

03
PART THREE

HPS SYSTEM TRAINING

HPS SYSTEM



1、 HPS System Introduce

2、 HPS System Installation

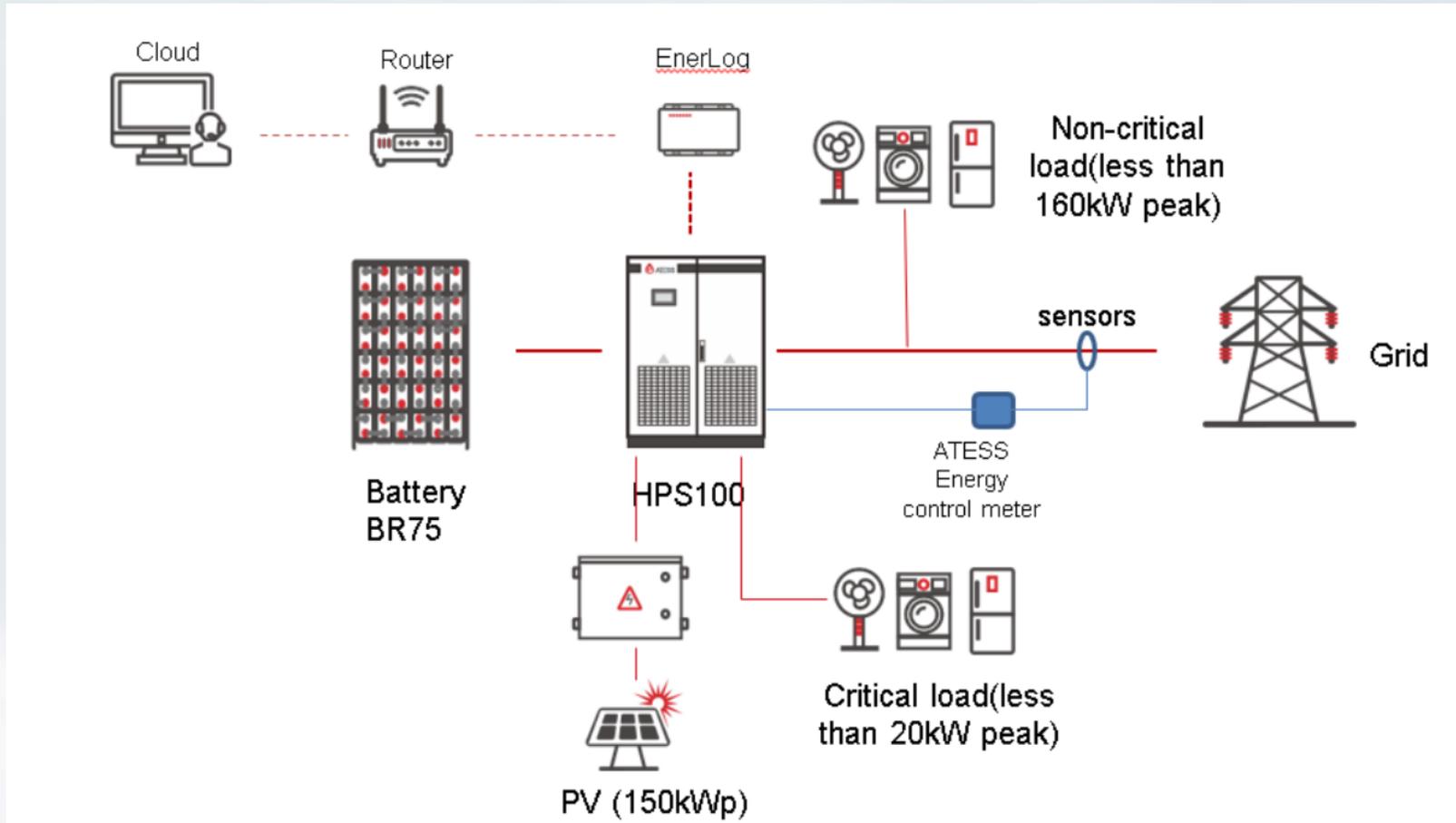
3、 HPS System Commissioning

4、 HPS System Troubleshooting

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PPT & SPEAKER: Jean 0670247147

1、HPS System Introduce



- **All-in-one hybrid inverter**
Battery, load, grid, solar connection all supported

- **Programmable working mode**
Peak-shaving, back-up, use the system however you want it

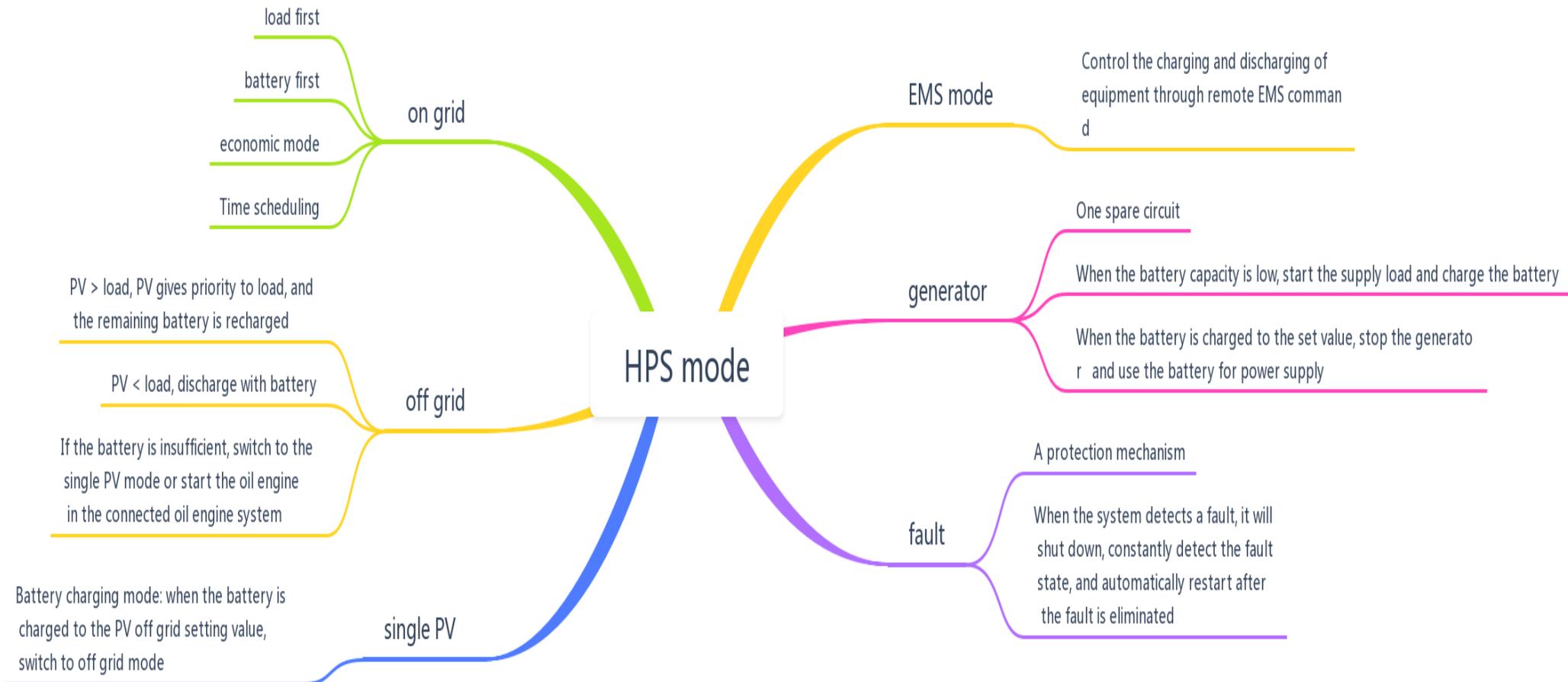
- **Hot back-up**
One inverter fails in parallel system, the other(s) takes over seamlessly.

- **Touchscreen LCD**
More convenient for parameter setting and maintenance

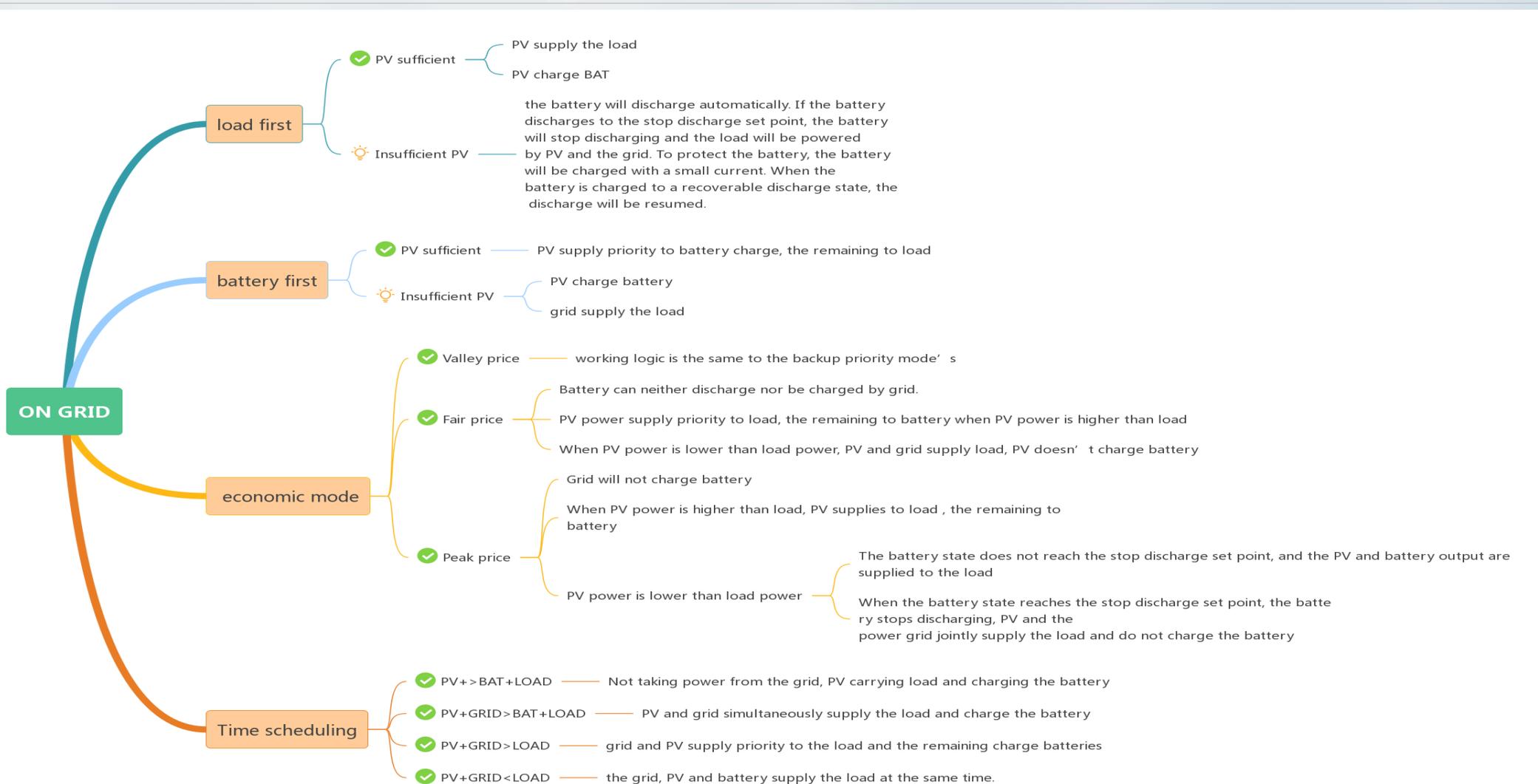
- **Seamless transfer**
Uninterruptable power supply guaranteed

- **Dry contact output**
Supports remote control of DG

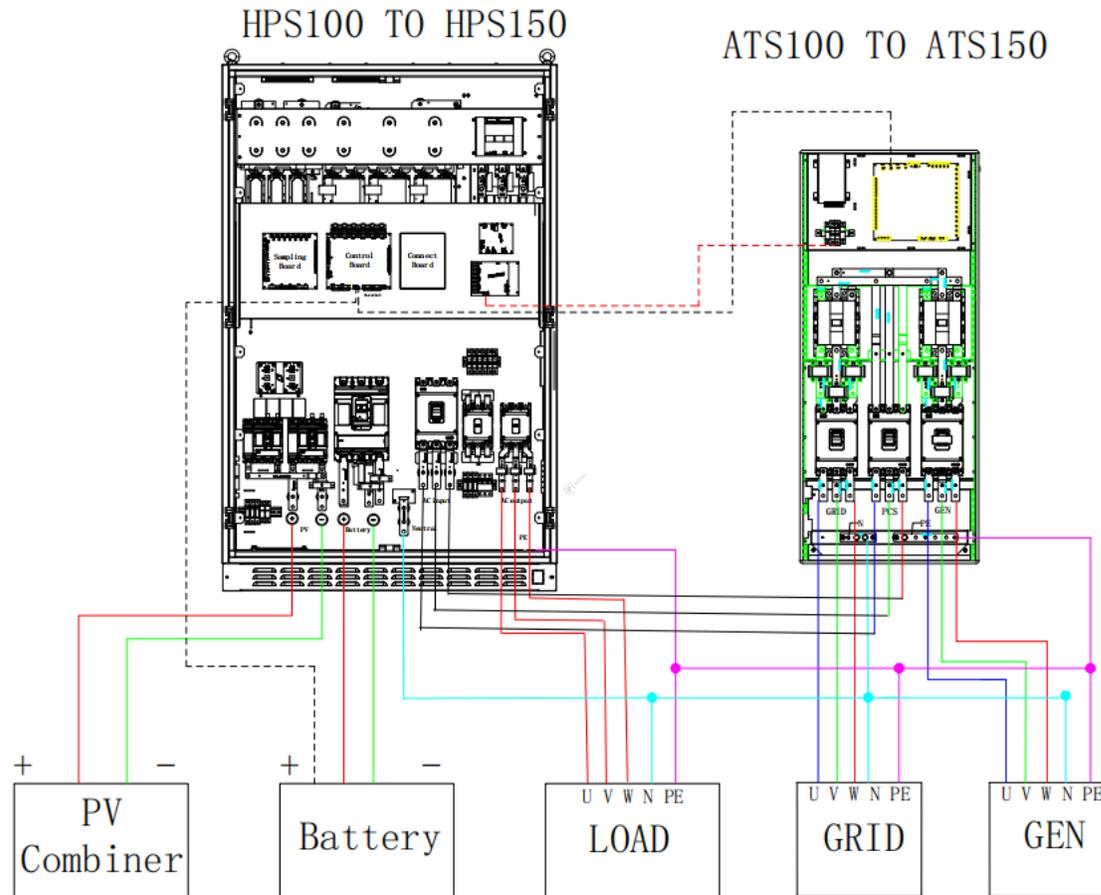
1、HPS System Introduce



1、HPS System Introduce



2、 HPS System Installation

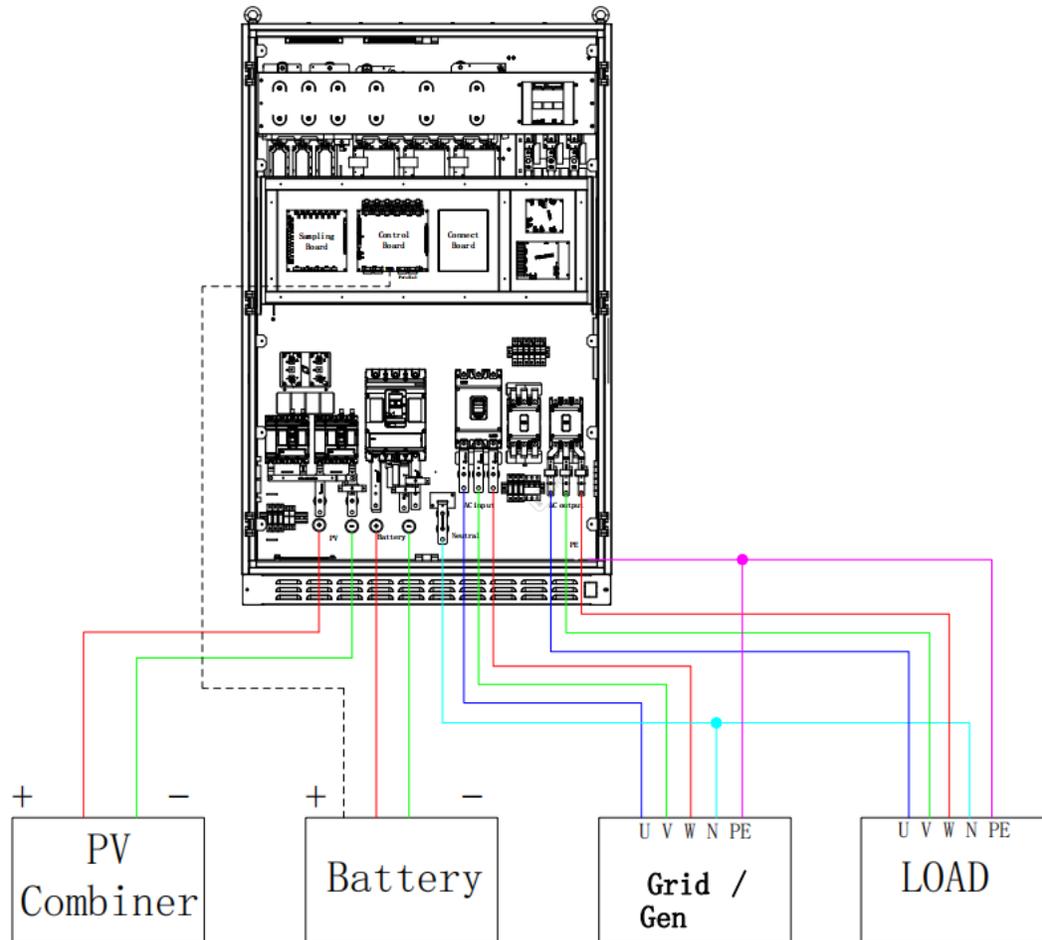


Mainly divided into two parts

1. Connection of power lines
The power line includes PV, battery, load, power grid, and generator, as well as the power supply connection of ATS
2. Connection of communication lines
The communication line mainly includes the communication connection between the battery and HPS, the communication connection between HPS and ATS, and the communication connection between HPS parallel machines

The solid lines in the figure indicate power cables, while the dashed lines indicate communication cables

2、 HPS System Installation



Cable	Cable Diameter Requirements (mm ²)				Aperture	
	HPS50	HPS100	HPS120	HPS150	HPS50	HPS100/120/150
	Bellow are total line diameter					
PV	50mm ²	70mm ²	95mm ²	120mm ²	Φ8	Φ10
Battery	50mm ²	120mm ²	120mm ²	150mm ²	Φ8	Φ10
Utility	70mm ²	120mm ²	120mm ²	150mm ²	Φ8	Φ10
Load	35mm ²	70mm ²	70mm ²	95mm ²	Φ8	Φ10
N wire	70mm ²	120mm ²	120mm ²	150mm ²	Φ8	Φ10
Earth wire	More than 16 mm ² . Green and yellow is recommended				Φ8	Φ8
Communication Wire	0.75mm ² , shielded communication line is recommended				/	

1. Please select the corresponding withstand voltage cable according to the voltage level.

2. Because different voltage will lead to change of current, please calculate the corresponding cable diameter according to the actual voltage range.

2、 HPS System Installation

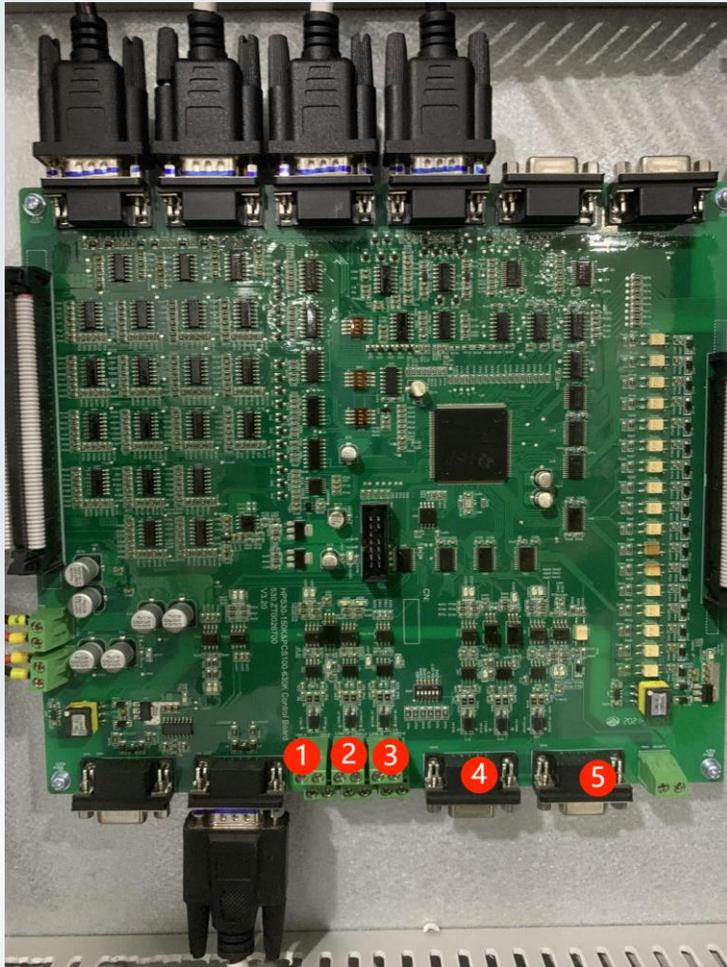
HPS100 internal components as an example



- 1 PV breaker
- 2 battery breaker
- 3 AC input (grid/generator breaker)
- 4 bypass breaker
- 5 AC output (load breaker)
- 6 Fan power supply switches
- 7 Lightning protection switch

What we mainly need to connect are circuit breakers 1, 2, 3, and 5. Other parts do not need to be connected. There are corresponding markings on the machine, and the corresponding lines can be connected according to the markings. 1 and 2 mainly distinguish between positive and negative poles. 3 and 5 mainly distinguish the phase sequence of three-phase cables.

2、 HPS System Installation



As shown in the figure, the upper and lower rows of interface 123 are the same, while interface 45 is the same

1 485 AB interface

2 CANA interface

3 CANB interface

4/5 (CN18/CN19) parallel communication interface

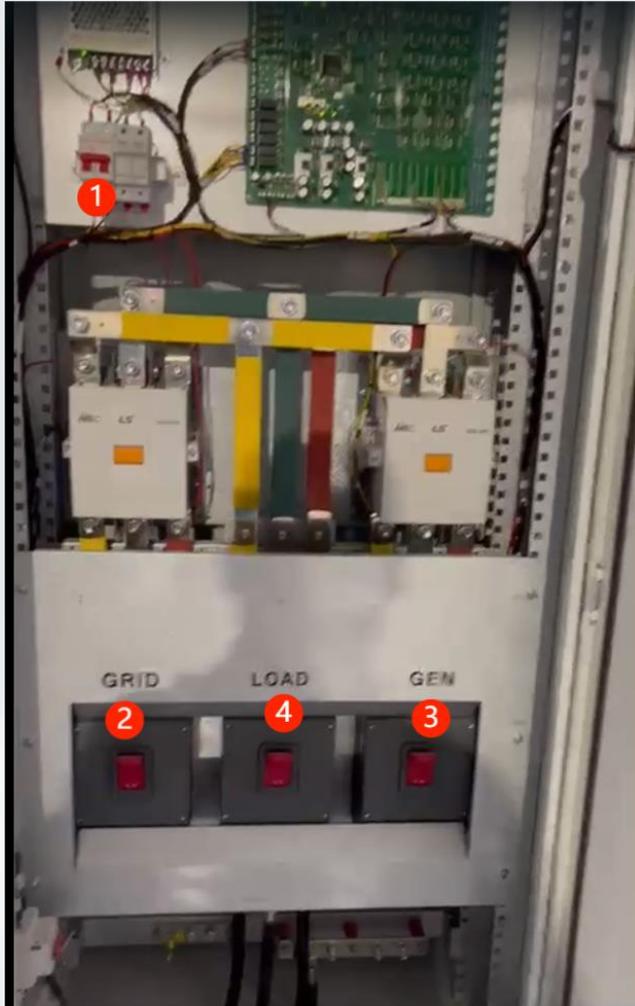
The 485 interface is connected to a monitoring system, including our own product enerlog or shinemaster, or a third-party control system provided by the customer (the customer control system needs to be compatible with our 485 protocol)

The CANA interface is connected to the BMS communication of the battery. If it is a battery from another manufacturer, it also needs to be compatible with our CAN protocol for communication.

3 CANB interface HPS and ATS communication interface

4/5 (CN18/CN19) HPS parallel interface, if it is two HPS parallel machines, only one interface needs to be connected

2、 HPS System Installation



The figure shows ATS100

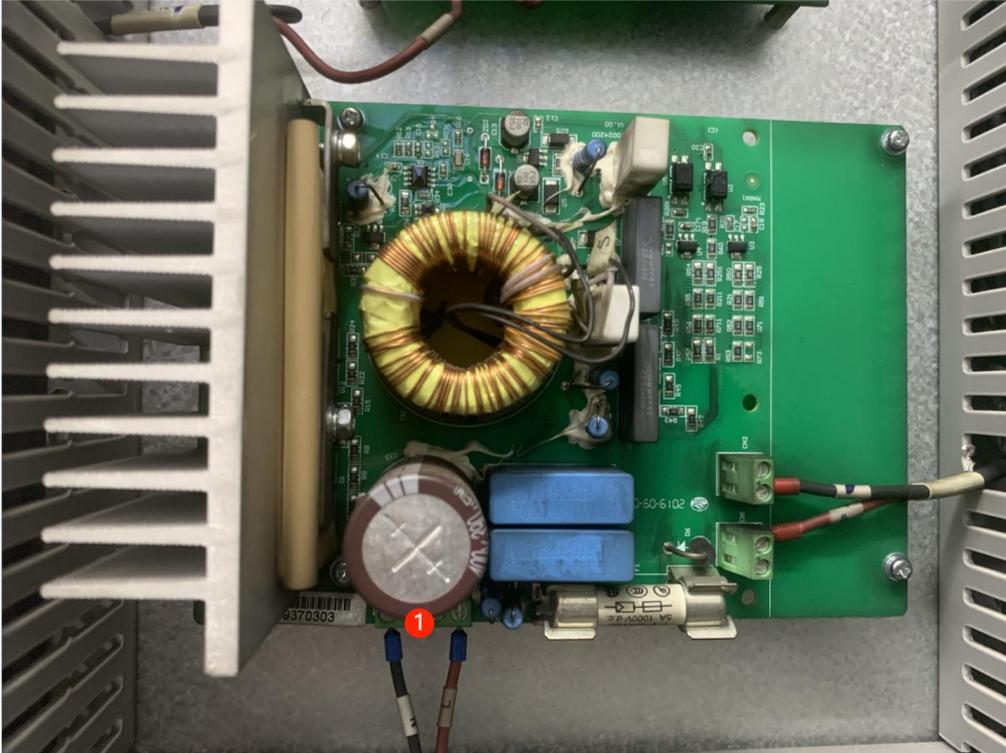
1 ATS control board power switch, which needs to be connected to the CN3 interface of the HPS buck board in order to have power input

2 grid breaker

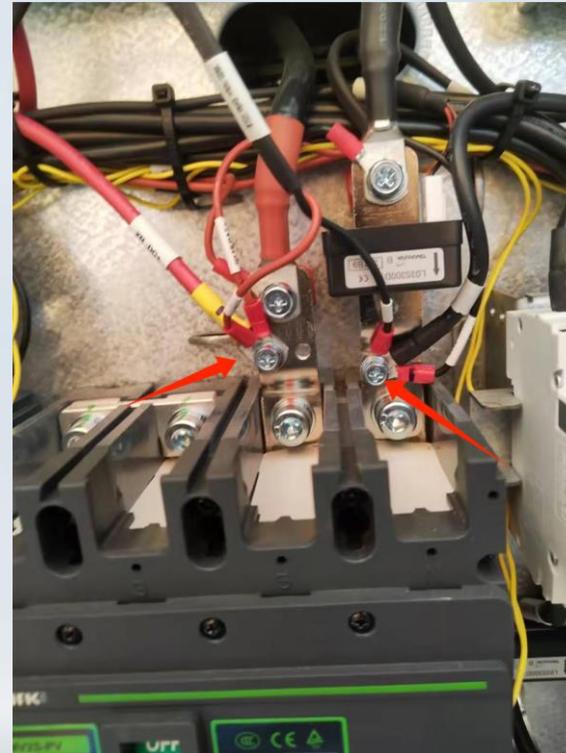
3 generator breaker

4 load breaker connected to AC input breaker of HPS

2、 HPS System Installation



As shown in the figure, 1 is the cn3 interface of the HPS buck board, and the power cord in the ATS needs to be connected here. Only then can power be supplied to the ATS control board.



If it is ATS30, the power cord needs to be connected to the upper end of the HPS30 battery breaker. Be careful not to connect the positive and negative poles in reverse

2、 HPS System Installation

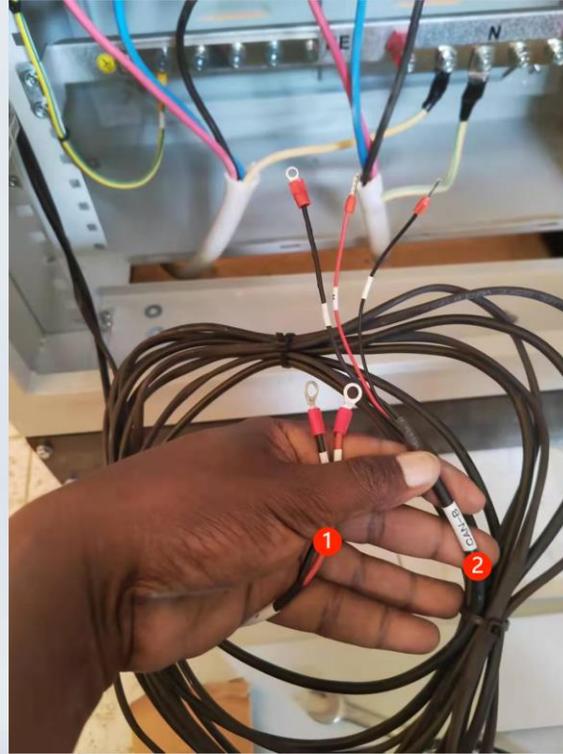
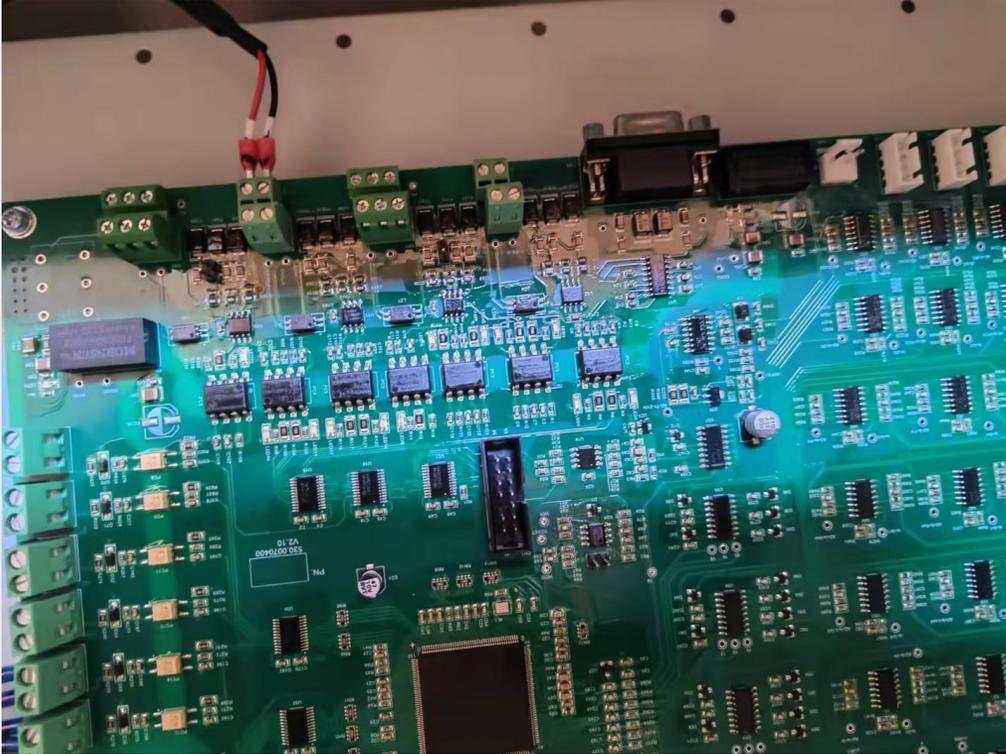
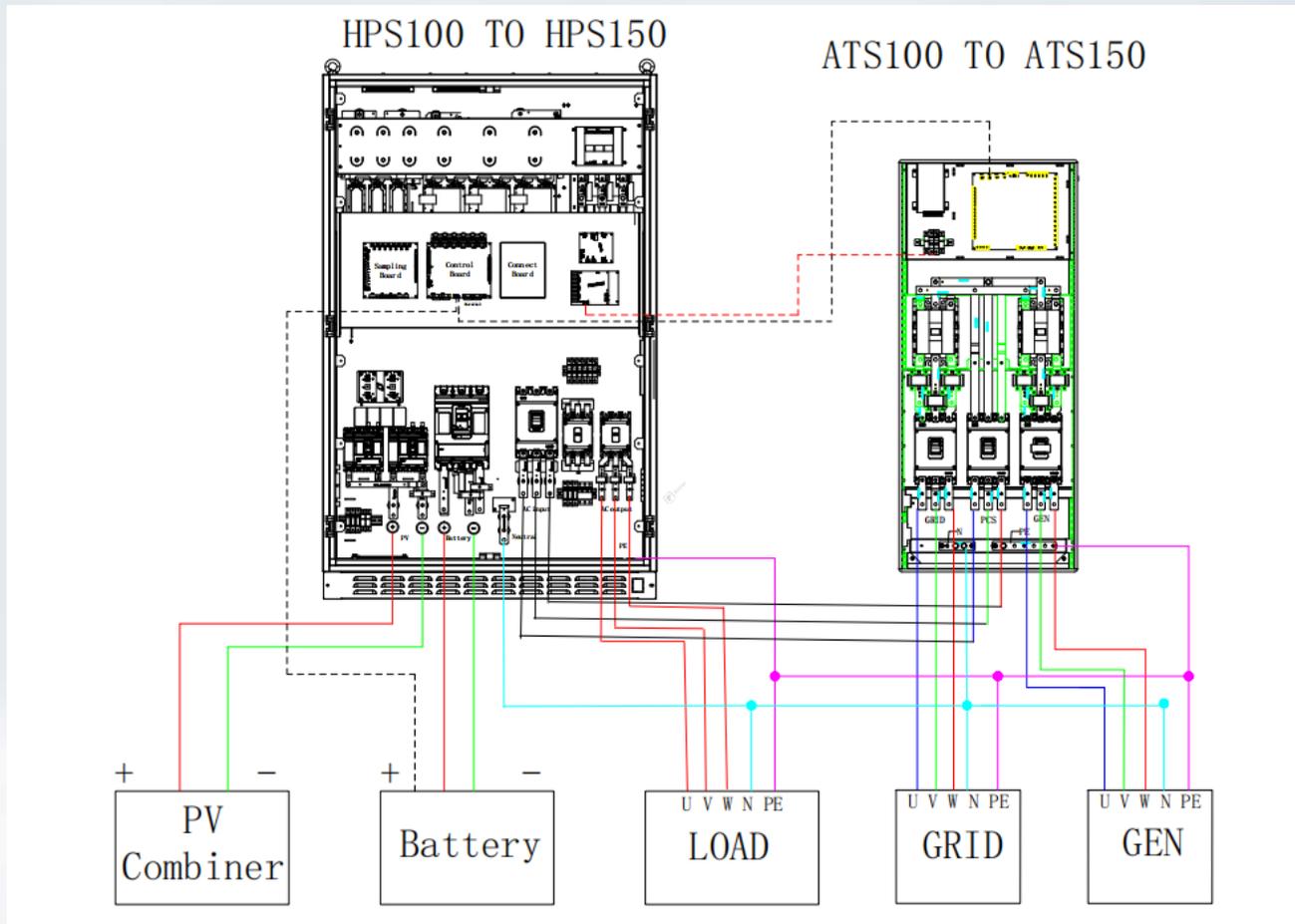


Figure 1 shows the ATS control board. The CANA interface cable has been connected at the factory and does not need to be connected again. Figure 2 shows the power line of ATS, and Figure 2 shows the communication line (can-B) of ATS connected to the CANB interface of HPS.

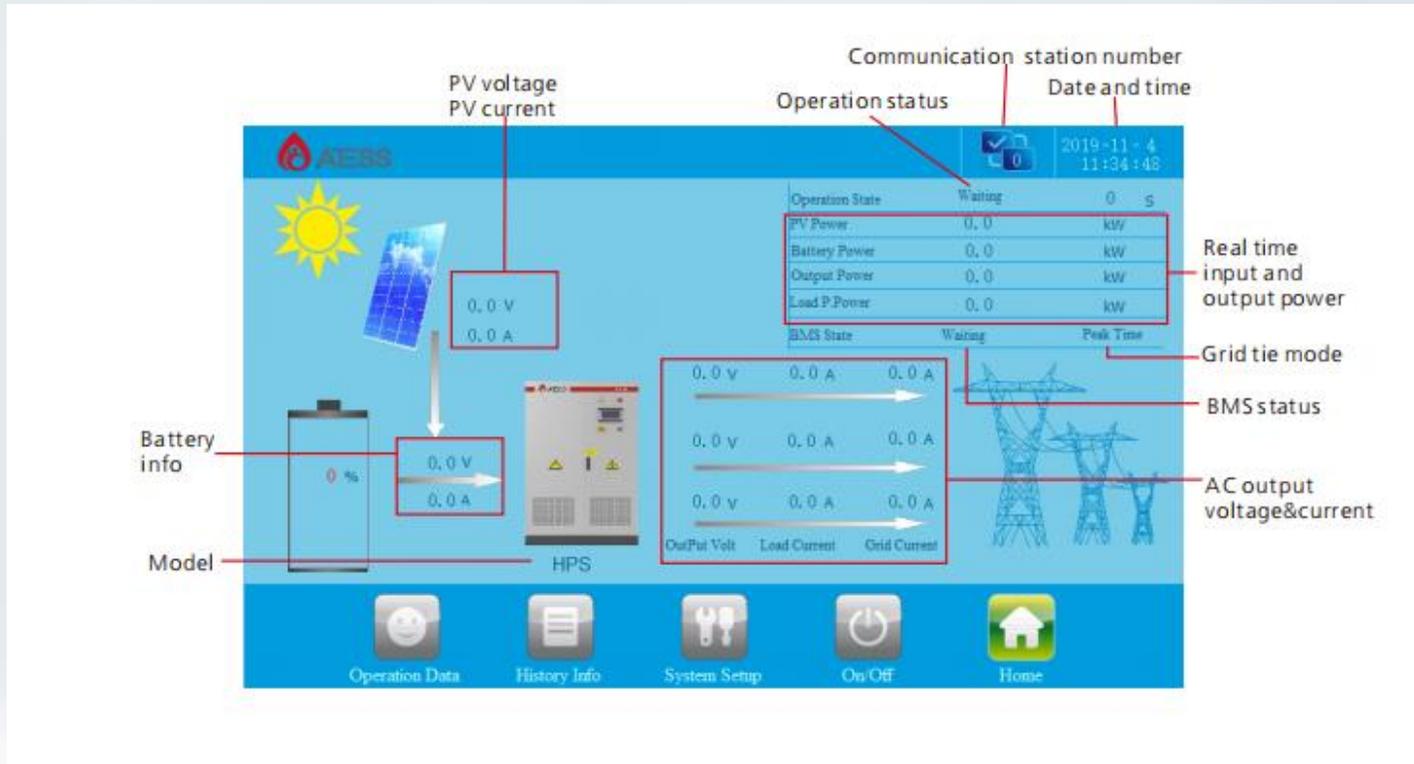
2、 HPS System Installation



After connecting all the lines, recheck them again

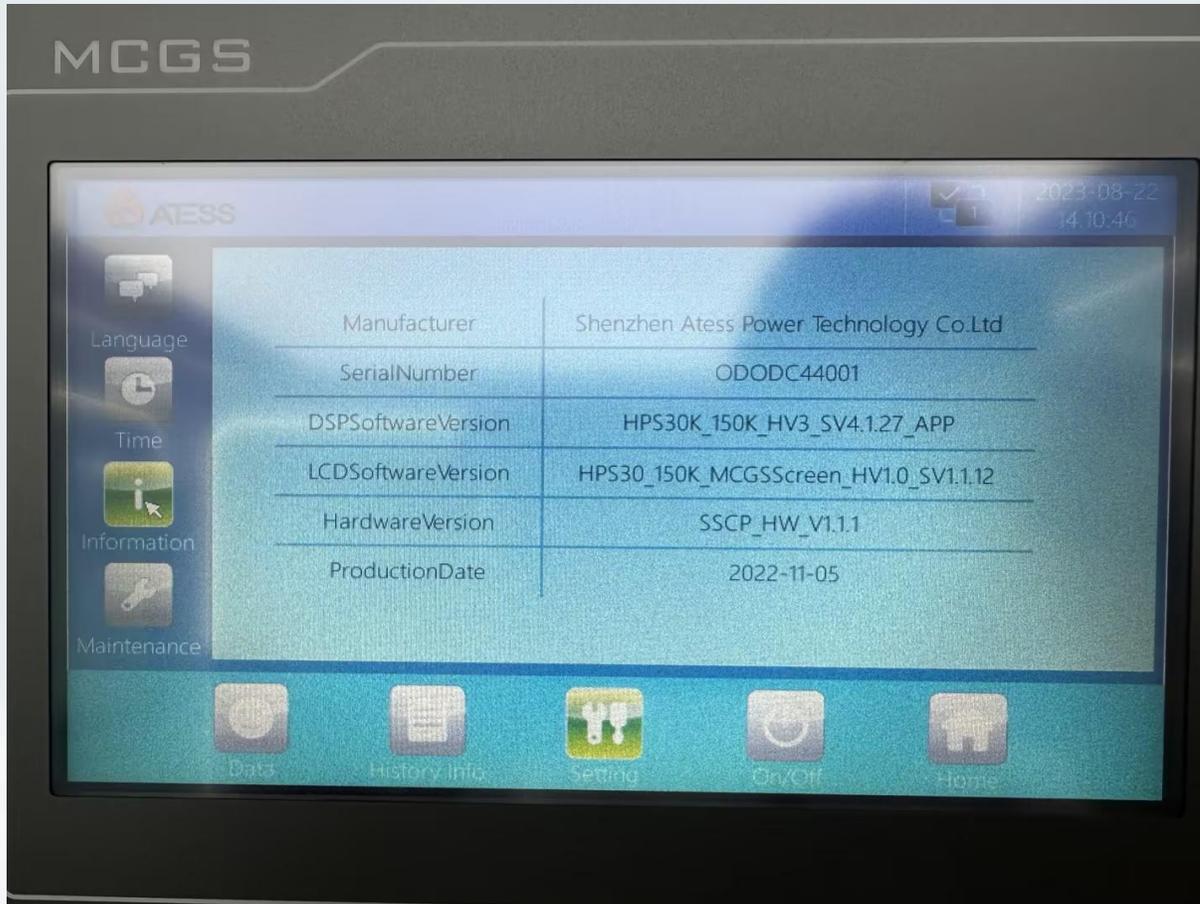
1. Is the positive and negative poles of the cable correct
2. Is the three-phase sequence of the cable correct
3. If there is a multimeter, you can measure whether the voltage of PV breaker, battery breaker, and grid breaker is consistent with the actual situation.
4. Check if the cana connection is correct and if the H&L connection is reversed. If you have a multimeter, you can measure whether the resistance between H&L is 60-120 ohms.
5. Is the 485 AB interface connected correctly.
6. If there is an ATS system, check if the ATS power cord is connected correctly and if the CAN B is connected correctly.
7. If it is a parallel system, check if cn18 and cn19 are connected.

3、 HPS System Commissioning



1. The battery can be used for the first time power-on.
2. Adjust HPS parameters based on actual application.
3. Check if the data is displayed normally, including homepage data, operational data, and history info.
4. Check whether the hardware part is normal according to the fault record displayed in history info.
5. Confirm that the data display is normal, there are no special faults, and it can be turned on and run.

3、 HPS System Commissioning



Use battery power to view and record the specific model and version information of the HPS. Due to varying delivery times, there are also certain differences in the installation of software versions.

Different versions may have some different parameters. Or the same parameters correspond to different English translations and positions.

So the first thing to confirm after opening HPS should be the on-site version information.

View Location: setting → information menu

3、 HPS System Commissioning



The main menu we need to set is in maintenance.

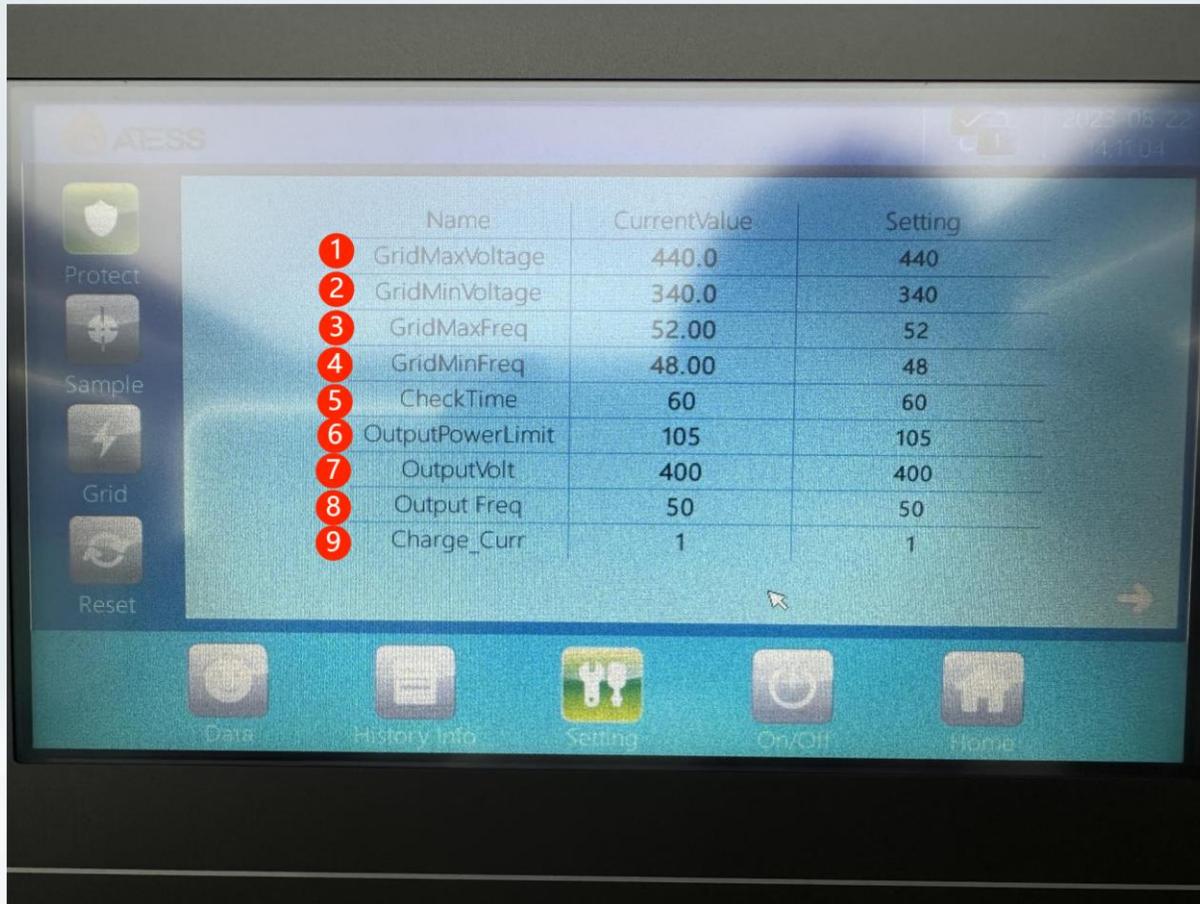
Setting → maintenance → password1234

The main menu settings include protect menu and sample menu

The protection menu mainly sets various protection values for systems such as batteries

The sample menu mainly refers to the startup and shutdown of various functions, as well as the setting of running modes.

3、 HPS System Commissioning



	Name	CurrentValue	Setting
1	GridMaxVoltage	440.0	440
2	GridMinVoltage	340.0	340
3	GridMaxFreq	52.00	52
4	GridMinFreq	48.00	48
5	CheckTime	60	60
6	OutputPowerLimit	105	105
7	OutputVolt	400	400
8	Output Freq	50	50
9	Charge_Curr	1	1

1/2 is the upper and lower limits of the power grid, set according to $\pm 10\%$ of the on-site mains voltage

3/4 is the upper and lower limits of frequency, set according to ± 2 of the on-site mains frequency

5 is the self check time during system startup, ranging from 10 to 300S

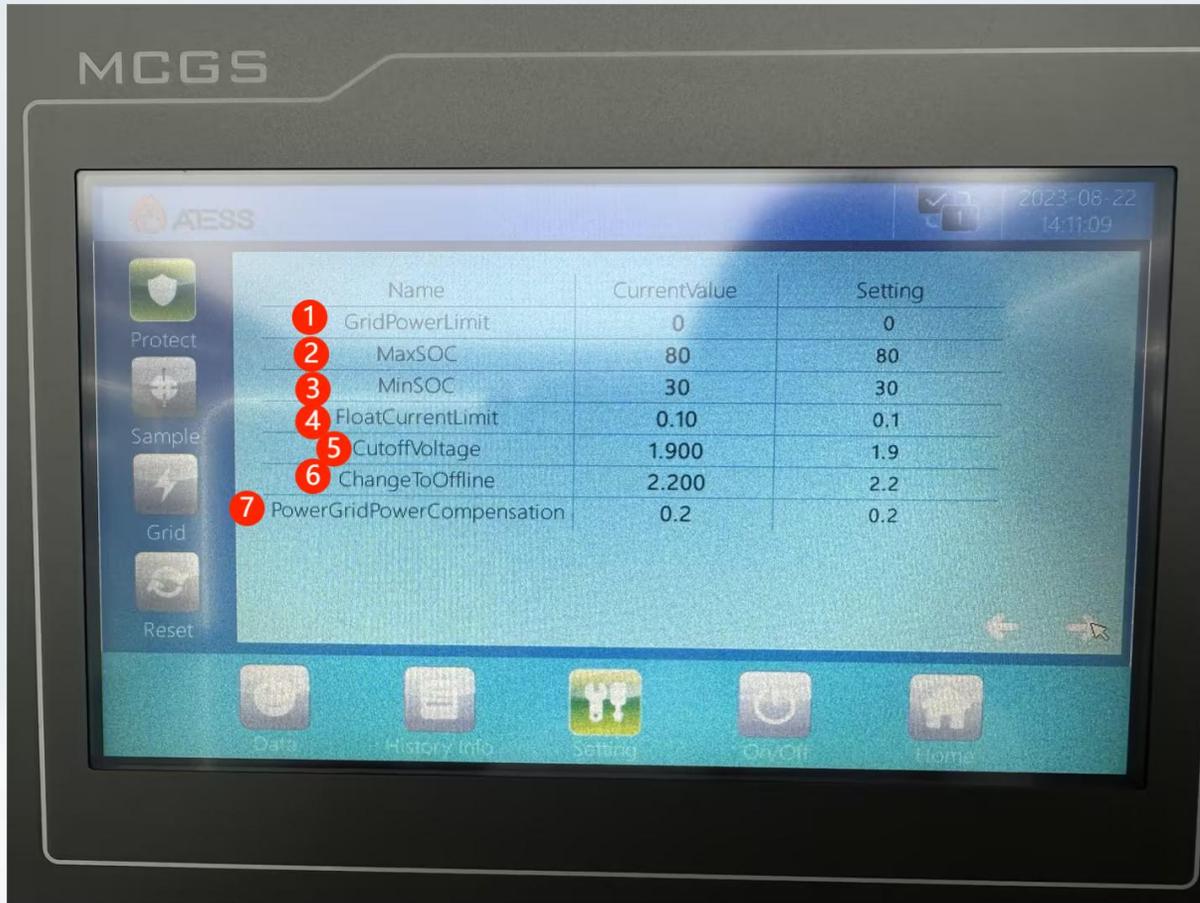
6 Output power limiting. For example, the HPS100 has a rated power of 100kw. Setting 100 indicates that the HPS output power is 100KW. If set to 110, it indicates that the peak power of this device can reach 110KW.

7 output voltages, standard machines are 380 and 400.

8 output frequencies, standard machines are 50 and 60.

9 charging current, set according to the actual charging current of the battery.

3、 HPS System Commissioning



1. The upper limit of the power grid is generally set to twice the rated power of the corresponding HPS, with a maximum setting of 240.

2/3, generator start stop SOC upper and lower limits

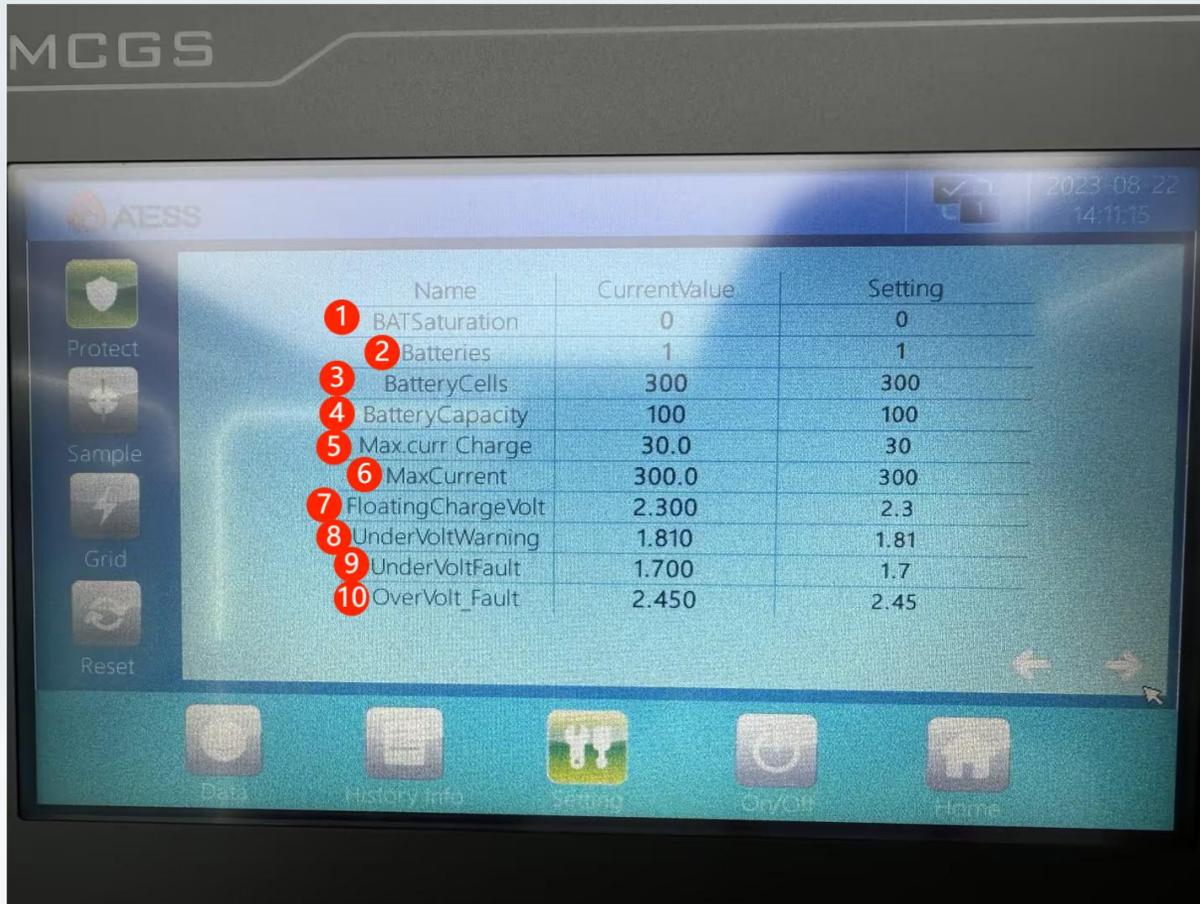
4. Float charging current limiting point setting, generally set to 0.1

5. Discharge cut-off voltage, set according to the actual battery parameters

6. Single PV to off grid, usually set according to the battery standard voltage

7. Grid power compensation, which means that the reactive power of the machine is compensated by the grid. Set to 0 to not use grid compensation.

3、 HPS System Commissioning



	Name	CurrentValue	Setting
1	BATSaturation	0	0
2	Batteries	1	1
3	BatteryCells	300	300
4	BatteryCapacity	100	100
5	Max.curr Charge	30.0	30
6	MaxCurrent	300.0	300
7	FloatingChargeVolt	2.300	2.3
8	UnderVoltWarning	1.810	1.81
9	UnderVoltFault	1.700	1.7
10	OverVolt_Fault	2.450	2.45

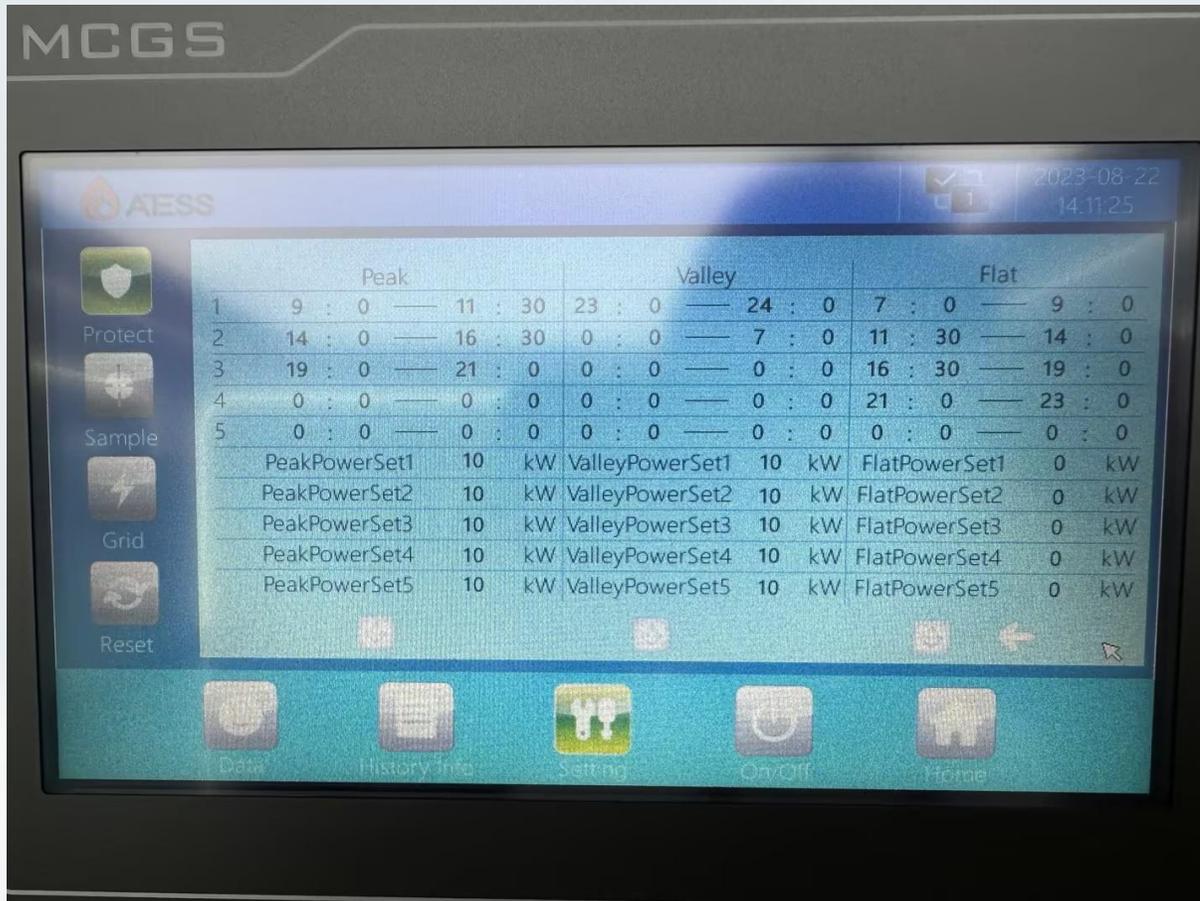
1. Battery charging saturation setting
2. Number of battery packs, the number of parallel battery packs in the system
3. The number of battery units (per unit) can generally be calculated based on the total battery voltage/standard battery unit voltage
4. Battery capacity (single set) is set based on the actual battery capacity
- 5/6, charging and discharging current protection is set based on the actual maximum charging and discharging capacity of the battery
7. Float charging voltage is set based on the float charging voltage of the battery
8. The undervoltage alarm is generally set to be 0.05 to 0.1 lower than the discharge cutoff voltage.
9. Under voltage protection is generally set 0.05 to 0.1 lower than under voltage alarm
10. Overvoltage protection is set according to the actual protection parameters of the battery

3、 HPS System Commissioning



1. The upper limit of generator power is set according to the actual upper limit of generator power, not exceeding 2 times the rated power of HPS, and the maximum setting is 240
2. Discharge cut-off SOC, battery discharge cut-off SOC
3. Upper limit of feed network power
4. Upper limit of power for the generator to charge the battery
5. SOC for battery recovery discharge
6. Charging stop SOC
7. Charging power of the power grid
8. Cut-off charging power of the power grid

3、 HPS System Commissioning



This page is the setting page for time scheduling and economic mode, which only takes effect when in grid mode and corresponding modes are set.

Economic mode only requires setting a time period

The time scheduling mode requires setting the time period and corresponding power

The time period setting method must be continuous from 0:00 to 24:00. If a certain time period is missed, it will cause abnormal operation.

3、 HPS System Commissioning



- 1, islandprotectlevel
- 2, grid&pv charge together
- 3, manual adjustment
- 4, BMS communication enable
- 5, anti—backflow enable
- 6, DG enable
- 7, parallel enable
- 8, number of parallel machines
- 9, parallel redundant number
- 10, parallel address
- 11, parallel address switching enable

3、 HPS System Commissioning

- 1, island protect: This is a protection point setting, usually set to 1 or 2. Smaller value indicates higher protection.
- 2, grid&pv charge together: This is only about whether PV and grid charge the battery simultaneously. It does not mean that if set to 0, the grid will not charge the battery.
- 3, manual adjustment: This function is required with special parameters. Normally, please set it to 0.
- 4, BMS communication enable: Set it up according to the actual situation of the battery. You need to check whether the communication line between the battery and the HPS is correctly connected before setting it up.
- 5, anti—backflow enable: Usually, we set it to 1, meaning that this function is turned on. The energy will not flow to the grid. Offided to loads and batteries only. Can be adjusted according to the practical application.
- 6, DG enable: If the system is connected to a generator, it is set to 1
- 7, parallel enable: If the system is connected by more than 2 HPS, set to 1
- 8, number of parallel machines: Number of HPS units in the system
- 9, parallel redundant number: Represents the maximum number of faulty devices in a parallel system.
- 10, parallel address: The parallel address of HPS is set in order according to the quantity. The address of each HPS cannot be duplicate. For example, 4 HPSs with addresses set to 1, 2, 3, and 4
- 11, parallel address switching enable: The HPS parallel address can be automatically switched when running. Will not cause conflict

3、 HPS System Commissioning

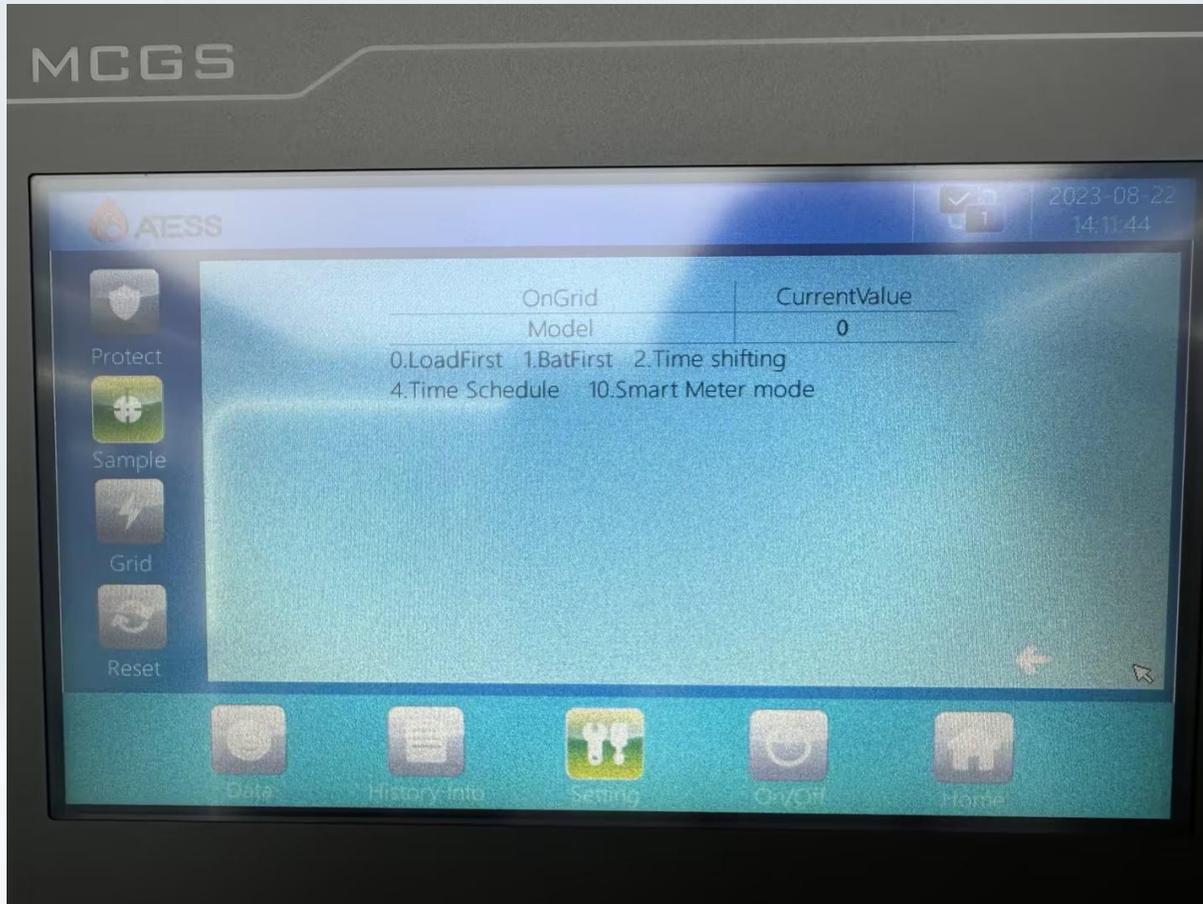


- 1, monitor parallel judgment sign
- 2, BMS voltage judge enable
- 3, ATS enable
- 4, ATS communication station number enable
- 5, ATS communication station number
- 6, ATSNnumbers
- 7, forcecharge enable
- 8, AC over voltage time (20ms)
- 9, batt to non-critical enable
- 10, meter communication station number
- 11, CT ratio of meter

3、 HPS System Commissioning

- 1, monitor parallel judgment sign: When using a parallel system with monitoring, all HPS settings are set to 1. Single machine systems do not need to be set.
- 2, BMS voltage judge enable: When the SOC calculation accuracy of BMS is poor, which affects the system operation and uses the single voltage for the judgment, set to 1, otherwise set to 0
- 3, ATS enable: Used when there is access to ATS in the system.
- 4, ATS communication station number enable: When multiple ATS are connected to the system, this enable setting needs to be activated in order to set the ATS station number. Each HPS corresponds to one ATS
- 5, ATS communication station number: Set according to the number of ATS units connected to the system. HPS1 corresponds to ATS1, and HPS2 corresponds to ATS2. And so on
- 6, ATS numbers: The total number of ATS units connected to the system
- 7, forcecharge enable: This function is only effective when using our battery. The battery BMS also needs to set the equalization time at the same time.
- 8, AC over voltage time (20ms) : This value is the protection reaction time of the HPS. The HPS settings vary for the different specifications. Please are not free to modify it.
- 9, batt to non-critical enable:
- 10, meter communication station number: The communication station number of the electricity meter can be found on the electricity meter
- 11, CT ratio of meter: The CT ratio of the electricity meter can be found on the electricity meter.

3、 HPS System Commissioning



Select the operating mode and set it according to the actual needs.

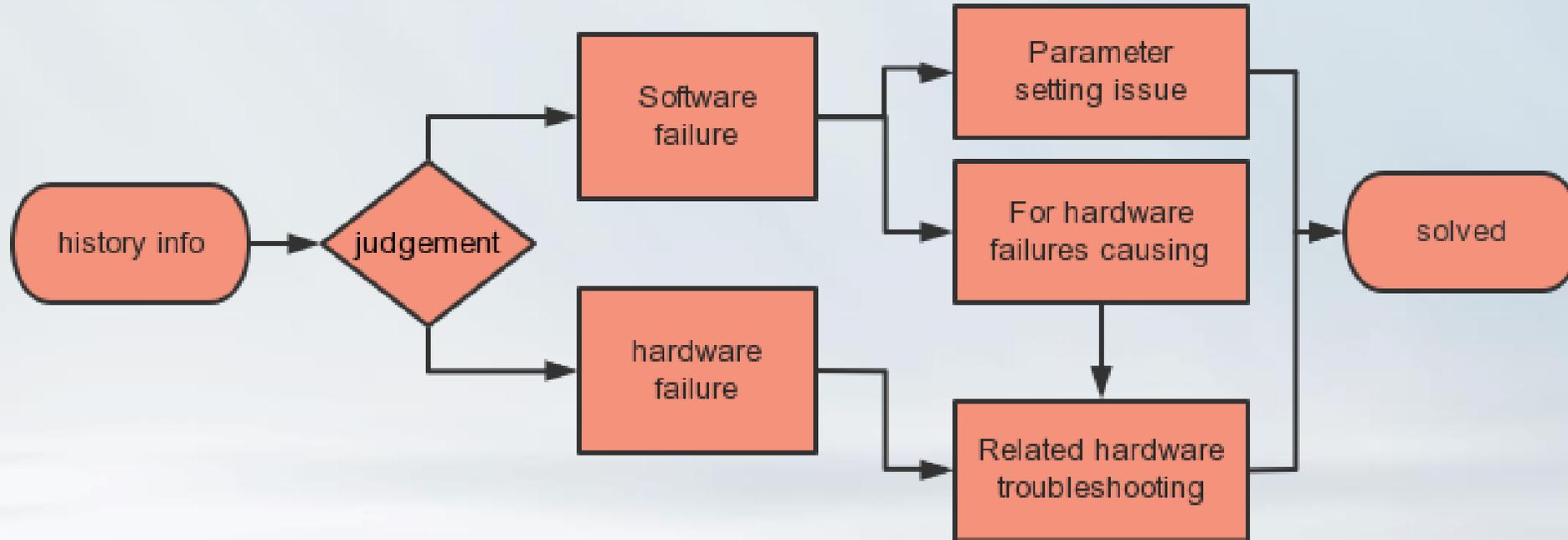
- 0, load first
- 1, battery first
- 2, time shifting
- 3, time schedule
- 10, smart meter mode

3、 HPS System Commissioning

The following is the run data page. After completing parameter settings, you can return to this page to check if the data is normal. For example, if there is BMS communication, you can check whether the data on the BMS data page is normal. Is the voltage of the battery unit normal, and is there a display of negative or too high voltage and current.



4、 HPS System Troubleshooting



4、 HPS System

Troubleshooting

Our common faults are usually divided into hardware faults and software faults. In fact, each software failure also corresponds to a hardware part.

On hardware, we can usually observe with the naked eye whether the appearance is complete and whether there are signs of burning black. Or cooperate with a multimeter to check whether the voltage is normal, whether the resistance is normal, and so on.

Software failures generally refer to incorrect or unreasonable parameter settings. This includes sometimes requiring recalibration of the system, such as voltage and current. For a common example, if you see a batt undervoltage fault in historical data, it is necessary to check whether the unit voltage in the running data is displayed correctly. If the displayed voltage differs significantly from the actual value, it indicates that the cells are set incorrectly and need to be recalculated and reset. If the display is correct, check if the minimum battery voltage sent by BMS is lower than the under voltage fault we set.

Generally, we can view the corresponding fault information and troubleshoot it based on the **HPS software faults and instructions** file.

5、 HPS System Tools



1.The hardware tools shown in the figure are commonly used.

2.We also have some related software tools, including DSP tool 、 CANtest、 J Flash、 CCS UniFlash 2.0.0、 EasyConverter、 anydesk、 teamviewer etc.

- 1 Clamp flow meter
- 2 multimeter
- 3 insulating gloves
- 4 Temperature detection gun
- 5 CAN BOX
- 6 RS232 cable
- 7 485-RS232 cable
- 8 emulator
- 9 J-link