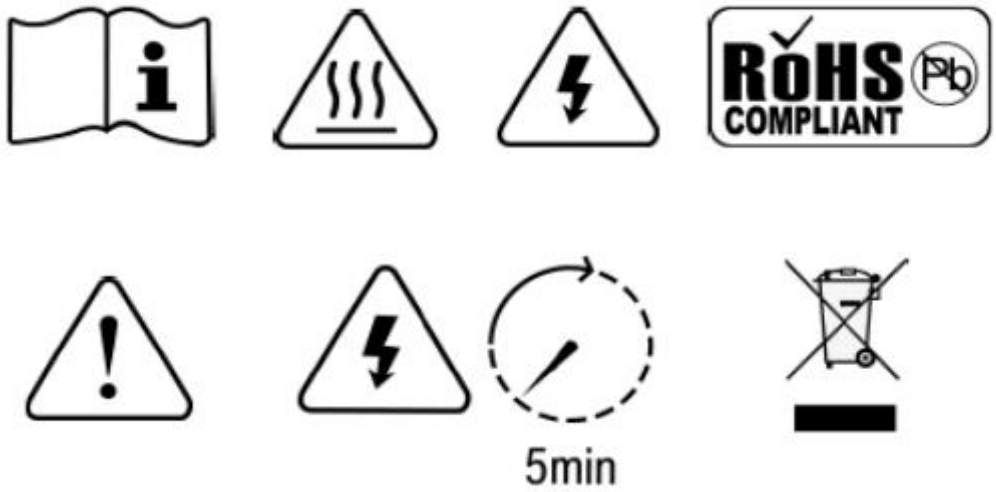
TBB POWER

Version: A1.3

SOLAR HYBRID INVERTER

USER MANUAL

Apollo Matrix Series



WARNING: HIGH VOLTAGE INSIDE

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

MADE IN CHINA

Disclaimer

Unless specially agreed in writing, TBB Power Co., Ltd

- Take no warranty as to the accuracy, sufficiency or 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 offers a 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 a procedure for installations. This manual is for anyone intending to install our equipment.

General Instruction

Thanks for choosing our products and this manual is suitable for Apollo Matrix solar hybrid inverter. This chapter contains important safety and operation instructions. Read and keep this User Guide well for later reference.

The Apollo Matrix solar hybrid inverter needs to be installed by professionals and please pay attention to the following points before installation:

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

- Please connect positive terminal “+” of the battery to “+” input of the inverter.
- Please connect negative terminal “-” of the battery to “-” input of the inverter.
- Please use the shortest cable to connect and ensure a secure connection.
- While connecting, please secure the connection and avoid short cut between the positive terminal and the negative terminal of the battery, which will cause damage to the battery.
- Inverter will have high voltage inside. Only an authorized electrician can open the case.
- The inverter IS NOT designed to use in any life-sustaining equipment.

Contents

1. General Safety Instruction

Safety Instruction

As dangerous voltages and the high temperature exist within the Apollo Matrix solar hybrid inverter, only the qualified and authorized maintenance personnel is permitted to open and repair it. Please make sure Apollo Matrix solar hybrid inverter is turned off before opening and repairing it.

This manual contains information concerning the installation and operation of the Apollo Matrix solar hybrid inverter. All relevant parts of the manual should be read before commencing the installation. Please follow the local stipulation meantime.

Any operation against safety requirements or design, manufacture, safety standard is out of the manufacturer warranty.

General Precaution

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

Precaution Regarding Battery Operation

- Use plenty of freshwater to clean in case battery acid contacts skin, clothing, or eyes and consult with the doctor as soon as possible.
- The battery may generate flammable gas during charging. NEVER smoke or allow a spark or flame in the vicinity of the battery.
- DO NOT put the metal tool on the battery, as spark and 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

Brief Instruction

1.1.1 General Description

Apollo Matrix is the new generation solar hybrid inverter designed for various types of off-grid systems including the AC Couple system, DC Couple system, and generator hybrid system. It can provide UPS class switching speed and support parallel as well as composing three-phase system.

Apollo Matrix delivers high reliability, performance, and industry-leading efficiency for mission-critical applications. 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 Matrix can automatically adjust its charging current to avoid the grid or generator being overloaded. In case of temporary peak power appears, it can work as the supplement source to the generator or grid.

1.1.2 Naming Rules

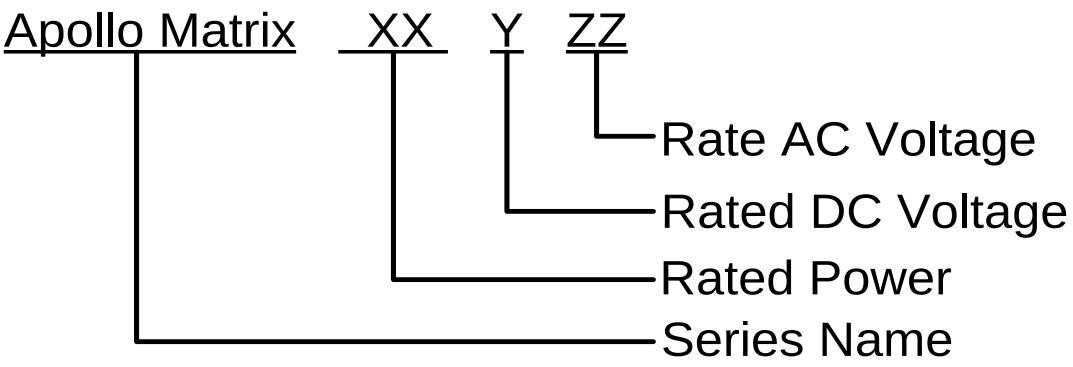


Figure	Explanation	
Apollo Matrix	Series name	
3.0	Represent rated capacity	3000W
5.0		5000W
S	Represent rated DC voltage	48VDC
--	Represent rated AC voltage	230VAC

Naming example **:** Apollo Matrix 5.0S
Apollo Matrix solar hybrid inverter
Rated capacity **:** 5000W
Rated DC voltage **:** 48V

Structure

1.1.3 Front

Apollo Matrix 3.0S, Apollo Matrix 3.0M

Apollo Matrix 5.0S

Figure 2-1 Front View of the Solar Hybrid Inverter Structure

1.1.4 Control Panel

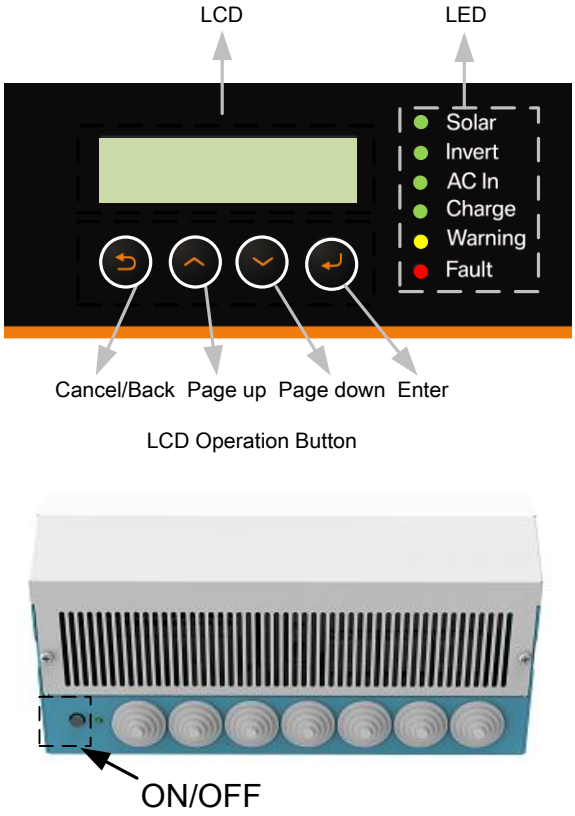


Figure 2-2 Solar Hybrid Inverter Control Buttons

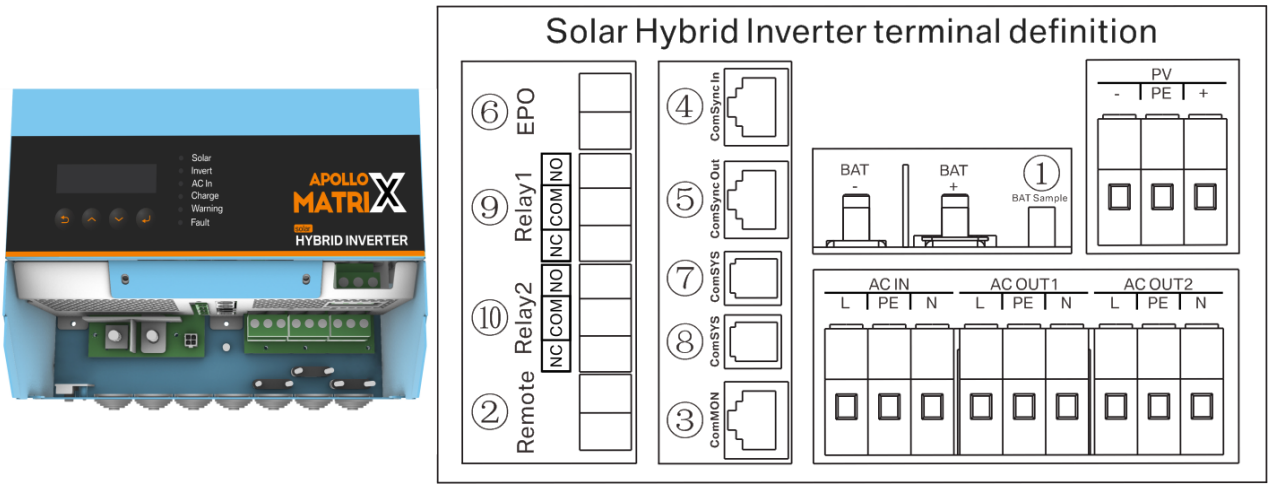
Table 2-1 Control Buttons

Button	Function
	➢ Cancel the selection. ➢ Display the previous level of the menu.
	➢ Display the previous page. ➢ Increase the value of the selected item. ➢ Press the button for more than 2 seconds to scroll the page up.
	➢ Display the next page. ➢ Decrease the value of the selected item. ➢ Press the button for more than 2 seconds to scroll the page down.
	➢ Enter into this menu, displaying the next level. ➢ Select and confirm the selection of a menu item.

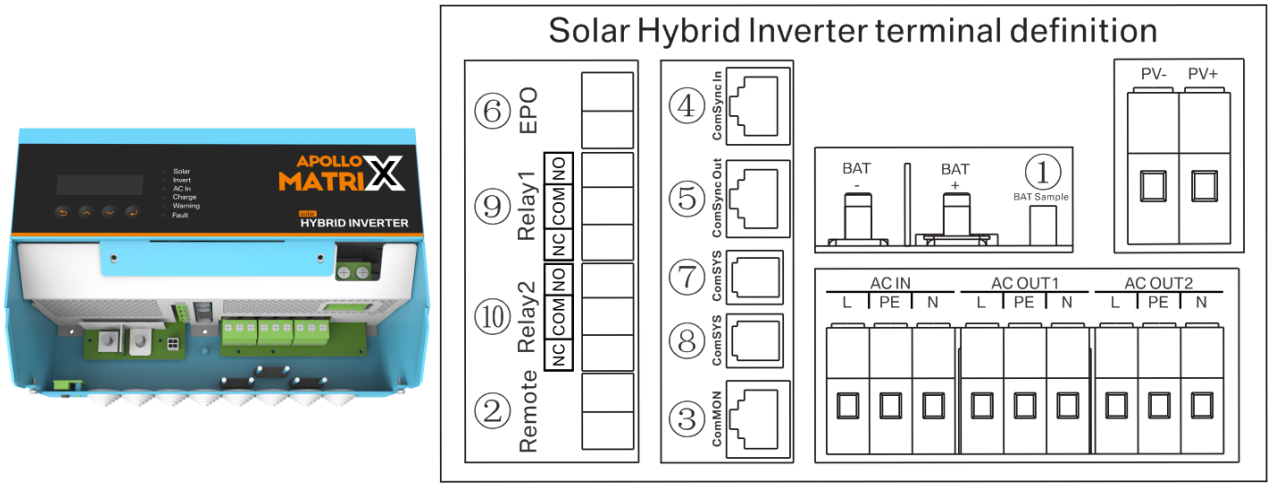
Table 2-2 LED Directive Function

LED	Function
Solar	➢ It will light up when the inverter is in the solar charging mode.
Invert	➢ It will light up when the inverter is in the inverter mode.
AC In	➢ It will flash when the inverter detects any input, mains or generator. ➢ When the inverter is in the mode of using the bypass to supply power, u -sing the bypass to charge, and feeding power to the grid, the indicator light will be always on.
Charge	➢ It will flash when the inverter is in the float charging status. ➢ It will light up when the inverter is in the bulk or absorption charging status.
Warning	➢ It will flash when there is a warning in the inverter.
Fault	➢ It will flash when an error happens to the inverter.

1.1.5 Connection Compartment



Apollo Matrix 3.0S

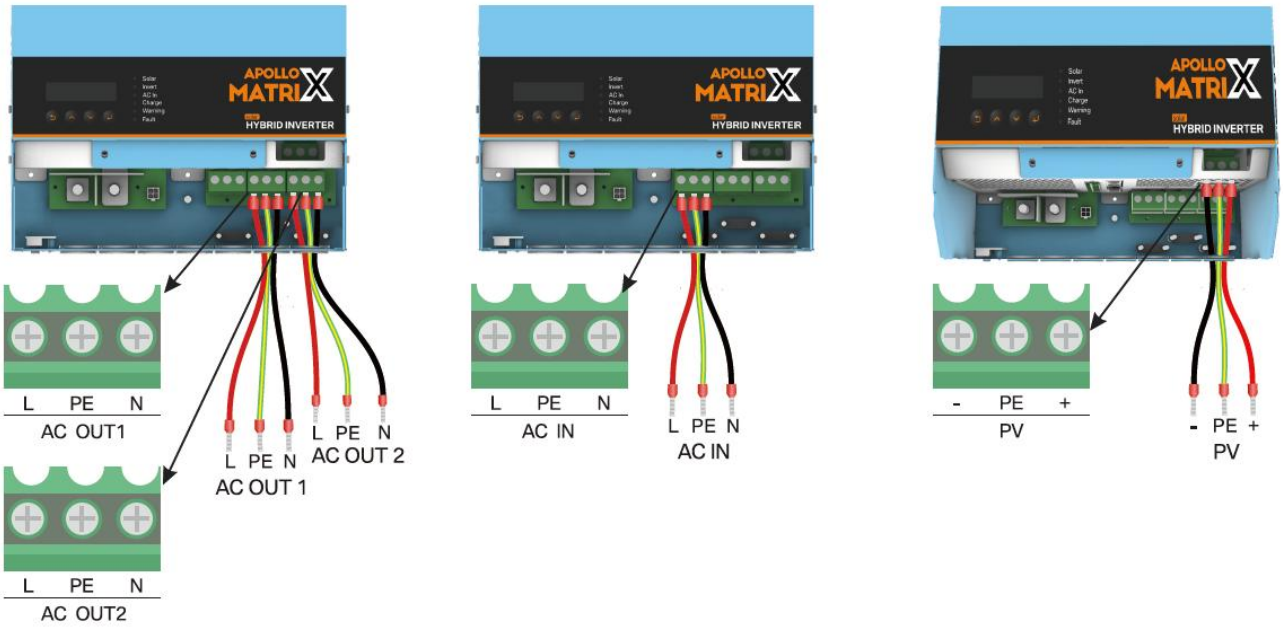


Apollo Matrix 5.0S

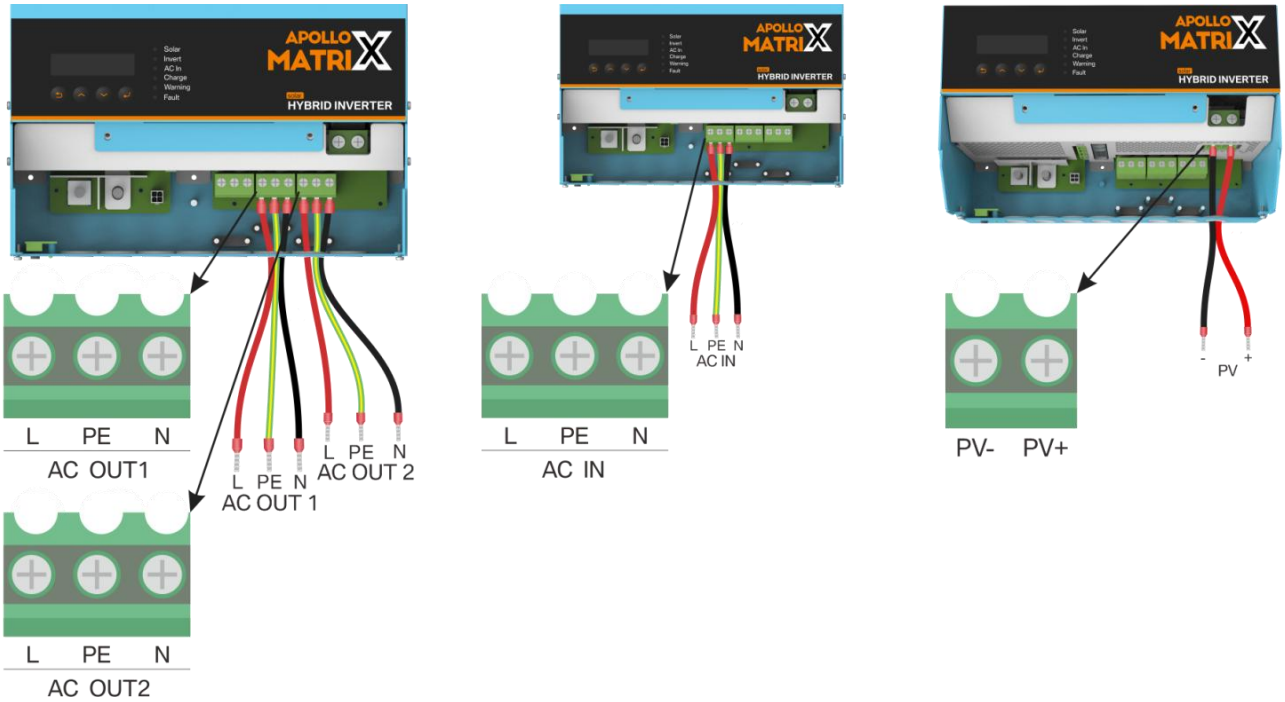
Figure 2-3 Signal Terminals

Table 2-3 Signal Terminal 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 (NO, C, NC)	Dry contact output control 1 (NO, C, NC) .
⑩	Relay2 (NO, C, NC)	Dry contact output control 2 (NO, C, NC) .



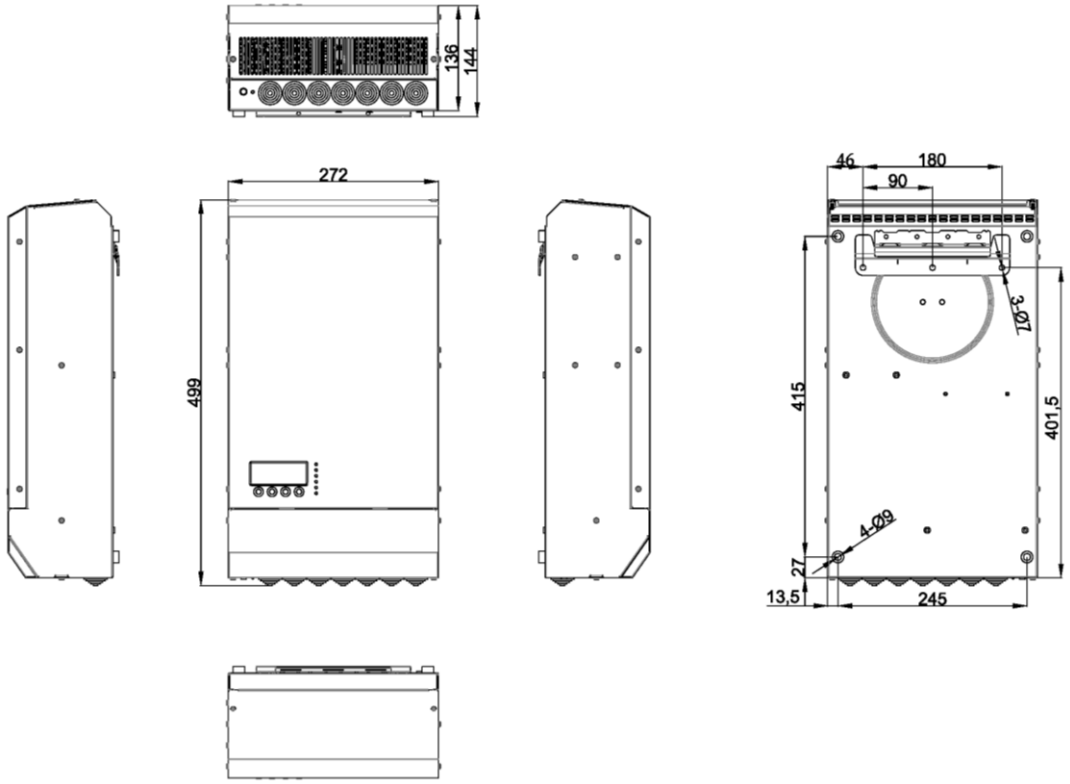
Apollo Matrix 3.0S, Apollo Matrix 3.0M



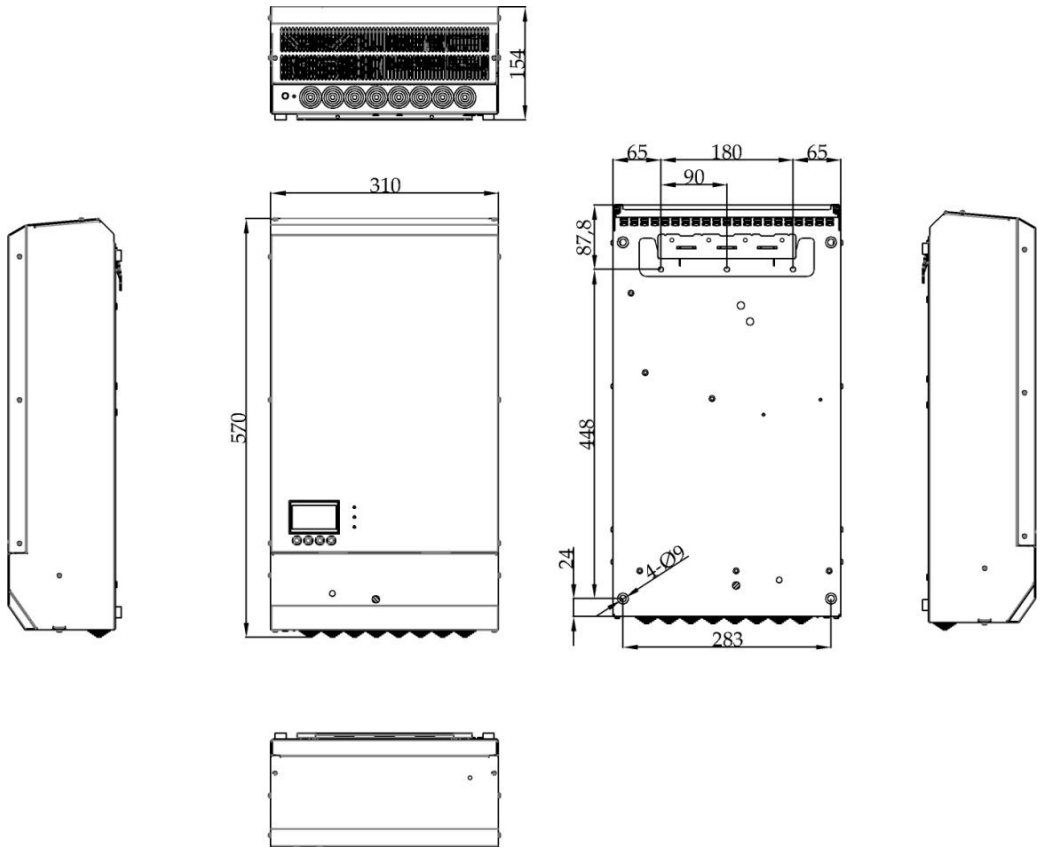
Apollo Matrix 5.0S

Figure 2-4 Power Terminals

1.1.6 Dimension



Apollo Matrix 3.0S, Apollo Matrix 3.0M



Apollo Matrix 5.0S

Figure 2-5 Dimension of the Solar Hybrid Inverter

Function

1.1.7 DC Couple and AC Couple System

Using Apollo Matrix together with a Solar Mate MPPT and a PV inverter from TBB Power, you can compose both the DC Couple system and AC Couple system. Featuring greater flexibility, the AC Couple system can achieve higher system power and is much more suitable for a commercial project. Please refer to 5.5.2.1 for the explanation in detail.

It is recommended to use IG series PV inverter from TBB Power to compose an AC Couple system. In case you want to use a third-party PV inverter, please consult with TBB Power sales.

1.1.8 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 a single-phase system, max three units can be connected in parallel. For a three-phase system, max six units can be connected together.

1.1.9 Power Control and Power Assist

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

1.1.10 System Working Mode

Apollo Matrix offers powerful functions for users to program for different systems, such as power backup, solar hybrid, ESS, ESS with peak tariff shaving, etc. Please refer to chapter 5.6.1 for details.

1.1.11 Built-in Load Management

There are two outputs built-in the Apollo Matrix. The AC output 1 is used to connect the critical loads, which will be a backup solution with the battery connected to the inverter. AC OUT2 is the secondary output and you can configure it with different functions, such as grid only, base on a specific time zone or specific battery voltage or SOC. Please refer to chapter 5.6.4 for details.

1.1.12 Powerful and Reliable Inverter

High Performance Pure Sine Wave

Apollo Matrix 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. A pure sine wave can guarantee the correct function of sensitive equipment (computer, laser printer, TV etc.). Also, your home appliances such as fridge, microwave and power tools will work more smoothly, and more efficiently.

High Surge Power Capability

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

Battery Low Voltage/SoC Protection

Apollo Matrix provides configurable low voltage/SoC protection for the battery.

1.1.13 Professional Battery Charger

Multi Stage Sophisticated Charging Algorithm for the Lead Acid Battery

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

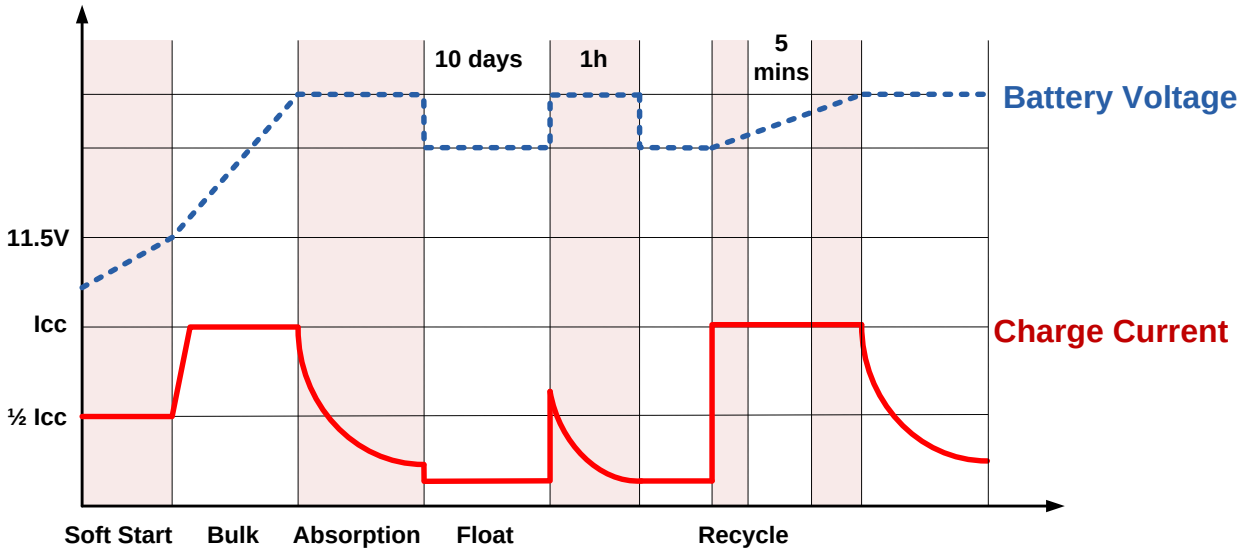


Figure 2-6 Multi stage sophisticated charging algorithm for the lead acid battery

The float charging and the recycle charging program guarantee that your battery gets proper maintenance in case of long time connection and less aging in case of long time connection without being used.

Battery Sample Cable (Temperature and Voltage)

The battery temperature is a key factor in the correct charging for the 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 rather than being overcharged or undercharged. All charging voltages recommended by the battery manufacture are in fact ONLY applied at 20℃-25℃.

The Bat sample cable (battery temperature and voltage sensor) supplied together with Apollo Matrix measures the battery temperature and automatically adjusts it in real time to properly charge your batteries at compensation rate. If the Bat sampling cable is missing, Apollo Matrix will use 25℃ as the default setting. This feature is especially recommended for sealed batteries and/or when the battery temperature is expected to fluctuate significantly.

Multi Chemical Batteries Available

Apollo Matrix offers premium charging algorithm for the common chemical lead acid batteries include 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 Matrix has the built-in communication protocol, making it compatible with 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 battery unattended while performing the desulfuration.

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

If battery type is set as 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 Matrix provides a manual equalization program. If it is recommended by the battery manufacturer, you can initiate the desulfuration program manually. Once you trigger on the equalization program, Apollo Matrix will perform equalization charging.

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

- Check electrolyte level and refill battery with 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 the 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 the heavily used battery, you may wish to equalize your battery. For the battery with light service only need to be equalized every 2-3 months.

Important:

- Equalization can damage your batteries if it is not performed properly. Always check battery fluid before and after equalization. Fill batteries only with distilled water.
- Always check the equalization switch is set back to OFF after each time's equalization.
- Battery manufactures' recommendations on equalization vary. Always follow the battery manufacturer's instructions so batteries are properly equalized. As a 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 protection, equalization charging can be performed if and only if you set the battery to be a traction, Flooded /OPzS batteries. If you choose AGM, GEL or Lead-Carbon, the EQ charging can't be performed.

1.1.14 Transfer

Uninterrupted AC Power

In case of voltage/frequency/waveform of AC input matches the minimum quality, the voltage will be switched directly to the AC output. Apollo Matrix solar hybrid inverter will work as a battery charger and the load will be powered by the AC input. The voltage of the AC output and the AC input will be the same.

In case of the AC input fails or exceeds the maximum AC input current set by the user, Apollo Matrix solar hybrid inverter will initiate a quick switching to the inverter, which will guarantee an undisturbed power. Upon AC input resumes or matches the quality, it will switch back again. Due to its ultra-quick transfer design, as quick as 0ms, Apollo Matrix solar hybrid inverter could be used as a UPS.

Ground Relay

The neutral output of Apollo Matrix solar hybrid inverter is automatically connected to earth when no external AC source is available. Once the external AC source is available, the ground relay will open. You can disable this feature through the TBB Link.

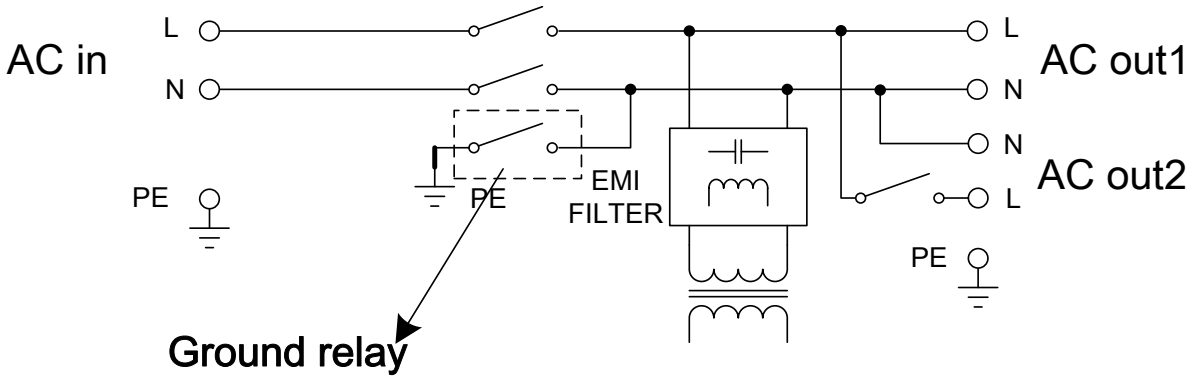


Figure 2-7 Ground Relay Schematic

1.1.15 Protect Function

The Apollo Matrix solar hybrid 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 Matrix 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 the battery, the equipment will automatically cut off the output according to the low voltage/SoC protection point set by the user.

1.1.16 Communication

Dry Contact Input

Apollo Matrix is equipped with two dry contacts input for remote on/off and EPO control.

Dry Contact Output

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

- Relay1: The relay is closed when the battery is under voltage.
- Relya2: The relay is closed when a fault or 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 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 metal conductive dust.

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

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 or a insulated box spanner to avoid battery shorting or the shorting of the battery cables.

Maximum torque: 12 Nm.

Model	Recommended cross section ϕ8 aperture copper terminal (Length<5m)
Apollo Matrix 3.0S	25mm²~50mm²
Apollo Matrix 5.0S	50mm²

4. Configuration

Check before Operation

Please check according to the following instructions before operation.

- 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 firmly and reliably.
- Double confirm the battery breaker is OFF.
- Make sure the cables are properly connected firmly and reliably.
- Reasonable installation space, clean and tidy environment, no construction residue.

Power ON

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 the invert LED to make sure the inverter is running normally.

Note: If it is the first time to boot, please set the parameters by following the setup wizard after the Step 2.

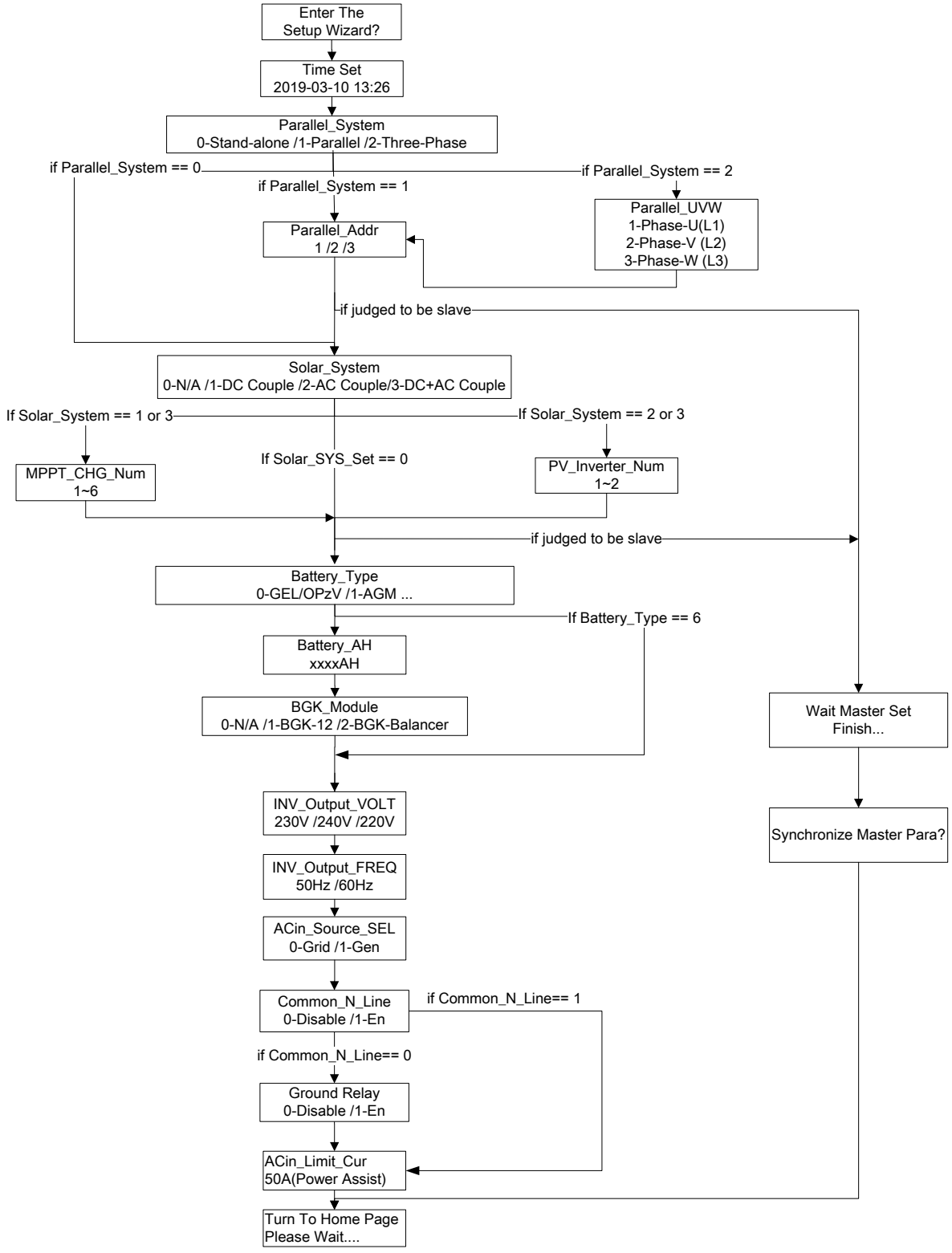
Power OFF

- Step 1: When the inverter is in the inverter 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.

Setup Wizard

For the purpose of a quick configuration, when turning on Apollo Matrix for the first time or after restoring it to the factory settings, the equipment will enter into the setup wizard automatically covering all basic setting you need to perform.

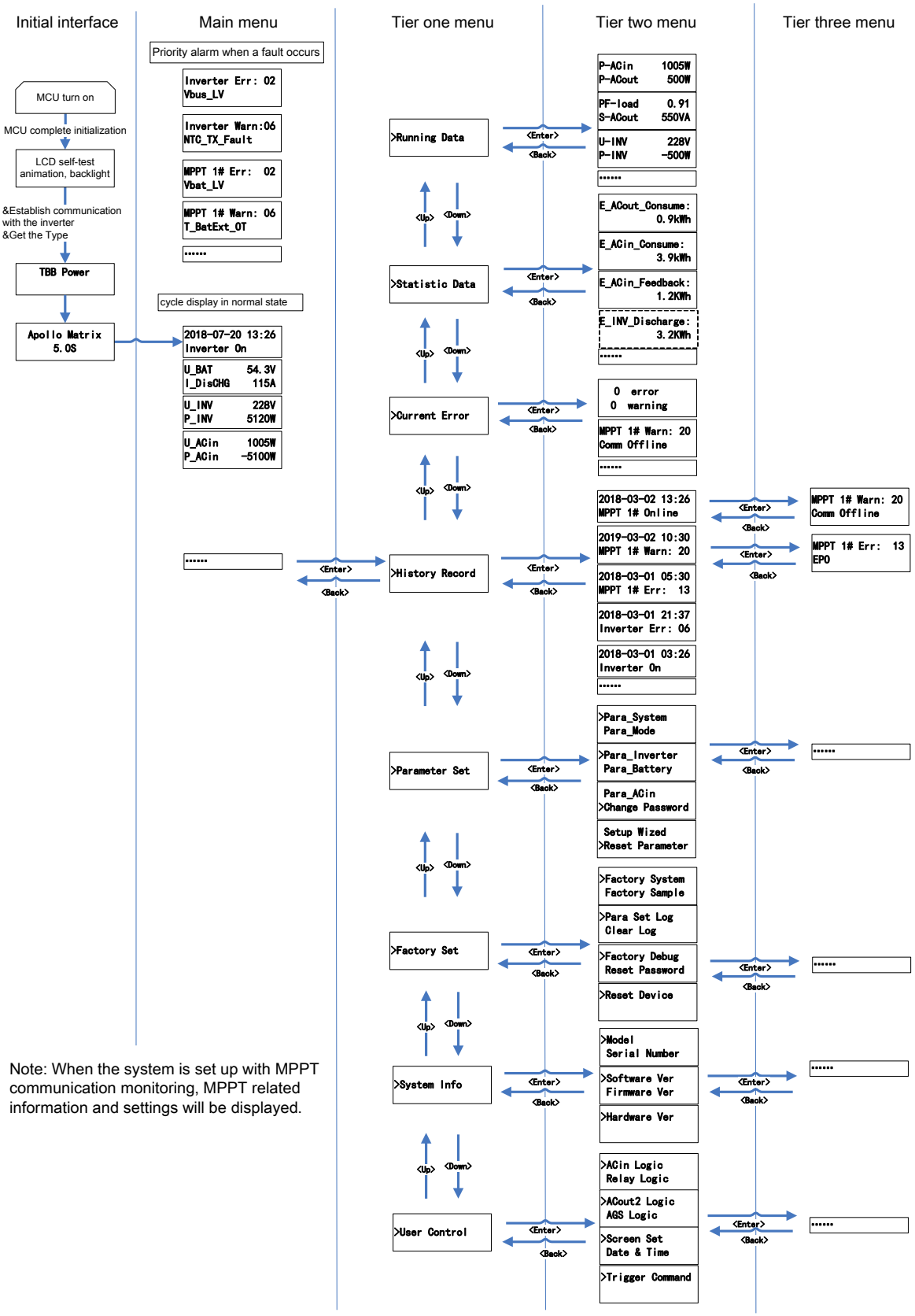
Please refer to 4.1.2 for detail explanation for each parameter.



5. Operation

Menu Introduction

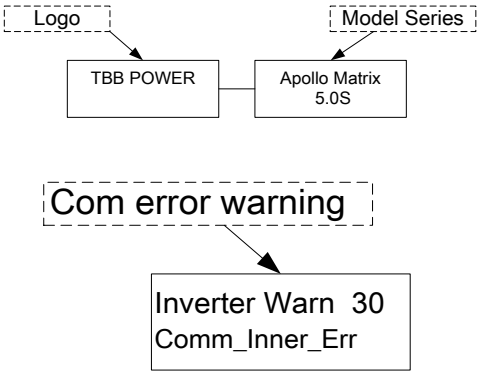
There will be a main menu and three-tier menu on the LCD showing all active parameters and the alarm information and you can configure all parameters for Apollo Matrix as well through the menu.



Note: When the system is set up with MPPT communication monitoring, MPPT related information and settings will be displayed.

Initial Interface

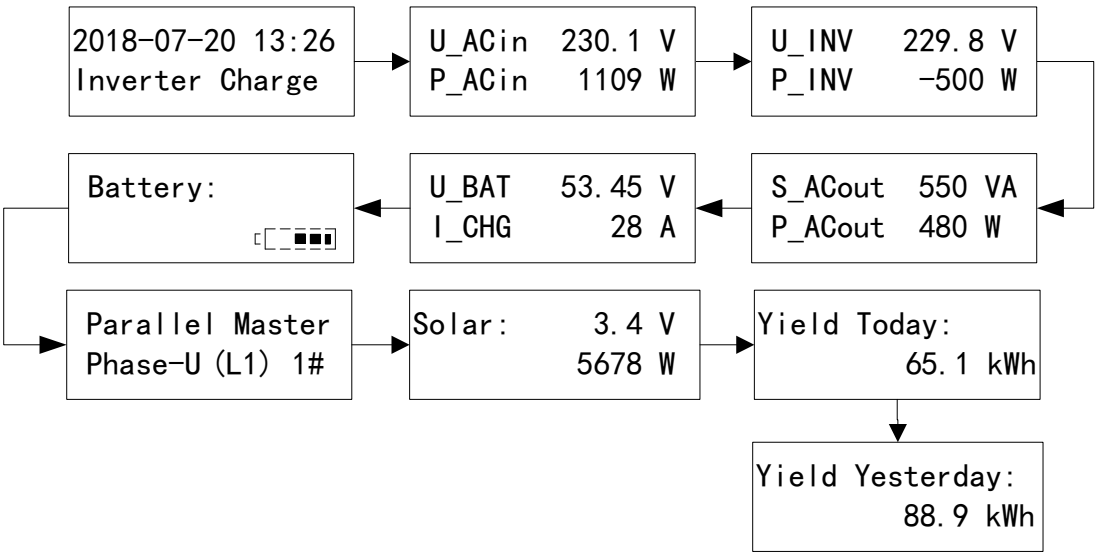
Once the inverter is powered on, the following screen will display the manufacturer name and the model number. In case of communication failure between the LCD and the inverter, there will be an alarm displaying as well.



Main Menu

The LCD main menu is a real-time information interface displaying data of the equipment. The default interval time is 5S, and the time can be set manually. When press <UP> and <Down> to turn pages. It will stay on the choosing page for 30S and the time can be set manually.

In the parallel system or three-phase system with the common battery pack, the battery's parameters are only displayed on the master inverter.

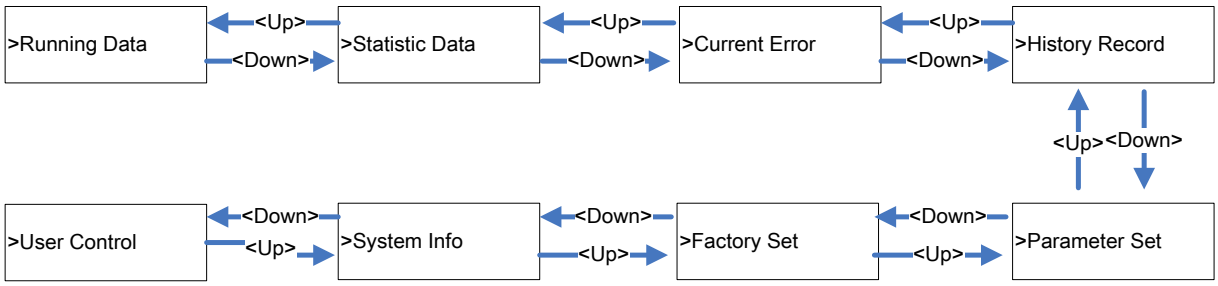


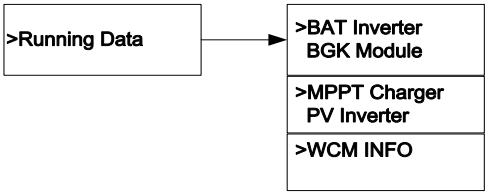
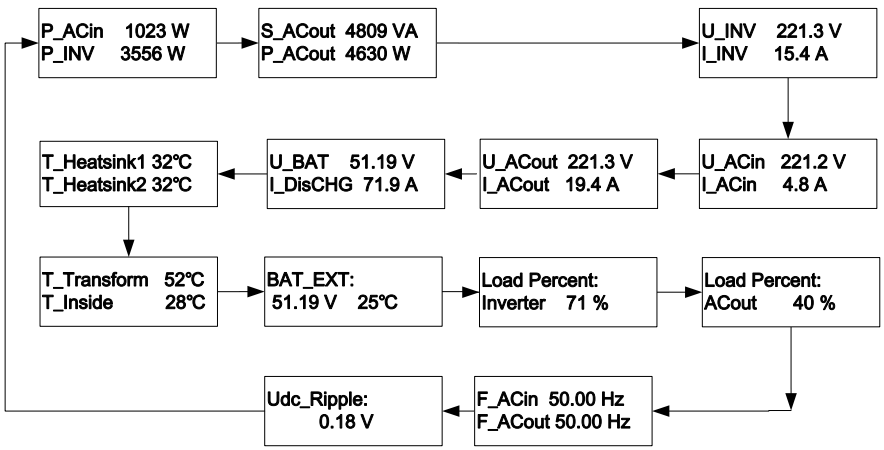
Tier One Menu - Information Query Interface

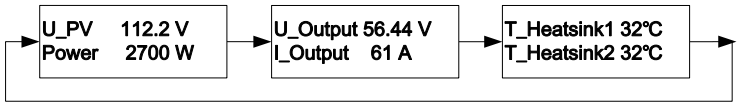
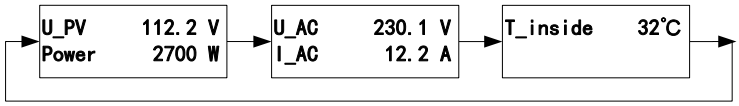
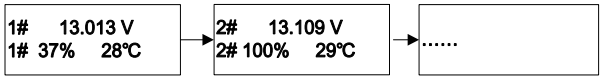
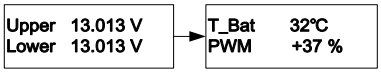
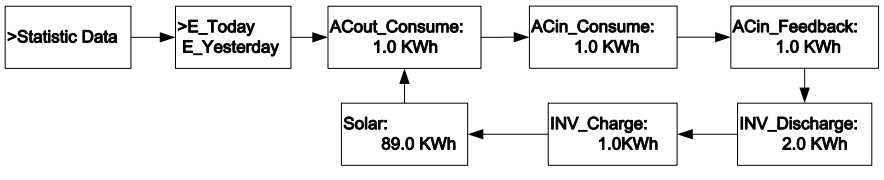
After press <Enter> button, you will approach Tier One Menu. Scroll on a specific screen and press <Enter> button, you can enter the Tier Two Menu and the Tier Three Menu. Press <Back> button, you can return to previous menu.

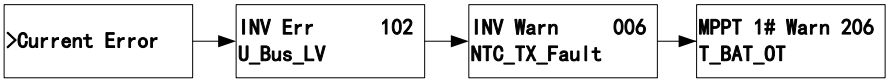
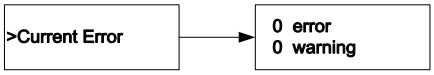
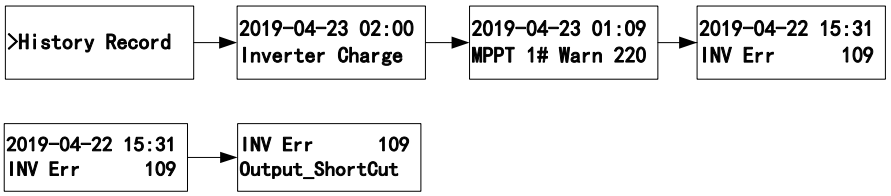
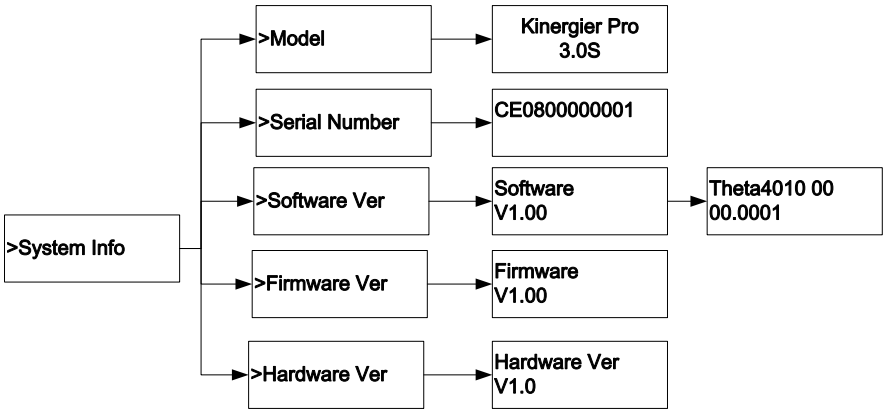
Among Tier one menu, there are three categories: information query, configuration and control.

Tier one menu



>Running Data	Select **Running Data** page, press <Enter> button you can approach all the active running data of Apollo Matrix. When other equipment is connected to the inverter, such as IG PV inverter, Solar Mate MPPT or Battery Guard BGK module, you can read the data through this screen  as well. After selecting **BAT Inverter**, press <Enter> button you can approach all the active running data of Apollo Matrix inverter. Through pressing <UP> and <Down> button, you can go through the current data of Apollo Matrix inverter.  Select **MPPT**, press <Enter> button you can approach all the active

	running data of the Solar Mate MPPT. Please notice that this data will be only available when you install Solar Mate MPPT from TBB Power.  Select **PV inverter**, press <Enter> button you can approach all the active running data of IG PV inverter. Please notice that this data will be only available when you install IG PV inverter from TBB Power.  Select **BGK**, press <Enter> button you can approach all the active running data of the BGK battery guard. By pressing <UP> and <Down> button, you can go through the current data for each battery cell and the working status of each BGK module. **BGK-12**  **BGK-Balancer:**  **WCM INFO:** 
>Statistic Data	Enter this page, you can check the statistic data of today and yesterday, including consumption KWh, AC charging KWh, PV Charging KWh, Battery Charging/Discharging KWh etc. In the parallel system or three-phase system with the common battery pack, the battery's parameters are only displayed on the master inverter. 

>Current Error	Enter this page, you can check the active alarm and error. Press <UP> and <Down> to scroll through the pages. For detailed explanation of the error code, please refer to Chapter 6.  Displaying like the following when there is no fault: 
>History Record	Enter this page, by pressing <UP> and <Down> button, you can review the history record including event and alarm. Holding the <UP> and <Down>, it will enter into auto scroll. If you want to check details for specific alarm, you can press <Enter> 
>System Info	Enter this page, you can check the manufacturing data of this Apollo Matrix inverter, including serial number, software version, firmware version, etc. 

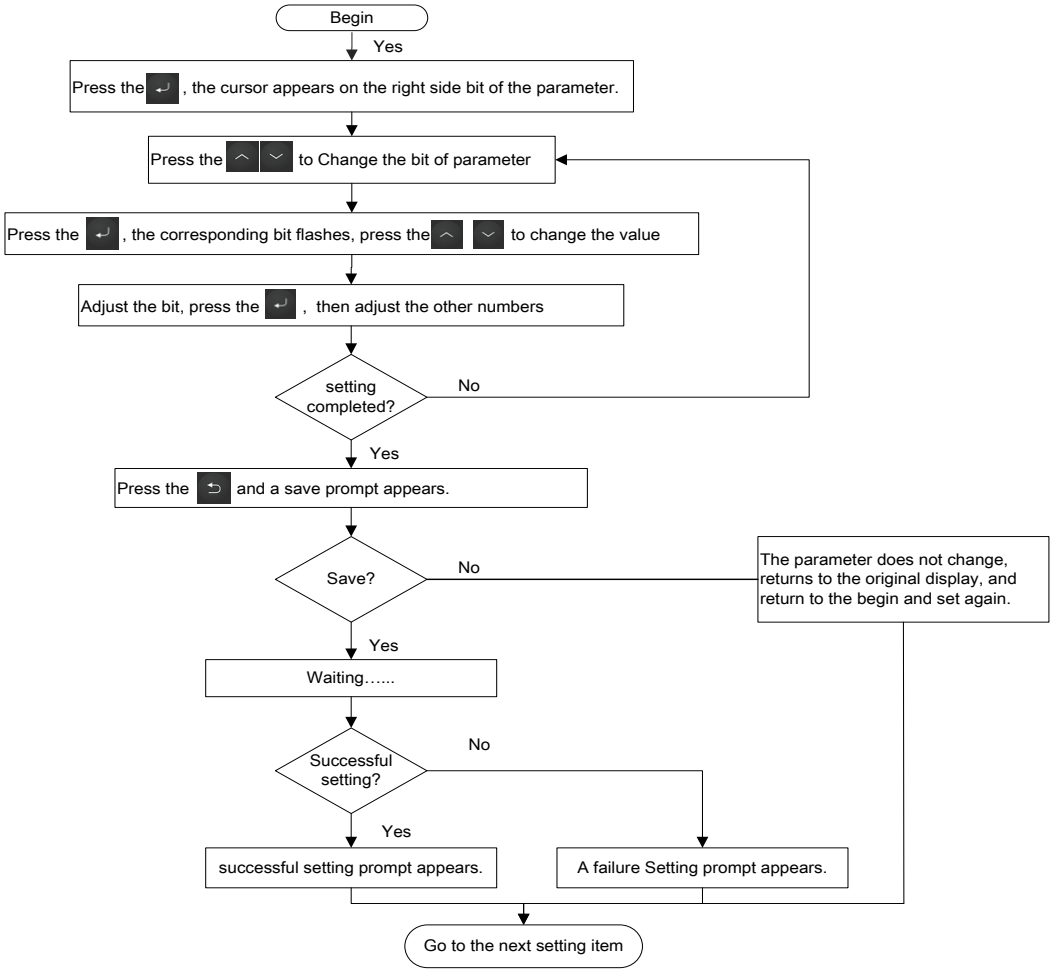
Tier One Menu - Configuration Interface

4.1.1 General Operation Instruction

Apollo Matrix offers unlimited possibility for users to program the inverter and system for different configurations, systems and applications. The configuration can be done by the combination of four switches on the front panel or through the TBB Link software supplied by TBB Power.

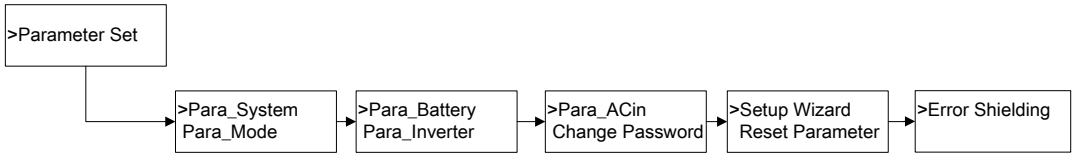
The following chapters explain how to configure the parameters through the combination of switches.

- Scrolling to the “Parameter Set” screen and press “Enter” to confirm.
- This menu is protected by the password. The default password is “1000” and it can be changed by the client.
- Choose the screen for the parameters you want to set.
- Combined four buttons, you can achieve all configurations of this chapter. Please find the following buttons for functions setting during the configuration.
  1. Press <UP> and <DOWN> button to choose specific number you want to program.
  2. Press <Enter> button to activate the entering.
  3. Press <UP> and <Down> button to choose digit you want to put.
  4. Press <Enter> button to confirm this digit.
  5. After entering all four digits, please press <Back> button and <Enter> button to confirm.



4.1.2 Parameter Set

A password is required to enter the parameter setting interface. The default is '1000' and it can be changed. This menu contains the following settings of submenus:



5.5.2.1 Para_System – System Parameter Setting

There are total three sub-menus including **Parallel_System, Solar_System and BMS_System.**

"Parallel System" submenu offers you all the parameters you need to configure when you are using Apollo Matrix to compose a single phase parallel system or three phase systems.

- When composing a single phase system, up to three units of Apollo Matrix can be connected together.
- Upon composing a three phase system, up to six units of Apollo Matrix can be connected together with two units on each phase.

Parallel_System:

	Item	Setting range	Description
Parallel System	Parallel_System	0-Stand-alone 1-Parallel 2-Three-phase	Set the unit in the stand alone or parallel or three-phase system. **Defaul**:0-Stand-alone
	Parallel_UVW	1-U(L1) 2-V(L2) 3-W(L3)	Set the unit in phase **Default**:1-U(L1)
	Parallel_Address	Parallel system:1~3 Three phase system:1~2	Can not set in Stand alone system. **Default**:1
	BAT_Independent	0- Disable(Common battery pack System) 1- Enable(Independent battery pack system)	Not applicable to AC Couple system and Stand-alone. **Default**: 0- Disable

Solar System submenu offers the approach to compose the DC Couple or AC Couple systems by using Apollo Matrix.

- When composing the DC Couple system, all the parameters you configured on the Apollo Matrix will be updated automatically on the Solar Mate MPPT.
- For the parallel system, only the master unit need to be configured.

Solar System:

	Item	Setting range	Description
Solar System	Solar_System	0-DC Coupling 1-DC+AC Coupling	Select Solar system you are intending to compose. DC Coupling: using Solar mate series MPPT Charger. AC Coupling: using IG series PV Inverter **Default:**0- DC Coupling
	MPPT_CHG_Num	1~6	Number of the Solar Mate MPPT connected.(only applicable for DC Couple system) **Default:**1
	PV_Inverter_Num	1~2	Number of the IG PV inverter connected. (only applicable for AC Couple system) **Default:**1
	FREQ_Drop Set---> Drop_Start_FREQ	50.1~51.0Hz (@50Hz) 60.1~61.0Hz (@60Hz)	Drop Start Freq： When frequency reaches this set value, PV inverter starts to derate. **Default**: 50.85Hz
	FREQ_Drop Set---> Drop_Stop_ FREQ	51.1~53.5Hz (@50Hz) 61.1~63.5Hz (@60Hz)	Drop Stop Freq: When frequency reaches this set value, PV inverter derates to the minimum power. **Default**: 53.05Hz
	FREQ_Drop Set---> Disconnect_ FREQ	51.5~54.5Hz (@50Hz) 61.5~64.5Hz (@60Hz)	Disconnect Freq: When frequency reaches this set value, PV inverter has no output. **Default**: 54.15Hz

5.5.2.2 Para_Mode

Para_Mode:

	Item	Setting range	Description
Para_Mode	Common_N_Line	0-Disable 1-Enable	Input and output Neutral line setting. Disable: The input and output Neutral lines are isolated. – normally used for the Grid connection Enable: Input and output Neutral lines are connected. – normally used for the Generator connection **Default**: 0-Disable
	Ground_Relay	0-Disable 1-Enable	The neutral output of inverter is automatically connected to earth when no external AC source is available. Disable: Neutral grounding is disable Enable: Neutral grounding is enable **Default**: 1-Enable
	Bypass_Supply_EN	0-Disable 1-Enable	Allow bypass to power the load in case the inverter fails or the battery reaches low voltage/ SoC. Disable: Bypass output is disabled Enable: Bypass output is enabled **Default**:1-Enable
	N2G_U_DET_EN	0-Disable 1-Enable	Voltage detection between Neutral and Ground. Disable: Disable the voltage detection Enable: Enable the voltage detection **Default**:1-Enable
		 With this function enabled, it can be used to detect reverse polarity of L and N input. Or, it can be used to detect if there is proper grounding of your grid input. Upon input reverse polarity or bad grounding, an alarm will be triggered on at the inverter.	
	Main_Switch_SEL	0-Default 1-Mobile 2-REGO System	Main Switch Control Mode Default: Inverter will controlled through membrane switch at the front panel. Mobile : It is designed for mobile application. An external remote panel MCK can be purchased from TBB Power to control the inverter working either at normal mode or charger only mode.

			REGO : It is designed for REGO system.The inverter can be controlled by the communication in the REGO System. **Default**: 0-Default
	EPO_Function_EN	0-Disable 1-Enable	Whether the EPO Function is Enabled Disable: Disable the EPO Funciton Enable: External signal will turn off the inverter, displaying fault by LED and LCD. **Default**: 0-Disable
	Remote_Ctrl_ EN	0-Disable 1-Enable	Whether or not allowing remote control (such as the APP or PC) to set parameters. Disable: Remote Ctrl mode is disabled. Enable: Remote Ctrl mode is enabled. **Default**: 1-Enable
	IDC_Optimize_EN	0-Disable 1-Enable	Optimize the charge current, reduce the current ripple. **Default**: 0-Disable
	Remote_Update	0-Disable 1-Enable	Enable ComMon(external communication) firmware remote upgrading, that will give user firmware upgrading right. **Default**: 1-Enable
	Err_Auto_Reset	0-Disable 1-Enable	Auto reset is enabled when the error has been solved. **Default**: 1-Enable

5.5.2.3 Para_Battery

With this menu, you can configure comprehensive parameters related to the battery and battery charging. There are three sub menus including **Basic Set, Advanced Set** and **EQ Control and Setting** which is only applicable for flooded and traction battery.

Basic Set

	Item	Setting range	Description
Basic Setting	Battery_Type	Five different types of the lead acid batteries and one lithium battery, as well as a customized battery type.	Set the following Battery Type chart. **Default**: 0-GEL/ OPzV
	Battery_Ah	50~5000Ah	Set the battery capacity (not applicable with TBB SUPER-L lithium battery) **Default**: 200Ah

Battery type Description

No	Battery Type	Absorption Charging Voltage	Float Charging Voltage	Charge rate	Max allowed Charge rate	EQ charging voltage
		Default	Default	Default		
0	GEL/OpzV	14.1V	13.7V	0.15C	0.25C	N/A
1	AGM	14.4V	13.5V	0.15C	0.25C	N/A
2	Lead-Carbon	14.1V	13.5V	0.2C	0.5C	N/A
3	Flooded	14.7V	13.5V	0.15C	0.25C	Enable (15.5V)
4	Traction	15.2V	13.5V	0.15C	0.25C	Enable (16.2V)
5	Customerize /Li-ion	14.2V (12/24V Sys) 13.3V (48V Sys)	14.0V (12/24V Sys) 13.1V (48V Sys)	0.3C	1.0C	N/A
6	TBB SUPER-L	BMS taking control of charging parameter (CAN)				

Advanced Set

The following parameters is applicable for the 12Vdc battery. If you are using 2Vdc battery to compose the battery bank, please multiply your actual voltage by 6 to enter each value.

	Item	Setting range	Description
Advanced set	SYS_CHG_MaxCur	5~900A	Battery bank allows maximum charging current. Note: there is a default current according to the battery type and size you choose, and it can be adjusted as well.
	DisCHG_MaxCur	5~2700A	Allowed maximum discharging current of the battery bank. **Default:** 300A
	U_Absorp_CHG	This value is affected when changing the battery type.	The absorption charging voltage (voltage mentioned here is refer to 12Vdc battery) Note: This value is affected when changing the battery type.
	U_Float_CHG	This value is affected when changing the battery type.	The float charging voltage (voltage mentioned here refers to 12Vdc battery) Note: This value is affected when changing the battery type.
	LV_PRO_Recover	11.0~14.0V	Undervoltage protection recovery value. (voltage mentioned here is refer to 12Vdc

			battery) **Default**: 13.0V
	BAT_LV_WARN	10.0~13.0V	Undervoltage warning for single battery. (voltage mentioned here is refer to 12Vdc battery) **Default**: 11V
	BAT_LV_Protect	9.5~12.5V	Undervoltage protection for single battery. (voltage mentioned here is refer to 12Vdc battery) **Default**: 10.5V
	U_DisCHG_End	9V~11V max	Ultimate undervoltage protection for single-cell battery. (voltage mentioned here refers to 12Vdc battery) Note: the status consumption power will be 0mA once triggering this protection. With Solar Mate MPPT, the inverter can be triggered automatically as soon as the sun comes up next day. **Default**: 9.9V
	Min_Bulk_Time	10~600min	Minimum Bulk time. **Default**: 30min
	Max_Absorp_Time	1~120h	Maximum absorption time. Note: the allowed max time varies according to the selected battery type **Default**: 8h
	Auto_CHG_Cycle	8~960h	Absorption cycle time. **Default**: 240h
	CHG_T_Compensate	0-Disable 1-Enable	Enable the charging temperature compensation. **Default**: 1-Enable
	CHG_TEMP_Coef	0~-30mV/℃	Charging temperature compensation coefficient. (voltage mentioned here is refer to 12Vdc battery) **Default**: -18mV/℃
	BAT_OT_WARN_Gate	25~65℃	Battery over temperature warn gate **Default**: 55℃
	SOC_Low_Warning	6~80%	Can be set in TBB SUPER-L mode, the inverter will send out a warning when the SOC under the setting value **Default**: 20%
	SOC_Low_Protect	5~40%	Can be set in TBB SUPER-L mode, the inverter will send out a warning when the SOC under the setting value **Default**: 5%

	SOC_CHG_Enough	30~99%	Can be set in TBB SUPER-L mode, the inverter will stop charging once reaching this value and will switch to the inverter mode. **Default**: 80%
	Mask_OV_Warn	0-Disable 1-Enable	Can be set in TBB SUPER-L mode, the warning will be masked when the BMS is over voltage. **Default**: 1-Enable
	Lower_CHG_Volt	48V: 0~2.0V 24V: 0~1.0V	Can be set in TBB SUPER-L mode, the charging voltage can be reduced. **Default**: 0V
	Float_CHG_EN	0- Disable 1- Enable	It can be set in TBB SUPER-L mode. When the BMS issues a 0A charging current command, the floating charging current remains 2A. **Default**: 1-Enable

EQ Ctrl_Set (This function is only applicable for flooded battery and traction battery.)

	Item	Setting range	Description
EQ Ctrl_Set	EQ_Command	0-OFF 1-ON	EQ charging Switch Choose 1, you can turn on the EQ charging and it will automatically quit after performing the EQ charging. It can be manually shut down at any time after choose 0. **Default**: 0-OFF
	EQ_Voltage	15.5~16.3V	User can change the EQ voltage for flooded and traction battery. **Default**: 15.5V (Flooded) 16.2V (Traction)
	EQ_Sustain_Time	30~90min	User can change the EQ timer for flooded and traction battery. **Default**: 30min

5.5.2.4 Para_Inverter

Para_Inverter:

You can configure the output of the inverter through this menu.

	Item	Setting range	Description
Para_Inverter	INV_Output_VOLT	200~240V	Inverter output voltage RMS. **Default**: 230V
	INV_Output_FREQ	50/60Hz	Rated AC frequency. **Default**: 50Hz

5.5.2.5 Para_ACin:

Through this menu, you can configure the range of the input parameters for this inverter.

	Item	Setting range	Description
Para_ACin	ACin_Source_ SEL	0-Grid 1-Generator	Select the ACin Source. When "1-Generator" is selected, the parameter "Common N" is Enabled and the "Ground Relay"is Disabled. **Default**: 0-Grid
	ACin_U_Max	240~265V @230VAC; 120~140V @120VAC	Maximum AC in input voltage Eg:120~140V @120VAC means the actual value is 120~140V **Default**: 265V@230VAC,132V@120VAC
	ACin_U_Min	145~200V @230VAC; 80~110V @120VAC	Minimum AC in input voltage Eg:80~110V @120VAC means the actual value is 80~110V **Default**: 175V@230VAC,87V@120VAC
	ACin_F_Max	51~59Hz @50Hz 61~69Hz @60Hz	Maximum AC in input frequency **Default**: 55Hz
	ACin_F_Min	41~49Hz @50Hz 51~59Hz @60Hz	Minimum AC in input frequency **Default**: 45Hz
	Harmonic_Adapt	0-Normal 1-Weak AC Input	AC input harmonic adaptation mode. Note: When the AC in input harmonic is too large and the inverter cannot track its phase, select 1 to enable the inverter a greater chance to track the phase of the AC input. Please refer to the specification for the transfer time after this setting. **Default**: 0-Normal
Para_ACin	ACin_Limit_Cur (PowerAssist)	5A-Rate AC input Current	The maximum current allowed for AC in input. Note: Once it is set up, the inverter will use only extra power to charge the battery. And when the input current of ACin reaches the set value, the insufficient part of the energy required by the load will be taken from the battery. **Default**: Rate AC input Current
	AC_Connect_Delay	20~990s	Time delay upon detecting qualified grid. **Default**: 20s
	Grid Regulation	0 -N/A 1- NRS 2017	

	Fixed cosPHI	0 - -0.98 1 - -0.99 2 - +1/-1 3 - 0.99 4 - 0.98	

5.5.2.6 Change Password

Through this menu, you can change the password.

5.5.2.7 Setup Wizard

The setup wizard is a quick configuration process for all basic setup. Please refer to chapter 4.4 for details.

5.5.2.8 Reset Parameter

With this menu, you can restore the factory setting of Apollo Matrix inverter.

5.5.2.9 Error Shielding

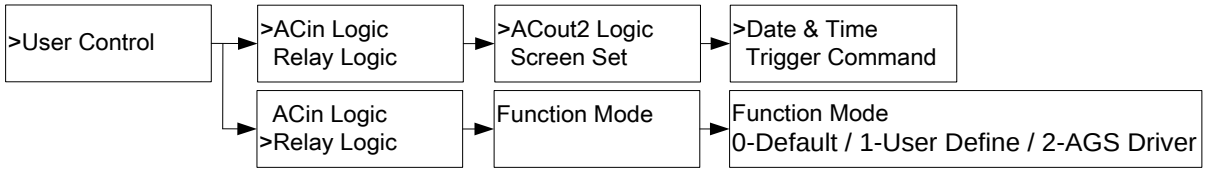
With this menu, you can shield some alarm which you do not bother to see.

	Item	Setting range	**Description**
Error Shielding	ACin_LV Warn	0-Display 1-Shield	Whether shield the ACin_LV Warning. For UPS application, it is recommended to enable this alarm. **Default**: 1-Shield
	MPPT Offline	0-Display 1-Shield	Whether shield the Solar Mate MPPT offline Warning. **Default**: 0-Display
	PV_INV Offline	0-Display 1-Shield	Whether shield the IG PV inverter offline Warning. **Default**: 1-Shield

User control

Using this menu, user can configure some working logic for this Apollo Matrix inverter. This feature is only applicable for the Master unit.

- ACin Logic
- Relay Function
- ACout2 Logic
- AGS Driver

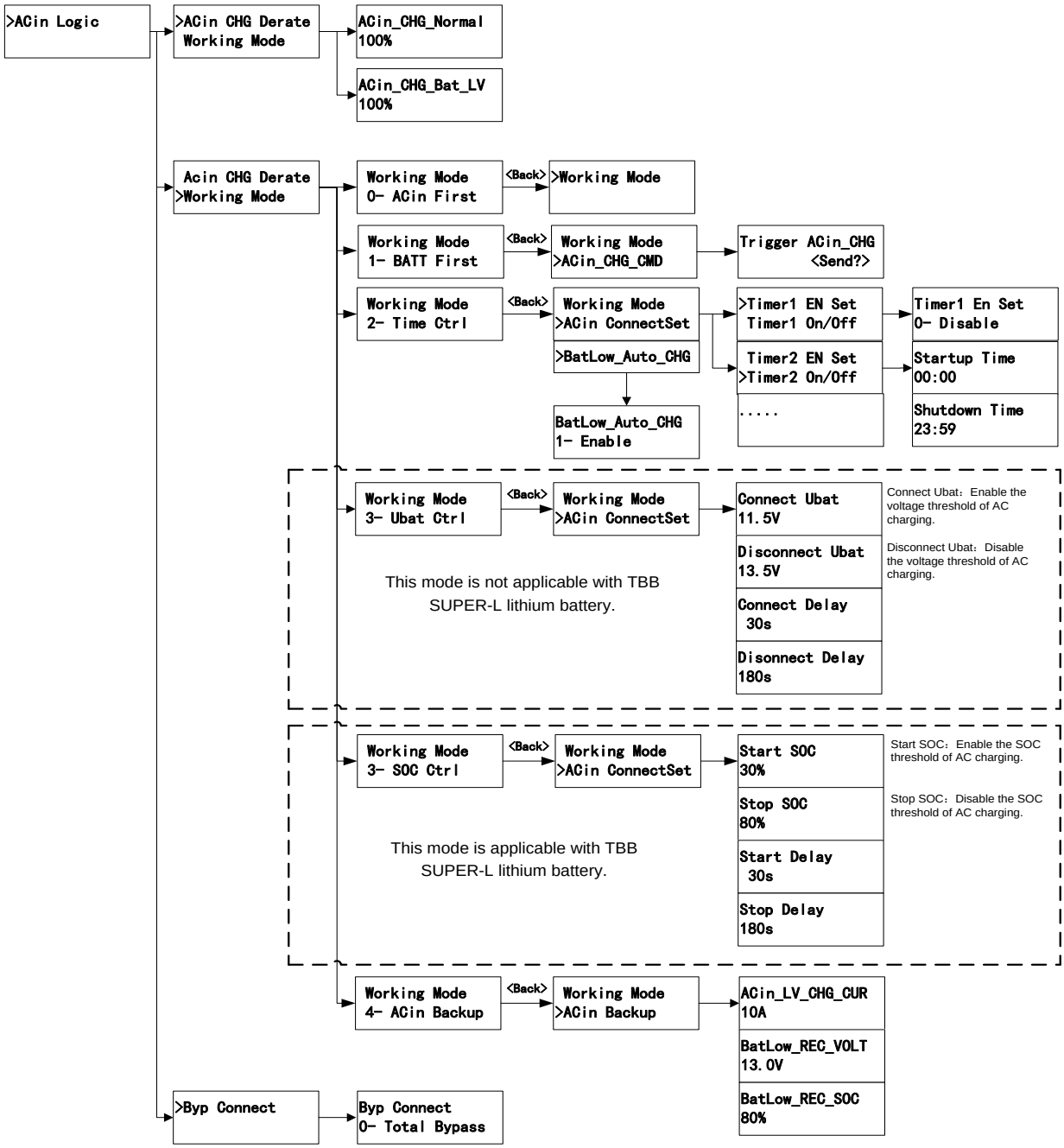


4.1.3 ACin Logic

With this menu, you could set up the working logic of Apollo Matrix working in different applications.

Item	Setting range	Description
Working Mode	0-ACin First 1- BATT First 2-Time Ctrl 3-Ubat / SOC Ctrl	0- ACin First： Under this mode, the grid will supply power to the load preferentially and meantime charging the battery. Apollo Matrix will switch the power supply to the battery only upon the grid fails. 1- BATT First： Under this mode, the load will be powered by the PV and the battery. Only upon battery reaches discharged warn level, Apollo Matrix will bring AC in (grid or generator) to charge the battery. Once the battery reaches the absorption stage or lithium battery BMS sends signal, Apollo Matrix will stop charging and use battery to power the load. 2-Time Ctrl： Apollo Matrix offers Time Ctrl mode which is an advanced control mode, offering three timers for user to configure. Within the set time zone, Apollo Matrix will work in the AC In First Mode. Beyond the time zone, Apollo Matrix will work in the BATT First mode. Meantime, when the battery discharges under Batt First Time zone, you can configure whether to let Apollo Matrix enter the AC in First mode. This mode can be used in area where there is peak/off peak

		tariff policy. 3-Ubat Ctrl: This is the advanced mode base on BATT First. Under this mode, part of the energy can be reserved for powering on purpose when the grid fails. Users can set the battery voltage threshold for transferring to the mains supply (charging the battery at the same time after transferring) and the battery voltage threshold for disconnecting the mains. 4-SOC Ctrl: This is the mode with the same function to that of Ubat_Ctrl mode, but designed for TBB SUPER-L lithium battery only. Under this mode, user can program the SOC percentage for entering charging or existing charging mode. **Default**: 0-ACin First
ACin_CHG_CUR	Apollo Matrix 3.0S: 0~40A; Apollo Matrix 3.0M: 0~80A; Apollo Matrix 5.0S: 0~70A.	This setting is designed for users to configure the charging current for this inverter or even switch off the charger.
Byp Connect	0- Total Bypass 1- Bypass Assist	Set the bypass logic: 0- Total Bypass: When the battery power is sufficient and no error occurs, power the loads with the battery only. 1- Bypass Assist If the ACin is normal, the load is powered by the DC power first. When the battery power is insufficient to supply power to the load or an overload occurs, the bypass is used as an assist power to supply the loads. **Default**: 1- Bypass Assist



4.1.4 Relay Function

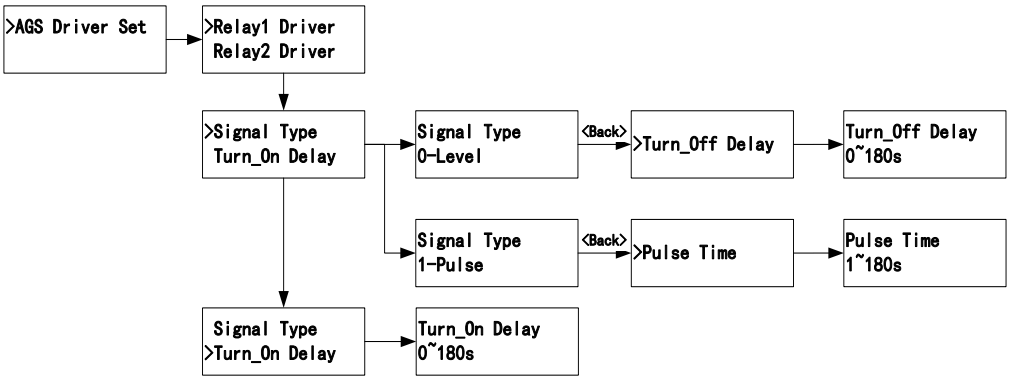
With this menu, you could set up the function of the dry contact output relay built-in Apollo Matrix.

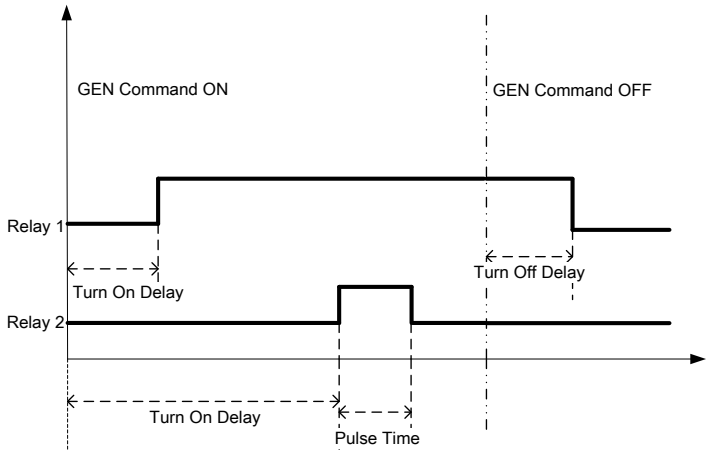
Item	Setting range	Description
Relay Function -->Function Mode	0-Default	Under Default, 1: The dry contact relay 1 is defined as the battery low voltage alarm. 2: The dry contact relay 2 is defined as the inverter overload alarm.
	1-User Defined	The two dry contact relays can be programmed with following function respectively.

		0-Ubat Low 1-OverLoad/OT 2-INV Fault 3-ACin Error 4-ACin Charging 5-ACin Ready 6-ACin Voltage 7-Fan Running
	2-AGS Driver	Both relay 1 and 2 will perform as the AGS driver. Please refer to 5.6.3 for explanation in detail.

4.1.5 AGS Driver

With this menu, relay 1 and relay 2 will be programmed to control the start and stop of the generator. Please find following chart with detailed definition.



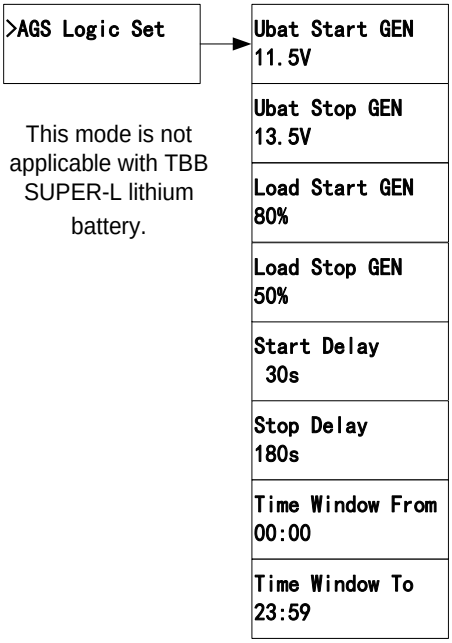


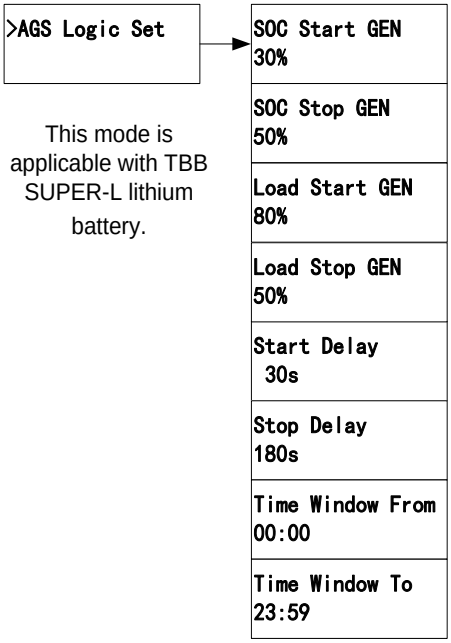
Item	Setting range	Description
AGS Driver Set	See AGS Driver Set Table	Set the Relay1 and Relay2 to Control the generator See Relay1 and Relay2 parameter setting
Min Run Time	180~1800s	Minimum time for generator running **Default:** 180s
Interval Time	30~1800s	Minimum time interval for generator starting **Default:** 30s
AGS Logic Set	See AGS Logic Set Diagram	Generator control (start/stop) logic

AGS Driver Set Table: Relay1 and Relay2 parameter setting

Item	Setting range	Description
Signal Type	0-Level 1-Pulse	0-Level: Relay will operate in Level Mode 1-Pulse: Relay will operate in Pulse Mode **Default:** 0-Level(Relay1) / 1-Pulse(Relay2)
Turn On Delay	0~180s	Turn ON after the Delay time when get the turn on command. **Default:** 0s (Relay1) / 10s (Relay2)
Turn Off Delay	0~180s	Turn OFF after the Delay time when getting the turn on command. **Default:** 30s
Pulse Time	1~180s	Pulse Time **Default:** 3s

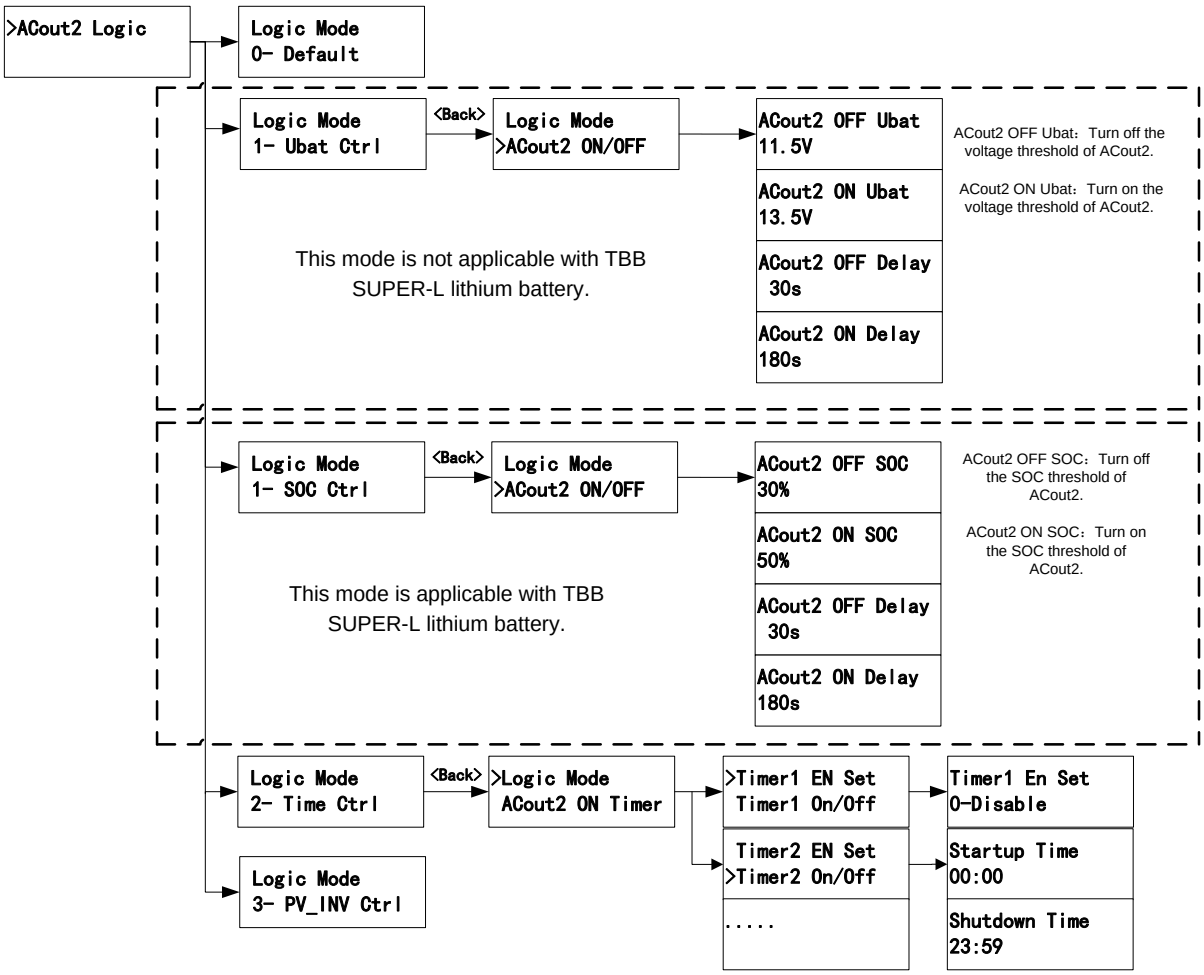
AGS Logic Set Diagram





4.1.6 ACout2 Logic

Item	Setting range	Description
ACout2 Logic -->Logic Mode	0-Default 1- Ubat / SOC Ctrl 2-Time Ctrl 3-PV_INV Ctrl	0-Default: ACout2 relay is turned on only when the system is powered by the AC in or Grid. 1-Ubat Ctrl: Control the ACout2 relay according to battery voltage. SOC Ctrl: Control the ACout2 relay according to battery SOC. 2-Time Ctrl: Timing control for the ACout2 relay. 3-PV_INV Ctrl: There is a such option when the AC couple mode has been selected and after that option is set, the oversized PV inverter can be connected to the AC Output 2 to improve the suitability of the AC couple system. The size of PV inverter connected on AC output 2 can not be bigger than the size of battery inverter.



4.1.7 Screen Set

Backlight _KeepOn	Backlight fixed lighting function is enabled. 0-Disable 1-Enable **Default:** 0-Disable
Page_Interval	Page automatically turning time, displaying the interface information in real time, 3~30s. **Default:** 5s

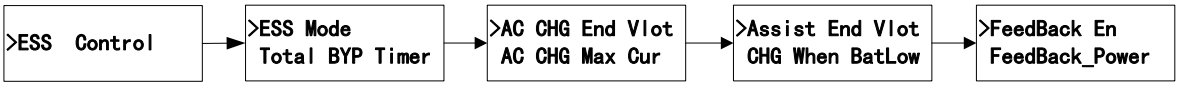
4.1.8 Date & Time

Set the current Date & Time.

4.1.9 Trigger Command

Fault Unlock	Set the fault unlock, and the inverter can be restarted.
Fan Dedusting	Clean dust in the inverter.
Parameter Sync	In parallel or three phase system, the slave inverter can use the function to synchronous the parameters with the master inverter.

4.1.10 ESS Control



5.6.8.1 ESS Mode

Item	Setting range	Description
ESS Control---> ESS Mode	0- Disable 1- Enable	0-Disable: disable ESS mode function and hide the associated settings 1-Enable: enable ESS mode function and show the associated settings

5.6.8.2 TotalBYP Timer

Item	Setting range	Description
TotalBYP Timer---> Time1 EN Set	0- Disable 1- Enable	0-Disable: disable Timer1 function 1-Enable: enable Timer1 function
TotalBYP Timer---> Time1 On/Off	Startup Time Shutdown Time	Set the startup time and shutdown time of Timer1
TotalBYP Timer---> Time2 EN Set	0- Disable 1- Enable	0-Disable: disable Timer2 function 1-Enable: enable Timer2 function
TotalBYP Timer---> T Time2 On/Off	Startup Time Shutdown Time	Set the startup time and shutdown time of Timer2
TotalBYP Timer---> Time3 EN Set	0- Disable 1- Enable	0-Disable: disable Timer3 function 1-Enable: enable Timer3 function
TotalBYP Timer---> T Time3 On/Off	Startup Time Shutdown Time	Set the startup time and shutdown time of Timer3

5.6.8.3 AC CHG End Vlot

Item	Setting range	Description
ESS Control---> AC CHG End Vlot	Assist End Vlot+2V ~ U_Float_CHG	Battery_Type is GEL/OpzV,AGM, Lead-Carbon, Flooded,Traction, Customerize/Li-ion
ESS Control---> AC CHG End SOC	Assist End SOC+5% ~ 100%	Battery_Type is TBB SUPER-L

5.6.8.4 AC CHG Max Cur

Item	Setting range	Description
ESS Control---> AC CHG End Vlot	Apollo Matrix 3.0S: 0~40A Apollo Matrix 3.0M: 0~80A Apollo Matrix 5.0S: 0~70A	

5.6.8.5 Assist End Vlot

Item	Setting range	Description
ESS Control---> Assist End Vlot	BAT_LV_WARN + 0.4V ~ AC CHG End Vlot - 2V	
ESS Control---> Assist End SOC	SOC_Low_Warning + 1% ~ AC CHG End SOC-5%	

5.6.8.6 CHG When BatLow

Item	Setting range	Description
ESS Control---> CHG When BatLow	0- Disable 1- Enable	Whether allowing total charging mode when battery is undervoltage. **Default**: 0-Disable

5.6.8.7 FeedBack En

Item	Setting range	Description
ESS Control---> FeedBack En	0- Disable 1- Enable	Whether allowing feedback to grid. **Default**: 1-Enable

5.6.8.8 FeedBack Power

Item	Setting range	Description
ESS Control---> FeedBack Power	Apollo Matrix 3.0S: 2500W Apollo Matrix 3.0M: 2500W Apollo Matrix 5.0S: 4000W	FeedBack En is Enable

6. FAQ

Error Code

5.1.1 Inverter Error

No.	Error Code	Description	Solution
101	U_Bus_OV	DC bus is over voltage	Check the battery voltage.
102	U_Bus_LV	DC bus is under voltage	Check the battery connection and voltage.
103	U_Bus_HW_Pro	Hardware protection to prevent DC bus over voltage	Check the battery voltage and charger output voltage
104	PSU_Fault	Auxiliary power supply is abnormal	Restart the inverter. Contact the installer in case the error still exists
105	T_HS_OT	Heat sink's temperature is too high	Check and ensure the inverter has good ventilation
106	T_TX_OT	Transformer's temperature is too high	Check whether the air vent of the inverter is clear and unobstructed; check whether the ambient temperature exceeds 40℃.
107	Sam_HD_Fault	Sampling is abnormal	Restart inverter. Contact the installer in case the error still exists.
108	EEPROM_Fail	ROM is abnormal	
109	Output_ShortCut	Output short circuit	Check if there is short circuit at loads.
110	Output_OverLoad	Output over load	Reduce the load.
111	CoolSys_Err	Cooling system is abnormal	Check if the fan is working properly.
112	U_BAT_Low_Deep	Battery is severely under voltage	Connect to a valid grid or generator. Restart the inverter and charge the battery.
114	Instant_OC_Soft	Instantaneous over current	Check if there is a short circuit at loads.
115	EPO	Emergency stop	Check the EPO Dry Input.
116	Rly_Err	Relay is abnormal	Restart the inverter. Contact the installer in case the error still exists.

5.1.2 MPPT Error

No.	Error Code	Description	Solution
301	U_Bus_OV	DC bus is over voltage	Check the PV input voltage.
302	U_BAT_OV	DC bus is under voltage	Check the battery voltage.

304	Buck_ShortCut	Buck short circuit	Check if there is a short circuit at the MPPT output.
305	I_Buck1_OC	Buck 1 is over current	Check the MPPT output connection. Restart the equipment. Contact the installer in case the error still exists.
306	I_Buck2_OC	Buck 2 is over current	
307	T_Board_OT	Control Board's temperature is too high	Check the fan ventilation.
308	T_HS_OT	Heat sink's temperature is too high	Check whether the air vent of the inverter is clear and unobstructed; check whether the ambient temperature exceeds 40℃.
309	PSU_LV	Auxiliary power supply is abnormal	Restart the MPPT. Contact the installer in case the error still exists.
310	PSU_LV_HD	Auxiliary power supply is abnormal(hardware)	
311	Sam_HD_Fault	Sampling is abnormal	
312	EEPROM_Fail	ROM is abnormal	
313	EPO	Emergency stop	Check the EPO Dry Input.

5.1.3 BMS Error

No.	Error Code	Description
040	Module_OV	Lithium module is under the over voltage protection.
041	Module_UV	Lithium module is under voltage protection.
042	Module_OT	Lithium module's temperature is too high.
043	Module_UT	Lithium module's temperature is too low.
044	Discharge_OC	Lithium module's discharge current is over normal value.
045	Charge_OC	Lithium module's charge current is over normal value.
046	Module_INT_Err	Lithium Battery Module fails.

Warning Code

5.1.4 Inverter Warning

No.	Warning Code	Description	Solution
001	U_BAT_OV	Battery is over voltage	Check the battery voltage.
002	U_BAT_LV	Battery is under voltage	Check the battery voltage.
003	U_BAT_LV_Fault	Battery is under voltage protection	Check the battery voltage.
004	Overload	Overload warning	Reduce the load.
005	NTC_HS_Fault	Heat sink NTC fails	Power off the inverter and check the internal NTC connection. Contact the installer if the fault still exists.
006	NTC_TX_Fault	Transformer NTC fail	
007	T_BAT_OT	Battery temperature is too high	Check battery sensor connection; check battery temperature; check battery connection

008	Fan_Fault	Fan is abnormal	1.Check whether the fan is blocked. 2.Open the case, check the fan connection. Contact the installer if the fault still exists.
009	ParConnect_Err	Parallel connect is abnormal	Check the connection of the parallel communication cable.
010	ParComm_Err	CAN communication is abnormal	Check the parallel parameter setting.
011	Par_ID_Conflict	Parallel address conflict	Check the parallel parameter setting (ID address)
012	Para_Conflict	Parameters do not match	Check the parameter setting or trigger the Parameter Sync.
013	Par_SyncTimeOut	synchronization overtime	
014	ModeSet_Mismatch	The system mode and parameter setting do not match	Check the parameter setting (Lithium battery, AC Couple)
015	Out_Circuit_Err	Parallel system or three system's AC output is abnormal	Check the output wire connection
016	Comm_HMI_Err	Internal communication of LCD is abnormal	Open the case, and check the LCD wire connection. Contact the installer if the fault still exists.
020	ACin_OV	AC input is over voltage	Check the AC input voltage and the connection
021	ACin_LV	AC input is under voltage	
022	ACin_OF	AC input is over frequency	
023	ACin_LF	AC input is under frequency	
024	ACin_PhaseErr	AC input phase sequence is abnormal	
025	U_NEU_2_GND_Err	The voltage between N and GND is abnormal	1.Check the ACin L-N connection. 2.Check the GND connection.
030	Comm_Inner_Err	Communication between the inverter and the DSP is abnormal	Open the case, and check all the inner connections. Contact the installer if the fault still exists.
031	Model_Detect_Err	Software and hardware matching error	Restart the inverter. Contact installer if fault still exist.

5.1.5 MPPT Warning

No.	Warning Code	Description	Solution
201	U_BAT_OV	Battery is over voltage	Check the battery voltage and connection
203	Cur_Limit	MPPT current limitation alarm	Check if there is a short circuit at output
204	BAT_UnConnect	The MPPT is not connected to	Check the battery connection.

		battery	
205	NTC_HS_Fault	Heat sink NTC fails	Power off the inverter and check the internal NTC connection. Contact the installer if the fault still exists.
206	T_BAT_OT	Battery temperature is too high	Check battery sensor connection; check battery temperature; check battery connection
207	Fan_Fault	Fan is abnormal	1.Check whether the fan is blocked. 2.Open the case, check the fan connection. Contact the installer if the fault still exists.
209	Comm_Sys_Err	Communication Between the MPPT and the Inverter is abnormal, at DC Couple system	Check the connection of the communication cable.
210	Comm_HMI_Err	Internal communication of LCD is abnormal	Open the case, check the LCD wire connection. Contact the installer if the fault still exists.
213	U_BAT_LV_Protect	Battery is under voltage protection	Check the Rate_Volt set of the MPPT.
214	NTC_Board_Fault	Internal NTC fail (SP)	Check battery sensor connection; Check battery temperature; Check battery connection
215	I_Load_OC_Fault	Load output over current (SP)	Check load
220	MPPT Comm Offline	Communication off line	Check the comm connection with the inverter, at DC Couple system

5.1.6 BMS Warning

No.	Warning Code	Description
050	Module_HV	Lithium module is over voltage.
051	Module_LV	Lithium module is under voltage.
052	Module_HT	Lithium module's temperature is too high.
053	Module_LT	Lithium module's temperature is too low.
054	Discharge_HC	Lithium module's discharge current is over normal value.
055	Charge_HC	Lithium module's charge current is over normal value.
056	INT_Comm Fail	Communication among Lithium modules is abnormal.
057	EXT_Comm Fail	Communication with the inverter is abnormal.
058	SOC_Low	Lithium module's SOC is too low.

5.1.7 Meter Warning

No.	Warning Code	Description
800	Comm_Meter_Err	Communication with the inverter is abnormal.

7. Specification

Model	Apollo Matrix 3.0M	Apollo Matrix 3.0S	Apollo Matrix 5.0S
Power Assist	Yes		
AC inputs	Input voltage range:175~265 VAC, Input frequency:45~65Hz		
AC input Current	32A (transfer switch)		50A (transfer switch)
Inverter			
Nominal battery voltage	24VDC	48VDC	
Input voltage range	21~34VDC	42~68VDC	
Output	Voltage: 220/230/240 VAC ± 2%, Frequency: 50/60 Hz ± 0.1%		
Harmonic distortion	<2%		
Power factor	1.0		
Cont. output power at 25°C	3000VA	3000VA	5000VA
Max Output power at 25°C	3000W	3000W	5000W
Peak power (5 sec)	9000W	9000W	15000W
Maximum efficiency	94%	95%	96%
Zero load power	14W	14W	18W
Charger			
Charge voltage 'absorption'	28.8VDC	57.6VDC	
Charge voltage 'float'	27.6VDC	55.2VDC	
Battery types	AGM/ GEL/ OPZV/ Lead-Carbon/ Li-ion/ Flooded/ TBB SUPER-L		
Battery Charge current	80A	40A	70A
Temperature compensation	Yes		
Solar Charger Controller			
Max output current	60A	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		
General data			
AC Out Current	AC Out1 Current: 32A AC Out2 Current: 32A		AC Out1 Current: 50A, AC Out2 Current: 32A
Transfer time	<2ms(<15ms when Weak_Grid 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		
Mechanical Data			
Dimension	499*272*144mm	499*272*144mm	570*310*154mm
Net Weight	20kg	20kg	32kg
Cooling	Forced fan		
Protection index	IP21		
Standards			
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		
Grid Regulation	NRS 097-2-1:2017		

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