ENSERVER 100/250/500/630

Bidirectional Enserver User Manual

Contents

1 Introduction

1.1 Contents

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1.2 Target readers

Qualification：

- Only professional electricians certified by relevant departments can install this product.
- The operator should be fully familiar with the structure and working principle of the entire energy storage system;
- The operator should be fully familiar with this manual;
- The operator should be fully familiar with the local standards of the project.

1.3 Symbols

In order to ensure the personal and property safety of the user during installation, or optimally efficient use of this product, symbols are used highlight the information. The following symbols may be used in this manual, please read carefully, in order to make better use of this manual.

	DANGER DANGER indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.
	CAUTION CAUTION indicates there is potential risk, if not avoided, could result in equipment malfunction and property damage.
	Caution,risk of electric shock When ESS bank connecting point are exposed, there will be DC voltage in the equipment DC side; and when output breaker is on, there is a potential risk of electric shock.
	Caution, risk of fire hazard Suitable for mounting on concrete or other non-combustible surface only.
	Protective conductor terminal The Enserver has to be firmly grounded to ensure the safety of personnel.
	Risk of electric shock, Energy storage timed discharge Electrical shock danger exists in the capacitor; the cover shall be moved at least 5 minutes later after all powers are disconnected.

Safety instructions 2

2.1 Notice for use

Enserver installation and service personnel must be trained and familiar with the general safety requirement when working on electrical equipment. Installation and service personnel should also be familiar with the local laws and regulations and safety requirements.

- Read this manual carefully before operation. The equipment will not be under warranty if failing to operate according to this manual.
- Operation on the Enserver must be for qualified electrical technician only.
- When Enserver operating, don't touch any electrical parts except for the touch-screen.
- All electrical operation must comply with local electrical operation standards.
- Permission from the local utility company is required before installing the energy storage system and only professional personnel are qualified for the operation.

2.2 Installation

Proper installation requires following all the instructions in the user manual involving transportation, mounting, wiring and commissioning. ENERCAP does not cover warranty for the Enserver damage due to failing to use it properly.

The protection level of the Enserver is IP20, which is designed for indoor installation. Please refer to chapter 5 for installation instruction.

Other notice for using the Enserver :

> Pay attention to the safety instructions listed here and below ;
> Pay attention to the user manual of energy storage controller ;
> Technical data related to equipment shall be considered.

2.3 Important note

Item 1 Static electricity can cause damage to the Enserver
electrostatic discharge may cause unrecoverable damage to Enserver internal components! When operating the Enserver, operator must comply with anti-static protection norms!

Item 2: Restriction
The Enserver cannot be directly used to connect the life support equipment and medical equipment!

Item 3: Precautions
Make sure installation tools or other unnecessary items are not left inside the Enserver before starting up.

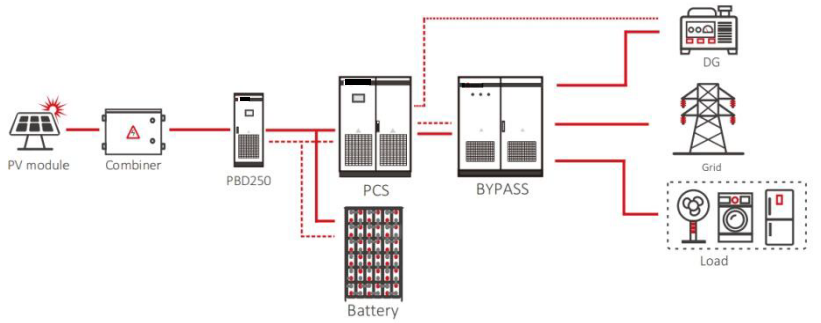
Item 4: Maintenance notice
Maintenance can only be carried out after the Enserver totally discharged.

3.1 Bi-directional energy storage Enserver

1. This series energy storage controller produced by ENERCAP is a bidirectional ESS Enserver. Its main function is to store the energy of power grid / oil engine to the ESS, or release the stored energy to the power grid or supply load.

2. The energy storage controller and bypass cabinet can realize seamless switching off the grid and ensure uninterrupted load supply. If it is not equipped with bypass cabinet, it is impossible to carry out parallel and off grid seamless switching, and only pure grid connection or pure off grid mode can be operated.

3. At the same time, it can be combined with PBD (photovoltaic DC converter) to charge photovoltaic energy into the ESS or output it through Enserver of energy storage controller.



PBD+ENSERVER+bypass system diagram

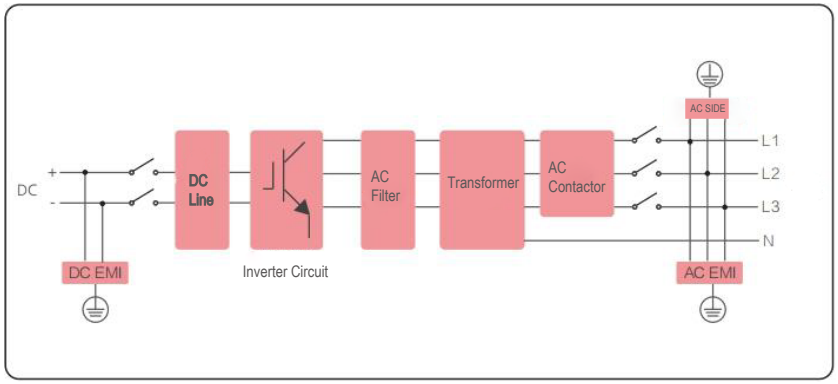
System Description:

PBD:

Photovoltaic DC converter, photovoltaic DC input, and then DC output to charge the ESS, or Enserver output through the energy storage controller to supply load or power grid.

Bypass: The bypass cabinet can be connected to photovoltaic grid connected Enserver (to be matched with **ENSERVER**), energy storage controller, load, power grid and oil engine. Main functions: AC confluence, parallel off grid switching in cooperation with energy storage controller, and automatic switching of power grid oil engine.

3.2 Circuit diagram of the Enserver



3.3 The layout of the main components

3.3.1 External components

The main external components of the energy storage controller include: LED indicator, LCD touch screen, off-on knob, emergency stop button and other parts.

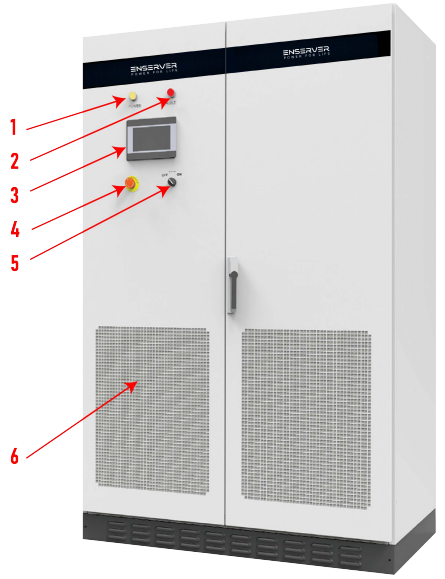


Figure 3-3-1-1 Enserver appearance

No.	Name	Descripition
1	Power indicator	When power supply is normal, the indicator displays yellow.
2	Enserver malfunction indicator	When Enserver is faulty, the indicator displays red.
3	Touch Screen LCD	Operation information display, receive control command and parameters setting
4	Emergency STOP	Shut down the Enserver when pressed down
5	Off-on knob	Only control the grid-side switch, and does not control the DC-side switch
6	Dust screen	Prevent dust from entering into the Enserver

Figure 3-3-1 Part description

➢ Indicator

There are two LED indicators on the Enserver which is used to display the current status of the Enserver.

Figure 3-3-1-2 LED indicators

Emergency STOP

CAUTION

The emergency stop button is only used in case of emergency, such as: serious failure in the grid, fire, etc.

Figure 3-3-1-3 Emergency STOP

The emergency stop button immediately disconnects the Enserver from both grid and ESS, which ensure the safety of the Enserver. By pressing the emergency stop button, the device will be locked in the "off" position. Only release the emergency stop button by rotating it clockwise and closing AC, DC breaker, can the Enserver resume working normally.

The emergency stop button immediately disconnects the Enserver from both grid and ESS, which ensure the safety of the Enserver. By pressing the emergency stop button, the device will be locked in the "off" position. Only release the emergency stop button by rotating it clockwise and closing AC, DC breaker, can the Enserver resume working normally.

➢ Off-on knob

It is used to start or stop the Enserver.

Figure 3-3-1-4 Off-on knob

➢ Touch screen

It displays the Enserver's operating parameters, power generation, and faulty information record. Please refer to Section 6, for details.

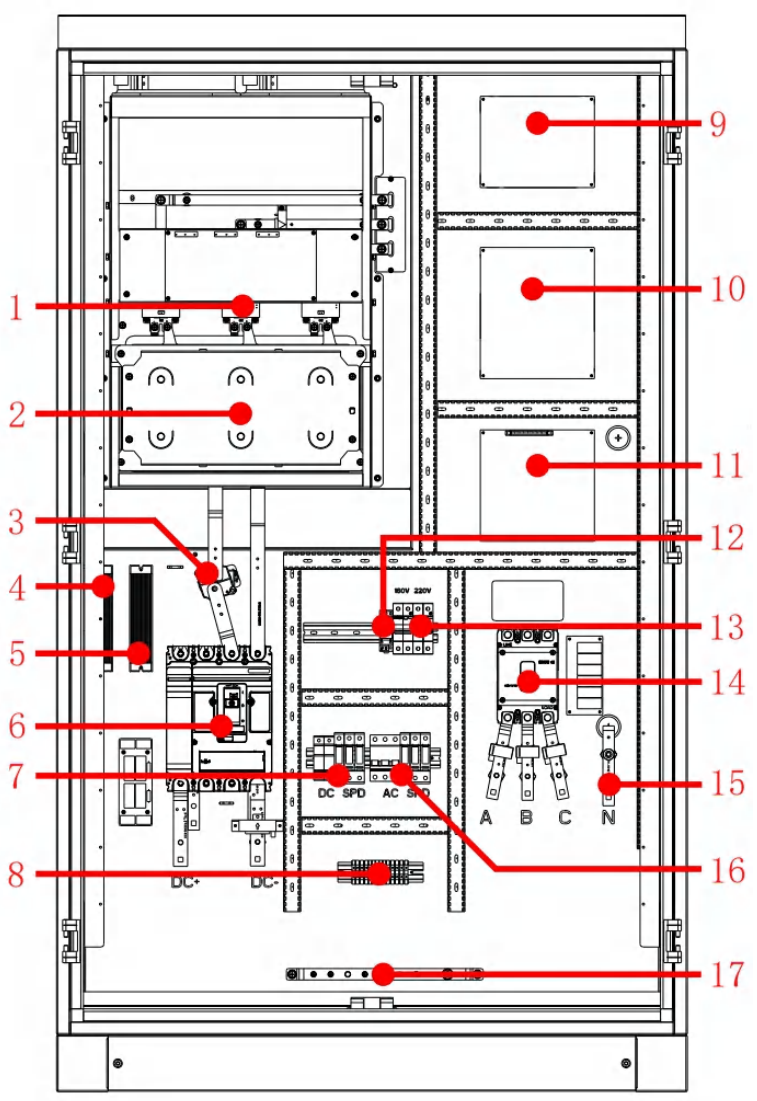
3.3.2 Components at the front

The main components of PCB and AC power supply circuit breaker include lightning protection switch, AC power supply circuit breaker, etc. The layout of different models is different, not all of them can be displayed here, which does not mean that there is no such part.

3.3.2.1ENSERVER 100KW main parts overview

NO	Name	Description
1	IGBT module	Power module
2	Capacitance	DC bus capacitance
3	DC main relay	DC main relay
4	Aluminum shell resistance 1	DC soft start resistance
5	Aluminum shell resistance 2	DC bus discharge resistance
6	ESS circuit breaker	Control the connection of ESS and **ENSERVER**
7	DC lightning protection	DC lightning protection
8	Terminal block	Terminal block connecting with bypass cabinet
9	Interface board	Power supply convert PCB
10	Control board	Control board
11	Sampling board	PCB that samples voltage, current and temperature
12	DG dry contact	Control running of DG
13	AC power supply microbreaker	AC power supply microbreaker
14	AC circuit breaker	Control AC connection with **ENSERVER**
15	N terminal	N terminal connected with bypass cabinet
16	AC lightning protection and lightning protection switch	AC lightning protection and lightning protection switch
17	PE terminal	Grounding copper bar

Table-ENSERVER 100KW main parts overview

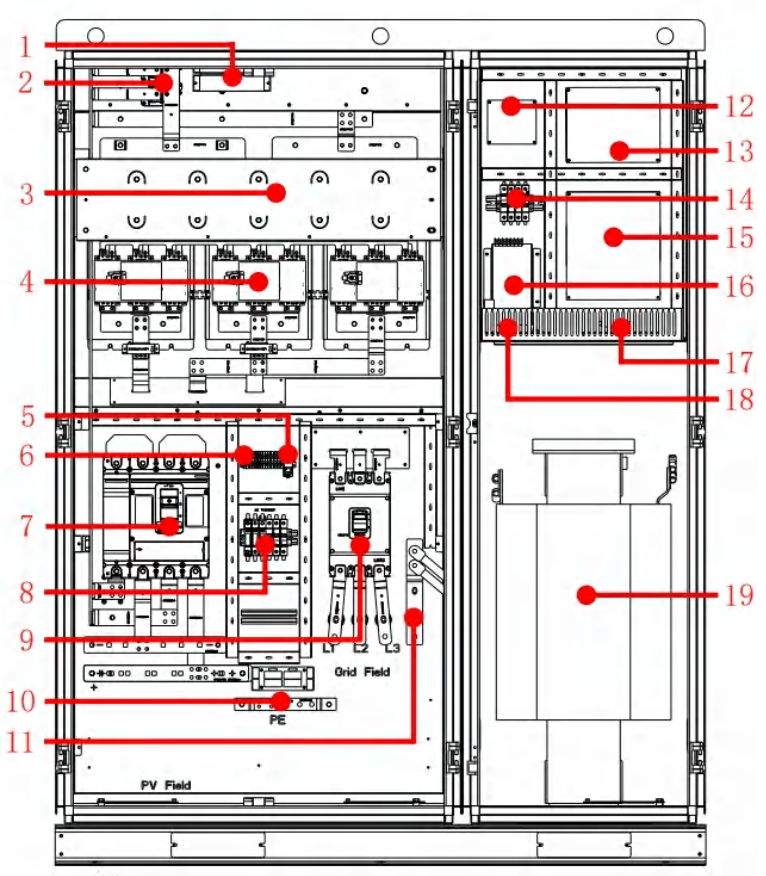


ENSERVER 100KW main parts overview

3.3.2.2 ENSERVER 250KW main parts overview

NO	Name	Description
1	Aluminum shell resistance 1	DC bus discharge resistance
2	DC main relay	DC main relay
3	DC auxiliary relay	DC auxiliary relay
4	Capacitance	DC bus capacitance
5	DG dry contact	Control running of DG
6	Terminal block	Terminal block connecting with bypass cabinet
7	ESS circuit breaker	Control the connection of ESS and **ENSERVER**
8	AC lightning protection and lightning protection switch	AC lightning protection and lightning protection switch
9	AC circuit breaker	Control AC connection with **ENSERVER**
10	PE terminal	Grounding copper bar
11	N terminal	N terminal connected with bypass cabinet
12	Rectifying board	DC power supply and AC/DC power supply PCB
13	Interface board	Power supply convert PCB
14	AC power supply microbreaker	AC power supply microbreaker
15	Control board	Control board
16	Mingwei power	Power supply module
17	Sampling board	PCB that samples voltage, current and temperature
18	BUCK board	DC Power supply PCB
19	Transformer	Isolated tranformer

Table-ENSERVER 250KW main parts overview

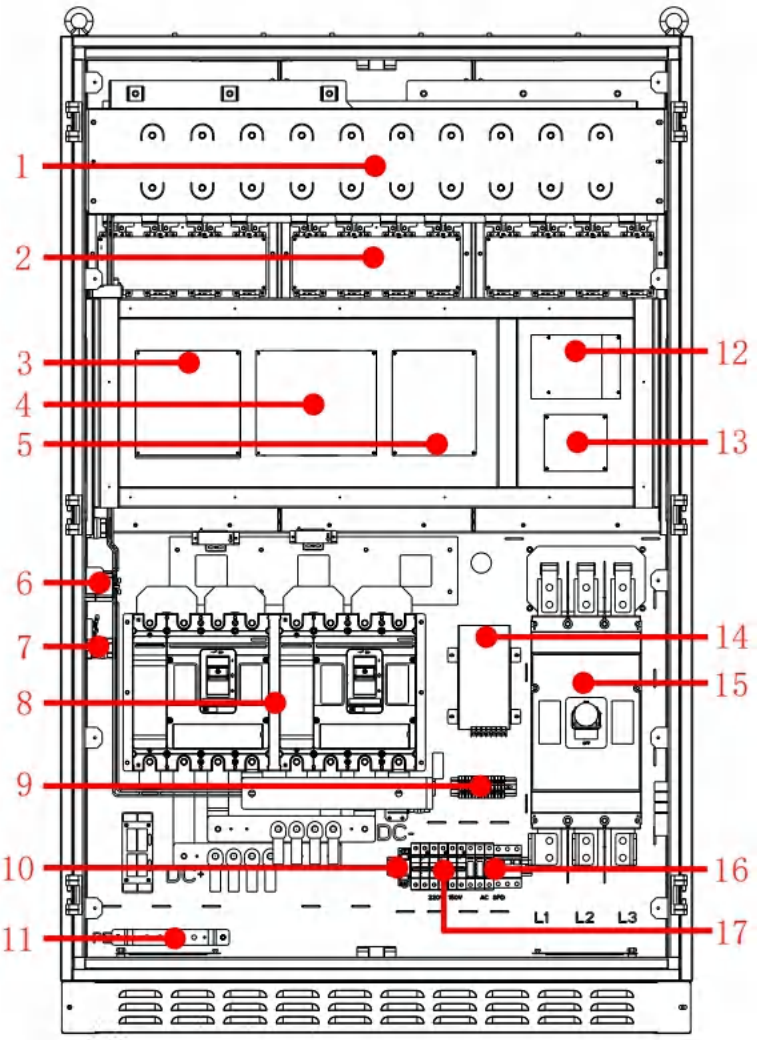


ENSERVER 250KW main parts overview

3.3.2.3 ENSERVER 500KW main parts overview

NO	Name	Description
1	Capacitance	DC bus capacitance
2	IGBT module	Power module
3	Sampling board	PCB that samples voltage, current and temperature
4	Control board	Control board
5	Interface board	Power supply convert PCB
6	DC main relay	DC main relay
7	DC auxiliary relay	DC auxiliary relay
8	ESS circuit breaker	Control the connection of ESS and **ENSERVER**
9	Terminal block	Terminal block connecting with bypass cabinet
10	DG dry contact	Control running of DG
11	PE terminal	Grounding copper bar
12	BUCK board	DC Power supply PCB
13	Rectifying board	DC power supply and AC/DC power supply PCB
14	Mingwei power	Power supply module
15	AC circuit breaker	Control AC connection with **ENSERVER**
16	AC lightning protection and lightning protection switch	AC lightning protection and lightning protection switch
17	AC power supply microbreaker	AC power supply microbreaker

Table-ENSERVER 500KW main parts overview

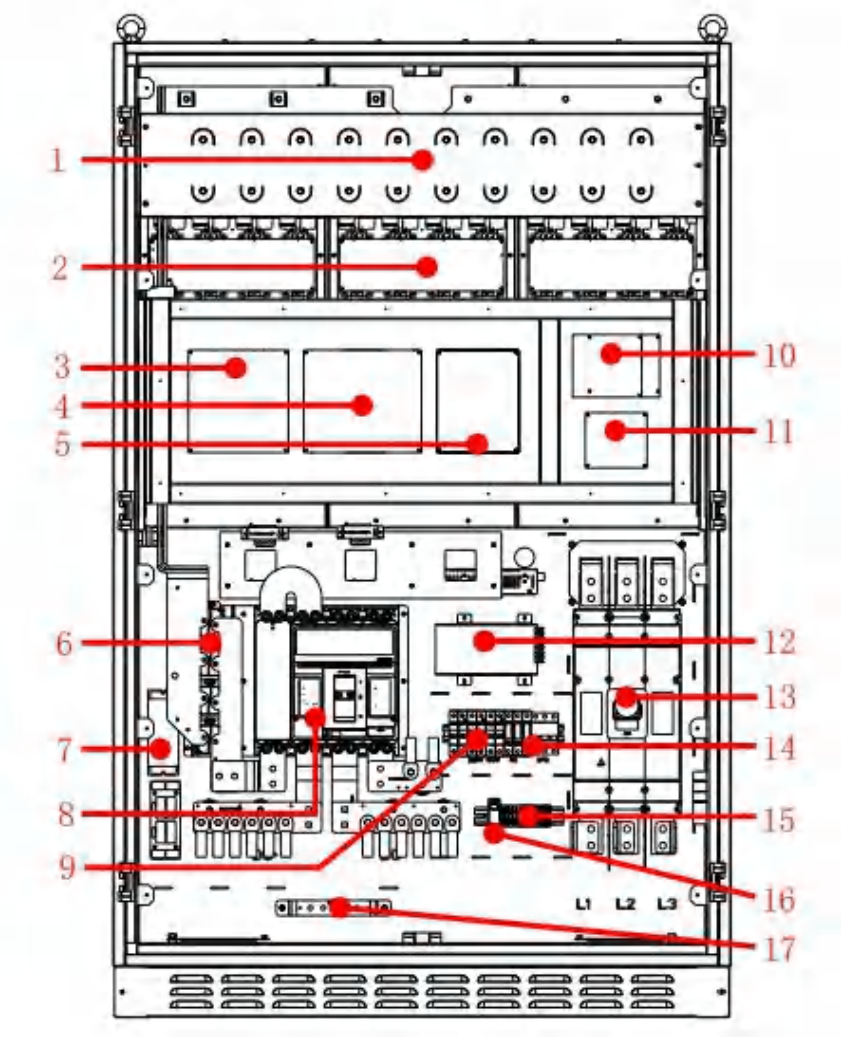


ENSERVER 500KW main parts overview

3.3.2.4 ENSERVER 630KW main parts overview

NO	Name	Description
1	Capacitance	DC bus capacitance
2	IGBT module	Power module
3	Sampling board	PCB that samples voltage, current and temperature
4	Control board	Control board
5	Interface board	Power supply convert PCB
6	DC main relay	DC main relay
7	Aluminum shell resistance	Soft start resistance
8	ESS circuit breaker	Control the connection of ESS and **ENSERVER**
9	AC power supply microbreaker	AC power supply microbreaker
10	BUCK board	DC Power supply PCB
11	Rectifying board	DC power supply and AC/DC power supply PCB
12	Mingwei power	Power supply module
13	AC circuit breaker	Control AC connection with **ENSERVER**
14	AC lightning protection and lightning protection switch	AC lightning protection and lightning protection switch
15	Terminal block	Terminal block connecting with bypass cabinet
16	DG dry contact	Control running of DG
17	PE terminal	Grounding copper bar

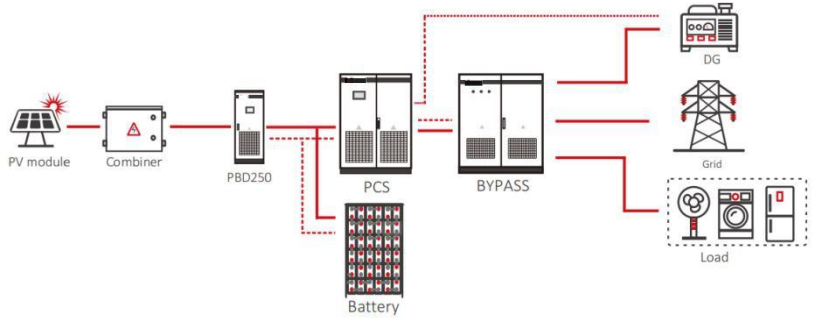
Table-ENSERVER 630KW main parts overview



ENSERVER 630KW main parts overview

3.4. Operation mode

1. Please read chapter 7.2.4 for the setting method of operation mode, and set the operation mode on the screen.
2. The ENSERVER needs to be used with bypass cabinet by default. If not, it can only operate in pure on-grid mode or pure off-grid mode, automatic on/off grid switching cannot be carried out.
3. Because the bypass cabinet can be connected to the PV grid connected Enserver, which is equivalent to PBD and regarded as PV energy, hereinafter referred to as PV. If PBD and PV grid connected Enserver are not connected, it is considered as insufficient PV.



System diagram

3.4.1 ON-grid charge and discharge mode

Functions optional in on-grid modes.
Anti-reflux (default enable is 0)
When set to 1, enable the anti countercurrent function;
When set to 0, the anti-reflux function is disabled.
1. In case of reverse current prevention, it is forbidden to feed power to the power grid.
2. When the reflux is not prevented, the residual power can feed to the power grid.
3. In DG mode, the anti-reflux function is turned on by default and cannot be closed.

Simultaneous charging enable (default enable is 1)
1. When set to 1, the grid or DG can charge the ESS at the same time as the PV.
2. When it is set to 0, the PV will charge the ESS first, and the grid or DG will not charge the ESS. Power grid or DG can be allowed to supply power when there is no PV ESS charging. Please read chapter 7.2.4 for setting method.

3.4.1.1 Load priority mode

1. When the PV energy is sufficient, PV will supply the load first, and the remaining electricity will be charged to the ESS.
2. When the PV power cannot fulfill the load, the ESS will discharge automatically. If the ESS discharges to the stop discharge set point, the ESS will stop discharging and the load will be powered by PV and the grid. In order to protect the ESS, the ESS will be charged with a small current. When the ESS is charged to a recoverable discharge state, the discharge will be resumed.

➢ Stop discharging set point: discharge cut-off voltage, discharge cut-off SOC, see Chapter 7.2.4 for details

➢ Recover discharging set point: ESS saturation and recovery discharge SOC. See Chapter 7.2.4 for details

3.4.1.2 ESS priority mode

1. When the PV energy is sufficient, charge ESS first and supply the remaining power to the load;
2. When the PV energy is insufficient, the PV charge the ESS first, the load is supplied by the power grid, and the power grid charges the ESS at the same time;
3. If the ESS is not discharged in the ESS priority mode or switched to other modes, in order to maintain the electrochemical activity of the ESS, it will enter the ESS discharge state after one week of current limiting charging, and the ESS discharge power will be calculated according to the ESS specification. (it will not discharge to the power grid when anti-reflux).

3.4.1.3 Economic mode

The period of economic mode is divided into peak period, fair period and valley period. Please refer to section 7.2.4 for the setting details.

1. Valley period: working logic is the same to the ESS priority mode's.

2. Fair period:

A) When PV energy is sufficient, PV is preferentially used for load, and the residual energy to charge the ESS;

B) When PV energy is insufficient, PV and power grid jointly supply load without charging the ESS;

C) The ESS supply the load without discharging.

3. Peak period:

A) The grid does not charge the ESS;

B) When PV energy is sufficient, PV shall supply the load first and the ESS shall be charged.

C) When PV energy is insufficient, there are two cases:

(1) If the ESS state does not reach the stop discharging set point, PV and ESS supply for load.

(2) When the ESS state reaches the stop discharging set point, the ESS does not discharge, PV and power grid jointly supply the load without charging the ESS.

3.4.1.4 Time shifting mode

1. Peak period: There are five time periods on the screen, and the corresponding discharge power value (KW) can be set for each time period. When reaches the set time, it will discharge automatically based on the set value.
2. Fair period: the screen can be set for 5 time periods, and the ESS will not be charged or discharged during the set time period.
3. Valley period: the screen can be set for 5 periods, and the corresponding charging power value (KW) can be set for each period. When reaches the set time, it will discharge automatically based on the set value.
4. Time segments cannot overlap or be omitted.
5. For details about how to set a time range, see 7.2.4.

3.4.1.5 EMS MODE

Description:

1. In EMS mode, the **ENSERVER** is controlled by EMS management system and has no operation logic itself, and the power is controlled by EMS command;
2. The power transmitted under EMS mode is still limited by the screen setting value;
3. It needs to be used with EMS;

3.4.2 Off-grid mode

1. When there is no power grid or the DG is connected, the **ENSERVER** will automatically switch to off grid mode.
2. In off grid mode, when the PV energy is sufficient, the PV will power the load first and charge the ESS.
3. In off grid mode, when PV energy is insufficient, the ESS will automatically discharge and supply the load.
4. When the power grid or DG is restored, the Enserver will automatically switch to on-grid mode or DG mode.

3.4.3 DG mode

1. In off grid mode, if the Enserver is connected to the DG and the DG enable is set to 1, when the ESS discharges to the stop discharge setting point, the Enserver sends a dry contact signal to start the DG. After the DG is successfully connected, it enters DG mode. Now the DG supplies power to the load; Meanwhile, the Enserver stops supplying power to the load and only charges the ESS.

2. When the ESS reaches the preset point of stopping DG, the Enserver will stop the dry contact signal, the DG will be switched off and Enserver will switch to off-grid mode.

> Start the DG set point: SOC lower limit, discharge cut-off voltage, see Chapter 7.2.4 for details

> Turn off the DG set point: SOC upper limit, floating charge current limit point settings. See Chapter 7.2.4 for details.

3.4.5 PV charge

1. In off-network mode and PBD is connected to the system, when the ESS discharges to the stop discharging set point and no power grid or DG is connected, the ESS continues to discharge to the undervoltage alarm point and enters the PV charge mode.

2. In PV charge mode, the **ENSERVER** stops AC output and only keeps the PBD charging the ESS.

3. In PV charge mode, the PBD continues to charge, and the ESS state returns to the setting point of "PV charge to off-grid", and automatically switches to off-grid mode.

4. In PV charge mode, when the power grid/DG is connected, immediately exit the PV charge mode and enter the grid-connected/DG mode.

3.4.6 Fault mode

When the Enserver fails, the contactor on AC and DC sides will immediately disconnect and shut down the Enserver, so as to ensure the system safety. At this time, the Enserver will continuously monitor whether the fault is eliminated, If not, it will maintain the fault state; after eliminated, it will restart automatically.

3.4.7 Permanent failure mode

When the invertrer has a serious fault, the contactor on AC and DC sides will immediately disconnect and enter a permanent fault state to ensure safety of the system. When permanent fault is detected three times in a row, all switches will be disconnected. For example, the IGBT module of the Enserver is faulty. When Enserver enters this permanent failure mode, please do not repair it without permission. You should contact the personnel of the local dealer or call ENERCAP **after-sales** for help.

3.5 Dimensions and weight

Model	100KW	250KW	500KW	630KW
Dimension (W*H*Dmm)	1100/ 1890/ 850	1600/ 2080/ 850	1200/ 1900/ 800	
Weight(KG)	820	1465	900	950

Figure--Net Demensions and weight of **ENSERVER**

3.7 Packing information

NO	Name	Unit	Qty.	Note
1	**ENSERVER**	unit	1	Key included
2	User manual	pcs	1	
3	Certificate	pcs	1	
4	Factory test report	pcs	1	
5	Accessories	**pcs**	1	Communication lines etc.

Figure--Packing information

Transportation and storage 4

4.1 Transportation

Transportation should follow the transportation methods described in the user manual.
The Enserver's weight and center of gravity should be taken into account during transportation. The center of gravity is marked on the box.

Caution, risk of danger
During transportation, lifting equipment and personnel must be qualified. The Enserver should be placed vertically and the inclination cannot be more than 10 degrees. It is not allowed to place the Enserver upside down or transport in a horizontal position.Incorrect lifting and transportation can lead to serious injury, property loss and damage to the Enserver.

4.2 Inspection and storage

The Enserver should be carefully checked before signing the document from the transportation company. Check the received items against delivery note, and if there is any defect or damage, immediately notify the transportation company. If necessary, you can seek help from ENERCAP Customer Service department.

Caution
ENserver can only be stored when it is stopped and all the doors are closed in a dry room to protect the internal circuits against dust and moisture.

5 Installation

5.1 Installation condition requirements

To ensure normal operation of the machine, the installation environment is required as follows:

> The ingress protection of Enserver is IP20. Moreover, as this product is an electronic equipment, it shall not be placed in humid environment;
> Install indoors and avoid sunlight and rain;
> Ventilation of the room shall be good;
> The installation environment shall be clean;
> As some noise will be produced in operation, this equipment shall be installed far from residential quarters;
> The installation ground shall be even enough, and firm enough to support the weight of Enserver;
> The installation position shall be convenient for maintenance;
> Ambient temperature range: –25°C~55°C;
> Appropriate space shall be reserved for the machine to ensure ventilation and cooling.

We suggest Enserver is installed in the distribution room. The floor, wall clearance, Ventilation equipment and precaution should be designed by professional personnel and satisfy the following requirements.

> Foundation requirement

Enserver is required to install on even ground with fire-retardant material as the surface or channel steel support structure, and sag or tilt ground is prohibited. The foundation shall be solid, safe and reliable. The foundation shall be capable of bearing the load of the Enserver. Its load bearing ability shall be concerned throughout the installation place selection.

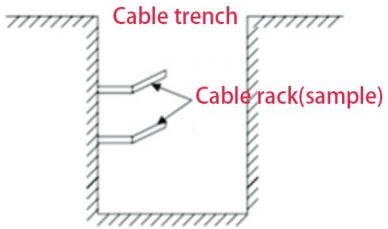
> Clearance space

During installation of the Enserver, appropriate space shall be left to the wall or other equipment, in order to satisfy the requirements on narrowest maintenance channel, emergency access and ventilation.

In front of the installation place of Enserver, a space of 0.8m or more shall be ensured, the back 0.8m or more, the top 0.8m or more to ensure easy installation, cooling and maintenance.

> Cable trench

The cable connection of Enserver adopts bottom inlet and bottom outlet. Cable trenches are recommended to ensure easy installation and maintenance.



The cable trenches are often designed and constructed by the construction side based on relevant standards, with the equipment weight and dimensions required to be considered. Good electrical connection is needed between different cable trenches and GND terminals.

> Wiring specification

Cables in the Enserver can be classified into either power cables or data cables. In cabling, the power cable shall be kept far away from, and the cable shall be kept in right angle at cross. The cable shall be as short as possible, and an appropriate distance shall be kept to the power cable. It is recommended that the insulation impedance of BT + and BT - at DC end to ground to be higher than 1m.

The power cable and data access shall be placed in different cable trenches respectively to avoid lengthy routing between the power cable and other cables, so as to reduce the electromagnetic interruption caused by sudden change of the output voltage. The distance among the power cable and data access shall be more than 0.2m. When the cables are crossed, the cross angle shall be 90 degrees, while the distance can be reduced appropriately.

> Ventilation requirement

In operation, Enserver will produce a lot of heat. When ambient temperature is too high, the electrical property of the equipment may be affected, the equipment may even be damaged. Therefore, the heat release shall be fully considered in designing the control room to ensure operation of the equipment in high efficiency.

> Ventilation environment

To satisfy the ventilation requirement of Enserver, its installation environment shall meet the following conditions:

※ Enserver shall be prevented from being installed in the place of poor ventilation condition and insufficient air flow;

※ The air inlet shall have enough air supplementation.

> Ventilation equipment

To ensure safe and reliable operation of the equipment, the ambient temperature must be within the permission range –25°C~ 55°C, therefore, appropriate ventilation devices must be equipped with to release the heat generated by the equipment.

1. There must be ventilation equipment inside the distribution room to ensure release of the waste heat generated by the Enserver from the equipment, and allow for maximum ambient environment temperature. This can be realized from installation of exhaust devices;
2. Another fan can be added at the air duct outlet to exhaust the air out and ensure balanced pressure;
3. The direction of the air outlet shall be selected according to the local actual wind direction;
4. Pay attention to the dustproof measures and waterproof design at the air inlet and outlet;
5. If more air ducts are required, its dimensions shall be designed by the professionals according to the air output amount.

> Other protections

With IP20 of protection level, Enserver is appropriate to be installed in dry and clean environment. Meanwhile, water leakage of the house shall be prevented, as it may damage the Enserver. According to EMC requirement and noise level, the Enserver shall be installed in industrial environment.

5.2 Tools and spare parts required for whole machine installation

Tools and spare parts required for installation is as follows:

- Hoisting crane, forklift or fork lift truck (with the capacity for bearing the weight of the Enserver)
- Torque wrench
- Screwdriver
- Wire stripper
- Terminal crimping machine
- Heat dryer
- Megger and multimeter

5.3 Mechanical installation

5.3.1 Transportation of packaged whole machine

This Enserver is transported as an integrated unit, and the user can hoist it from th bottom with a forklift, or move it with a hoisting crane or crane.

Note 1: The Enserver is integrated and cannot be dissembled either in transportatio or installation. Any fault attributed to modification unauthorized by the ENERCAP i beyond the quality assurance.

Note 2: In movement, tilt, violent shake or sudden force upon the Enserver shall b prevented, such as sudden down of lifting.

Note 3: Please read carefully the labeled parameters to select an appropriate transportation means and storage place.

We suggest the user make use of forklift to move the Enserver if possible.

Before the Enserver is moved to the designated place, we suggest to lay the DC input cable and AC main power supply cable. As these cables are relatively thick, they are hard to be cabled after the Enserver is installed.

To keep the equipment in a better protective status, please adopt transportation with package as much as possible, and comply with the labels printed on the package in transportation：

Sign	Indication
	The gravity centre
	Lifting logo
	Face up to prohibit the Enserver horizontally, tilted or upside down
	Handle with care, to avoid the transport environment too intense collision friction damage to the Enserver
	Keep away from moisture

Enservers whose packages are not demolished can be moved with forklift, hoisting crane or crane. In moving, attention shall be paid to the weight painted on the package to ensure enough load capacity of the devices. As the gravity center of the equipment locates at the lower place symmetrical in front and back and left and right, the support point or hoisting point shall be arranged reasonably in transportation.

The forklift transportation is the standard one. The gravity center of the cabinet in transportation should locate between two forks of the forklift. The big-size Enserver may block driver's sight, and it shall be treated with cooperation of the aid personnel.

5.3.2 Movement and installation of bare machine

Demolish the package of Enserver

Please demolish the packaged cabinet of the equipment according to the following procedures:

Procedure 1: Demolish the wood side and roof of the packaged cabinet Procedure 2: Demolish the out-set package material on the machine

Procedure 3: Demolish the fastening screws between the machine and the pallet

① Demolish the front and back cover lids of the pedestal;

② Screw off the hold-down nuts at the bottom of the wood pallet;

③ Remove the screws, and the Enserver will depart from the wood pallet.

Movement and installation of bear machine

The Enserver with demolished package can be moved with forklift, hoisting crane, slide rail or crane. If the package demolished place is far from the final installation place, it can be transported with forklift containing wood pallet.

If the wooden pallet at the bottom of the machine has been removed, when using the forklift, the front and rear cover plates of the base need to be removed first, and the center of gravity should be placed in the middle of the two forklifts, and then start lifting and transporting, as shown in the following figure:

Caution, risk of danger

We must act slowly and gently when transporting the Enserver with forklift to avoid violent vibration of the Enserver or collision with other objects.

If lifting method is used for moving, please pay attention to the lifting position, ensure that the lifting angle is 70 °, and be cautious of the center of gravity position of the Enserver.

NOTE:

> It is necessary to always pay attention to the position of the center of gravity of Enserver.

> Take necessary auxiliary measures to ensure the safety of transportation personnel;

> Take necessary auxiliary measures to ensure that the equipment is delivered to the final installation site.

5.4 Electrical installation

5.4.1 Input and output requirements

Caution, risk of danger

> There is a danger of electrical shock of high voltage in Enserver's operation; only electricians of professional skills can operate.

> All connections with this equipment shall be done under non-voltage state.

> The Enserver may be damaged if input or output terminal is incorrectly plugged.

Failure of acting upon this information may cause serious personnel injury or significant property loss even to death.

> ESS

The 100KW and 250KW ESS operating voltage is 500V–820V. The ESS voltage sould be not lower than 500V and not higher than 820V; 500KW and 600KW ESS operating voltage is 600V–900V. The ESS voltage sould be not lower than 600V and not higher than 900V.

> PV module

The maximum MPPT working voltage of PV module should not be more than 820V and the open circuit voltage should not exceed 1000V, otherwise the equipment will be in over-voltage protection state and cannot work normally. The MPPT voltage range of should be within 480V-800V, which means the minimum PV working voltage shall not be lower than 480V. And under the rated power, maximum working voltage shall not be higher than 800V.

> PV and ESS configuration

The MPPT voltage shall be greater than the maximum voltage of the ESS, otherwise, the ESS cannot be fully charged by PV power. However, it is suggested that the voltage difference not be too large, or it will speed up the machine wearing and the reduce efficiency. The best configuration is that the voltage of MPPT is 100V higher than the maximum ESS voltage.

>Three phase grid connection

The Enserver will constantly detect whether the power grid meets the grid connection conditions. The grid connection requirements of various countries may be different. The protection parameters of the Enserver can be set. For details, please refer to the local grid connection regulations. The power grid is a three-phase power grid. Plus, the installation shall be approved by the local power department.

Model	ENSERVER 100/250/500/630
Grid voltage limit	360V-440V
Grid frequency limit	45Hz-55Hz/55Hz-65Hz

> Cable requirements

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. The following table only provides the cable requirements of the lowest working voltage and rated power. In actual application, it should be calculated according to the actual voltage, please inquire the after-sales staff of ENERCAP if you need more details.

The cables should be calculated according to the actual voltage, or you could contact ENERCAP.

Cable	Requirements for bus diameter			
Model	100KW	250KW	500KW	630KW
ESS	70mm²	95mm²*2	95mm²*3	95mm²*4
AC output	70mm²	70mm²*2	95mm²*3	95mm²*4
N line	70mm²	70mm²*2	95mm²*3	95mm²*4
Ground line	The diameter of the ground cable should not be less than half of the cross-sectional area of the AC output cable			
Communication line	Shielding wire: >705nm			

5.4.2 DC side wiring

Caution, risk of danger

The positive and negative of the ESS shall not be connected in reverse. A multimeter shall be used to determine the polarity first, and then connect into the corresponding input ends of the ESS.

Specific procedures are as follows:

1) Cut off the distribution circuit breaker at the DC side, and ensure that no voltage on the wire at DC side.

2) Use a multimeter to measure the open circuit voltage of the ESS to ensure that it is within the allowed range.

3) Determine the positive and negative pole of the ESS with a multimeter.

4) Strip off the insulation skin at the end of the cable.

5) Crimp the wiring copper nose.

1. Put the stripped copper core into the crimping hole of the copper nose.

2. Use the terminal pressing machine to press the copper nose tightly. The number of crimping shall be more than two.

6) install the shrink fit sleeve.

1. Select the heat shrinkable sleeve which is more consistent with the cable size, length is about 5cm.

2. The heat shrinkable sleeve shall be sleeved on the copper nose of the wiring to completely cover the wire pressing hole of the copper nose.

3. Use a heat blower to tighten the heat shrink sleeve.

7) Connect the positive of the ESS to the "ESS input +" of DC input

1. Select the bolts that match the copper nose.

2. Connect the copper nose at both ends of the wiring firmly to the "ESS input +" end of the Enserver and the positive pole of the ESS.

3. Tighten the bolts with a screwdriver or wrench.

8)Connect the "ESS input -" end of the Enserver to the negative pole of the ESS by cable according to the method of step 7.

9) Please be sure that all wiring are fastened.

5.4.3 AC side wiring

Caution, risk of danger

When connecting the AC grid, cut off the circuit breaker at the AC side to ensure that the AC wire connecting to terminals has no electricity.

The output voltage of the AC side of the Enserver is 400V, which is connected to the power grid through a transformer. The wiring method of AC side and grid side is as follows:

1) Cut off the circuit breaker at AC side, to ensure that the AC wire connecting to terminals has no electricity. Confirm it with a multimeter.

2)Ensure that the wiring phase sequence at AC side is in consistent with the phase sequence at grid side.

3)Strip the insulation skin off at the end of the cable

4)Crimping copper nose

1. Put the exposed copper core of the stripped wire head into the crimping hole of the copper nose.

2. Use the terminal crimper to compress the copper nose of the wiring, and the number of crimping shall be more than two.

5)Install the shrink fit sleeve.

1. Select the heat shrinkable sleeve which is more consistent with the cable size, length is about 5cm.

2. The heat shrinkable sleeve shall be sleeved on the copper nose of the wiring to completely cover the wire pressing hole of the copper nose.

3. Use a heat blower to tighten the heat shrink sleeve.

4. Connect "L1" cable to "L1" terminal on grid breaker or òL1ó on PCS breaker of bypass cabinet. Select the bolts that match the copper nose.

5. Connect the AC output òL2" to the power grid switch òL2" or the PCS switch òL2" on the bypass cabinet (B (V) phase) as described in Step 6. Connect "L3" of AC output to power grid switch òL3" or PCS switch òL3" of bypass cabinet, namely C (W) phase; Connect N wire to the N bar on PCS. (The 500KW/630KW transformer needs to be external, so there is no N bar inside the PCS, so connect the N of the transformer directly to the N bar of the bypass cabinet).

5.4.4 Earthing

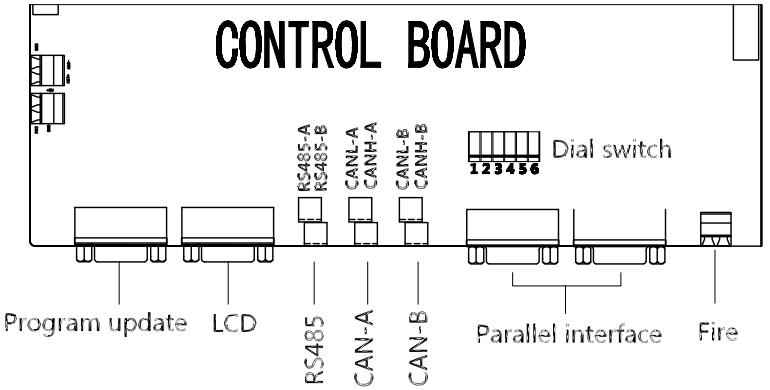
Enserver must be earthing well for safety; Please make sure of the connection between PE in power distribution cabinet and PE copper in the Enserver good; and make sure the earthing cable more than half of load cable, and earthing resistance is not lower than 4Ω

All wiring into the channel at the bottom of the Enserver to be all the wiring is completed, the connection port must be sealed with dust cotton, to prevent dust from entering the inside of the Enserver.

Connect several connecting wires on the PE copper bar as some parts inside the energy storage controller need to be grounded, please do not change them without permission, so as to avoid electric shock

5.5 Communication

The ENSERVER adopts various communication modes. The figure below is the diagram of the communication port of the control board.



Description of dial switch:

The dial switch is a connection control switch with communication matching resistance (120) Ω "On" indicates connection resistance and "off" indicates no connection with the resistance.

No.	Name	Description
1	485	485 matching resistance
2	CANA	CAN matching resistance
3	CANB	CAN matching resistance
4	M-S	Parallel matching resistance
5	ON-OFF	
6	MMS	

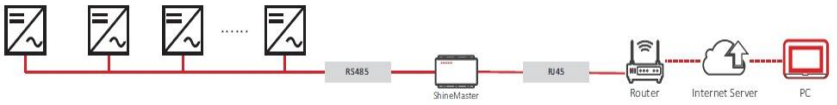
1. RS485 communication

> Multiple Enservers communicate with each other through RS485 line, and finally transmitted to the monitoring server through the Shinemaster / Enerlog via Ethernet, which can remotely moniter the operation status and data of single / multiple Enserver(s) in real time. Both ends of the RS485 communication line are connected with terminals, and the terminals at both ends are connected in parallel. The length of the line shall not exceed 1000m. It is recommended to use a special shielded communication line.

> The RS485 interface of the Enserver is located on the internal control board of the machine. Please distinguish "A" and "B". The wrong connection will lead to communication failure.

> If Shinemaster / Enerlog is not used for monitoring, the user's own monitoring equipment needs to be compatible with the RS485 communication protocol of ENERCAP.

> For the same 485 bus, only 120 Ω matching resistance needs to be connected from end to end. Please set the dial switch according to the field installation.



2. BMS-CAN communication

> When the ENSERVER works with ESS BMS management system, it needs to communicate with BMS through CAN communication. The CAN communication interface of BMS is connected to CAN-A interface of the ENSERVER, communication can be realized after docking the communication protocol.

> Terminals are used at both ends of the CAN communication line. The terminals at both ends are connected in parallel to make the can communication line. It is recommended to use a special shielded communication line to reduce communication interference and improve the operation stability of the system.

> The CAN-A interface is on the internal control board of the Enserver. Please distinguish between "L" and "H". Incorrect connection will lead to communication failure.

> If the user does not use the BMS ESS system produced by ENERCAP, the user's own BMS ESS system needs to be compatible with the BMS communication protocol of ENERCAP.

> For the same CAN bus, just connect 120Ω matching resistance from end to end. Please set the dial switch according to the field installation.

3. Bypass cabinet–CAN communication

- When the **ENSERVER** is used with the bypass cabinet, it needs to communicate with each other. The Can communication port of the bypass cabinet is connected to the CAN-B interface on **ENSERVER**. Note: Only the ENERCAP bypass cabinet can communicate with the **ENSERVER.**
- ENERCAP bypass cabinet comes with a dedicated communication line to communicate with the Enserver which is directly connected to the CAN-B interface.
- The can-A interface is on the internal control board of the **ENSERVER**. Please distinguish "L" and "H". Incorrect connection leads to failure of normal communication.
- For the same CAN bus, 120 Ω matching resistance needs to be connected from end to end. Configure the dial switch according to the site installation.

4. PBD - CAN communication

- **ENSERVER** is used with PBD and needs to communicate with it, and the CAN-B communication interface of PBD is connected to can-B of the **ENSERVER**.
- PBD is in the same position as the communication interface of the **ENSERVER**. Please distinguish "L" and "H". Incorrect connection leads to failure of normal communication.
- For the same CAN bus, 120 Ω matching resistance needs to be connected from end to end. Configure the dial switch according to the site installation.

Parallel communication (parallel customized

- When the same ENSERVER models connect in parallel, the parallel communication line should be connected, which is supplied along with each ENSERVER. The parallel ports of the two ENSERVERS are connected using the parallel communication line.

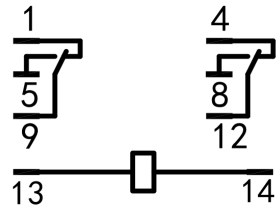
The control board has two parallel ports, either one can be connected, the two ports are exactly the same.

- The dial switch 4, 5 and 6 should be switched to "ON" for the first and the last ENSERVER in the parallel system .
- When no other device is connected to the CAN-B bus in the system, the dial switch 3 of first and the last ENSERVER in the parallel system must also be switched to "ON". If the bus is equipped with other devices, ensure that there are resistors at each end of the bus. Set the dial switch based on the site condition.

As Parallel function is a special customized function, please use it under the guidance of ENERCAP staff.

5.6 Diesel generator dry contact wiring

The Enserver has a passive dry contact contactor to control the diesel generator, and the following is the dry contact structure diagram (initial state).



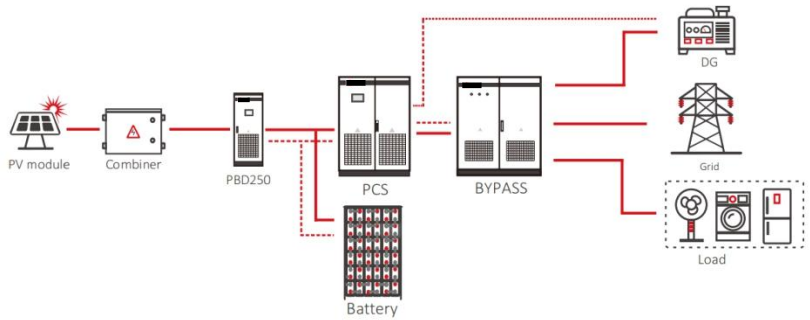
Wiring instructions:

1. "13" and "14" are the dry contact contactor power supply, which has been connected before delivery.
2. There are two groups of dry contacts: 1, 5, and 9 are a group, and 4, 8, and 12 are a group. The two groups work simultaneously.
3. The initial state is that when the ENSERVER does not send the command to start the DG, the state between "1" and "9" is closed, and the state between "5" and "9" is open. When the ENSERVER sends the command to start the DG, "1" and "9" are converted from closed to open, and "5" and "9" are converted from open to closed. "4" and "8" and "12" are the same.
4. When the current needs to pass through the dry contact, the AC voltage does not exceed 240V, the DC voltage does not exceed 28V, and the current does not exceed 5A.

5.7 Energy storage system wiring and communication wiring

5.7.1 **Cable Connection with the Bypass Cabinet**

When the ENSERVER is used with the bypass cabinet, switching between on-grid and off-grid can be realized. ENSERVER, Loads, PV Enservers (INVs), Grid and Generator are connected to the bypass cabinet under the corresponding circuit breakers.



1. The communication connection between the bypass cabinet and ENSERVER is divided into CAN communication and control communication. (See Section 5.5 for can communication connection).

2. Control communication connection method: Both the bypass cabinet and the PCS have a conversion terminal block (see section 3.3.2), and the bypass cabinet is provided with a butt harness. Connect according to the digital label.

3. 500KW/630KW does not have a built-in transformer, so you need to connect an external transformer when it is used with a bypass cabinet. For specific connection methods, refer to the internal transformer wiring diagram of 500KW/630KW.

5.7.2 Wire connection of parallel system and CAN communication wire

> Parallel system:

1. The same ENSERVER model is connected in parallel with the AC output suppling load at the same time, running in the same mode.

2. Parallel means when off-grid parallel, in which multiple ENSERVER maintain the same AC frequency, amplitude and phase.

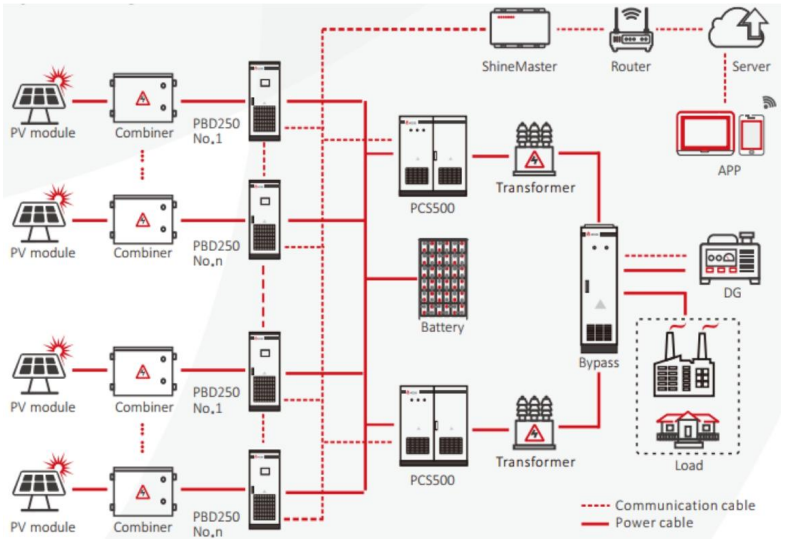
> System requirements:

1. The ENSERVER must be of the same model.

2. To ensure the stable running of the system, ensure that the configurations of each machine are consistent.

3. The parallel system needs to communicate, so all devices must be installed in adjacent positions.

For example, the wiring diagram of the system with two parallel PCSs and four PBDs is as follows:



> Wiring instructions:

1. To reduce circulation loss, it is recommended to share batteries. If the shared ESS is selected and the ESS is equipped with BMS, all devices (ESERVER and PBD) need to communicate with the ESS.

2. Multiple devices share power grid and DG. When automatic switching function of power grid /DG is required, it needs to be used with bypass cabinet.

3. The parallel system is equipped with dedicated communication ports and cables to connect the communication ports of parallel devices.

4. To ensure the communication quality, the devices must be installed in the same position to reduce the communication distance. The length of the communication cable we supply is 5 meters.

5. When multiple ENSERVERS are connected in parallel, the bypass cabinet can also work in parallel with multiple bypass cabinets. Each ENSERVERS is equipped with one bypass cabinet.

6. The length of the AC cable to the convergence point on each machine must be the same; otherwise, power distribution may be unbalanced.

> Working mode:

The working mode of the parallel system is the same as that of the single system, but the working mode of each device must be set to the same.

Redundancy is optional for parallel systems.

Description of redundancy function selection:

Redundancy can be selected only when one device fails and the other devices can still drive all the loads. Otherwise, the device will be overloaded.

Note: Parallel machine is a special function, standard machine may not be equipped with this function, please contact ENERCAP after sales team in advance if you need this function.

Installation requirements for parallel systems are high. Before installation, contact ENERCAP for installation and testing to ensure the correct operation of parallel systems.

6 Commissioning

6.1 Inspection before operation

Before the Enserver is put into operation, its installation shall be inspected. At least two staff do the inspection according to the items listed below to ensure the correctness of the installation.

Inspection items for installation

1. There is no deformation or damage to the Enserver.
2. Bottom of the Enserver is fixed securely, the foundation support is stable and reliable.
3. There is enough space around the Enserver.

Electrical inspection

1. Enserver is grounded completely and firmly.
2. The grid voltage matches the rated output voltage of the Enserver.
3. The phase sequence of grid connection is correct, and the tightening torque meets the requirements.
4. Cable number is marked correctly and clearly.
5. The insulation protection cover is complete and reliable, and the danger warning label is clear and firm.

Other inspection

1. All useless conductive parts shall be tied with insulating ties.
2. There are no tools, parts, conductive dust or other foreign matters left inside the cabinet.
3. There is no condensation of moisture or ice in the cabinet.

6.2 Power on steps

Energy storage controller adopts the integrated AC and DC power supply method, and LCD can be lit when there is AC or DC alone.

ESS power supply

The ESS can be used for the first time power-on. When the ESS breaker is closed, the LCD should be on.

AC power supply

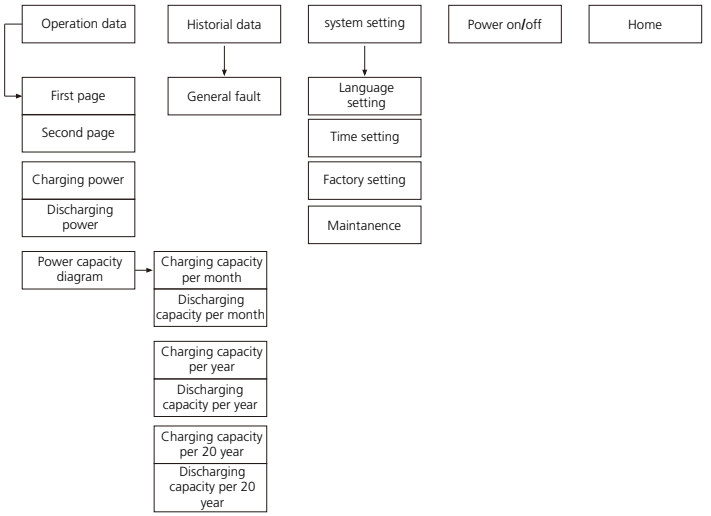
AC power supply can be used for the first time power-on. Turn on AC input switch, bypass switch, AC output switch and the micro breaks, LCD should be on. When the energy storage controller is powered by AC, as long as the ESS voltage is detected to be abnormal for more than 10 minutes, all circuit breakers except bypass will be switched off, and Enserver won't be able to start and operate when powered by AC source alone. After LCD is lighten by AC power supply, the bypass switch must be off before the machine turns on.

It is recommended to use batteries to light up the screen. After power on, please do not switch the power-on knob immediately. Please check the historical information page and check whether the operation setting is in line with the actual situation. Please refer to Chapter 7 for details.

GUI instruction 7

7. 1 LCD display screen introduction

User can view the information of the Enserver operation on the LCD touch screen, as well as setting the operating parameters. In order to facilitate the operation, a menu is provided below.



ENSERVER LCD Menu logical structure

1. After the LCD is powered on, it enters the startup interface and home page for after 15s, but it still takes about 2 minutes to initialize. the Enserver cannot be started until the initialization is completed.

2. at the top right of each page, The communication status between LCD and the inverter's control board (if √the communication is normal, otherwise ×, communication failure), station number of the communication end where the Enserver is located, system time, etc are displayed.

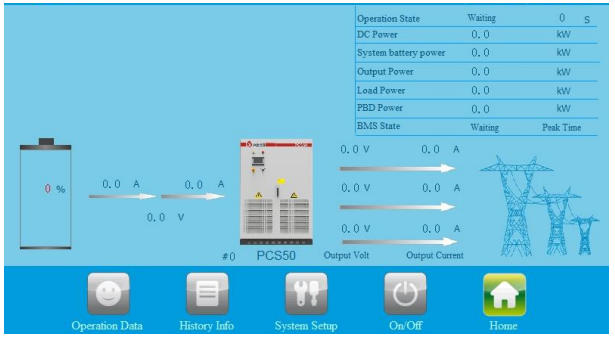
3. After power on and entering the home page, the program needs to be initialized for a period of time. When √ and numbers appear, the initialization is completed.

7.2 LCD operation

7.2.1 Home page

When powered or clicking "Home" button in any interface will enter into the Home page.

The operating status of the Enserver output power, safety standard, model, input and output voltage,current information can be viewed in the page. Pressing the following key can switch to other pages.



7.2.2 ON/OFF interface

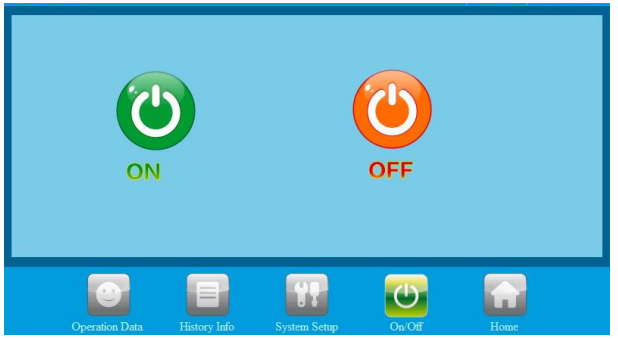
Clicking "ON/OFF" button in any interface will enter into this interface.

There are "ON" and"OFF" button which is used to turn on and turn off the Enserver.

Start up: turn the start knob to on and click "on" to start up successfully.

Shut down: shut down by clicking "off", or turn the start / stop knob to off directly.

If the machine will be turned off for a long time, use the off-on knob to shut it down.



7.2.3 Operation data

Click [operation data] at the bottom of any other interface to enter the submenu of "operation data".

The submenu includes: operation data, power curve, charge and discharge capacity. The corresponding submenu interface can be accessed through the left button. The default one is"operation data" interface.

Operation data: display the current parameters and real-time data of energy storage power generation, including grid voltage, grid frequency, grid current, DC input voltage, DC input current, temperature in the case and total generation time (real-time update).

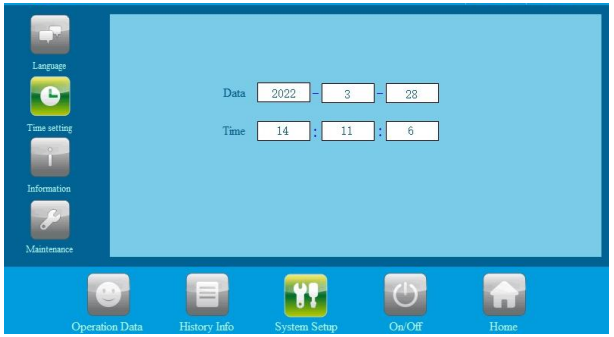
7.2.4 System setting

Clicking "System setting" button in any interface will enter into this interface.

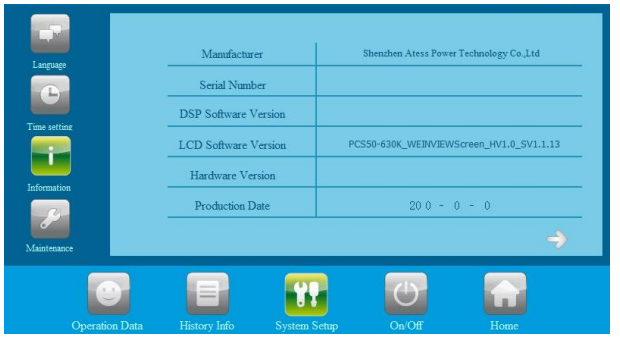
Submenu: language settings, time settings, Enserver information, maintenance.Pressing the left button can enter into the corresponding submenu interface. The default one is language setting interface.

Language Settings: Select language, currently it only supports Chinese, English.

Time settings: system time setting (if the date and time displayed on LCD is not inconsistent with the actual date and time, they can be modified here).



Device Information: This page shows the manufacturer, Enserver serial number, hardware and software version information, and the date of manufacturing.



Maintenance: the interface requires a password to login. It is for electrician and maintenance personnel who are fully familiar with the structure and working principle of the DC grid system only, in order to avoid damage to personal safety and the Enserver.

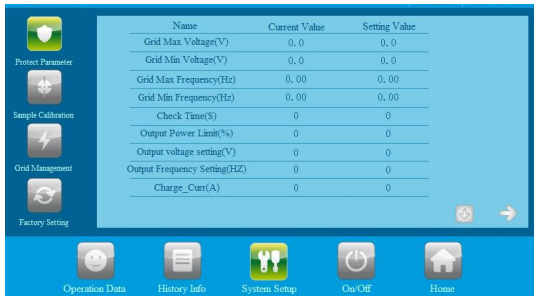
Enter the correct password to enter the submenu of "equipment maintenance". The submenu includes: protection parameters, calibration parameters, power grid management, factory settings. The default one is"protection parameters".

1. modify the set value. Click hange the current value to the same value as the set value.
2. Some new LCD will save the data automatically.

There are several reasons why the current value cannot be changed to the set value:

- LCD response is slow, you can switch pages to speed up the update.
- The value exceeds the limit and cannot be saved.
- Other data on this page has errors and cannot be saved.

1. Protection parameters:



Grid Max. voltage: If it exceeds Max. power grid voltage, it will switch to off grid mode. The default setting is 110% of rated voltage.

Grid Min. voltage: If it gets lower than Min. power grid voltage, it will switch to off grid mode. The default setting is 90% of rated voltage.

Grid Max. frequency: If it exceeds Max. power grid frequency, it will switch to off grid mode. The default setting is rated + 2.

Grid Min. frequency: If it gets lower than Min. power grid frequency, it will switch to off grid mode. The default setting is rated -2.

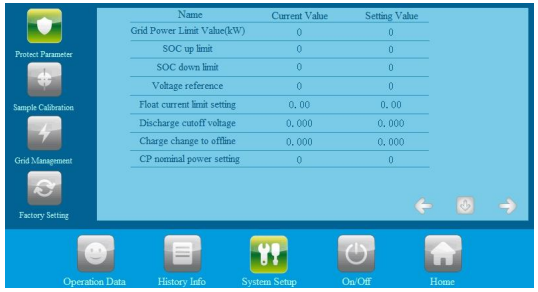
Check time: startup detection time, default 60 seconds, minimum 10 seconds, maximum 300 seconds.

Output power limit: AC output power percentage. It can be set to 1% - 120%, the default setting is 100%, and it is recommended not to exceed 110%.

Output voltage setting: the off-grid output voltage can be set to 380 or 400, and can be changed according to the actual needs. After the change, power off and restart to take effect.

Output frequency setting: the AC output frequency can be set to 50 or 60, and can be changed according to the actual needs. After the change, power off and restart to take effect.

Charge_current: you can modify the ESS charging current by changing this value. Please set it according to the actual parameters of the ESS to avoid losses caused by ESS overcharge. When the ESS is with BMS, the BMS will send the maximum charging current limit, compare it with the charging current set on the screen, and take the smaller value for charging.



Grid power limit value: the maximum power can be taken from the grid.

SOC up/down limit: only valid in diesel generator mode and when the ESS has BMS. When off grid and the current SOC is lower than the Min. SOC, the Enserver sends the diesel generator starting command; in diesel generator mode, the current SOC is higher than the upper SOC limit, and the Enserver sends the diesel generator closing command.

Voltage reference: no effect.

Float current limit setting: set current limiting charging, when the current unit voltage is greater than (floating cell voltage - floating charge current limiting point), enter the current limiting charging state.

$$\text{Target charging current} = \frac{\text{floating cell voltage -current unit voltage}}{\text{floating charge current limiting point value}} * \text{ESS charging current set value}$$

When the ESS is with BMS, the charging current setting value of the ESS will be compared according to the maximum charging current limit value sent by the BMS and the charging current setting value set on the screen, whichever is smaller.

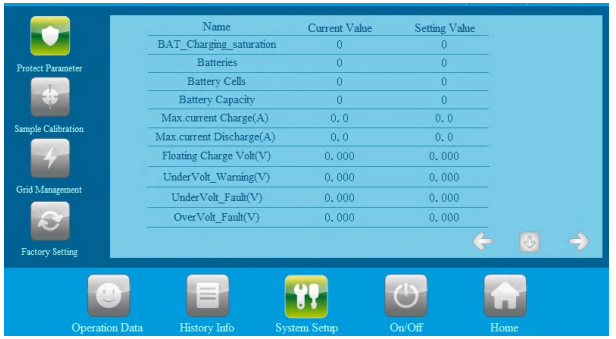
The real-time cell voltage of the ESS will be calculated according to the maximum cell voltage sent by the BMS.

When there is no BMS, it will enter floating charge current limiting mode in the DG mode and send the instruction to shut down the DG.

Discharge cutoff voltage: When the ESS voltage reaches the discharge cut-off voltage, the ESS stops discharging (the ESS continues to discharge until the undervoltage alarm shifts to single PV mode and the ESS fails if no PBD is connected), and the ESS takes effect when no BMS occurs.

Charge change to offline: In single PV mode, the ESS unit voltage reaches the set value when the ESS unit voltage reaches the single PV off-grid mode.

CP nominal power setting: When the energy storage controller is equipped with a grid-connected PV Enserver, the total power of the PV Enserver needs to be set.



This page is for setting ESS parameters. Batteries are an important part of the energy storage system. Ensure that the ESS parameters are consistent with the actual situation.

Bat_charging saturation: takes effect only in grid-connected mode. When the ESS voltage stops discharging due to undervoltage or discharge cut-off, the ESS unit voltage must reach the set value to resume discharging.

$$\text{Recovery discharge unit voltage} = \text{floating charge unit voltage} - \frac{\text{ESS saturation set value}}{10}$$

This function does not take effect when the ESS is lithium ESS and BMS voltage judgment is not enabled on the **ENSERVER**.

Batteries: The number of ESS modules connected in parallel. e.g. 2V/200Ah , 240 strings, 2 series, then the number of groups is 2.

ESS cells: The number of batteries in a string of ESS. e.g. 2V/200Ah , 240 strings, 2 series, then the number of cells is 240.

ESS capacity: Capacity of a ESS group (unit: Ah). e.g. 2V/200Ah , 240 strings, 2 series, then the capacity is 200Ah.

Max.current charge: indicates the protection value of the total ESS charging current.

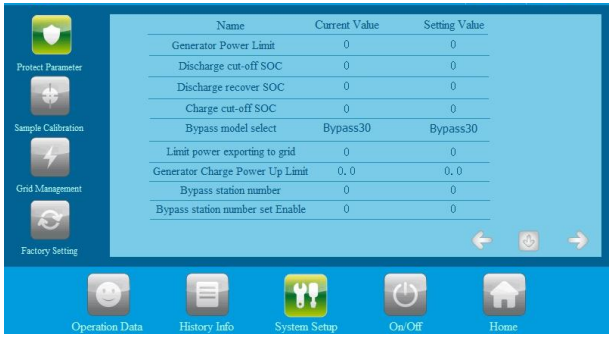
Max.current discharge: specifies the protection value of the total discharge current of the ESS.

Floating charge voltage: set the floating charge unit voltage of the ESS. When the ESS cell voltage reaches this setting value, the charging current approaches 0A. It's calculated with the maximum cell voltage sent by BMS if there is BMS, otherwise calculated with the average voltage.

Undervoltage warning: indicates the unit voltage when the ESS undervoltage alarm is generated. The minimum cell voltage sent by BMS is used when BMS is present, otherwise the average voltage is used for calculation.

Undervoltage fault: the unit voltage value when the ESS undervoltage protection, when the ESS voltage reaches this set value, the **ENSERVER** will protect and stop. The minimum cell voltage sent by BMS is used when BMS is present, otherwise the average voltage is used for calculation.

Overvoltage fault: the ESS overvoltage unit voltage value. When the ESS voltage reaches this set value, the **ENSERVER** will protect and stop. The maximum cell voltage sent by BMS is used when BMS is available, otherwise, the average voltage is used for calculation.



Diesel power limit: takes effect in only the "power mode" mode. It is the power upper limit of the power generator and the limit of charging + load. Note that the power upper limit of the power generator cannot be lower than the total load value.

Discharge cutoff SOC: when the ESS is a ESS with BMS and SOC reaches the set value, the energy storage controller will stop the ESS discharge and only the grid-connected state will take effect; The ESS does not take effect when there is no BMS. If there is no BMS, use the discharge cut-off voltage to judge.

Discharge recovery SOC: When the ESS is with BMS, the discharge is triggered to stop the SOC and when the SOC is restored to the set value, the discharge can be continued. It only takes effect when grid-connected. If the ESS has no BMS, the ESS does not take effect. In this case, use the discharge saturation.

Charge cutoff SOC: when the ESS is with BMS, the SOC reaches the set value and stops charging, and it does not take effect when there is no BMS; This setting value and floating charge voltage take effect at the same time, whichever reaches it first takes effect.

Bypass model select: Select the correct bypass cabinet model when the bypass cabinet is used. Otherwise, power sampling errors may occur.

Limit power exporting to grid: the maximum power feed to the power grid, including PV, which can limit the power feed to the power grid.

Diesel charge power up limit: the maximum charging power of the tanker to the ESS, which can limit the charging power of the tanker to the ESS.

Bypass station number: this parameter is not required for single system. The parallel system is divided into two situations: 1. Each **ENSERVER** is equipped with a bypass cabinet. In this case, the communication station number should be the same as the 485 address of the corresponding **ENSERVER**. 2. All **ENSERVER** share one bypass cabinet. In this case, the address should be the same as the address 485 of the **ENSERVER** connected to the bypass cabinet.

Bypass station number set enable: when you need to set the communication station number of the bypass cabinet, set it to 1 first and then change it. After the change is successful, set it to 0. Only the corresponding **ENSERVER** and bypass cabinet should be enabled.

This page is used to set economy mode and time shifting mode. This page takes effect only in economy mode and time shifting mode. The time range after 24:00 must be divided into two periods. For example, from 22:00 to 2:00, it can be divided into 22:00-24:00 and 00:0-2:00.

In the economic mode, only the effective time is set. The peak, valley, and fair working logic of the economic mode is implemented according to the three time periods.

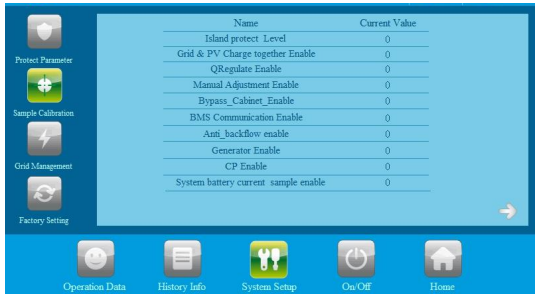
In time shifting mode, not only the setting of the effective time takes effect, but also the setting of the effective power, the peak period, valley period and fair period that divided into five periods respectively. At the same time, there are five corresponding power settings.

The page without instructions is factory preset parameter, please do not modify.

If the subsequent scheme changes, please modify the parameters under the guidance of ENERCAP.

2. Calibration parameters:

The modified parameters will be saved automatically. Failure to automatically save after modification means that this function cannot be enabled, if so please contact ENERCAP.



Island protect level: protection function to prevent the **ENSERVER** from incorrectly entering the off-grid mode under abnormal conditions of power grid/generator. The value ranges from 0 to 9. 0 indicates disabled, and 1 to 9 indicates level. Do not set the value too high; otherwise, the power grid/ generator will be affected.

Grid&PV charge together enable: When this parameter is set to 1, the power grid, DG and PV can charge the ESS at the same time. PV supply is preferred, supplemented by power grid/DGwhen insufficient; When set to 0, the power grid/DG and PV cannot charge the ESS at the same time. PV supply is preferred, and only when PV has no power will the power grid/DG charge the ESS.

Qregulate enable: After this parameter is set to 1, the reactive power mode can be set on the power grid management page. For further details, contact ENERCAP after-sales team.

Manual adjustment enable: It is only used to modify important parameters. Do not open it in normal situation. Please use it under the guidance of ENERCAP.

Bypass_cabinet_enable: When the **ENSERVER** is used with the bypass cabinet produced by ENERCAP, set this parameter to 1. Otherwise, set it to 0.

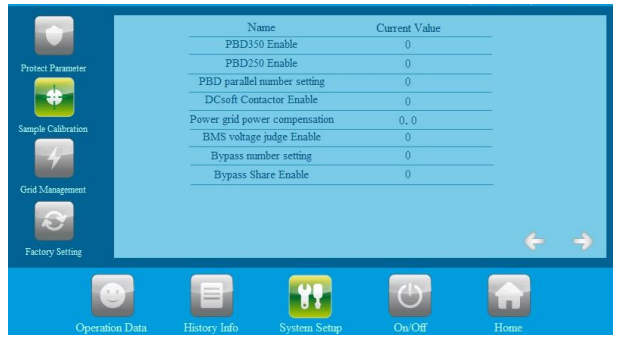
BMS communication enable: Set this parameter to 1 for BMS communication between the **ENSERVER** and the ESS. Otherwise, set it to 0.

Anti-backflow enable: Set this parameter to 1 when it is not allowed to feed electricity to the power grid. Otherwise, set it to 0.

Generator enable: If there is an DG connected to the system, set this parameter to 1; otherwise, set this parameter to 0.

CP enable: Set to 1 when the **ENSERVER** is used with the solar grid-connected Enserver, otherwise set to 0.

System ESS current sample enable: Set this parameter to 1 when the **ENSERVER** uses the current sensor alone to collect ESS current; otherwise, set this parameter to 0. Generally, the value is set to 0.



PBD350 Enable: Set this parameter to 1 when it is used with PBD350. Otherwise, set this parameter to 0.

PBD250 Enable: Set this parameter to 1 when it is used with PBD250. Otherwise, set this parameter to 0.

PBD Number of parallel systems: number of PBDs in the system.

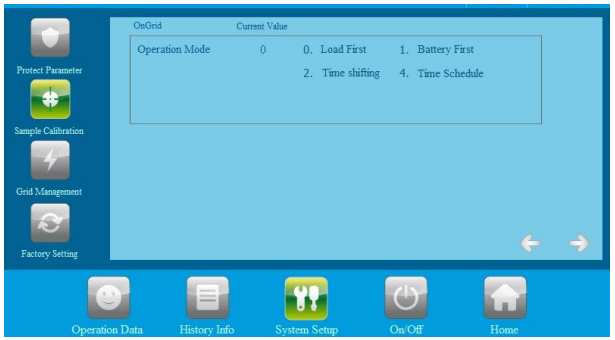
DC soft contactor enable: factory default, do not modify.

Grid power extraction compensation: reduces the power extraction from the grid, up to 10kw.

BMS voltage judgment Enable: Set this parameter to 1 when the BMS SOC calculation accuracy is poor and system operation is affected and the single voltage is needed to determine the BMS. Otherwise, set this parameter to 0.

Number of bypass stations: indicates the number of Bypass cabinets in the system.

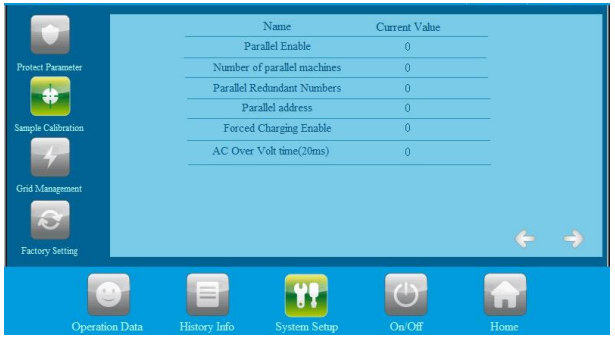
Bypass sharing enable: When the parallel system shares one Bypass cabinet, set this parameter to 1. Otherwise, set this parameter to 0.



Connection mode selection page:

1. Enter different numbers and select different network connection modes.
2. The time shifting mode is pure grid-connected mode, so use it with caution.
3. When the bypass cabinet is used, the system selects the on-grid mode or DG mode according to the actual connection.

If user has customized the operation mode, please do not modify it.
The page without instructions is the factory preset parameter, please do not modif.
If the subsequent scheme changes, please modify the parameters under the guidance of ENERCAP.



Parallel enable: when it is set to 1, parallel function is enabled. All the parallel units needs to be set to 1.

Number of parallel machines: number setting of parallel system. When 2 Enservers in parallel, set as 2; when three units set as 3.

Parallel redundant numbers: Maximum number of faulty machine, can be set to 0 or 1. When set to 0, if one machine in the parallel system goes down, all machines will turn into faulty mode; If set to 1, when the faulty number is less than 1, the other machine keeps running(max. faulty number that can be supported is 1).

Parallel address: the address of the parallel system, which cannot be repeated. The address must be set from No. 1 and must be continuous; Address 1 is the host.

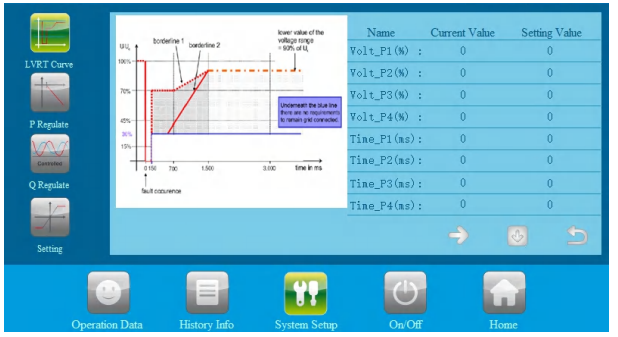
Forced charging enable: Set to 1 when matched with batteries produced by ENERCAP, otherwise set to 0.

AC overvoltage protection time (20ms) : in off-grid mode, when the energy storage controller triggers the AC overvoltage delay protection, do not change the value. Otherwise, system stability may be affected.

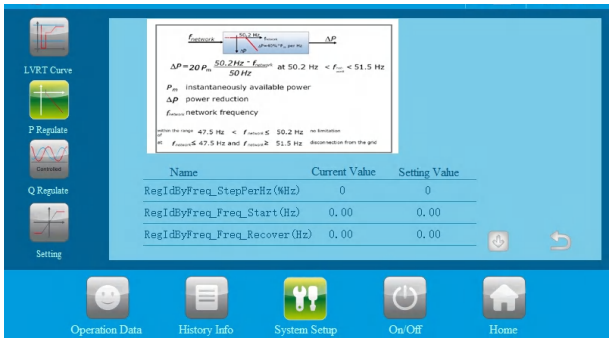
3. Power grid management

Parameters on this page are very important and are preset by the factory. Please do not modify without permission from ENERCAP. Otherwise, ENERCAP will not be responsible for the consequences.

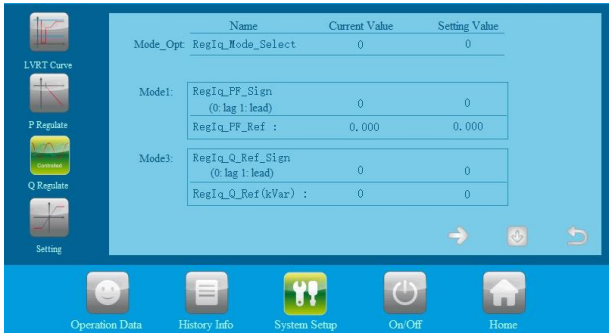
The unspecified pages are factory preset parameters and should not be modified. If the solution changes, please modify the parameters under the guidance of ENERCAP.



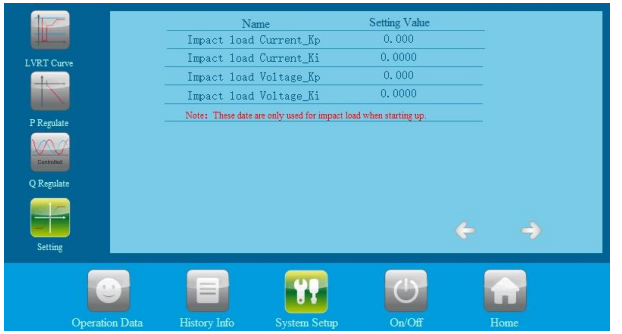
The parameters on this page are important and factory default parameters. Do not modify them.

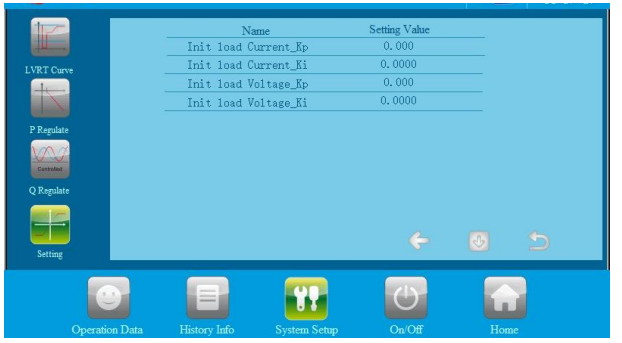


The parameters on this page are important and factory default parameters. Do not modify them.



The parameters on this page are important and factory default parameters. Do not modify them.
This page takes effect after reactive power adjustment is enabled.
Mode selection: Select the reactive power adjustment mode and set it to 1 or 3. Only 1 and 3 take effect temporarily.
Mode 1: Adjust the output power factor and direction of the energy storage controller. Mode 3: Adjust the reactive power value and direction of the energy storage controller.





The last two pages of the protection point are important operation PI parameters, which affect the stable operation of the output. Please do not modify the PI parameters by yourself, but only with the permission of ENERCAP.

The page without instructions is the factory preset parameter, please do not modif.
If the subsequent scheme changes, please modify the parameters under the guidance of ENERCAP.

4. Factory settings

The value on this page are important factory preset parameters. Please do not modify them without consent of ENERCAP.

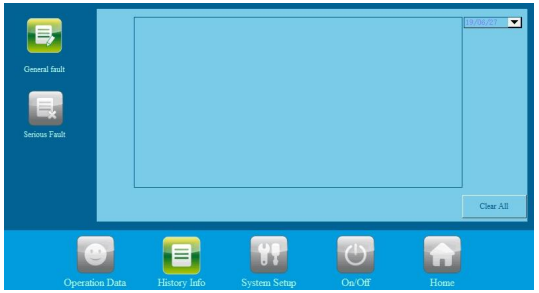
The page without instructions is the factory preset parameter, please do not modif.

If the subsequent scheme changes, please modify the parameters under the guidance of ENERCAP.

Serial number: equipment serial number, on the nameplate of the Enserver.
Safety regulation setting: safety regulation selection, default parameter, do not need to modify. **Model setting:** select the model of Enserver according to the actual model, and do not modify it. Due to the slight difference in the design of different models, the wrong model will lead to the failure to start and clear the parameter settings, resulting in unnecessary losses. If it needs to be modified for special reasons, please modify it under the guidance of ENERCAP after-sales team. After modifying the model, restart it to take effect.
Communication station number setting: RS485 communication address setting. If it is a parallel system, be sure to set it from 1.
Factory date setting: modify the factory date.
Save: Click Save after modifying the data.
Restore factory settings: clear all power records, but do not clear parameter settings.

7. 2. 5 Historical information

Clicking "historical information" can enter into the sub-menu of the "historical information".
The submenu includes: Common historical failure, serious historical failure. Via the left button you can enter the corresponding submenu interface. The "common historical faults"is the default interface.



History of failure: all the common history of failure details can be found by flipping the page up and down.
The common fault information, see table 7.3.

7.2 LCD display information schedule

General history failure table

NO	Information
	English
2	IGBT_Failure
3	IEEPROM_Write_Failure
4	IEEPROM_Read_Failure
5	IAC_MainContactor_Failure
6	IAC_SlaveContactor_Failure
11	Bypass_Communication_Fault
13	BMS_Communication_Fault
15	BMS_Fault
17	Smoke_alarm_Fault
24	AC_NoUtility_Fault
25	AC_GridPhaseSeque_Fault
26	AC_PLL_Fault
27	AC_Volt_Unbalance_Fault
28	AC_Curr_Unbalance_Fault
29	AC_Wu_OverVolt_Fault
30	AC_Wu_UnderVolt_Fault
31	AC_VW_OverVolt_Fault
32	AC_VW_UnderVolt_Fault
33	AC_UV_UnderVolt_Fault
34	AC_UV_UnderVolt_Fault
35	AC_OverFreq_Fault
36	AC_UnderFreq_Fault
37	AC_GridCurr_DcHigh_Fault
40	GridCurr_High_Fault

43	AC_Overload_Fault
44	AC_Lightload_Fault
46	LVRT_Fault
47	Converter_Module_OverTemp_Fault
49	Converter_L_OverTemp_Fault
51	Transformer_OverTemp_Fault
52	LowTemp_Fault
53	EPO_Stop
54	KeyEmergencyStop
55	LcdEmergencyStop
57	AC_MainContactor_Fault
58	DC_MainContactor_Fault
59	PBD350_Communication_Fault
60	AC_SlaveContactor_Fault
65	AC_Thunder_Fault
79	DC_SoftStart_Fault
80	INV_SoftStart_Fault
83	Batt_OverVolt_Fault
84	Batt_UnderVolt_Fault
85	Batt_OverCurr_Fault
86	Batt_OverCharge_Fault
87	Fault_Feedback_Warnning
91	Temp_Derating_Warnning
92	Bstt_UnderVlt_Warnning
103	PBS250_Communication_Fault

7.4 General troubleshooting

If there is a fault during the operation, please click the LCD "history information" page to view the fault information. The following are the common fault analysis and solutions of **ENSERVER**:

1. Manual shutdown: turn **ENSERVER** panel knob to "off"

solution: the knob is shut down normally, no need to handle.

2. LCD emergency stop: click "off"on **ENSERVER** screen

Processing steps: the screen is shut down normally, no need to handle.

3. Emergency stop: emergency stop button pressed.

Handling steps: release the emergency stop button in case of no other abnormalities.

4. Batt_UnderVolt_Fault:

Possible reasons:

a. The ESS voltage sampled on the screen reaches the under-voltage protection condition and triggers it.

b. The switch of ESS on ESS side or the on the energy storage controller is not turned on.

c. If this fault occurs during operation, the ESS voltage may be pulled down due to high-power output, or the ESS itself may be defective.

d. If it is a ESS with BMS, this fault will also occur if the lowest cell voltage of the ESS unit transmitted by the BMS to the energy storage controller reaches the protection condition.

Processing steps:

a. First, check the ESS connection, screen sampling error, and ESS parameter settings.

b. If it is a ESS with BMS, check whether the BMS data meets the protection conditions.

c. If there is no problem with the above, please contact ENERCAP for assistance.

5. Batt__OverVolt__Fault:

Possible reasons:

a. The ESS voltage sampled on the screen reaches the overvoltage protection trigger condition.

b. If it is a ESS with BMS, this fault will also occur if the highest cell voltage of the ESS unit transmitted by the BMS to the energy storage controller reaches the trigger protection condition.

7. Batt__OverCurr__Fault: the ESS discharge current is higher than the maximum discharge current

Processing steps: check whether the maximum discharge current value of the ESS is reasonable, multiply the maximum discharge current by the ESS voltage, calculate the maximum discharge power of the ESS, see whether it is less than the load power, if yes, reduce the load power.

8. BMS__Fault: secondary or tertiary ESS failure

Processing steps:

A. Check the specific faults reported by BMS

B. Contact the Enercap to solve the problem

C. Restart after troubleshooting

9. BMS__Communication__Fault: the energy storage Enserver did not receive CAN data sent by ESS BMS

Processing steps:

A. check whether the CAN line of ATS is connected to the CAN-A port of the Enserver's control board

check if the L and H CAN line are connected reversely.

C. check whether the CAN line is interfered. Suggest to use sampling shielded communication line. D. use the CAN box to check whether there is data sent by the BMS on the bus.

E. if the communication still fails, contact ENERCAP After sales team.

10. Bypass__Communication__Fault: the energy storage Enserver did not receive can data sent by bypass cabinet

Processing steps:

A. check whether the CAN line of ATS is connected to the CAN-B port of the Enserver's control board.

B. check whether the L and H CAN line is connected reversely

C. check whether the CAN line is interfered. Suggest to use sampling shielded communication line. D. use CAN box to check if there is data sent by ATS on the bus.

E. if communication still fails, contact ENERCAP after sales team.

11. AC__NoUtility__Fault: no AC voltage.

Processing steps: generally, this fault will not fade out because there is no output due to other reasons.

12. AC__OverFreq__Fault: the power grid frequency exceeds the upper limit, and the energy storage Enserver enters off grid state.

Processing steps: check whether the upper limit of power grid frequency is reasonable. If yes, wait until it returns to normal, the Enserver will automatically enter into grid connection state.

13. AC__UnderFreq__Fault: the power grid frequency is lower than the lower limit, and he energy storage Enserver enters the off grid state.

Processing steps: check whether the lower limit of power grid frequency is reasonable. If yes, wait until the power grid frequency returns to normal, ENSERVER will automatically enter into grid connection state.

14. AC__UV__OverVolt__Rmt__Warning: when the utility grid voltage is higher than the upper limit, he energy storage Enserver enters off grid state.

Processing steps: check whether the upper limit setting of power grid voltage is reasonable. If yes, wait until the power grid voltage returns to normal, and ENSERVER will automatically enter into grid connection state.

15. AC_VW_OverVolt_Rmt_Warning: when the grid voltage is higher than the upper limit, Enserver enters off grid state.

Processing steps: check whether the upper limit setting of power grid voltage is reasonable. If yes, wait until the power grid voltage returns to normal, and Enserver will automatically enter into grid connection

state.

16. AC_WU_OverVolt_Rmt_Warnin: when the grid voltage is higher than the upper limit, Enserver enters off grid state.

Processing steps: check whether the upper limit setting of power grid voltage is reasonable. If yes, wait until the power grid voltage returns to normal, and Enserver will automatically enter into grid connection state.

17. AC_UV_UnderVolt_Rmt_Warning: when the grid voltage is lower than the lower limit, Enserver enters off grid state.

Processing steps: check whether the lower limit setting of power grid voltage is reasonable. If yes, wait for the power grid voltage to return to normal, and Enserver will automatically enter into grid connection state.

18. AC_VW_UnderVolt_Rmt_Warning: when the grid voltage is lower than the upper limit voltage, Enserver enters off grid mode.

Processing steps: check whether the lower limit setting of power grid voltage is reasonable. If yes, wait for the power grid voltage to return to normal, and Enserver will automatically enter into grid connection state.

19. AC_WU_UnderVolt_Rmt_Warning: when the grid voltage is lower than the upper limit voltage, Enserver enters off grid state.

Processing steps: check whether the lower limit setting of power grid voltage is reasonable. If yes, wait for the power grid voltage to return to normal, and Enserver will automatically enter into grid connection state.

20. AC_GridPhaseSeque_Fault: reverse phase sequence connection of power grid

Processing steps: check the three lines of phase sequence U V W of the utility grid, which are corresponding to A B C connected to the AC input terminal of inverter.

21. OverTemp_Fault: the temperature inside of the machine is too high.

Processing steps:

A. check whether the power supply micro break of the inverter is turned on. If not, turn it on.

B. check whether Enserver air inlet and outlet are blocked, and clean dust regularly.

C. wait for the machine to cool down, the fault is eliminated and inverter restart normally, and observe whether the fan works when the temperature reaches 60 ℃. If not, please contact after-sales team.

Regarding other faults, please contact relevant professionals of ENERCAP.

8 Operation

8.1 Power on steps

After installation and system settings are inspected, Enserver can be started for operation.

> First run

The first operation steps are as follows:

1. Turn on the PV, ESS, AC input and power supply micro breaks.
2. Check whether the screen sampling data is abnormal and consistent with the actual situation;
3. After checking, turn the knob to "on", click "on" on the LCD" on / off "page, and wait for the machine to enter" grid connection "; if the site is off grid, it will enter" off grid mode "after starting;
4. During operation, observe whether the data displayed on the screen is normal and whether there is fault information reported, and whether the machine has abnormal noise and smell; if any abnormal situation occurs, please stop the machine immediately for inspection.

Warning!

The bypass switch is only used for maintenance. Please do not turn it on during normal operation.

Manual shutdown

1. After clicking the LCD shutdown button to shut down the machine manually, it must be turned on manually through the start button (on) on the LCD; if the machine is turned off by turning the knob to "off", turn the **ENSERVER** knob to "on" first, and then click the "on" button on the LCD "switch on" page to start the machine, otherwise Enserver cannot start automatically.

Warning!

The machine is still with electricity after manual shutdown.

8.2 Pilot operation completion

The following procedures shall be carried out after the Enserver is normally in operation.

Procedure 1: Inspect whether abnormity exists in the Enserver, such as excessive noise, excessive heat, abnormal smell or smoke.

Procedure 2: Measure whether Enserver voltage, current and THD are stable.

Procedure 3: Operate LCD control panel and inspect whether it displays normally and accurately.

Procedure 4: Test whether it conforms to the preset operation logic.

By now, the pilot operation of Enserver is fully completed, and we can enter the daily operational maintenance.

8.3 Power off steps

CAUTION!

After the Enserver is completely powered off, the general DC switch at ESS side and the Grid switch at grid side still maintain voltage. If operations are needed, please be sure to cut off the outer power completely, and wait for not less than 5 minutes.

1. Turn the knob switch to "OFF" to shut down;
2. Disconnect the AC general input switch;
3. Disconnect the DC output switch;

It is normal that the **ENSERVER** generates an alarm during the power-off. You can continue to perform the power-off steps.

9 Routine maintenance

9.1 Regular maintenance

Due to the influence of environment temperature, humidity, dust and vibration, the devices inside the Enserver will be aged and worn, which will lead to potential failure inside the machine. Therefore, it is necessary to carry out daily and regular maintenance to ensure its normal operation and service life. All measures and methods to help the Enserver in good working condition belong to the scope of maintenance work.

9.1.1 Safety precautions

(1) Only qualified and authorized personnel can maintain the Enserver.

.(2) When carrying out maintenance work, do not leave the screws, washers and other metal parts in the Enserver, otherwise the equipment may be damaged.

(3) If only the circuit breaker is opened, the cable connection terminal inside the Enserver is still electrified.

(4) Before opening the cabinet door and starting the formal maintenance work, it is necessary to not only disconnect the circuit breaker, but also disconnect the front and rear level circuit breakers of the Enserver.

(5) After the Enserver stops operation, please wait at least 5 minutes before operating.

(6) Disconnect all external connections of the Enserver and the internal power supply of the equipment.(7) Ensure that the Enserver is not inadvertently recharged.

(8) Use a multimeter to ensure that the Enserver is completely electrically neutral inside.

(9) Make necessary grounding and short circuit connections.

(10) Use insulating material cloth to cover the parts near the operation part that may be electrified.

9.1.2 System maintenance

Tools to be used during maintenance

	Cell phone that can take photos
	Multimeter
	Thermometer
	Pen and paper
	Spanner, screwdriver etc
	Thermal imager

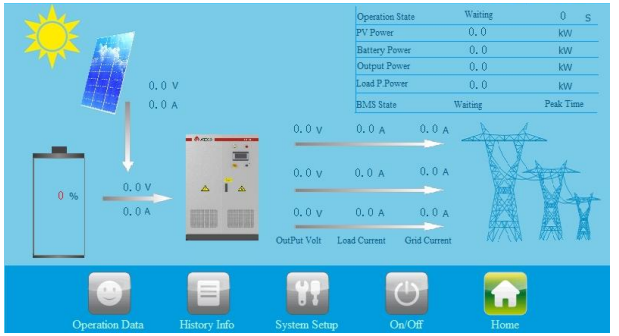
When doing maintaining inspection records, you need to perform inspection one by one according to the table and describe the faulty items.

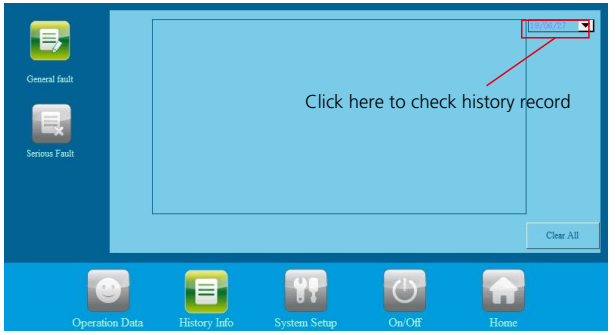
2.1 Maintenance and inspection checklist for running system

When recording inspection and maintenance, inspection shall be carried out one by one following the table sequence, and the faulty items shall be described accordingly.

Please refer to Capture 10.3 Maintenance and inspection checklist for non-shutdown system.

After the inspection record is completed, photos of the operation status in home page and historical information page shall be taken for record, as shown in the following figures:





2.2 Maintenance and inspection checklist for shutdown system

Please refer to Capture 10.4 Maintenance and inspection checklist for shutdown system.

9.1.3 Relative operations CAUTION!

All maintenance operations must be carried out in the condition that DC side and AC side of the Enserver, PV module and AC distribution cabinet switch are all disconnected. Maintenance must be proceeded only after AC and DC disconnected for at least 5 minutes, in order to avoid electric shock!

Only professional technicians familiar with the system operation can perform such operation.

Disconnect the circuit breaker

Operate the DC switch of PV input and ESS input to disconnect **ENSERVER** from the PV and ESS. And operate AC input and AC output switches to disconnect **ENSERVER** from AC sources. Make sure that **ENSERVER** won't switch on accidentally. Test with a multimeter to make sure the device is disconnected and with zero voltage. Even if **ENSERVER** has been disconnected from the grid / main power supply, ESS and PV, some of the internal components (such as capacitors) still have residual voltage and discharge slowly, so please wait at least 5 minutes after the circuit breaker is disconnected and use the multimeter to measure and confirm the safety before continuing operation.

Maintain and modify

Only ENERCAP authorized personnel can maintain and modify the equipment. For personal safety, use only the original accessories provided by the manufacturer. If you use non-original parts, you cannot ensure compliance with relevant certification standards in terms of electrical safety and EMC.

How to use bypass switch

If the **ENSERVER** fails and cannot continue to operate, it needs to be shut down for maintenance, while the load connected to the **ENSERVER** needs to continue working, the bypass switch can be used to keep the load work uninterruptedly under the power supply of power grid or generator, and the maintenance personnel can carry out maintenance work safely.

Step 1: turn on the bypass switch in case of machine failure.

Step 2: turn off the switches of "AC input", "AC output", "PV input" and "ESS input".At this time, the AC and DC power are disconnected from **ENSERVER**, and the load is all supplied by the power grid, after the residual power is discharged, maintenance work can be carried out.

Note:

1. After power off, wait for 5 minutes to confirm safety before carrying out maintenance work.
2. Use the multimeter to ensure safety before disassembling and other work.

Function and safety parameters

Do not change parameters of ENSERVER without the authorization of the local power supply company and the instruction of ENERCAP After sales team. Unauthorized change of functional safety parameters may cause injury to personnel or Enserver damage, in this case, ENERCAP will not provide warranty services.

Replace the dust screen

During the use of ENSERVER, the dust on the top shall be cleaned regularly, and the dust screen at the air inlet shall be cleaned or replaced. During the cleaning, ENSERVER needs to be power-off.

Replacement method of dust screen: the dust filter cotton on the door panel can be directly pulled up for cleaning and replacement.

To ensure the normal operation of the machine, clean the air filter regularly. Not cleaning for a long time may affect the intake air volume and cause overheat.

9.2 Waste disposal

The Enserver will not cause environmental pollution, since the all the components meet the requirements of environmental protection. According to environmental protection requirements, user shall dispose the Enserver in accordance with the relevant laws and regulations.

Appendix 10

10.1 Specification

Model	100KW	250KW	500KW	630KW
ESS parameter				
ESS operating voltage	500-820V		600-900V	
Max. ESS charging/ discharging current	220A	550A	917A	1155A
Max. ESS charging/ discharging power	110kW	275kW	550kW	693kW
AC parameter				
Rated voltage	400Vac			
Rated current	144A	361A	722A	909A
Rated power	100kW	250kW	500kW	630kW
Max. AC apparent power	110kVA	275kVA	550kVA	693kVA
Rated frequency	50/60Hz			
Frequency Range	45-55Hz/55-65Hz			
Power factor	0.8lagging—0.8leading			
THDI	<3%(Full load)			
THDU	≤2%			
Overload capacity	110%-10 mins,120%-1 min			
Other parameter				
Ingress Protection	IP20(Outdoors)			
Protective class	Class I			
Mains over voltage category	Class III			
Demand response mode	DRM0-8 (optional)			
Enserver toplogy	Isolated		External isolated transformer	
Noise emission	<65dB (A) @1m			
Cooling	Intelligent air cooling			
Humidity	0%-95% non-condensing			
Maximum altitude	6000 (derate over 3000m)			
Build-in transformer	Yes		No	
Operating temperature	-25℃~55℃			
Active anti-islanding method	In the absence of a reference, the energy storage controller output frequency is disturbed			
Communication				
LCD display	Touch screen LCD			
Communication interface	RS485/CAN			

10.2 ENERCAP Industry warranty

> Warranty period

The warranty period of this product is one year. If otherwise specified in the contract, the contract shall prevail.

During the warranty period, the customer shall show the invoice and date of purchase to the service personnel of ENERCAP. At the same time, the nameplate mark on the product shall be clear and visible, otherwise, ENERCAP has the right not to provide warranty service.

> Warranty conditions

In the event of failure during the warranty period, ENERCAP will repair or replace the product free of charge; The customer shall Set aside some time to repair the faulty machine.

> Liability exemption

In case of the following circumstances, ENERCAP has the right not to conduct warranty:

1. Products without logo of ENERCAP Power Industry LLC logo;
2. The product or component that has exceeded the valid warranty period of ENERCAP;
3. Failure or damage (such as high temperature, low temperature, too wet or dry, high altitude, unstable voltage or current, etc.) caused by working in beyond-specified environment or wrong installation, storage or use that violates the instructions;
4. Failure or damage caused by unauthorized installation, repair, modification or disassembly. except for those authorized by ENERCAP;
5. Failure or damage caused by using components that not supplied by ENERCAP;
6. Failure, damage or transportation damage caused by accident or human factors (operation error, scratching, carrying, bumping, improper voltage connection etc.), ;
7. Failure or damage caused by force majeure (such as earthquake, lightning, fire etc.);
8. Failures or damages caused by other factors rather than quality problems of the supplied product itself(including components).

10.3 Maintenance and inspection checklist for running system

No.	Category	Check item	Method/Tool	Standard	Result	Problem description	Check frequency
1	System operation status check	Whether the LCD display of the machine is in normal operation	Visual inspection screen	Operation status display is not "fault" or "serious fault"	☐ Normal ☐ Abnormal		Once a month
2		Whether there is error recorded in history that caused shutdown	Visual inspection screen	No error caused shutdown	☐ Normal ☐ Abnormal		
3		Whether the data transmission of monitoring device is normal	Monitoring web page / APP	Monitoring connection and data transmission are normal	☐ Normal ☐ Abnormal		
4		Whether the fan rotates normally and the air outlet is normal (first check whether the temperature collected by the equipment reaches the fan opening condition, which normally is 60℃)	Visual inspection Thermal imager	Normal rotation, normal air output	☐ Normal ☐ Abnormal		
5		Whether the equipment has abnormal smell or sound	Smell, listen	No abnormal sound or smell	☐ Normal ☐ Abnormal		
6		Emergency stop button(when the system is in standby mode)	Manual	The circuit breaker trips after pressing the emergency stop button	☐ Normal ☐ Abnormal		

10.4 Maintenance and inspection checklist for shutdown system

No.	Category	Check item	Method/Tool	Standard	Result	Problem description	Check frequency
1	System cleaning	Whether there is water leakage or other foreign matters in the room or container	Visual inspection	No water leakage or foreign matter	☐ Normal ☐ Abnormal		Once a month
2		Whether there are rodents and insects such as rats, geckos, cockroaches and ants in the cabinet	Visual inspection	No animals or insects	☐ Normal ☐ Abnormal		
3	System cable connection (power-off inspection)	Whether the power cable connection is loose	Manual /Wrench	No looseness	☐ Normal ☐ Abnormal		Once a month
4		Whether the communication cable connection is loose	Manual bolt driver	No looseness	☐ Normal ☐ Abnormal		
5		Check equipment ground connection	Visual inspection /Multimeter	<=4Ω	☐ Normal ☐ Abnormal		
6		whether the external connection of the equipment is damaged	Visual inspection	No damage	☐ Normal ☐ Abnormal		
7	Internal cleaning	whether there is moisture or condensation inside the cabinet	Visual inspection	No condensation, no moisture	☐ Normal ☐ Abnormal		Once a month
8		Whether there is obvious dust inside the cabinet	Visual inspection	No obvious dust	☐ Normal ☐ Abnormal		
9		Whether the front and rear dust screens has blockage	Visual inspection	No blockage	☐ Normal ☐ Abnormal		
10		Whether there is obvious damage inside the equipment	Visual inspection	No damage	☐ Normal ☐ Abnormal		
11		whether there is obvious rust inside the cabinet	Visual inspection	No rust	☐ Normal ☐ Abnormal		
12		Safety signs	Visual inspection	Safety signs are not shed	☐ Normal ☐ Abnormal		

Note: the table only indicates the recommended maintenance frequency of the product. The actual frequency shall be determined according to the specific installation environment. The scale of power station, location and site environment will affect the maintenance frequency. If the operation environment is windy and dusty, it is necessary to shorten the period and increase the frequency.