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your smart energy

V01

OPERATION & MAINTENANCE MANUAL OF ENERGY STORAGE SYSTEM(ESS)
STORION-T30 (INDOOR,WITH M48112-S)

CONTENT

01 Introduction

1.1 Brief Introduction

This manual applies for Storion-T30 Li-ion battery energy storage system, mainly includes:
(1) Safety introduction
Introduces the product use, operating notes and qualification of operators of T30 Li-ion battery energy storage system.
(2) Product description
Describes product appearance, product characteristics, system composition and major functions of T30 Li-ion battery energy storage system.
(3) Operation
Introduces the operation of T30 system.
(4) Routine maintenance
Introduces items in maintenance of T30 Li-ion battery energy storage system, including attentions.
(5) Troubleshooting
Introduces the faults of T30 Li-ion battery energy storage system, causes to faults, and processing method.

1.2 Explanation of Terms

(1) Lithium iron phosphate cell (LiFePO4)
Basic unit is constituted by electric poles and electrolytes; Each cell is independent and closed.

NOTE: Paralleled cell cannot be regarded as an independent cell, even repacked as one whole battery pack.

(2) Lithium iron phosphate pack
Combination made up of battery monitoring circuit, battery equalization circuit, electrical connectors, communication interfaces, thermal management devices and multiple Lithium iron phosphate cells.

NOTE: For packs from same company, all the details such as physical size, working performance and interface specification should be consistent so that all the packs are compatible and interchangeable.

(3) Battery management system
Electronic equipment collection for monitoring the operating information of cells, packs and system units (such as voltage, current, temperature, protective parameter of batteries), evaluating the state of charge (SOC), the state of health (SOH) and cumulative processed energy and protecting batteries for safety, etc.
(4) Battery system unit
A combination of batteries through series parallel combination inside and a battery management system (BMS) in which accesses to DC side of a bidirectional converter.
(5) Storage unit
A combination of a bidirectional converter and a battery system unit, which can be used as an independent load or be controlled directly by monitoring system.

02 Safety Instructions

2.1 Manual Keeping

This manual contains important information about operating the system. Please read it carefully before operation.
The PCS should be operated in strict accordance with the description in the manual, in case that it causes damage or loss to equipment, personnel and property.
This manual should be kept carefully for maintenance and reparation.

NOTE: To ensure optimal reliability and to meet warranty requirements, the Energy Storage System must be operated according to the instructions in this manual.

2.2 Operator Requirements

The operators should get a professional qualification, or be trained.
The operators should be familiar with the whole storage system, including compositions and working principles of the system.
The operators should be familiar with the Product Instruction.
While carrying out maintenance work it has to be at least two operators in the field all the time. They cannot operate on any equipment until they are all powered off and fully discharged.
It is strictly prohibited for any maintenance to be carried out when equipment is on or charged.

NOTE:
(1) If the installer leaves the site, the system that has not started normal operation during debugging should be shut down in time, including batteries and PCS.
(2) When the system fails in normal operation, please refer to the troubleshooting table to solve the problem first. If the problem cannot be solved, please contact AlphaESS engineers. If you cannot contact in time, please shut down the system.
If the equipment is damaged due to unauthorized operation without following the above precautions, it will not be covered by the warranty.

2.3 Protection of Warning Sign

The warning sign contains important information for the system to operate safely, and it is strictly prohibited to torn or damage the sign.
Ensure that the warning sign is always clear.
The signs should be replaced immediately if damaged.

2.4 Setting of Warning Sign for Safety

While instructing, maintaining and repairing, in case of incorrect operation or accident caused by unrelated personnel nearby, the suggestions below should be followed:

Obvious signs should be set at front switch and rear-level switch in case of accidents caused by false switching.

Warning signs or tapes should be set near the operation areas.

Keys of the system must be pulled out after maintenance or operation.

2.5 Live Line Measurement

High voltage in the system which may cause vital electric shock when touched by accident.

Equipment protection must be taken in live line measurements (e.g.: insulation gloves).

The measuring equipment should be connected and used correctly to ensure personnel safety. When measuring, at least two workers are needed.

2.6 Measuring Equipment

To ensure the electrical parameters to match requirements, related measuring equipment are required when the system is being connected or tested.

Ensure that the connection and use matches specification in case of electric arc or shock.

2.7 Electrostatic Prevention

Contact or improper operation of the printed circuit board or other ESD sensitive components may result in damage to the device. Unnecessary contact should be avoided.

2.8 Moisture Prevention

It is very likely that moisture may cause damages to the system.

Do not open the Cabinet door if the humidity is larger than 95%.

Repair or maintaining activities in wet conditions should be avoided or limited.

2.9 Operation after Power Failure

The battery system belongs to energy storage system, which maintains fatal high voltage even when the DC side is disconnected. Therefore, touching of the battery output is strictly prohibited.

The PCS maintains fatal voltage even when both the DC or AC side are disconnected, so it must be tested by the multimeter for safety before operation.

2.10 Minimum Personal Protective Equipment

For the safety of operators, personal protective equipment are required. During the operation, following protective equipment are required:

No.	Item	Notes
1	Work clothes	
2	Protective shoes	
3	Protective glasses	

When doing maintenance works such as checking cables or wires, measuring voltage, replacing small electrical parts or cleaning modules and brackets, as minimum the following protective equipment are required

No.	Item	Notes
1	Work clothes	
2	Protective shoes	
3	Protective glasses	
4	Insulated gloves	For touching live parts

NOTE: All metal tools during maintenance should be insulated.

When replacing modules, the following protective equipment are required:

No.	Item	Notes
1	Work clothes	
2	Protective shoes	
3	Protective glasses	
4	Insulated gloves	For touching live parts

NOTE: When replacing modules, the hydraulic lift should be used carefully in case that the modules may fall down. All workmen are suggested to wear high-safety and high strength protective shoes to protect their feet.

03 EMS Instruction

3.1 Function Description

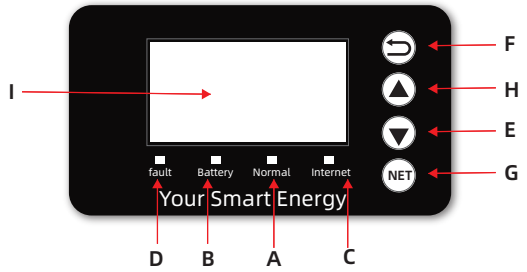


Figure 3-1 EMS Interface

Table 1 Function Description

Object	Name	Description
A	Indicator LED	Green: The system is operating normally
B		Green: Allow the battery to charge or discharge Flash: Don't allow the battery to charge or discharge
C		Green: Server Connected
D		Red: Fault
E	Button Function	Down Button: Move cursor to downside or decrease value.
F		Return Button: Exit the current interface or function
G		ENT Button: Confirm the selection
H		Up button: Move cursor to upside or increase value
I	LCD Screen	Display the information of the system in this LCD screen

3.2 Introduction

If you find the manual content is inconsistent with the software version, please contact AlphaESS in time.

power	0W
Pload	00.kw
Battery	%
offGridMode	

Main Interface

Main Interface displays the system working status and information, including:
- Power: Total AC output power
- Pload: Total load power.
- Battery: Current remaining battery power (SOC).
- offGridMode: Current working state of the equipment, including alarm type.

In the Main interface, press ENT key to enter the Menu main interface.

NOTE: Through the up and down key, select the sub-menu, press the ENT key to enter the select sub-menu, press Return key to return to the previous layer.

3.2.1. Main menu

Main menu	Status	System status data
	History	System historical data
	Setting	System settings
	Information	System message

3.2.2. Status

Status	Grid	Uab/Ubc/Uca	The line voltage on the AC side of PCS
		Ia/Ib/Ic	Phase current on the AC side of PCS
		F	Frequency on the AC side of PCS
		PInv	Output power on the AC side of PCS
		PmAC	Total power read by meter on grid side
		PmDC	Power read by meter on PV inverter side
	Solar	U1	PV1 voltage
		I1	PV1 current
		P1	PV1 power
		U2	PV2 voltage
		I2	PV2 current
		P2	PV2 power
		Pm_dc	PV inverter output
	Battery	U	Battery voltage
		I	Battery current
		P	Battery power
		SOC	Battery SOC
		RelayL	Relay status
	UPS	-	
	Communication	BMS	BMS communication status
		Net	Network communication status
		Meter1	Grid meter communication status
		Meter2	Meter of PV inverter communication status
		PCS	PCS communication status

Status	**Communication**	**AndroidLCD**	No used
		Pvcb	PV combiner box / PV inverter communication status
		Air_Con	Air conditioner communication status
		Dispatch	Dispatch communication status
		InEmuCom	No used
		PHY_Conn	No used
		STSCom	STS communication status

3.2.3. History

History	**Einput**	Total energy purchased from the grid log
	Eoutput	Total energy of feed-in
	Edischarge	Total battery discharge energy
	Epvtotal	Total energy of PV generation
	Egridcharge	Total energy charged by the grid to the battery
	Echarge	Total battery charging energy
	Error Logs	Alarm details

3.2.4. Setting

Setting	**Function**	**Solar**	**Storage Cap**	Set the installed PV capacity of the energy storage machine
			On Grid Cap	Set the installed PV capacity of the grid-connected machine (if the PV inverter is controllable, it is the total rated power of the PV inverter)
			On Grid InvNum	Set the number of PV inverters
		Battery	**Bat Model**	View battery model
			SOC Calibration	Set whether to calibrate SOC
			Battery Ready	View battery model
			CloseRelay	Set whether to forcibly close the relay
			Soc50Flag	Set battery 50% calibration enable (48%-52%) (Only for T30)
			Set ID	Set battery cluster ID (Only for M48112-S)
		Grid	**Export Control**	Set the percentage of the maximum feed-in limit

Setting	**Function**	**Grid**	**Pmeteroffset**	**Enable**	Enable	
				Offset	Setting value>0 means buying electricity from the grid, setting value<0 means selling electricity to the grid	
				Start Time 1	Start time 1	
				End Time 1	End time 1	
				Start Time 2	Start time 2	
				End Time 2	End time 2	
			PmeterMax	Set the upper limit of the power meter		
			Peak Shave	**Peak ShaveEN**	Function enable	
				UpperLimit	UpperLimit	Set peak power
					Start Time 1	Start time 1
					End Time 1	End time 1
					Start Time 2	Start time 2
					End Time 2	End time 2
				LowerLimit	LowerLimit	Set power of valley period
					Start Time 1	Start time 1
					End Time 1	End time 1
					Start Time 2	Start time 2
					End Time 2	End time 2
				Delta	Allowable error value	
		UPS System	**No used**			
			System Mode	System mode selection, optional DC/AC/Hybrid		
		System Mode	**Work Mode**	**Force Charge**	Set whether to turn on the force charge function	
				Allow Discharge	Set whether to turn on the discharge time period function (Spontaneous use within the time period, discharge is prohibited outside the time period)	
				Charge Start Time 1	Set the charging start time of the first stage	

Setting	**Function**	**System Mode**	**Work Mode**	**Charge End Time 1**	Set the charging end time of the first stage
				Charge Start Time 2	Set the charging start time of the second stage
				Charge Start Time 2	Set the charging start time of the second stage
				Charge cut SOC	Set the upper limit of charging SOC
				DisCharge Start Time 1	Set the discharge time of the first stage
				DisCharge End Time 1	Set the first stage to stop the discharge time
				DisCharge Start Time 2	Set the discharge time of the second stage
				DisCharge End Time 2	Set the second stage to stop the discharge time
				Discharge Cut SOC	Set the lower limit of discharge SOC in grid-connected mode
			ChargePower	**Power**	Set the upper limit of force charging power
		BackUp	**LoadCutSoc**	Set the off-grid mode to cut off the load SOC, LoadCutSoc <LoadTiedSoc	
			LoadTied-Soc	Set the off-grid mode to cut off the load and then connect to the SOC of the load again, LoadCutSoc <LoadTiedSoc	
			AirSelect	Choose an air conditioner brand	
			Backup-Box-Enable	Whether to connect to STS	
		CT Meter	**CT Enable**	Enable	
			CT Ratio	CT Ratio	
		Generator	**GeneratorEN**	Set whether the DG function is turned on	
			Generator-Mode	**SOC**	Set DG working mode to SOC mode
				TOU	Set DG working mode to time period mode
				Manual	Set DG working mode to manual mode
			GCSOCStart	Set the SOC for starting charging by DG in SOC mode	

Setting	**Function**	**Generator**	**GCSOCEnd**	Set the SOC for ending charging by DG in SOC mode	
			GCTimeStart	Set the time to start charging by DG in TOU mode	
			GCTimeEnd	Set the time to end the charging by DG in TOU mode	
			GCOutput-Mode	**GCRated**	Set DG power control mode to rated power mode
				GCCharge	Set DG power control mode to battery charging power mode
			GCCharge-Power	Set PCS charging power in GCCharge mode	
			GCRated-Power	Set DG rated power	
			GCRated-percent	Set DG rated output ratio	
		PCS	**ModeOn**	Boot the PCS	
			ModeOff	Shutdown the PCS	
			ClearFault	Clear PCS errors	
			OnGridCmd	Set to grid-connected mode	
			OffGridCmd	Set to off-grid mode	
			Max-ChargeCurr	PCS maximum charging current	
			MaxDis-ChargeCur	PCS maximum discharge current	
			Energydis-patch	Dispatch mode, fixed as AC_Dispatch	
			AC_Tied	**AC_Grid**	Set the AC power supply to the grid
				AC_Gener-ator	Set the AC power supply to DG
			Minv	Select inverter model, optional T30/T50/T100/T150/TB250/TB500/TB100	
			MinLowVbat	PCS battery voltage lower limit	
			MaxHighVbat	PCS battery voltage upper limit	
			MaxHighVbat	PCS battery voltage upper limit	
			EquaChgVbat	PCS battery equalization voltage	

Setting	**Function**	**PCS**	**GridType**	PCS AC wiring mode, three-phase four-wire system	
		Dispatch	**CtrlMode**	Local	Set the control mode to local
				Remote	Set the control mode to remote
			Protocol	Scheduling protocol selection, Alpha/Nio	
			Dev_addr	Scheduling device address	
			EMS_timeout	Scheduling timeout 0 means unlimited time for EMS connection. If the timeout is not set as 0, EMS will not be connected when the time is out	
			ComMode	Set the dispatching communication method, RS485 is used by default, CAN/LAN is to be developed	
			ModbusRTU	Modbus baud rate selection, can be set to 19200 or 9600 (need to re-power after setting)	
			ModbusTCP	Server IP	No used
				Server Port	No used
				Client IP	No used
			MSID	No used	
			NioCtrl	Customized use for customers Nio	
	Safety	No used			
	Restart	Restart EMS			
	System	**Date Time**	Set time and date		
		Ethernet	**IP method**	Set the IP allocation method to manual	
				Set the IP allocation method to automatic	
			IP Address	Set IP address	
			Subnet Mask	Set the subnet mask	
			Default Gateway	Set the default gateway	
			MAC Address	Set the MAC address, here is a fixed MAC address	
		New password	No used		
		Language	**English**	Set language to English	
			Deutsch	No used	
	Reset Energy	Clear inverter power statistics			
	Reset Meter	Clear the energy statistics of the meter			

Setting	**Factory Reset**	Factory Reset
	Reset Meter	No used

3.2.5. Information

Information	**SN**	System serial number	
	Model NO.	System Model	
	Meter Model	No used	
	BMU Ver	BMU software version	
	LMU Ver	LMU software version	
	ISO Ver	ISO software version	
	BMSCommVer	No used	
	EMS Ver	H_Ver	EMS hardware version
		S_ver	EMS software version

04 Operation

4.1 Check before Operation

Before operation, please check the equipment according to following procedures: If no sign of damage is inspected visually outside the system module and all the battery and Grid switches are in the "OFF" position, you will

A. Check whether the DC input wiring of the energy storage system and the AC output wiring are normal and whether the grounding is good;
B. Check whether the polarity of the wiring is correct;

4.2 Power-on Procedures

The system shall be turned on in the correct sequence to avoid any damage.

A. Turn on the molded case circuit breakers of HV900112 in each cluster respectively.
From left to right: OFF- triggered position-ON;

NOTE: Time two clusters switching on should be more than 5s.

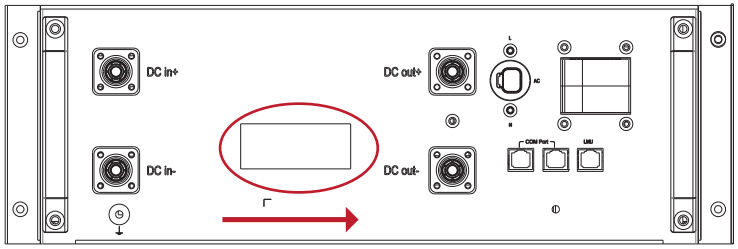


Figure 4-1 Turn on the molded case circuit breaker

B. Turn on the AC air switch of HV900112 in each cluster respectively. If there is an AC main switch, turn it on.

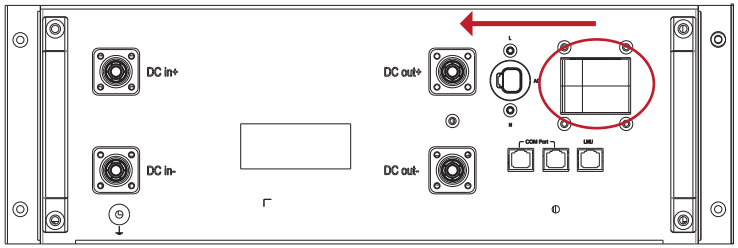


Figure 4-2 Turn on the AC switch

C. After the power is on, the LED on the batteries and HV900112 starts flashing.

D. After waiting for about 2 minutes, check the status of each HV900112 on the EMS display. You can check it according to the following table. If the value displayed on the EMS and the use in the table below, the battery output is normal.

NOTE: Inspection steps： EMS->Status-> Battery->RelayL;

Table 2 Battery status comparison table

ID	RelayL	ID	RelayL	ID	RelayL	ID	RelayL
1	1	6	32	11	1024	16	32768
2	2	7	64	12	2048	17	65536
3	4	8	128	13	4096	18	131072
4	8	9	256	14	8192	19	262144
5	16	10	512	15	16384	20	524288

E. If the battery status is correct, turn on the grid switch of the T30-INV by pulling the switch to the left.

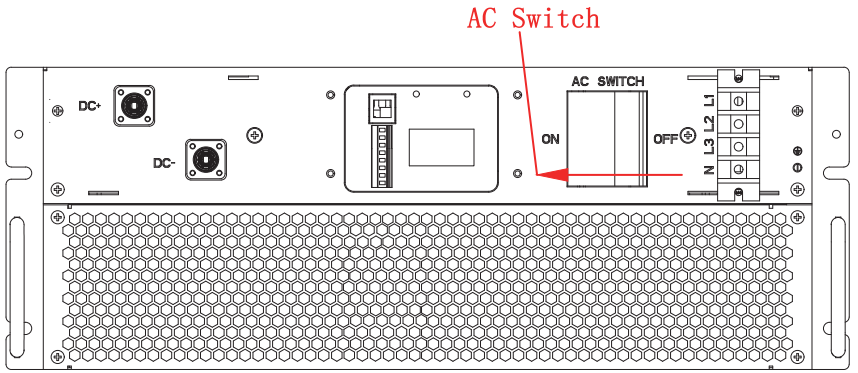


Figure 4-3 Turn on the grid switch

F. Normal system operation
After the system is powered on, it will be switched on automatically if there are no errors and warnings.

4.3 Power-off Procedures

The system shall be powered off according to following steps:

A. Turn off all of the loads.
B. Turn off the AC switch of the PCS.
C. Turn off the AC air switch of HV900112.
D. Turn off the MCCB of HV900112

05 EMS Operation

5.1 Self-Consumption

A. Check the relay status of HV900112： EMS->Status-> Battery->RelayL;
B. Set up the PV storage capacity： EMS->Setting-> Function->Solar->Storage Cap->0;
C. Set up the On Grid capacity： EMS->Setting-> Function->Solar->On Grid Cap;
D. Check the battery type is M48112-S： EMS->Setting->Function->Battery->M48112-S;
E. Check the Pmeteroffset is 0: EMS->Setting->Function->Grid-> Pmeteroffset ->0 (Password： 1111);
F. Check the Peakshaving is disable: EMS->Setting->Function->Grid-> Peakshaving->Enable->NO ;
G. Check the STS status is open (If available)： EMS->Setting->Function->Backup-> BackupBox -> Backup_EN->YES;
H. Check the system mode： EMS->Setting->Function->System Mode-> DC/AC;
I. Check the maximum charge power of system： EMS->Setting-> Function->SystemMode-> ChargePower->Power->30kW;
J. Set up the discharge cut SOC of the system: EMS->Setting-> Function->System Mode-> DischargeCutSOC->11%;
K. Check the meter status is enable： EMS->Setting-> Function->CT Meter-> Enable-YES;
L. Check the meter ratio is correct： EMS->Setting-> Function->CTMeter->Ratio-80;
M. Check the system software type： EMS->Setting->Function->Pcs->Minv->T30;
N. Check the running mode is AC_Grid: EMS->Setting->Function->PCS-> AC_Tied ->AC_Grid ;
O. Check the Dispatch status:EMS->Setting->Function->Dispatch->Ctrlmode->Local;

5.2 Pmeteroffset Mode

NOTE: The default PmeterOffset of the system is 0, that means the Pmeteroffset function is off.
If this function is on, the EMS would adjust the PCS output power so that the total grid power could meet the set value

For example if the value of PmeterOffset is set to 20kW, the maximum power absorbed from utility grid is 20 kW.
(1) If now the load power is <20kW, such as 10kW, and the batteries are not fully charged, the grid will charge the batteries with 10kW and provide power to load with 10kW at the same time.
(2) If now the batteries are full and the load power is 10kW, the grid power will supply load with 10kW.

(3) If now the load power is >20kW, such as 30kW, the grid will supply load with 20kW, the rest 10kW will be supplied by T30.
(4) If the load power is > (setup Pmeter_offset + 30kW), the setup is invalid. For example, the load power is 55kW, then the grid will supply load with 25kW and T30 will supply 30kW.

If you want to use this function, please follow the steps below:
Turn on the function of Pmeteroffset: EMS->Setting-> Function->Grid-> Pmeteroffset;

5.3 Peakshaving

A. Turn on the function of peak shave： EMS -> Setting -> Function -> Grid -> peakshave -> PeakshaveEN -> Yes;
B. Set up the peak power: EMS -> Setting -> Function -> Grid -> peakshave -> Upperlimit;
C. Set up the valley power: EMS -> Setting -> Function -> Grid -> peakshave -> Lowerlimit;
D. Set up the Delta power: EMS -> Setting -> Function -> Grid -> peakshave -> Delta;
E. Set up the first peak shaving start time: EMS -> Setting -> Function -> Grid -> peakshave -> peaktime -> PEAK_T1-START;
F. Set up the first peak shaving end time: EMS -> Setting -> Function -> Grid -> peakshave -> peaktime -> PEAK_T1-END;
G. Set up the first valley filling start time: EMS -> Setting -> Function -> Grid -> peakshave -> peaktime -> FILL_T1-START;
H. Set up the first valley filling end time: EMS -> Setting -> Function -> Grid -> peakshave -> peaktime -> FILL_T1-END;
I. Set up the second peak shaving start time: EMS -> Setting -> Function -> Grid-> peakshave -> peaktime -> PEAK_T2-START;
J. Set up the second peak shaving end time: EMS -> Setting -> Function -> Grid -> peakshave -> peaktime -> PEAK_T2-END;
K. Set up the second valley filling start time: EMS -> Setting -> Function -> Grid -> peakshave -> peaktime -> FILL_T2-START;
L. Set up the second valley filling start time: EMS -> Setting -> Function -> Grid -> peakshave -> peaktime -> FILL_T2-END

5.4 Time Period Charge and Discharge Mode

A. Turn on the function of force charge： EMS->Setting-> Function->System Mode-> Force Charge->Enable;
B. Set up the first charge start time: EMS->Setting-> Function->System Mode-> Charge Start Time 1;
C. Set up the first charge end time: EMS->Setting-> Function->System Mode-> Charge End Time 1;
D. Set up the second charge start time: EMS->Setting-> Function->System Mode-> Charge Start Time 2;
E. Set up the second charge end time: EMS->Setting-> Function->System Mode-> Charge End Time 2;
F. Set up the charge cut SOC of the system: EMS->Setting-> Function->System Mode-> Charge Cut SOC;
G. Turn on the function of allow discharge： EMS->Setting-> Function->System Mode-> Allow Discharge->Enable;
H. Set up the first discharge start time: EMS->Setting-> Function->System Mode-> Discharge Start Time 1;
I. Set up the first discharge end time: EMS->Setting-> Function->System Mode-> Discharge End Time 1;
J. Set up the second discharge start time: EMS->Setting-> Function->System Mode-> Discharge Start Time 2;
K. Set up the second discharge end time: EMS->Setting-> Function->System Mode-> Discharge End Time 2;
L. Set up the discharge cut SOC of the system: EMS->Setting-> Function->System Mode-> DischargeCutSOC->11%;

06 Android LCD Introduction and Set up

6.1 Running

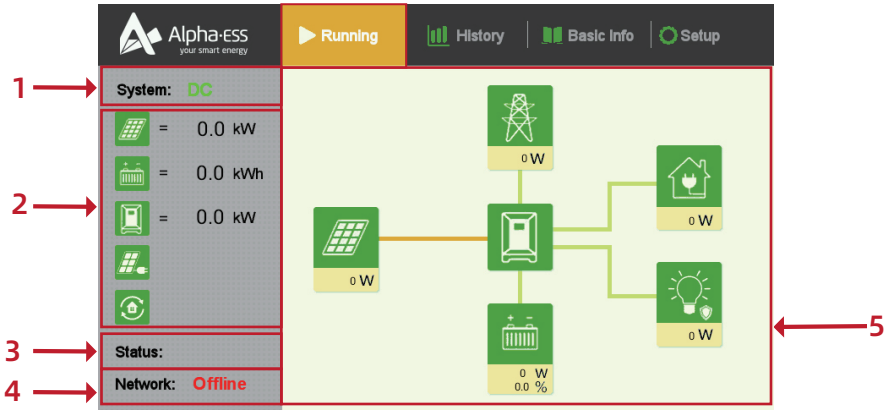


Figure 6-1 Running interface

After the boot interface, the system enters the running interface, as shown in Figure 6-1.

The information in running page includes:

Item	Description
1	System Mode
2	From top to bottom: PV capacity, battery capacity, inverter capacity, self-consumption rate and self-sufficient rate
3	System Status (Normal/Fault)
4	Internet Status (Online/Offline)
5	Running Diagram

1. System Mode: Display the current operating mode of the system.
2. System parameters, from which you can observe the energy parameters of the system and the energy utilization rate of the system.

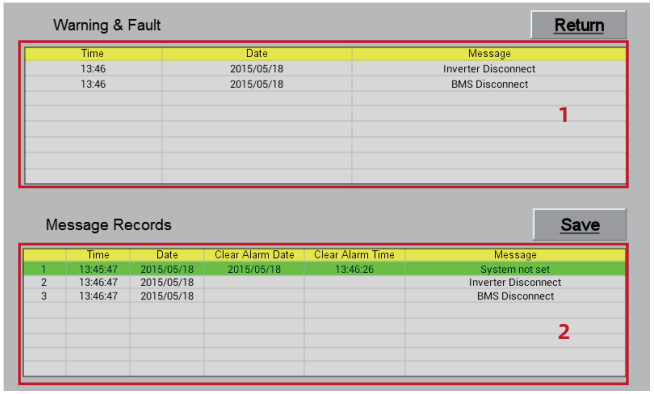


Figure 6-2 System status interface

3. Click the status can see the message as shown in Figure 6-2. The above list
(1) shows current errors and warnings; the below list
(2) shows errors and warnings already solved. The error information can be saved by pressing the button in the USB or SD card.

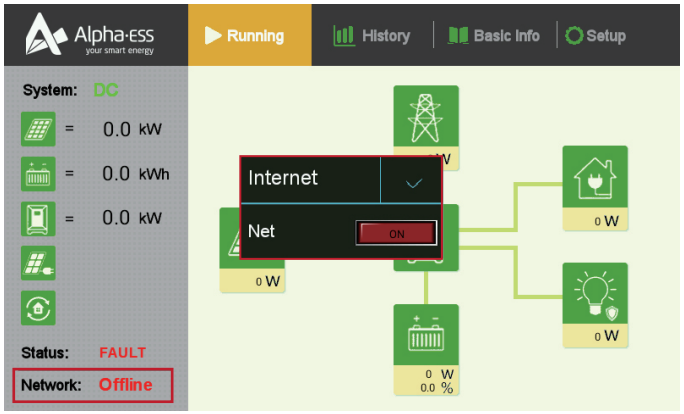


Figure 6-3 Internet status interface

4. Click the field "Network" to switch on or off the internet connection of your storage system. Please make sure your system is connected to the internet.

6.2 History

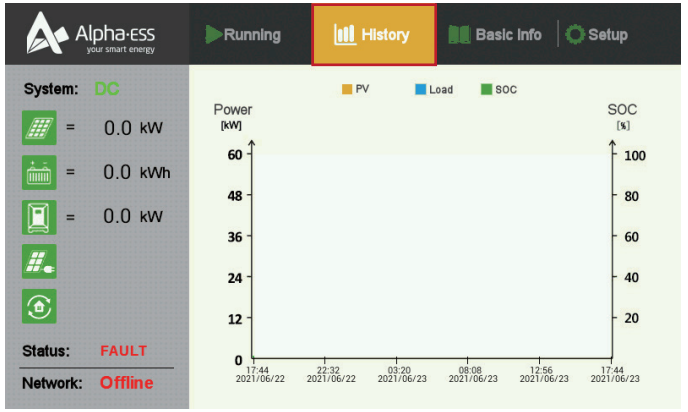


Figure 6-4 History interface

"History" shows 24 hours of history data for "Load" and "SOC" .

6.3 Basic info

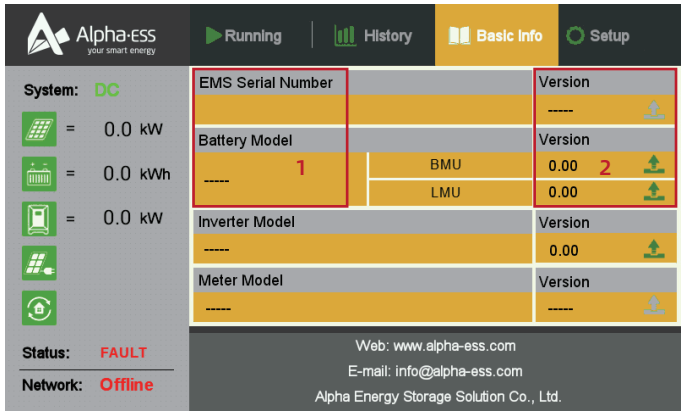


Figure 6-5 Basic info interface

The "Basic Info" section shows the component models of your systems (1) and their Firmware version (2).

6.4 Set up

6.4.1. System

Select the highlighted icon “System” to access the settings of the function configuration.

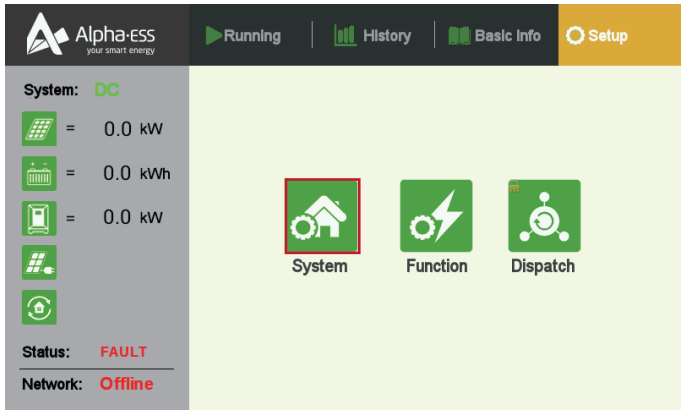
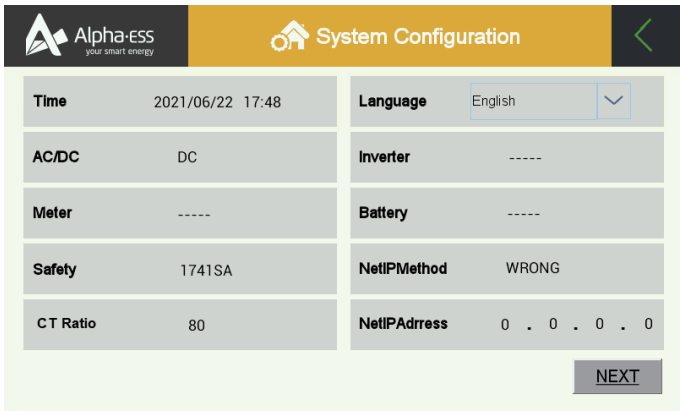


Figure 6-6 Press “System



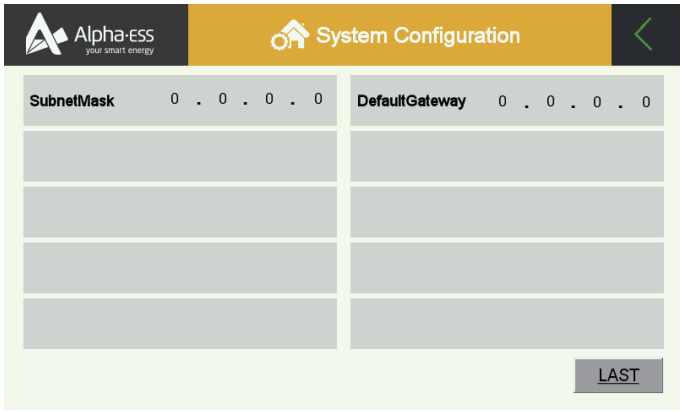


Figure 6-7 System Interface

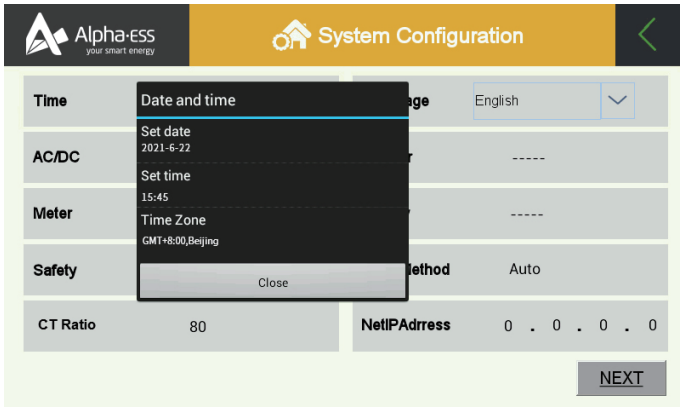


Figure 6-8 Set-up time interface

Press “Time” to set the date, time and time zone, then click the "Close".

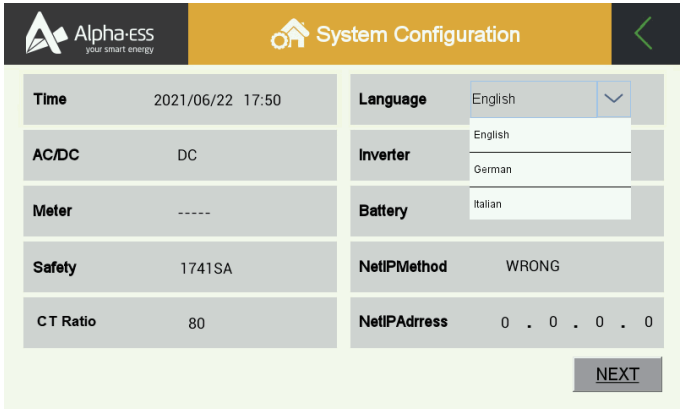


Figure 6-9 Set-up language

Press “Language” to set the language.

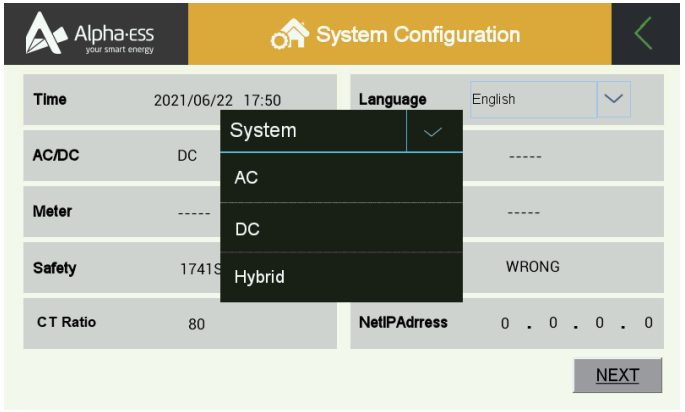


Figure 6-10 Set-up system mode

Press “AC/DC” to set the system mode. T30 system only supports AC Mode. Automatic identification of the type of meter, inverter and battery by the system.

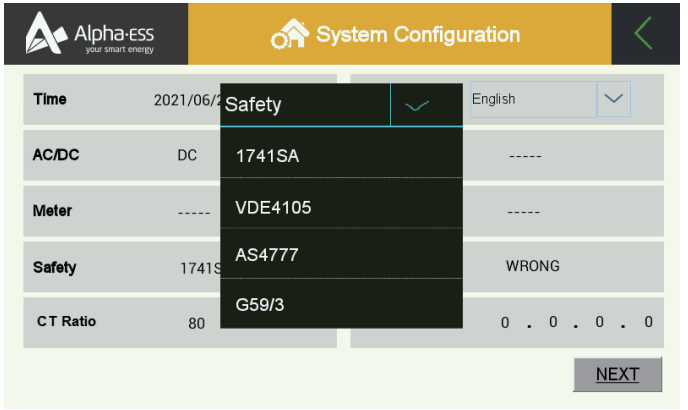


Figure 6-11 Safety interface

Click "Safety" to select the safe country; you can select the appropriate country according to your country. 1741SA is the American standard. VDE is the German standard. AS4777 is the Australian standard. G59/3 is the England standard

6.4.2. Function

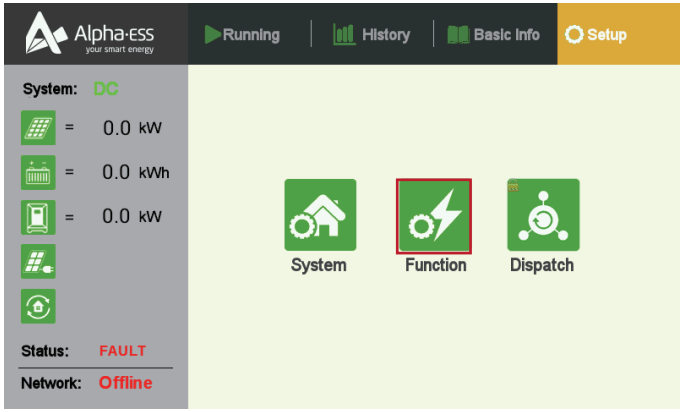


Figure 6-12 Press “Function”

Press “Function” to enter the function display.

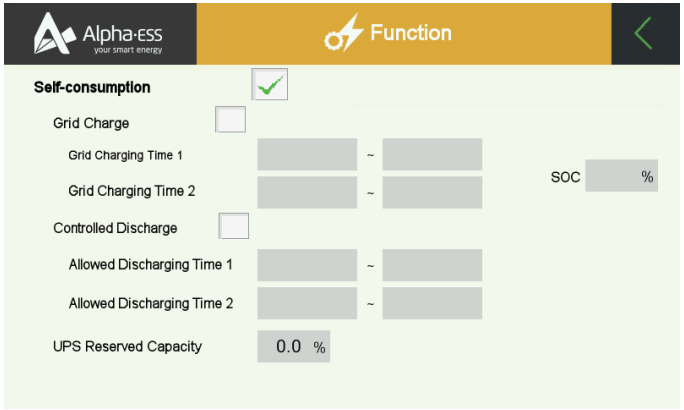


Figure 6-13 Function interface

"Self-consumption" mode, " Grid Charge" mode and " Controlled Discharge" mode can be selected.

NOTE: The "Self-consumption" mode is suitable the situation that the Gird construction is relatively prefect and there is no frequent power cut.

You can choose "Grid Charge" and "Controlled Discharge" to charge and discharge the device according to the time period you need.
To prevent battery over discharge, you can set the remaining SOC of the device in "Controlled Discharge" mode by selecting "UPS reserved capacity" . It's usually 20 percent.

6.4.3. Dispatch

This interface is open to internal tester only.

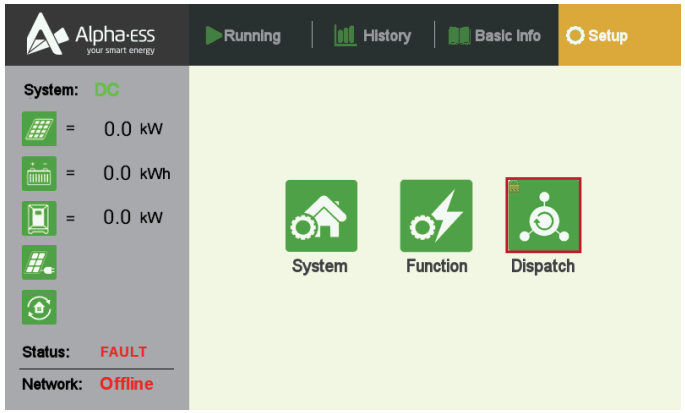


Figure 6-14 Dispatch Interface

07 Meter Instruction

7.1 Function Description

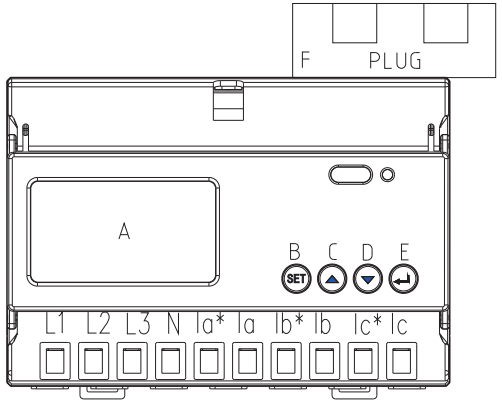


Figure 7-1 Schematic diagram of the appearance of the meter

Table 3 Function Description

Object	Name	Description
A	Display Screen	Data display and setting display
B	SET	Menu button: Enter / Exit menu.
C	UI	Up button: View the voltage and current in the viewing interface, left shift and flashing shift in the programming interface.
D	PQ	Down button:View the power in the viewing interface, move right in the programming interface and modify the flashing shift.
E	E Enter	Enter button:Check the power in the viewing interface and save the settings in the programming interface.
F	Plug	Connect to EMS or other meters through network cable to realize communication between devices.

7.2 Introduction

7.2.1. Introduction to the display interface

Examples of display interface:

Table 4 Partial display interface diagram

 Current forward active energy 12.34kWh	 Current reversing active energy 12.34kWh
 Current total power 1.234kW	 Current positive active power demand 1.234kW
 Phase A voltage 123.4V	 Phase A current 12.34A

NOTE: The above is just a part of the display interface. The display mode of other interfaces is similar to the above figure. You can judge the display meaning according to the information displayed on the interface.

7.2.2. Introduction to programming interface

Under any display item in the menu, press "SET" to enter the "PASS" interface, then press "ENT" to display "0000", prompt for the password and then enter the password as 0001,If the password is entered incorrectly, then return to "0000" to re-enter; if the password is entered correctly, you can enter parameter settings. After setting, press "SET" to enter "SAVE" interface, press "Enter" under "YES" to save. Exit after saving, press "Enter" under "no" to exit without saving.

NOTE: The above list is the key sequence interface when the ADL3000 is equipped with all functions. If there is no customized function, there is no relevant display interface. The displayed values displayed are all primary data. Please Make sure that the set ratio is consistent with the actual ratio.

7.3 Meter setting

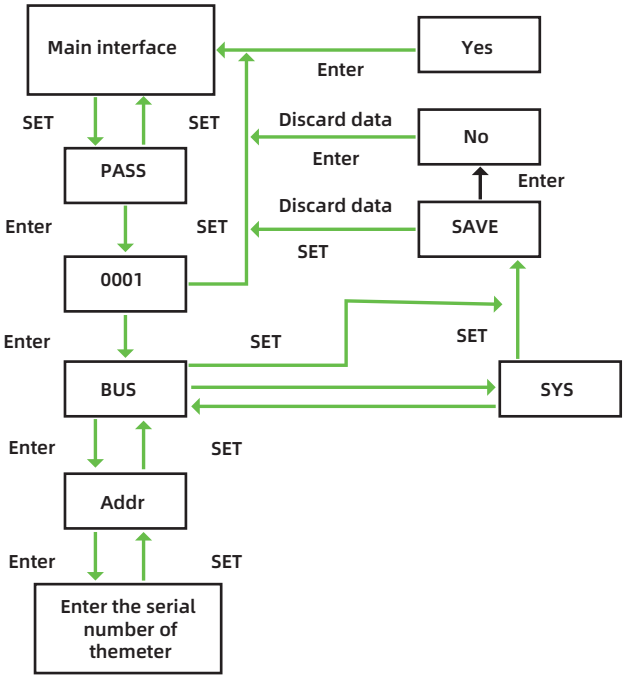


Figure 7-2 Flow chart of meter setting

7.3.1. Setup in on-grid mode

A. Press "SET" to enter the programming interface;
B. Enter the password 0001 and press "Enter";
C. See "BUS1" and press "Enter";
D. See "Addr" and press "Enter" ;
E. Use the up and down buttons to set the meter address.If the system is in the AC mode or Hybrid mode, the grid side meter is "001" and the PV inverter side meter is "002";If the system is in the DC mode,only need set the grid side meter as "001" ,the interface is shown below:

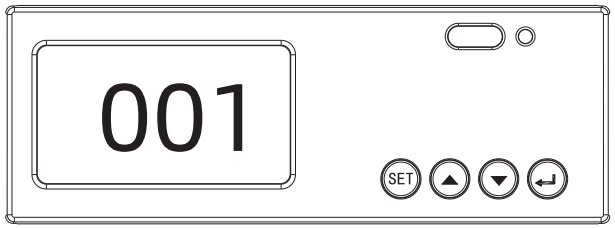


Figure 7-3 Address setting interface

F. Press "SET" to enter the "SYS" interface;
G. Press "SET" to enter "SAVE", press "Enter" to select "Yes" to save;
H. The setting is over;

08 Online Monitoring

8.1 Register

You have to create a new account on our web server for the normal monitoring. So please use the following steps:

Open the portal: www.alphaess.com.

Enter the username and password, then click “Login” to jump to the home page. There will be a prompt after a failed login.

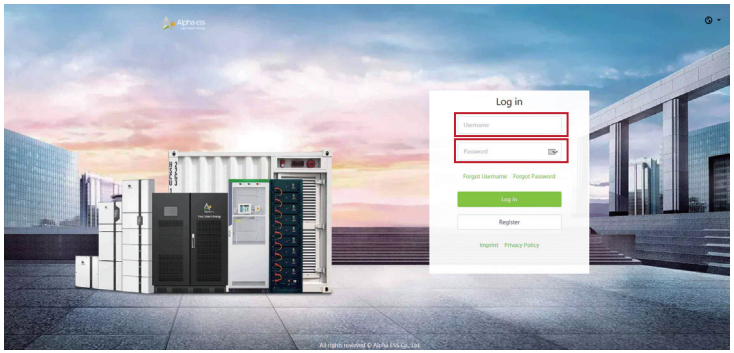
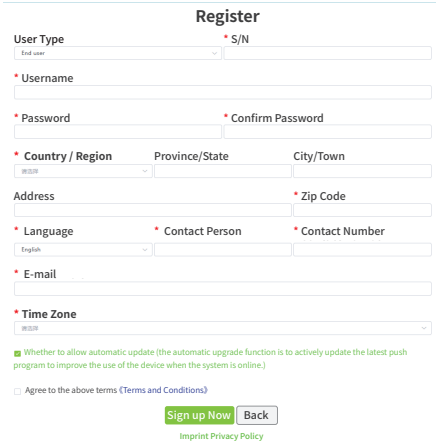


Figure 8-1 Monitoring login interface

Users who haven't yet registered need to click “Register” to visit the registration page: (as shown below)



Boxes followed by a “*” mark must be filled, and the contents you fill must consist with the facts. Registered users come in 2 types: end users and installers. Please choose between them according to the actual situation. Then you can check whether you need auto upgrade or not according to your own situation. Then Click “SIGN UP NOW” to go to the login page.

More detailed information can be obtained in Online Monitoring Web server installation Manual.

Figure 8-2 Register interface

8.2 Registering License

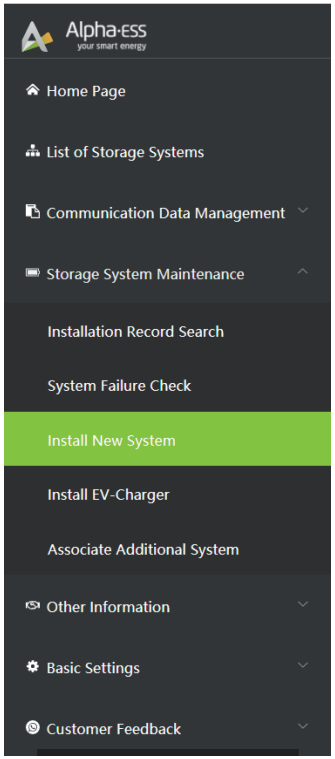


Figure 8-3 Menu for installer

Click Install new system to register the license No.

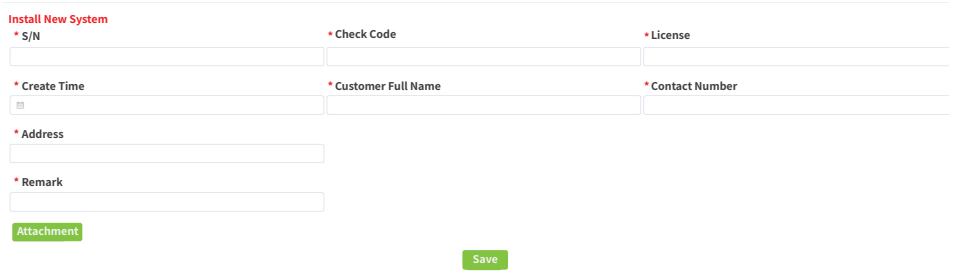


Figure 8-4 System registering interface

Input S/N, Check Code, License No., Date, Name, and Contact No. to complete the registering process.

09 Routine maintenance

9.1 Tool and Consumable Requirements List

9.1.1. Tools and equipment requirements

No.	Name	Model specification (precision)	Unit	Quantity	Remarks
1	Slotted screwdriver	2、4、6、8 "	.....	1	
2	Phillips screwdriver	2、4、6、8 "	.....	1	
3	Wrench		.....	1	
4	Multimeter		.....	1	
5	Clamp Meter		.....	1	
6	Insulation tester		.....	1	
7	Ethernet cable	CAT5E	.....	1	
8	USB-485 data cable	/	.....	1	
9	Digital storage oscilloscope	(If any)	.....	1	
10	Power quality analyzer	(If any)	.....	1	

9.1.2. Consumables list

No.	Name	Model specification (precision)	Unit	Quantity	Remarks
1	Electrical tape	.....	.....	Several disks	.....
2	Plastic cable tie			Several	

9.2 Maintenance list

A. Check whether the cable connection is loose;
B. Check whether the cable is aging or damaged;
C. Check whether the cable insulation tape is dropped;
D. Check whether the cable terminal screws are loose and whether there are signs of overheating;
E. Check whether the grounding is normal;

9.2.1. Routine inspection

9.2.1.1 Power on inspection

Operators need to conduct daily inspections of the equipment, and maintain the equipment by observing the status of the equipment indicator lights and software monitoring information.

Check items	Check content	Inspection requirements	Time	Notes
1.Battery				
Indicator light	Check all battery and high-voltage control box indicators when the system is runnin normally	Flashing green light	Once 6 months	
EMS display	There is nothing wrong with the EMS display when the system is operating normally	The fault light goes out and the interface displays On-Grid Mode	Once 6 months	
Battery cluster flags	Check that all battery cluster flags on the BMS display of each container are normal	Interface entry: Status-Battery-Relay to view	Once 6 months	
LMU sampling line	Use the host computer to monitor the voltage, temperature and event conditions of the module, and check whether the sampling line connection terminal and terminal block of the LMU, and the communication line connection terminal block are loose or damaged	The data is normal, there is no looseness or damage	Once 6 months	
System running	Check if there is any abnormal noise when the system is running	No abnormal noise	Once 6 months	
2.PCS				
PCS display	Check the PCS screen	All voltage, power and current data on the PCS should be normal	Once 6 months	
PCS communication	Check if communication is normal	The monitoring software can communicate with the PCS, and the status of the PCS can be displayed normally in the monitoring software	Once 6 months	

PCS internal temperature	Check the internal temperature of the PCS, including battery temperature and module temperature	PCS has no abnormal conditions	Once 6 months	
PCS working status	Work status, view history	Each PCS in the monitoring software is in a normal working state, no fault state	Once 6 months	
PCS fault record	Read error messages and warnings, export failure records	The PCS changes from a normal working state to a fault state, and the records are exported in the monitoring screen	Once 6 months	
PCS AC switch	Visually check the AC switch	AC switch is normal	Once 6 months	
PCS fan	Visually check the fan	The fan is operating normally	Once 6 months	
Function test	Check the PCS start-stop, switch control and other functions, the control function should be normal.	Functioning normally	Once 2 years	
Protective function	Check DC side over/under voltage, over current, short circuit, grounding protection, and AC side over/under voltage, over current, overload, over temperature, three-phase unbalance and other protection functions	The protection function should operate normally	Once 2 years	

9.2.1.2 Power off inspection

After the equipment has been running for a certain period of time, it is necessary to perform power outage maintenance on the equipment. Power outage maintenance includes: power outage inspection, maintenance work, etc.

Check items	Check content	Inspection requirements	Time	Notes
1.Battery				
Connect the battery to the high voltage control box	Check whether the wiring harness between the PACK and the high voltage control box is locked	All locked, not loose	Once 6 months	
High voltage control box connected with PCS	Check whether the wiring harness between the high voltage control box and the PCS is locked	All locked, not loose	Once 6 months	
Battery connection	Check whether the connection terminal of the battery power cable is damaged, deformed, or has overheating traces; whether the battery terminal is insulated and protected	The connection terminal and the base are normal, without damage or deformation, and no traces of overheating; All red and black terminal Amphenol connectors are complete	Once 6 months	
High voltage control box connection	Check whether the connecting terminal of the power line of the high-voltage control box is damaged, deformed, and whether there are traces of overheating; whether the terminal of the high voltage control box is insulated and protected	The connection terminal and the base are normal, without damage or deformation, and no traces of overheating; All red and black terminal Amphenol connectors are complete	Once 6 months	
Battery fixed	Check the fixation between the battery and the battery rack	All battery fixing bolts are tightened	Once 6 months	
Battery grounding	Check whether the battery is well grounded	The rear surface of the front cover of the battery box should be in good electrical connection with the surface of the battery rack and the grounding point (use a multimeter to test the conduction state)	Once 6 months	

Cabinet grounding	Check whether the cabinet grounding is well connected	The ground screw is fixed normally	Once 6 months	
Exterior	Check whether the appearance of all batteries and high-voltage control boxes in the system is normal	No damage on the surface, no rust or damage	Once 6 months	
Cabinet fixed	Check the fixing of the cabinet to the ground	All bolts are tightened	Once 6 months	
Cabinet appearance	Check whether the cabinet is rusty or damaged	No rust or damage on the surface	Once 6 months	
Harness fixed	Check the wiring of the wiring harness	There should be enough cable tie positions for the wiring, and there should be no excessive stress in the fixed position of the root of the wire harness	Once 6 months	
Cable aging	Check whether the cable is aging or damaged	No aging or damage	Once 6 months	
High voltage control box fixed	Check that the high voltage control box is well fixed, and the front panel is close to the battery rack to ensure that it is completely grounded	All fixing screws are locked	Once 6 months	
Molded case circuit breaker for high voltage control box	Check the normal closed state of the plastic case circuit breaker of the high-voltage control box	The high voltage control box molded case circuit breaker closes normally	Once 6 months	
2.Cabinet				
Safety warning label	Check all safety warning labels	The safety warning label is intact and undamaged	Once 6 months	
Door lock	Check whether the cabinet door lock is intact	The cabinet door lock is intact and can be locked and opened normally	Once 6 months	
Internal device location	Check whether all the equipment inside the cabinet is in place	All the equipment inside the cabinet is in place	Once 6 months	

Foundation	Check whether the foundation of the cabinet is inclined or sinking	No tilt or sink	Once 6 months	
Internal smell	Check that there is no obvious odor inside the cabinet	There is no obvious odor inside the cabinet	Once 6 months	
3.PCS				
PCS cable	Check the PCS cable terminal for signs of overheating	All bolts are tightened	Once 6 months	
PCS ground	Check if the PCS is properly grounded	No rust and damage	Once 6 months	
PCS fixed	Check the PCS fixation	All fixing bolts have been tightened, and the marks on the screws are not misaligned	Once 6 months	
PCS inlet and outlet	Check the PCS air inlet and outlet for debris	No debris; Note: Check whether the air intake holes can be properly ventilated. If the PCS cannot be cooled properly, it may be damaged by overheating	Once 3 months	
Primary circuit	Check the power line connection of the primary circuit, test the insulation resistance of the primary circuit to ground	The cable of the primary circuit should be firmly connected, without deformation, no broken skin, no oxidation, and the insulation resistance should be greater than 10MΩ	Once 12 months	
Switches, circuit breakers, contactors	Test PCS switch, contactor, circuit breaker, protection function	PCS switches, contactors, circuit breakers, and protection functions are normal	Once 12 months	
Lightning protection device	Check lightning protection device, DC fuse	The connection should be firm, the interface should not be oxidized, and the protection action should not be triggered under normal working conditions	Once 12 months	

9.2.2. Routine maintenance

9.2.2.1 Power on maintenance

Maintenance items	Maintenance requirements	Time
1.Battery		
Battery capacity calibration	Complete discharge-charge-discharge cycle	Once 6 months
Battery data analysis	Analyze the recorded BMS data (completed by Alpha employees)	Once 6 months
Check the switch function and trip	The function of the circuit breaker is normal; There should be no voltage when the circuit	Once 6 months
Function of the high-voltage control box circuit breaker	1. Breaker is disconnected. Use a multimeter to detect the DC voltage gear; 2. Tripping function detection: When the circuit breaker is closed, the host computer sends an instruction, and the circuit breaker normally trips	Once 6 months
Whether the insulation resistance of the DC side of the system is within a reasonable range	Will the BMS report an insulation fault when the system is running normally? If there is no fault, the insulation resistance is good	Once 6 months
2.Cabinet		
Circuit breaker maintenance	Check the contactors (auxiliary switches or micro switches) in turn every year and ensure their normal operation; Check operating parameters (pay attention to voltage and insulation)	Once 6 months
Security	Check the LCD screen; Simulate the power off and check whether the communication signal is available during the power off	Once 6 months
3.PCS		
Exterior	Check if the inverter is damaged or deformed	Once 6 months
Operating status	Check whether the inverter makes abnormal noises during operation; Check whether all components are normal during the operation of the inverter; Check the temperature of the inverter shell and use a thermal imager to monitor the temperature of the system	Once 6 months
Environment	Check whether the air inlet/outlet is normal; Check the humidity and dust around the inverter, and ensure that the filter device at the air inlet is working properly	Once 6 months

9.2.2.2 Power off maintenance

Maintenance items	Maintenance requirements	Time
1.Battery		
Fixed cabinet	The cabinet is fastened to the ground	Once 6 months
Cabinet grounding	Use a multimeter for grounding test	Once 6 months
Battery fixed	The battery is fastened to the battery holder	Once 6 months
Insulation protection	Protective cover on battery rack	Once 3 months
Battery label	Replace with the same label	Once 3 months
Battery grounding	Use a multimeter for grounding test	Once 3 months
High control box grounding	Use a multimeter for grounding test	Once 3 months
Whether the insulation resistance of the DC side of the system is within a reasonable range	Shut down the system, and disconnected all the high-voltage control boxvoltage control box plastic cases. And use the insulation resistance tester and the DC 1000V gear to test. Both the insulation resistance between the total positive and the ground, and the total negative and the ground of the junction cabinet should be ≥5MΩ	Once 6 months
Whether the grounding resistance of the battery, high-voltage box, and cabinet is within a reasonable range	Use the multimeter to test separately when the machine is stopped.The test value should be less than 10Ω.	Once 6 months
2.PCS		
PCS live part screws, collection wiring harness, communication wiring harness inspection	The live parts of the PCS screws, collection wiring harness, and communication wiring harness should be normal, without jamming or looseness, and no looseness or looseness of the connectors	Once 6 months
PCS cleaning, anti-rust inspection	Clean the PCS and check the wiring harness connector for rust	Once 6 months
System cleaning	Clean circuit boards and components; Check the temperature and dust of the PCS. If necessary, use the compressed air of the fan to clean the interior and replace the air filter	Once 6 months
Power circuit connection	Check whether the power cord is loose and fastened; Check whether the power cord and control cable are damaged; pay attention to the contact surface between the cable insulation and metal! Check whether the insulation tie is off the cable terminal	Once 6 months
Module check	Check or replace the power module to ensure that the power module works normally	Once 6 months

Security	Check the warning labels and replace them if necessary	Once 6 months
Fan repair	Perform routine maintenance on the fan to ensure that the fan operates normally, and dust cooling fan of the module	Once 6 months
Connection of interface and cable	Check whether the screws of the control terminal are loose. If there is any looseness, please use a screwdriver to tighten; Check whether the main circuit terminal is loose; Observe the connection between the inverter and the cable	Once 6 months
Circuit breaker maintenance	Inspect the metal parts for corrosion	Once 6 months

9.3 Notes

After all of the equipment are out of operation, the following notes should be paid attention to while maintaining:

A. Related safety standards and specifications should be followed in operation and maintenance.

B. Disconnect all the electrical connections so that the equipment would not be powered on.

C. Wait at least 15 minutes after disconnection in case that the residual voltage of capacitors down to safe voltage. Use a multimeter to ensure the equipment is completely uncharged.

D. The amount of maintenance staff should be not less than two while maintaining.

E. The equipment should be repaired by professional staff and it is strictly forbidden for maintenance staff to open equipment on their own.

F. Appropriate protective measures should be taken while maintaining, such as insulated gloves, shoes, and anti-noise ear plugs.

G. Usually the location of the storage system is far away from urban areas. Related emergency rescue measures should be prepared in order to be implemented when necessary.

H. Life is priceless. Make sure no one would get hurt first.

I. For single cell, it is better to be sank into water to block burning.

J. The batteries SOC need to be charged to 30%~50% when the whole system is static for a long time (that is, the batteries has not been charged for two weeks or longer) in case of over discharge.

K. Please contact us in time if there are any conditions that could not be explained in the manual.

10 Troubleshooting

Fault Category	LCD Fault Display	Fault Name	Troubleshooting
BMS	Cell-Temp-Diff	Cell temperature different fault	Shut down the system about 2 hours, then restart the system to check if the fault is eliminated If the problem is not resolved, please contact AlphaESS customer service
	Chrg-Ov-Curr	Module charge over current fault	Restart the system to check if the fault is eliminated If the problem is not resolved, stop any operation on the system and contact AlphaESS customer service
	Disch-Ov-Curr	Module discharge over current fault	Restart the system, turn off some of the loads to check if the fault is eliminated. If the problem is not resolved, stop any operation on the system and contact AlphaESS customer service.
	Pole-Ov-Temp	Pole over temperature fault	Shut down the system for about 2 hours, then restart the system to see if the fault is eliminated. If the problem is not resolved, please contact AlphaESS customer service.
	Cell-Ov-Volt	Cell over volt fault	Restart the system, switch the system to the discharging state, If the error is not eliminated, stop any operation on the system and contact AlphaESS customer service.
	Cell-Volt-Diff	Cell volt different fault	Restart the system to see if the fault is eliminated. If the problem is not resolved, please contact AlphaESS customer service.
	Disch-Low-Temp	Cell discharge under temperature fault	Confirm that the ambient temperature is higher than -10℃.. If it is lower than it, please turn on the heating equipment such as heater. If the ambient temperature is higher than -10℃., restart the system. If the problem is not resolved, please contact AlphaESS customer service
	Cell-Low-Volt	Cell under volt fault	Restart the system to see if the fault is eliminated If the problem is not solved, please contact AlphaESS customer service
	IR_Fail	Insulation resistance fault	Switch off the battery MCCB and measure the impedance of the positive and negative poles of the battery to the ground. Is it greater than 270KΩ and restart the system. If the problem is not solved, stop any operation on the system and contact AlphaESS customer service

Fault Category	LCD Fault Display	Fault Name	Troubleshooting
BMS	Commu_fail_LMU	LMU Communication fault	Check if the communication cable connector between the HV-control box and the battery is not plugged in. If the problem is not resolved, please contact AlphaESS customer service.
	Cell-Ov-Temp	Cell over temperature fault	Stop charging and discharging and then run the system after the fault is eliminated. If the problem is not resolved, please contact AlphaESS customer service.
	Commu_fail_BMU	BMU Communication fault	Check if the communication cable connector between the HV-control box and the TOP BMU is not plugged in. If the problem is not resolved, please contact AlphaESS customer service.
	Chrg-Low-Temp	Cell charge under temperature fault	Confirm that the ambient temperature is higher than 0°. If it is lower than below, please turn on the heating equipment such as heater. If the ambient temperature is higher than 0°, restart the system. If the problem is not resolved, please contact AlphaESS customer service.
	Wire-Harness-Err	Wire beam fault	Restart the system to see if the fault is eliminated. If the problem is not resolved, please contact AlphaESS customer service.
	Relay Err	Relay fault	Restart the system to see if the fault is eliminated. If the problem is not resolved, please contact AlphaESS customer service.
	Temp-Sen-Err	Temperature sensor fault	Restart the system to see if the fault is eliminated. If the problem is not resolved, please contact AlphaESS customer service.
EMS	PCS Lost	PCS Lost	Check if the communication cable connector between PCS (Storion-T30-INV: port 9, 10) and TOP BMU (EMS) is not plugged in and restart the system. If the problem is not resolved, please contact AlphaESS customer service.
	Meter1 Lost	Meter1 Lost	Check the communication line between the GRID meter and the TOP BMU (Meter COM port), and restart the system. If the problem is not resolved, please contact AlphaESS customer service.

Fault Category	LCD Fault Display	Fault Name	Troubleshooting
EMS	BMS Lost	BMS Lost	Check if the battery and TOP BMU (BMU) communication cable connector are not plugged in and restart the system. If the problem is not resolved, please contact AlphaESS customer service.
	PV Meter Lost	PV Meter Lost	Check if the communication cable between the PV side meter and the GRID meter is not plugged in. If the problem is not resolved, please contact AlphaESS customer service.
	SD Lost	SD Lost	Restart the system to check if the fault is eliminated. If the problem is not resolved, please contact AlphaESS customer service.
	RTC error	RTC error	Restart the system to check if the fault is eliminated. If the problem is not resolved, please contact AlphaESS customer service.
	Fire_Fault	Fire_Fault	Check the system for fire failure. If there is a fire, please extinguish the fire in safe condition. If there is no fire, please check if the DI1 (TOP BMU) interface terminal is connected tightly and restart the system. If the problem is not resolved, please contact AlphaESS customer service.
	Fire Controller Err	Fire Controller Err	Check whether the AC and DC switches on the fire controller are all turned on, and check whether the fire communication is connected to DI2 (TOP BMU). If the problem is not resolved, please contact AlphaESS customer service.
	GC_Fault	GC_Fault	Check if DO2 (TOP BMU) is connected properly, and after setting the diesel GENSET to start, measure whether DO2 (TOP BMU) 1, 2 is on. If the problem is not resolved, please contact AlphaESS customer service
	Over_Load	Over_Load	Reduce the number of loads, so that the load required power is less than the rated power of the system. If the problem is not resolved, please contact AlphaESS customer service.
	Over_Curr	Over_Curr	Reduce the number of loads, so that the load required power is less than the rated power of the system. After the load reduction, select fun-PCS-ClearFault on the EMS menu to clear the fault, otherwise the PCS will not operate normally. If the problem is not resolved, please contact AlphaESS customer service.

Fault Category	LCD Fault Display	Fault Name	Troubleshooting
PCS	PCSModeFault	PCSModeFault	Check whether the inverter is in the remote control mode. If it is not the remote control mode, please set it to the remote control mode. If the problem is not resolved, please contact AlphaESS customer service.
	AC_Out_volt_F	DC-AC subsystem AC output voltage Fault	Restart the system to check if the fault is eliminated. If the problem is not resolved, please contact AlphaESS customer service.
	AC_phase_lost	DC-AC subsystem AC phase lost Fault	Check if there is phase loss in the AC input of the inverter. If there is a phase loss, please power off and reconnect the cable. If the problem is not resolved, please contact AlphaESS customer service.
	off_grid_UPLF	DC-AC subsystem off-grid voltage phase lost Fault	Check if there is phase loss in the AC input of the inverter. If there is a phase loss, please power off and reconnect the cable. If the problem is not resolved, please contact AlphaESS customer service.
	EG_SF	DC-AC subsystem emergency stopped Fault	Check if the emergency stop button is operated manually. If yes, please release the emergency stop button according to the manual. If the problem has not been solved, please contact AlphaESS customer service.
	bat_overload	DC-DC subsystem battery overload Fault	Reduce the load on the grid side, check if the fault is eliminated, If the problem has not been solved, please contact AlphaESS customer service.
	emergent_stopped	DC-DC subsystem emergent stopped Fault	Check if the emergency stop button is operated manually. If yes, please release the emergency stop button according to the manual. If the problem has not been solved, please contact AlphaESS customer service.
	grid_N_line_lost	STS subsystem grid N-line lost Fault	Check if the phase of the grid has no N phase, If the problem has not been solved, please contact AlphaESS customer service.
	off_grid_AC_phase_lost	STS subsystem off-grid AC voltage phase lost Fault	Check if the off-grid phase is insufficient, If the problem has not been solved, please contact AlphaESS customer service.