53	The lithium module's temperature is too low.
54	The lithium module's discharging current is over normal value.
55	The lithium module's charging current is over normal value.

56	Abnormal Communication among the Lithium modules.
57	Abnormal Communication with the inverter.
58	Lithium module low SOC warning.

#### 6.2.4 BGK Warning

Warning Code	Description
80	Battery over voltage alarm.
81	Battery under voltage alarm.
82	The single battery voltage is lower than the average voltage.
83	The single battery voltage is higher than the average voltage.
84	The battery temperature is too high.
85	NTC fail.
86	The Battery Cell voltage does not match.
87	Communication address error.
88	Communication error with the inverter.
89	Communication error among the BGK modules.
90	System initialization error.

## 7. Specification

Series	Apollo Maxx				
Model	2.0M	3.0M	2.0S	3.0S	5.0S
Product Topology	Transformer based				
Power Assist	Yes				
AC inputs	Input voltage range:175~265 VAC, Input frequency:45~65Hz				
AC input Current (transfer switch)	32A				50A
<b>Inverter</b>					
Nominal battery voltage	24VDC		48VDC		
Input voltage range	21~34VDC		42~68VDC		
Output	Voltage: 220/230/240 VAC $\pm$ 2%, Frequency: 50/60 Hz $\pm$ 0.1%				
Harmonic distortion	<2%				
Power factor	1.0				
Cont. output power at 25°C	2000VA	3000VA	2000VA	3000VA	5000VA
Max Output power at 25°C	2000W	3000W	2000W	3000W	5000W
Peak power (5 sec)	6000W	9000W	6000W	9000W	15000W
Maximum efficiency	94%		95%		96%
Zero load power	11W	14W	11W	14W	18W
<b>Charger</b>					
Absorption charging voltage	28.8VDC		57.6VDC		
Float charging voltage	27.6VDC		55.2VDC		
Battery types	AGM/ GEL/ OPzV/ Lead-Carbon/ Li-ion/ Flooded/ Traction/ TBB SUPER-L(48V series)				
Battery Charging current	50A	80A	25A	40A	70A
Temperature compensation	Yes				
<b>Solar Charger Controller</b>					
Max output current	60A				90A
Maximum PV power	2000W		4000W		6000W
PV open circuit voltage	150V				
MPPT voltage range	65V~145V				
MPPT charger maximum efficiency	98%				
MPPT efficiency	99.5%				
Protection	a) output short circuit, b) overload, c) battery voltage too high d) battery voltage too low, e) temperature too high, f) input voltage out of range				
<b>General data</b>					
AC Out1 Current	32A				50A
AC Out2 Current	32A				
Transfer time	<0ms(<15ms when WeakGrid Mode)				
Remote on-off	Yes				
Programmable relay	2x				
Protection	a) output short circuit, b) overload, c) battery voltage over voltage d) battery voltage under voltage, e)over temperature, f) Fan block g) input voltage out of range, h) input voltage ripple too high				
CAN Bus communication port	For parallel and three phase operation, remote monitoring and system integration				
General purpose com. Port	RS485 (GPRS, WLAN optional)				
Operating temperature range	-20 to +65°C				
Storage temperature range	-40 to +70°C				
Relative humidity in operation	95% without condensation				
Altitude	2000m				
<b>Mechanical Data</b>					
Dimension	499*272*144mm				570*310*154mm
Net Weight	17kg	20kg	17kg	20kg	32kg
Cooling	Forced fan				
Protection index	IP21				
<b>Standards</b>					
Safety	EN-IEC 62477-1, EN-IEC 62109-1, EN-IEC 62109-2				
EMC	EN61000-6-1, EN61000-6-2, EN61000-6-3, EN61000-3-11, EN61000-3-12				

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