Elecnova

Liquid-cooled

Battery Cabinet ECO-B372LS User Manual

Shanghai Elecnova Energy Storage Co., Ltd.

The release date identified in the change history for this Manual is correct. Elecnova reserves the right of modification at any time.

The images provided in this Manual are for demonstration purposes only. Details vary slightly based on product version and market region. Elecnova has the final right of interpretation for all designs of products.

The information and advice are given in good faith and are believed to be accurate as of the date of editing. Elecnova does not express or imply any warranty regarding the information

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Revision History

Version	Description	Editor	Date	Remarks
A/1	New Version Release	Chong Qingfa	July 29, 2024	

Content

1. About this Manual

1.1 Preface

Dear user, much appreciation for using the Liquid-cooled Battery Cabinet ECO-B372LS product (hereafter referred as ECO-B372LS, or Battery Cabinet, or the Product) developed and produced by Shanghai Elecnova Energy Storage Co., Ltd. We sincerely hope that this product meets your needs, and we also hope that you are satisfied with its performance and provide us with your valuable comments and suggestions. We will continue to evolve and improve product quality

1.2 Applicable Product

This Manual is applicable to product model: ECO-B372LS, the Battery Cabinet

1.3 Brief Introduction

The manual includes the following contents:

- **Safety Instructions**

Introduced the safety operation precautions for the Product.

- **Product Description**

Introduced the overview of the Product and the technical parameters related to the system.

- **Product operation**

Introduced the operation of the Product and HMI screen.

- **Other**

Introduced the faults handling methods for the Product, as well as our company's contact information.

1.4 Safety Statement

In this Manual, the “DANGER”, “WARNING” and “CAUTION” tags in the following instructions are used to deliver information about hazards related to specific tasks and procedures. These safety precautions do not represent all hazards when performing a given task. Installers and operators should adhere to premium industrial safety practices, site specific ambience, health/safety plans, local safety requirements and regulations.

Only properly trained and qualified personnel are allowed to perform the installation procedures identified in this Manual.

	" DANGER ” indicates a hazardous situation which, if not avoided, will result in death or serious injury. "DANGER" is only limited to the most extreme cases. "DANGER" indicator is not used for property damage hazards unless there is also a risk of personal injury corresponding to these levels.
	"WARNING" indicates a hazardous situation which, if not avoided, could result in death or serious injury. "WARNING" indicator is not used for property damage hazards unless there is also a risk of personal injury appropriate to those levels.
	"CAUTION" indicates a hazardous situation which, if not avoided, may result in minor or moderate injury. “CAUTION” indicator can be used to warn of unsafe operations that could result in property damage.

1.5 Safety Instructions

◆ **Safety Usage Instructions**

This section introduces the general safety rules that need to be followed during operation of the Cabinet. Read these safety instructions before operation.

For specific safety matters, refer to the corresponding chapters.

	Touching the terminals, contacts, etc. connected to the power grid or Battery Cabinet may result in death from electric shock! Lethal high voltage exists in the Cabinet. Pay attention to and follow the warning labels on the product! Damaged internal component may cause electric shock or fire!

◆ **User Manual**

Read this Manual before operation, and keep the manual properly for review.

Operate the Battery Cabinet in strict accordance with descriptions in this Manual; otherwise, serious accidents such as product damage, property damage, and even personal injury/death may occur.

◆ **Personnel Requirements**

	Staff who performs electrical work on this product must undergo professional training and hold relevant licenses!

◆ **Safety warning signs**

For safe maintenance and inspection, please comply with the following requirements:

- ✓ To avoid mis-operation, put up warning signs on the front and rear side of the Cabinet. Also stick warning signs nearby a switch.
- ✓ Put up warning signs or warning tapes around the installation area.

◆ **Battery protection signs**

	This sign indicates a high voltage hazard which may cause electrical hazards if touched.
	This sign indicates that this is the protective earthing (PE) terminal, which needs to be firmly grounded to ensure the safety of personnel.

◆ **Environment Requirements**

- ✓ It is strictly prohibited to stack flammable, explosive and other dangerous items around the Battery Cabinet.
- ✓ The installation location of the Battery Cabinet shall comply with moisture-proofing requirements and others
- ✓ The intrusion of moisture may damage the battery system. To ensure the normal and safe running of the system, pay attention to the ambient humidity when performing routine maintenance and inspection.

◆ Product end-of-life

When the battery system reaches end-of-life, it shall not be disposed of as regular waste. Contact the relevant authorized recycling agency for proper disposal

2. Battery Cabinet Introductions

2.1 System Overview

ECO-B372LS is a C&I Battery Cabinet product solely developed and produced by Elecnova. This product adopts integrated design and integrates the LFP battery system, BMS, fire safety devices, BCQ (local EMS controller), liquid-cooling unit and other equipment components into a single Battery Cabinet. This Cabinet has the characteristics of energy saving, small size, high energy density, high environmental flexibility, fast on-site installation, friendly-grid-access and easy capacity expansion etc.

ECO-B372LS Cabinet appearance and internal view are shown below as Figure-1 and Figure 2-2.

Figure 2-1 ECO-B372LS Physical Image

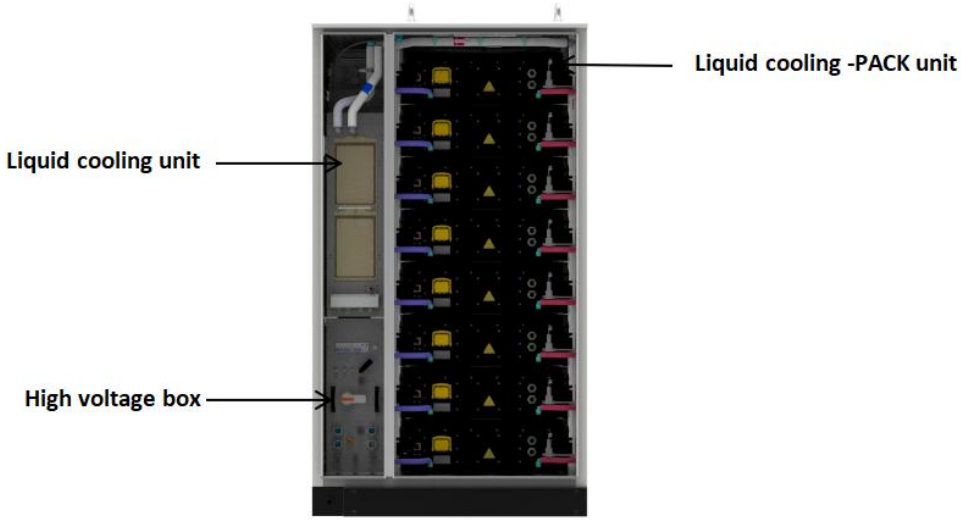


Figure 2-2 ECO-B372LS Internal View

Product Advantages:

- Ingress Protection level IP55: Supports outdoor and indoor multi-scenario installation.
- Fire early-warning + fully immersive Aerosol FSS

- Dual power design. Supports black start.
- High efficiency for charging/discharging: Deliver more power with excellent profitability
- Flexible installation for critical site conditions.
- On-site easy grid connection and commissioning.
- Easy multi-unit parallelization for easy capacity expansion.
- Support remote access, operation, maintenance management, unattended operation via local cloud platform

2.2 Technical Parameters

Item	Specifications	Remarks
Product model	ECO-B372LS	
DC Side Parameters		
Cell type	LFP 280Ah	
Configuration	1P416S	
Rated Cabinet Capacity	372.736 kWh	100%DOD,（25±2）℃, 0.5P
Rated Cell Capacity	280Ah	
Rated Voltage	1331.2 V	
Recommended voltage range	DC 1164.8-1497.6 V	Cell voltage range: 2.8V~3.6V
System Parameter		
System Efficiency	≥92%	Auxiliary power excluded
Charge/discharge Rate	0.5P	Constant power
Depth of Discharge	95%DOD	
Cycle Life	≥8000 times (25±2℃)	Conditions: 25±2℃, 0.5P, 95%DOD at rated operating conditions
Ingress Protection	IP54	
Cooling Method	Liquid cooling	
Operating Temperature	-25 to 55℃	
Relative Humidity	0-95%RH, no condensing	
Altitude	≤2000m	Derated above 2,000m, maximum application altitude ≤ 4000m
Dimensions (W*D*H)	1300*1300*2400 mm	
Weight	Approximately 3660kg	
Fire Suppression System	PACK-level aerosol + Cabinet-level detection	Aerosol
Communication interface	Ethernet/RS485	
Standards complied with	GB/T36276, GB/T 34120 GB/T34131, UN38.3 IEC62619, UL1973 UL9540, CE-EMC	

2.3 System Diagram

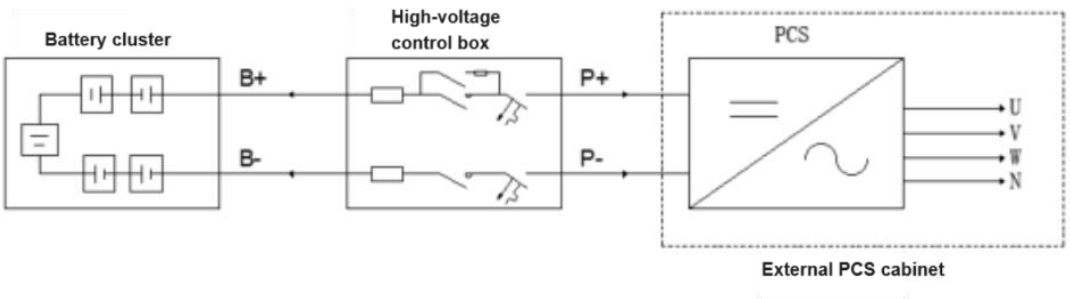


Figure 2-3 ECO-B372LS Main Circuit

Grid-tied operation mode

The liquid cooled battery cabinet is connected to the power grid through an external PCS system. It can be applied to power expansion, photovoltaic charging, peak shaving demand management, power quality management and other application scenarios. According to the selected grid connected PQ operation mode, lithium batteries can be charged and discharged with constant power, constant current, and constant voltage.

Off-grid operation mode

When the liquid cooled battery cabinet system is used for off-grid operation or black start power supply, the liquid cooled battery cabinet can output a fixed frequency and effective three-phase AC voltage through an external PCS system to achieve continuous power supply to the AC side load. This function can be used in application scenarios such as micro-grids in islands and remote areas, or backup power sources for important loads.

2.4 Communication Control

ECO-B372LS adopts a three-level communication system. Level-I is the BMU slave control device of the BMS, which is responsible for acquisition of PACK voltage, NTC temperature and other signals as well as the battery equalization management. Level-II is the BCU, main control device of the BMS, responsible for the summary and processing of the signals acquired by BMU, the realization of charging/discharging control, threshold protection, and the formulation and execution of thermal management strategies. Level-III is the BCQ, Local EMS Controller, the brain of ESS: Level-III realizes the info-acquisition, monitoring, processing and control of the BMS, PCS, HVAC, FSS status and other signals of the Battery Cabinet.

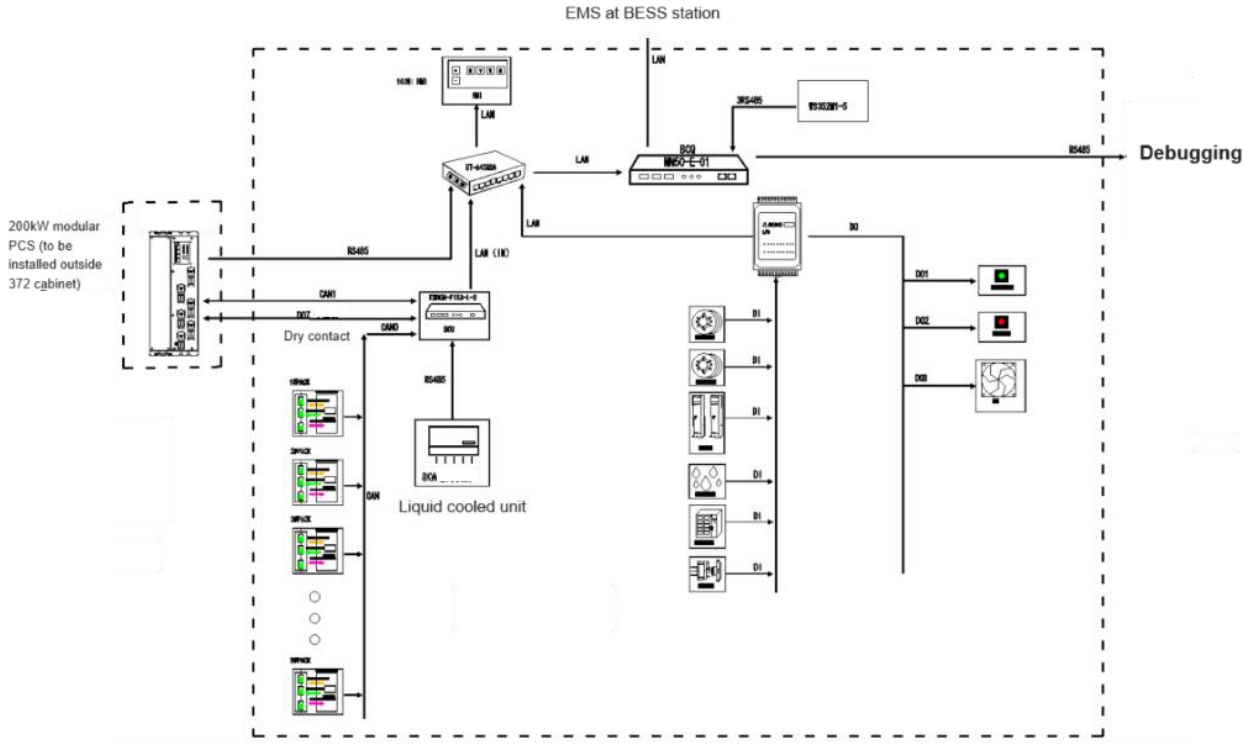


Figure 2-4 ECO-B372LS Communication Diagram

2.5 Ports

◆ 2.5.1 PACK Ports

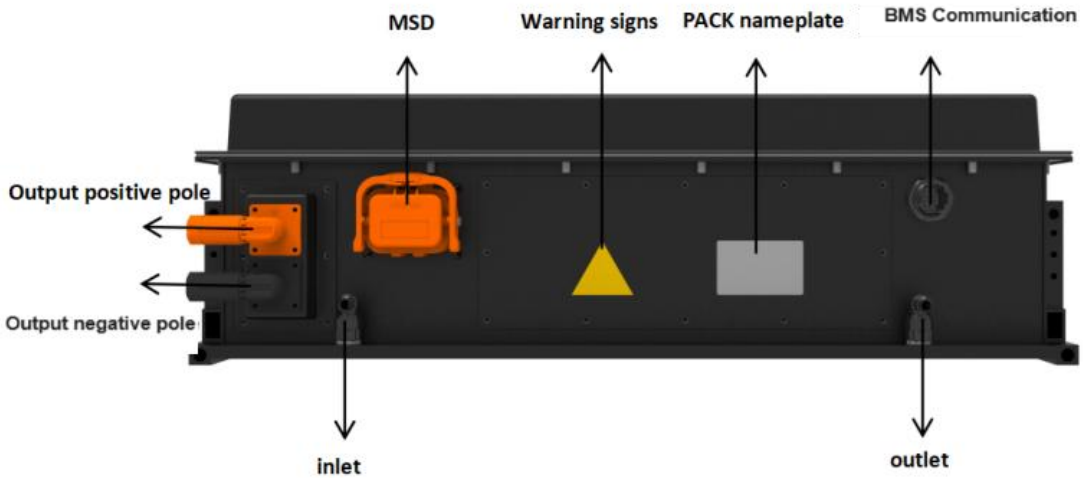


Figure 2-5 PACK Panel

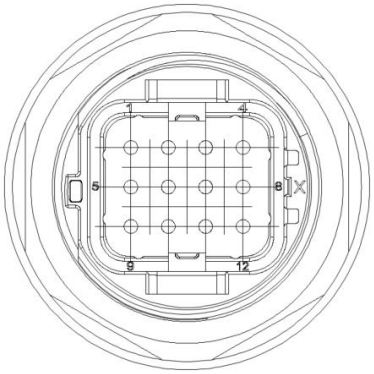


Figure 2-6 BMS Communication Socket

Ports	Port No.	Wire No.	Port Description
GAM	1	2V+	24V power supply (+) for slave control
	2	2V-	24V power supply (-) for slave control
	3	I01	Address allocation of slave control
	4	CAN0H	Internal communication of slave control
	5	CAN0L	Internal communication of slave control
	6	NA	/
	7	2V+	24V power supply (+) for slave control
	8	2V+	24V power supply (-) for slave control
	9	IO2	Address allocation of slave control
	10	CAN0H	Internal communication of slave control
	11	CAN0L	Internal communication of slave control
	12	NA	/

◆ 2.5.2 High-voltage Box Ports

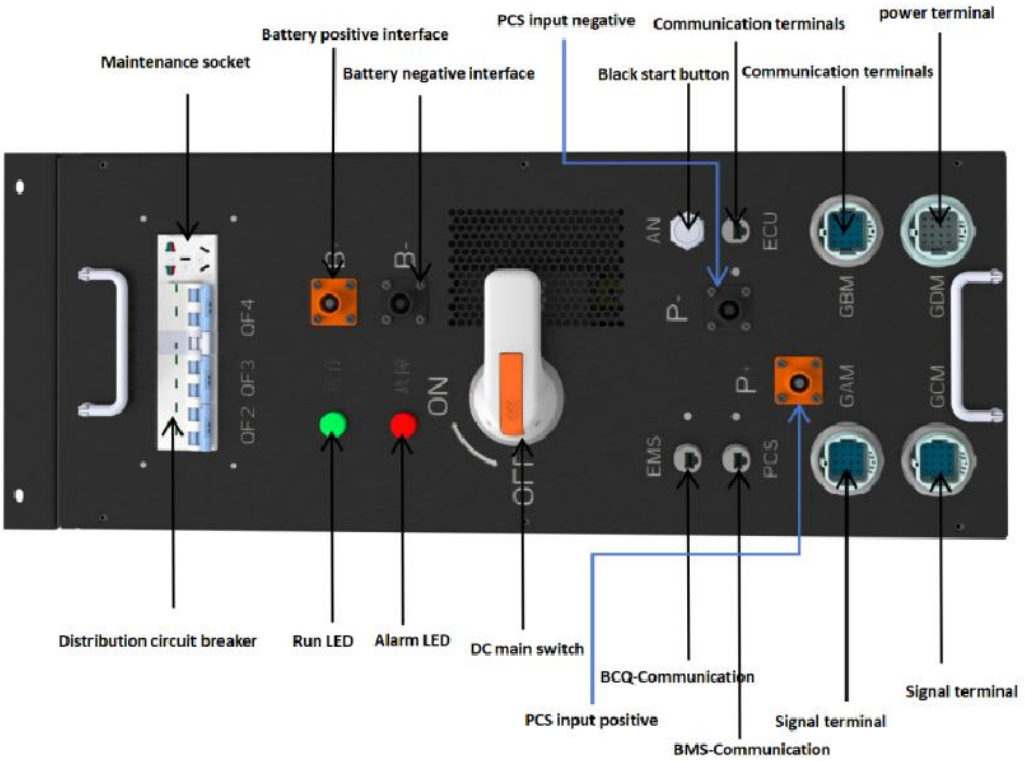


Figure 2-7 High-voltage Box Panel

Port Symbol	Device Name	Function Description	Remarks
B+	Battery positive connector	Positive pole connection between PACK and high-voltage box	
B-	Battery negative connector	Negative pole connection between PACK and high-voltage box	
P+	PCS positive connector	Positive pole connection between PCS and high-voltage box	
P-	PCS negative connector	Negative pole connection between PCS and high-voltage box	
RUN	High voltage box operation indicator light	Indicate the normal operating status of the high-voltage box	
FAULT	High voltage box fault indicator light	Indicate the shutdown status of the high-voltage box due to malfunction	
QF1	DC main circuit breaker	Connection control between battery system and PCS	
QF2	Auxiliary power circuit breaker	Auxiliary power control inside the cabinet	
QF3	Power circuit breaker for chiller unit	Power supply control of chiller unit	
QF4	Control power circuit breaker	Integrated cabinet control system power supply control	
BCQ	Local HMI Ethernet interface	Used for local control system network cable connection	
ECU	EMS Ethernet interface	Network cable connection with the higher-level EMS system	
PCS	PCS Ethernet interface	Network connection between local controller and PCS	
AN	Black start button switch	Control system black start power control switch	

GAM	BMS and PCS communication interface	BMS communication power supply and PCS communication interface	
GBM	IO node signal communication terminal	IO module node signal interface inside the high-voltage box	
GCM	Signal communication terminals for components inside the cabinet	Cabinet indication control and equipment communication interface	
GDM	High voltage box interface power terminal	Power supply interface for electrical components inside the cabinet	

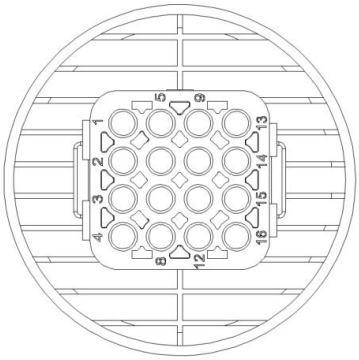


Figure 2-8 GAM, GBM and GCM Sockets

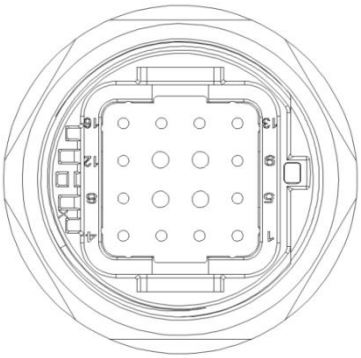


Figure 2-9 GDM Socket

Ports	Port No.	Wire No.	Port Description
GAM	1	2V+	Power supply for slave control
	2	2V-	Power supply for slave control
	3	A-5	Address allocation of slave control
	4	A-12	Internal communication of slave control
	5	A-24	Internal communication of slave control
	6	NA	/
	7	C-2	PCS CAN1H
	8	C-12	PCS CAN1L
	9	B-7	PCS DO7+
	10	B-25	PCS DO7-
	11	485A1	PCS 485A1
	12	485B1	PCS 485B1
	13	B-5	Sprinkling signal
	14	B-31	Sprinkling signal
	15	C-5	Debugging CAN2H
	16	C-15	Debugging CAN2L
GBM	1	4V+	Power supply inside the cabinet +
	2	4V-	Power supply inside the cabinet -
	3	KA2:A2	Fire protection shunt tripping QF2 +
	4	ID:18	Fire protection shunt tripping QF2 -
	5	DI1	Temperature detection feedback
	6	DI2	Smoke detection feedback
	7	DI3	Fire sprinkler feedback
	8	GND	Common point of feedback
	9	NA	/
	10	DI4	Immersion sensor feedback
	11	GND	Immersion sensor feedback
	12	DI5	Door/access control feedback
	13	GND	Door/access control feedback
	14	DI6	SBJ emergency stop

	15	KA2:2	Emergency stop shunt tripping QF2 +
	16	ID：15	Emergency stop shunt tripping QF2 -
GCM	1	HW	Power indicator light
	2	HG	Running indicator light
	3	HR	Fault indicator light
	4	COM	Common point of indicator light
	5	NA	/
	6	485A	Liquid-cooled unit
	7	485B	Liquid-cooled unit
	8	NA	/
	9	485A2	Measurement meter
	10	485B2	Measurement meter
	11	NA	/
	12	NA	/
	13	DI7	Reserved
	14	GND	Reserved
	15	DO3+	Reserved
	16	DO3-	Reserved
GDM	1	3V+	Power supply for immersion sensor
	2	3V-	Power supply for immersion sensor
	3	NA	/
	4	NA	/
	5	NA	/
	6	QF2-L	QF2 incoming power supply for energy storage cabinet
	7	QF2-N	QF2 incoming power supply for energy storage cabinet
	8	PE	QF2 incoming power supply for energy storage cabinet
	9	NA	/
	10	KL	Power supply for liquid-cooled unit
	11	KN	Power supply for liquid-cooled unit
	12	KPE	Power supply for liquid-cooled unit
	13	NA	/
	14	NA	/
	15	5V+	Power supply for human machine interface
	16	5V-	Power supply for human machine interface

◆ **2.5.3 External Interface Diagram**

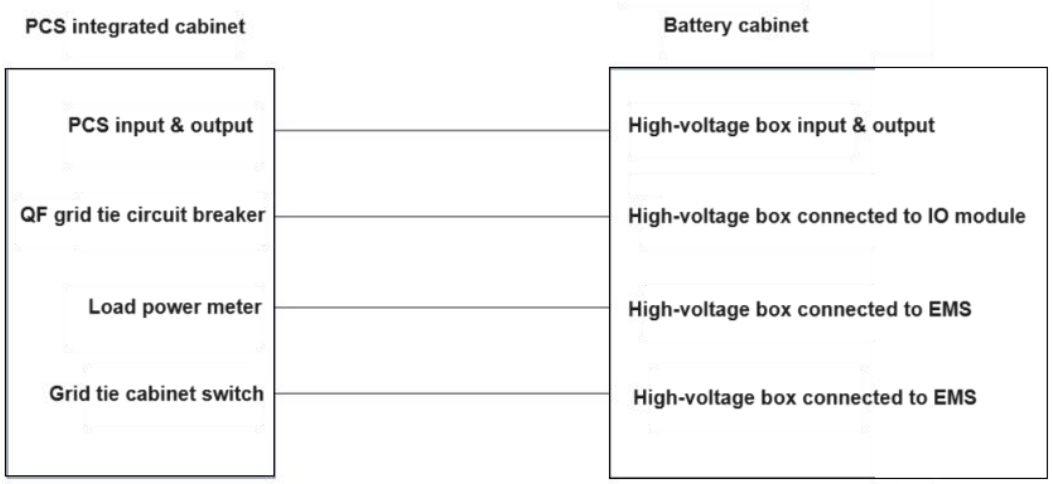


Figure 2-10 External Interface Diagram
(See Installation Manual for Details. Actual wiring may vary for a specific project)

2.6 FSS

◆ 2.6.1 Working principals of FSS (**F**ire **S**uppression **S**ystem)

FSS is divided into PACK-level FSS and Cluster-level FSS:

PACK-level applies early detection and fast fire extinguishing for internal combustion sources.

Cluster-level applies key control, expansion prevention and growth suppression for the external combustion sources.

PACK-level FSS

Each PACK is assembled with 1 unit of module-level FSS device, which detects fire and automatically extinguish fire without power supply. It provides PACK-level safety protection according to requirements of GB/T42288.

Once fire or heat reaching 185℃ is detected, FSS immediately start fire extinguishing.

Cluster-level Fire Protection System

Cluster-level FSS is an aerosol-based fire protection system. When smoke, or high temperature, or fire is detected, the audible and visual alarm is triggered immediately to inform personnels to take actions; At the meantime, it starts fire extinguishing device. The FSS Synchronously sends the Fire message to all related agents and personnels.

◆ 2.6.2 FSS components

✓ Aerosol FSS devices

JAD300-U01 fast aerosol-based fire extinguishing device is suitable for relatively closed spaces such as power cabinet etc.

In case of fire, the aerosol generator in the fire extinguishing device is activated by the electric trigger after the fire extinguishing device receives the electric starting signal. The aerosol generator generates fire extinguishing agent through the combustion reaction. The heat from the reaction process decomposes the chemical coolant so that the fire extinguishing agent and the coolant work together to extinguish the fire.

✓ **Audible and Visual Alarm**

The audible and visual alarm is a device that emits audible and visual alarm signals. When the alarm device receives a signal, it emits a strong audible and visual signal to alert on-site personnel.

✓ **Temperature and Smoke Detectors**

The temperature/smoke detectors are anti-explosive, mounted on the ceiling of the Cabinet. They are used to detect the fire in Cabinet.

3. Battery Cabinet Operations

3.1 Hazards

◆ Electric Shock Hazard

	Personnel will be exposed to voltages up to 936 VDC from battery cabinet, and there is also the possibility of low- and medium-voltage AC exposure. Arc flash and electric shock hazards are common at Battery Cabinet sites. Elecnova encourages full compliance with the practices and procedures specified in NFPA 70E, including the use of personal protective equipment (PPE), to adequately mitigate hazards of arc flash. Emergency personnel should rely on standard operating procedures (SOPs) to respond to incidents at power generation facilities.

◆ Fire and Explosion Hazards

	The battery cabinet contains flammable material and ignition sources. With enough oxygen, fire can spread. If not properly mitigated, the fire and other sources of extreme heat can cause thermal runaway of batteries and the release of combustible gases. If the combustible gas exists in sufficient density, there is a risk of explosion. If a fire alarm or other indication of thermal runaway occurs at Battery Cabinet site, first responders are advised to maintain safety distance till the Battery Cabinet site is verified to be safe in accordance with the site-specific Emergency Response Plan (ERP) and SOP.

◆ Chemical Exposure Hazards

	The battery cabinet contains hazardous chemical named LFP battery electrolyte. These chemicals can be harmful to both human health and the environment.

3.2 Operation Precautions

	The battery cannot be powered off. The shutdown sequence described below only isolates the battery and associated hazardous voltages. Personnel must be extremely cautious and wear appropriate PPE at all times.

	The complete Battery Cabinet shutdown sequence varies based on project-specific design. Always consult site-specific schematics and manuals to ensure proper isolation of electrical equipment.

WARNING	All personnel operating ECO-B372LS should be properly trained and qualified. Personnels are expected to read and understand all manuals and project documents and comply with the requirements and instructions.
WARNING	Turning off thermal management and communication systems for extended period of time can result in equipment damage and failure to detect fault conditions.
CAUTION	Disconnecting the BMS contactor under load may damage the BMS, and direct power failure may cause the main positive and negative contactors to stick. Only use the Emergency Stop in emergency situations.
CAUTION	Do not start the Battery Cabinet until commissioning and inspection are completed by Elecnova on-site technicians. Do not restart Battery Cabinet before scheduled maintenance are completed.
CAUTION	Do not modify or alter this manual without Elecnova's written permission.

3.3 Cabinet Panel

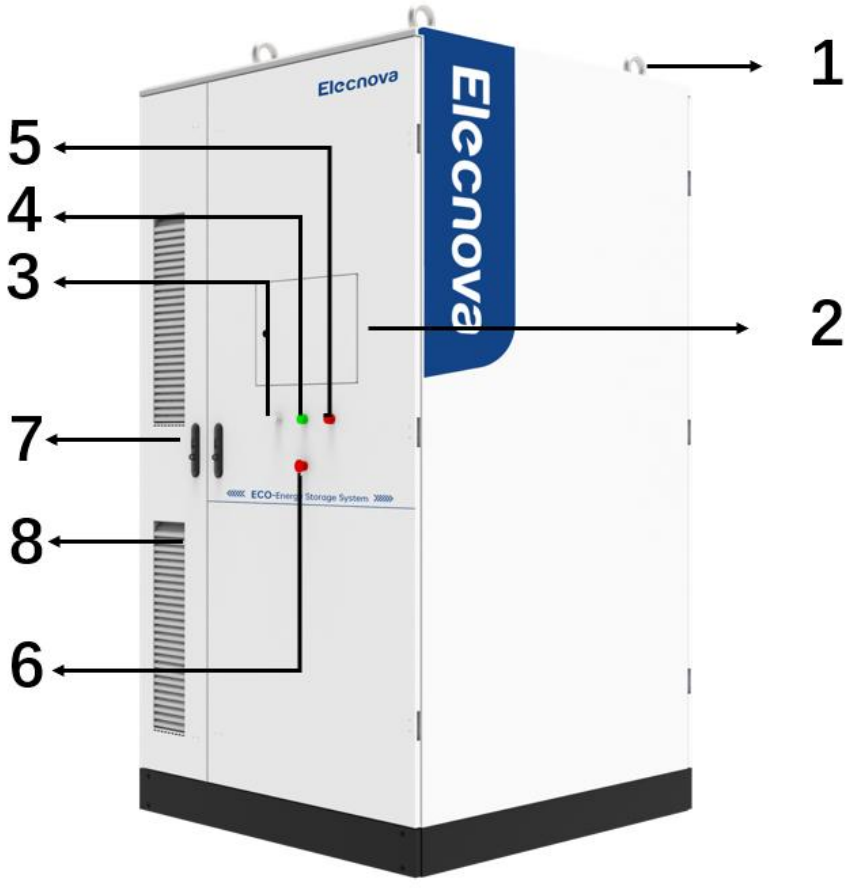


Figure 3-1 ECO-B372LS Front View

No.	Item	Q'ty	Remarks
1	Hanging ring	4	For lifting the cabinet
2	Human machine interface (HMI)	1	Onsite parameter monitoring
3	Indicator light (white)	1	Power indication (See Table of Indicator Status for details)
4	Indicator light (green)	1	Running indication (See Table of Indicator Status for details)
5	Indicator light (red)	1	Fault indication (See Table of Indicator Status for details)
6	Emergency stop button	1	For emergency shut down
7	Cabinet door lock	1	Protection inside the cabinet
8	Ventilation grille	1	For ventilation of enclosed electrics

Indicator status

Indicators	LED Status	Operation Conditions	Remarks
POWER indicator (white light)	Off	AC220V main power supply is on. Control power is on. QF2 is switched on	
	Off	Power supply for liquid cooling unit is on and QF3 is switched on	
	Off	DC/DC power is on, 24V power is on. QF4 is switched on	
	On	Both AC220V and DC/DC power are switched on, which means QF2 and QF4 are both switched on.	
	Off	Both AC220V and DC/DC are power off, which means QF2 and QF4 are both switched off	
RUN indicator (green light)	On	The Battery Cabinet in charging status, charging power ≥5kW.	
	On	The Battery Cabinet in discharging status, discharging power ≥3kW.	
	Off	The Battery Cabinet in standby mode, neither charging nor discharging.	
FAULT indicator (Red light)	On	Temperature detector is activated	
	On	Smoke detector is activated	
	On	Fire sprinkler signal	
	On	The water immersion sensor detects the liquid level signal and reaches the alarm value	
	On	Charge/discharge power ≥5kW. Cabinet door is open (Normally closed signal)	
	On	BMS charge/discharge 3rd level alarm (SOC alarm excluded).	
	On		PCS fault bit
	On	BMS fault list 1. PACK discharge over-current 2nd-level alarm; 2. PACK charge over-current 2nd-level alarm; 3. PACK insolation 2nd-level alarm 4. Cell charge over-heat 2nd-level alarm 5. Cell charge under-heat 2nd-level alarm 6. Cell voltage difference abnormal 2nd-level alarm; 7. Cell temp difference abnormal 2nd-level alarm; 8. DI1, DI2, DI3, DI4, DI5, DI6, DI7 and DI8 faults; 9. Internal comm lost; 10. Cell voltage sampling abnormal; 11. Cell temperature sampling abnormal; 12. Battery limit fault; 13. Software version parameters inconsistent; 14. PCS communication fault; 15. PC forced control debugging mode; 16. CAN Hall sensor failure; 17. CAN Hall sensor comm failure;	BMS fault bit

		18. Hardware self-test abnormal; 19. Balance fault; 20. BCQ communication fault 21. Cell discharge over heat 2nd-level alarm; 22. Cell discharge under heat 2nd-level alarm 23. Cell temperature rise abnormal 2nd-level alarm 24. BMS and AC communication fault	
	On	BCQ Fault: 1. IO module Fault; 2. 4G router Fault; 3. Industrial computer body fault; 4. Industrial switch fault; 5. IO module Communication fault; 6. 4G router Communication fault; 7. Industrial exchange Comm fault; 8. Comm fault with BMS (Indicator on, PCS running); 9. Comm fault with PCS (indicator on. PCS running); 10. Comm fault with meter (indicator, PCS running);	BCQ fault bit
	Off	The battery is either fully charged or fully discharged, the 3rd-level alarm not triggered.	Fully charged or discharged status
	Off	BMS 1st-level or 2nd-level alarm	Mild fault status of BMS
	Off	ECO-B372LS no-fault status.	No-fault status

3.4 Connection and Power-on

◆ 3.4.1 Cable Connection

Please refer to Installation Manual.

◆ 3.4.2 Power-on Operation

After POC cabinet is connected to Grid and Grid power is connected to the Battery Cabinet, switch on QF2, QF3 and QF4 sequentially, make sure that PCS is in standby mode while Grid is connected (check the status of PCS on HMI or WEB) and switch on QL1 to turn on high-voltage box; Then BMS closes the main contactors. As a result, the RUN Indicator lights up, indicating that the whole Battery Cabinet is successfully powered on.

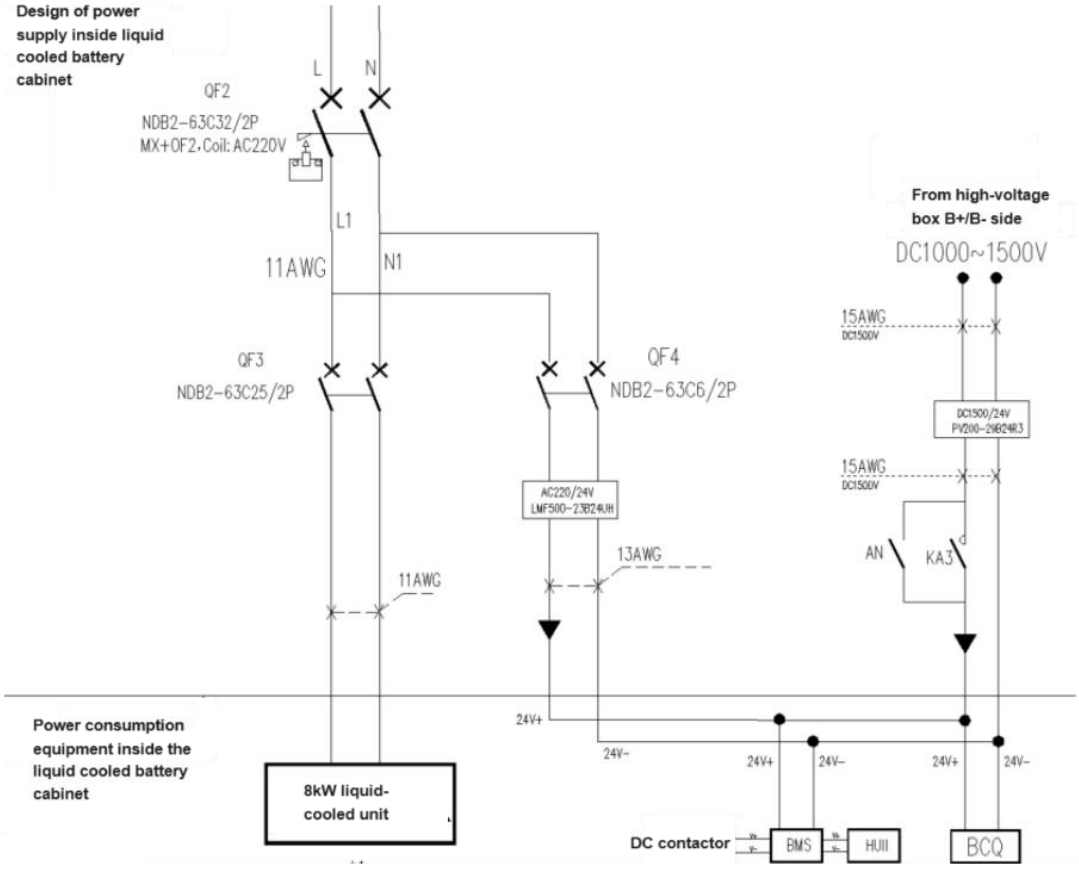


Figure 3-2 ECO-B372LS Operation Power Supply Wiring Diagram

- ✓ **QF2 switched on, the 220V/230V auxiliary power system is on;**
- ✓ **QL1 switched on, the main positive/negative contactors of PACKs are connected;**
- ✓ **QF4 switched on, the high-voltage box is powered on. After the high-voltage box is powered on, BCQ starts self-checking, and automatically connects the high-voltage contactors in box once no fault is found. At this point, a DC high voltage is generated at both positive and negative polarities of the battery. Then BCQ starts checking PCS. If no fault is found, BCQ notifies PCS to connect its main contactors. If BCQ does not release any command, PCS remains standby. If BMS issues power-on command, PCS starts self-checking for grid connection;**

Note: During commissioning or maintenance, if PCS is not in standby mode, it is strictly prohibited to perform power-on operation via BMS!!!

3.5 Charging and Discharging

After Battery Cabinet is powered on, BCQ starts its programmed operation and issues charging/discharging commands to the charger. BMS detects the charging/discharging current. Built-in charger starts charging/discharging operations. During charge/discharge period, both green indicator and white indicator light up.

3.6 Power-off Operation

1) First step, disconnect QL1, DC load switch, on the high-voltage box. Second step, disconnect QF4, MCB, on the high-voltage box panel. As a result, the main circuit contactors in the high-voltage box are disconnected, the green and red LED indicators on the high-voltage box panel goes out, indicating that the high-voltage box is powered off.

2) After the high-voltage box is powered off, switch off QF3 to cut off the liquid-cooling unit; Thereafter, switch off QF2 to disconnect Battery Cabinet from AC220V/230V power supply. Then disconnect breaker in POC to disconnect Battery Cabinet from Power Grid.

3) The white LED indicator on the Cabinet panel goes out: it indicates that ECO-B372LS, the Battery Cabinet, is successfully powered off.

Note: Before powering off ECO-B372LS, please ensure that it has exited from the charge/discharge mode. Never cut off the power supply when the Battery Cabinet is in charge/discharge mode!!!

3.7 Operation Instructions for Host Computer

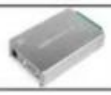
◆ 3.7.1 Preparation before Debugging of host Computer

- ✓ Find the right debugging port for respective application scenario: for single module PACK debugging/testing, connect CAN card to CAN0 port; For whole system debugging/testing, connect the CAN card to CAN0 port of high-voltage box;
- ✓ Before turning on low-voltage power supply, make sure that the voltage is within right range. The power supply of a 12V (24V) system is usually within the range of DC9-16V (DC22-32V);
- ✓ Before turning on the low-voltage power, connect CAN card and measure resistance between CAN-H and CAN-L with a multimeter: Resistance value around 60Ω is acceptable, minding sequence of CAN-H and CAN-L
- ✓ Before turning on the low-voltage DC power, double check the sequence of Voltage ± wire
- ✓ Check installation software of the upper computer. Make sure that the script ControlCAN.dll is consistent with the model of CAN card;
- ✓ Check the system configuration table: Be sure that EvbmaServer.ini is consistent with the model of CAN card. Examine the baud rate;
- ✓ Check the parameter configuration table: Be sure that EVBCM_Para_new.ini is consistent with the design parameters of the battery system.

①	Note: The software installation package of CAN only recognizes “ControlCAN.dll”. Depending on file size, 52k is applicable to ZLG CAN card, and 36k is applicable to CAN analyzer (CANalyst-II). CAN tools of different categories need suffix for switching.
②	The configuration file of project parameter corresponds to “Default Value” column in the configuration table of master-slave parameters on upper computer interface.
③	Configuration of Baud Rate

④	For types of CAN tools, the applicability of CAN tools except for the following 22 types needs to be confirmed with the manufacturer.
⑤	6 Common CAN Cards (Recommended by Manufacturer)

✓ Popular CAN cards, 6 types

Model	USBCAN1	USBCAN2	USBCAN2A	CANalyst2	USBCAN-E-U	USBCAN-2E-U
Picture						

✓ It is necessary to install CAN driver for computers that CAN software is not yet installed in.

◆ 3.7.2 Data Viewing on Upper Computer

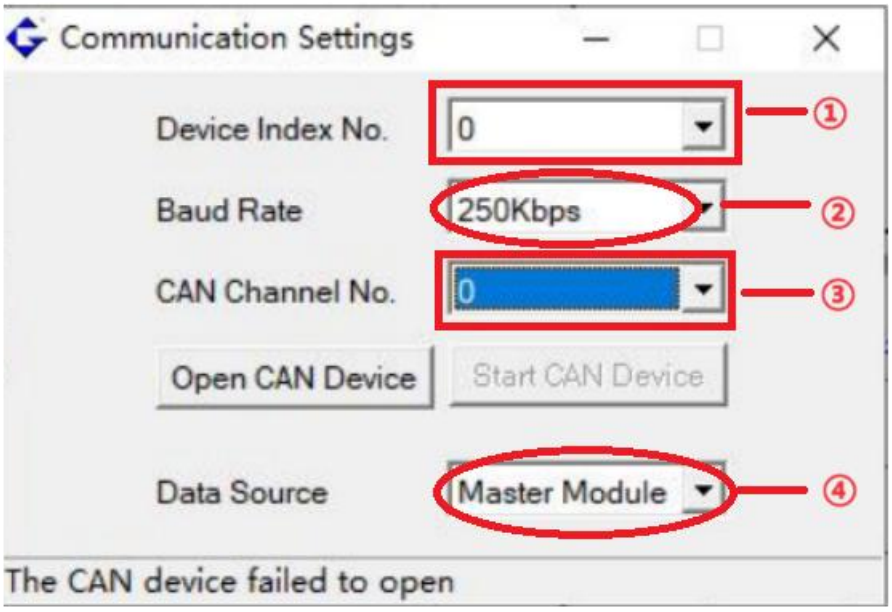


Figure 3-3 Communication Setting Interface of BMS Upper Computer

①	The CAN card device number needs to be distinguished when multiple CAN cards are shared on one computer
②	System baud rate
③	CAN card channel configuration, 0 represents "channel 1", 1 represents "channel 2"
④	The "master control mode" is suitable for working conditions with master control, while the "slave control mode" is suitable for working conditions with only slave control

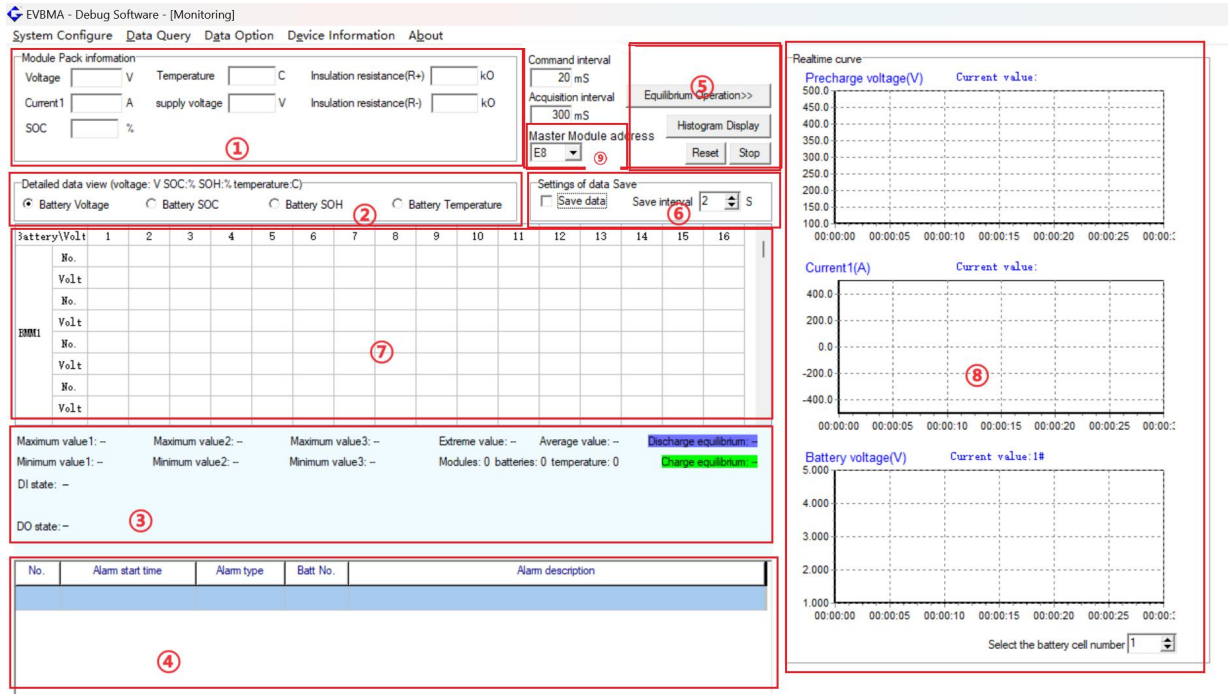


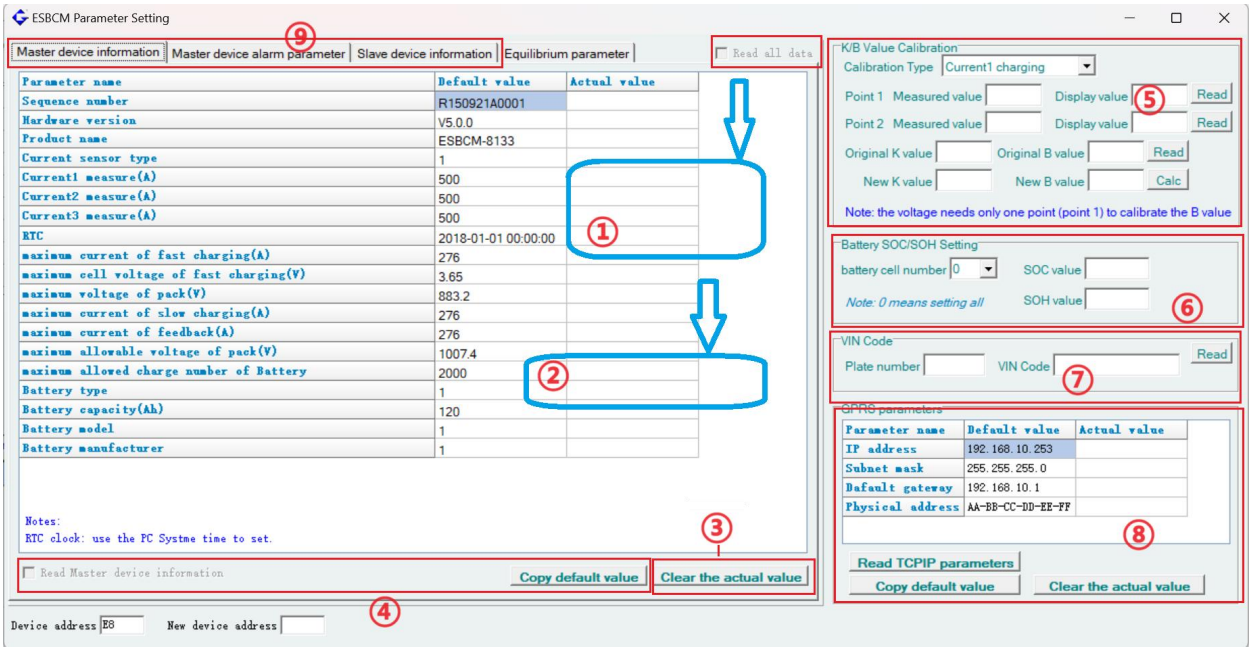
Figure 3-4 BMS upper computer management interface

From the above figure, it can be seen that the Battery Management System (BMS) is divided into 10 areas:

- ✓ Region 1: Group end data of battery system;
- ✓ Region 2: Data categories of individual modules in the battery system;
- ✓ Region 3: Data status of battery system;
- ✓ Region 4: Internal network alarm information of battery system;
- ✓ Region 5: Manual simulation operation of battery system. The current system can simulate "Do control": "Reset" is the upper computer restart button;
- ✓ Region 6: Data storage and storage interval;
- ✓ Region 7: Individual data details of the battery system;
- ✓ Region 8: Data curve of battery system;
- ✓ Region 9: Main control station location, E8 corresponds to the 1st main control, which is E8/9/A/B/C/D/E/F in sequence.

	When manually simulating the closing of DO on the upper computer, check and confirm that the load end is in unloaded state, verifying the logical relationship. Unauthorized closing may lead to safety accident and system damage.
	Before turning on the upper computer, check and confirm that other CAN software has been turned off; otherwise, software errors may occur.

3.7.3 Upper computer parameter configuration interface



①	To modify the parameters, you need to uncheck “Read All”; after the parameters are modified, you need to check “Read All” to inspect whether the actual values have be modified as necessary.
②	The “default value” corresponds to the parameter configuration table EVBCM.Para_new.ini in the host computer installation package; “Actual value "refers to the design parameters of the battery system
③	Refresh button
④	Read Device Information: Read the configuration parameters of current page, and uncheck corresponding option when modifying the parameters; Set All Parameters: Send the currently displayed parameters of all actual value columns to configuration table software for modification. Copy Default Value: Copy the data from “Default Value” column to “Actual Value” column.
⑤	Battery system current, voltage op amp coefficient: 1. "Read" is the current coefficient; 2. "Setting" is the modification factor.
⑥	SOC/SOH Manual Correction Window: 1. “Cell No. 0” represents all cells of battery system; 2. The other cell Nos represent the data of corresponding cell.
⑦	Vehicle Identification Number
⑧	GPRS Data Window

3.8 Operation Instructions for HMI

Refer to User Manual for HMI configuration screen

3.9 Operation Instructions for Website Platform

Refer to User Manual for website platform

4. Maintenance

4.1 Interpretation of Terms

- Normal Operation: Battery Cabinet operates every day;
- Intermittent Operation: Battery Cabinet operation frequency is not fixed during a month. Battery Cabinet does not run on daily basis;
- Long-term Idle: Battery Cabinet is shut down for more than 3 consecutive months (the battery system shall be charged to minimum SOC 40% before it is laid idle).

4.2 Maintenance under Normal Operation

- Perform the battery system maintenance once every 12 months to prevent battery damage. Refer to Chapter 4.5 for specific maintenance methods;
- Inspect the system once every 12 months (Refer to Annex 1) and keep the inspection records properly.

4.3 Maintenance under Intermittent Operation

Same as those for Normal Operation system (see Chapter 4.2).

4.4 Maintenance under Long-term Idle

- Keep Battery Cabinet SOC in 30%~50% during storage; Avoid long-term storage when SOC is lower than 15%. In case Battery Cabinet is to lay idle for a long time, turn off the power-consuming equipment in a timely manner;
- Check Battery Cabinet every 3 months (Refer to Annex 1). Make and keep the inspection records properly.
- Battery Cabinet maintenance shall be done every 3 months to prevent battery damage. Refer to 4.5 for maintenance methods;
- Before using Battery Cabinet under Long-term Idle, fully charge the Battery Cabinet at least once to restore its performance to the optimal state.

4.5 Maintenance Methods

To ensure safety and reliability, read and comply with the following instructions:

- Option 1:
  - ✓ This option is recommended for Battery Cabinet with SOC at low level.
  - ✓ Discharge the battery to the cut-off condition (average cell voltage <3.1V or min voltage <2.8V), then keep still for 1 hour;
  - ✓ Charge the battery to SOC 100% (max cell voltage >3.65V), then keep still for 1 hour;
  - ✓ Discharge the battery to SOC 40%.
- Option 2:
  - ✓ This option is recommended for Battery Cabinet with SOC at high level.
  - ✓ Charge the battery to SOC 100% (max cell voltage >3.65V) then keep still for 1 hour;

- ✓ Discharge the battery to cut-off condition (average cell voltage <3.1V or min voltage <2.8V), then keep still for 1 hour;
- ✓ Recharge the battery to SOC 40%.

5. Battery Cabinet Fault Handling

5.1 Common Faults Classifications

The abnormal operations of Battery Cabinet are classified as "Warning", "Minor fault", and "Major fault". For "Warning", the Battery Cabinet does not take any action; For "Minor fault", there is a minor fault in the system; For "Major fault", there is a major abnormality in the system.

Users may view fault details through HMI, Battery Cabinet display interface.

Users may also view fault details through local Website (within the same LAN area)

Users may contact after-sale-service to report a fault as well.

5.2 Emergency Faults Handling Methods

◆ 5.2.1 Fire

- ✓ Step 1: Evacuate on-site personnel to a safe place, delineate an isolation zone, and pass the warning message to relevant personnels to report.
- ✓ Step 2: To the extent that safety is ensured, follow steps below:

  In case wiring harness is in fire, fight fire with a carbon dioxide or dry powder fire extinguisher

  In case Battery Cabinet catches fire, fight fire with a high-pressure water gun at distance.

  In case site smoke inhaled, evacuate and seek medical methods at nearest hospital as soon as possible.

◆ 5.2.2 Water Flooding

- ✓ Step 1: Regardless of whether the system is powered on or not, evacuate personnels from site to a safe place and delineate a safe isolation zone.
- ✓ Step 2: Notify Battery Cabinet supplier for maintenance after the water recedes.
- ✓ Step 3: Do not start the Battery Cabinet until original supplier/manufacturer examines and determines so.

If a fire is caused by abnormal charging or discharging, cut off the power supply immediately. Then extinguish the fire!!!

6. Warranty Statement

Refer to Limited Warranty Letter for Elecnova ESS Products (Standard Edition).

The warranty conditions are also subject to terms and conditions of a contract.

7. After-sales Services

For any question about this product, please contact us with info below:

Name: Shanghai Elecnova Energy Storage Co., Ltd.

Address: 3F-T1, Hongqiaohui, Shanghai, China

T: +86 21 5439 6121, +86 199 0616 5606

Service Hotline: +86 21 5439 6121,

Email: sales@elecnova-ess.com,

https://www.elecnova-ess.com

To the extent permitted by laws, Elecnova has the final right of interpretation for this Manual. Elecnova reserves the right to modify this Manual without further notice.

Annex 1:

Inspection Item	Method	Yes –√ No -× N/A -O	Abnormal Record
Is the fire extinguishing system complete	Visual inspection		
Is the cooling system complete	Visual inspection		
Is the air duct of cooling system blocked	Visual inspection		
Are there any surfaces of the cabinet deformed	Visual inspection		
Are there any surfaces of the cabinet rusted or damaged	Visual inspection		
Is there any moisture inside the cabinet	Visual inspection		
Is the low-voltage wiring harness loose or damaged	Visual inspection		
Is the high-voltage wiring harness loose or damaged	Visual inspection		
Is there wiring harness interfering with structural components	Visual inspection		
Is the high voltage connection ablated	Visual inspection		
Are there any bolts loose or missing	Visual inspection		
Is there foul odor inside the cabinet	Smelling with nose		
Is there irritating odor inside the cabinet	Smelling with nose		
Is there burnt smell in the high voltage connection area	Smelling with nose		
Is the summary data complete	by upper computer		
Is the cell voltage data complete	by upper computer		
Is the cell temperature data complete	by upper computer		
Is there abnormal alarm in the alarm bar	by upper computer		
Note: In case that an abnormality is found, please provide feedback in time and contact relevant personnel for handling			

(END)