ZJB-101 Battery Bank Online Monitoring System

User Manual

Version:1.13

Revision 2023.11

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Read me

When you use ZJB-101 Battery bank online monitoring system, be sure to read this user manual carefully, and be able to fully understand the implications, the correct guidance of operations in accordance with user manual, which will help you make better use of ZJB-101 Battery bank online monitoring system, and help to solve the various problems at the scene.

1. Before the meter turning on the power supply, be sure that the power supply within the provisions of the instrument;

2. Communication terminal (RS485) is strictly prohibited to impose on high pressure;

3. Be sure the instrument wiring consistent with the internal system settings;

4. When communicating with the PC, instrument communication parameters must be consistent with the PC.

- **Please read this user manual carefully**
- **Please save this document**

Directory

1. - SUMMARIZE

ZJB101 battery bank online monitoring system can monitor important parameters such as system voltage, charge and discharge status, charge and discharge current, cell current and voltage, and cell internal resistance of the battery bank in real time, and can also equalize the voltage of the cell battery, so that the battery voltage is always kept within a reasonable floating charging range, prolonging the service life of the battery.

The system provides safe, stable and reliable protection for the secondary system load of the power network or communication network, and ensures the normal operation of relay protection and downstream equipment. Maximize battery life, save operating costs, and minimize the risk of power interruptions caused by power outages.

FEATURES

- Adopt DADC structure, can flexibly arrange the installation position of the sub-machine, convenient for installation and wiring.
- 4.0-inch LCD screen, comfortable to use, convenient and quick to operate.
- Independent sampling channel, the isolation voltage level reaches 3000V.
- Equilibrium adopts solid-state switch instead of contact relay inside, which has high reliability.
- Dual anti-interference design of software trap (Watch dog) and monitoring chip (Selected high-quality chips).
- The acquisition module supports hot swapping and automatic identification, and the host regularly calibrates the clock of the acquisition module.
- On-line internal resistance measurement, the system uses the Segmented DC Load Method to test the internal resistance of the battery, without injecting any AC signal into the system, without the need for the battery to be separated from the system.

2. - TECHNICAL SPECIFICATION

- Power supply

AC220V or DC110/220V

- Battery bank voltage monitoring

Range: 0-999.99V;
Resolution: 0.01V;
Accuracy: 0.1%; (within ±30% of rated voltage);

- Battery bank current monitoring

Range: 0-999.99A (adapted to the original system shunt);
Resolution: 0.01A;
Accuracy: ±0.5%/shunt, ±1%/current sensor;

- Cell voltage monitoring

Range: 0-20.000V;
Resolution: 0.001V;
Accuracy: 0.1% (within ±30% of rated voltage);

- Cell internal resistance monitoring

Range: 0-65535uΩ;
Resolution: 1uΩ;
Accuracy: 5%

- Cell temperature and environment temperature monitoring

Range: 0-99.9°C;
Resolution: 0.1°C;
Accuracy: ±0.5°C

- Charge and discharge capacity monitoring

Calculation time interval: 1S;
Maximum display range: 9999.9AH;
Clearing method: Manual

- Alarm and record

Number of alarm information displayed in real time: 240
Number of information records: 1000;
Cell battery history data record number: 1000;

- External physical interface

Data download interface: USB type-A;
Data upload interface: RS485 or RS232 or RJ45
Communication rate: 1200/2400/4800/9600/11520

- Display interface

Display size: 4.0 inches;
Display resolution: 480X320;

- Others

Equalize voltage: 10mV
Number of cell battery that can be monitored: 240pcs;
Level of battery voltage that can be monitored :2V, 4V, 6V, 12V;

3. - INSTALLATION AND START-UP

3.1.- Device overall

The whole monitoring equipment consists of three parts:

ZJB-101	Monitoring host	Collect, store and display each battery information, and provide external alarm and data upload;
ZJB-101C	Battery bank voltage and current acquisition module	Collect the system voltage of the battery bank, the input current of the charger, and the environment temperature
ZJB-CU	Battery monitoring module	Collect the voltage and internal resistance of each battery, and each monitoring module can collect 12 batteries, and equipped with an external temperature sensing unit.

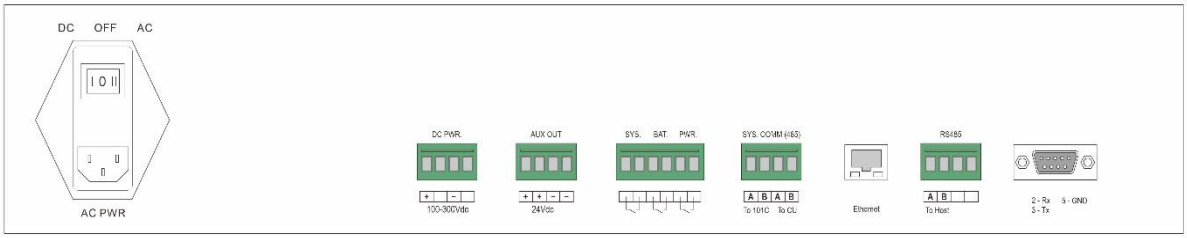
Notes:

1. ZJB-101 communicates with ZJB-101C and ZJB-CU modules through RS485.

2. ZJB-101 provides alarm passive output contacts and RS232, RS485 or Ethernet network interface (optional) to communicate with the host computer.

3.2.- Terminal definition

3.2.1 - ZJB-101 terminal definition



Terminal No.	Description
Switch	Adopt AC and DC power supply mode, and pulling the switch to the I or II position to select DC power supply /AC power supply .
24V output	ZJB-101 provides DC 24V to power the ZJB-CU.
Alarm output	Alarm I: The relay is closed when the system fails. Alarm II: The relay closed when any Cell reaches the Discharge cut-off voltage.
NO node	Communicate with ZJB-CU
CU-COMM	Optional,RJ45 TCP-IP protocol
Ethernet	Comm port for Host device
RS485	Optional, Comm port for Host device

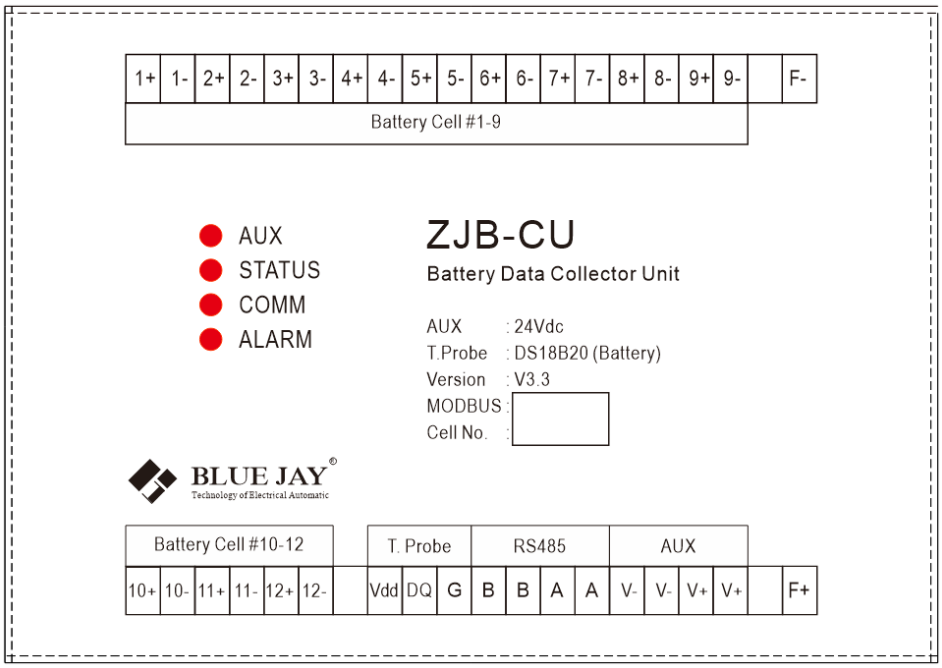
Note:

Ethernet, RS485, and RS232, only one interface can be selected, default RS485.

3.2.2 - ZJB-CU module terminal definition

Each ZJB-CU module can connect and monitor 12 battery cells. ZJB-CU needs to be assigned an independent ID number, and it should be connected in sequence when connecting to the battery.

For example,the module No. 1 monitors the 1st-12th battery,the module No. 2 monitors the 13th-24th battery, and so on.

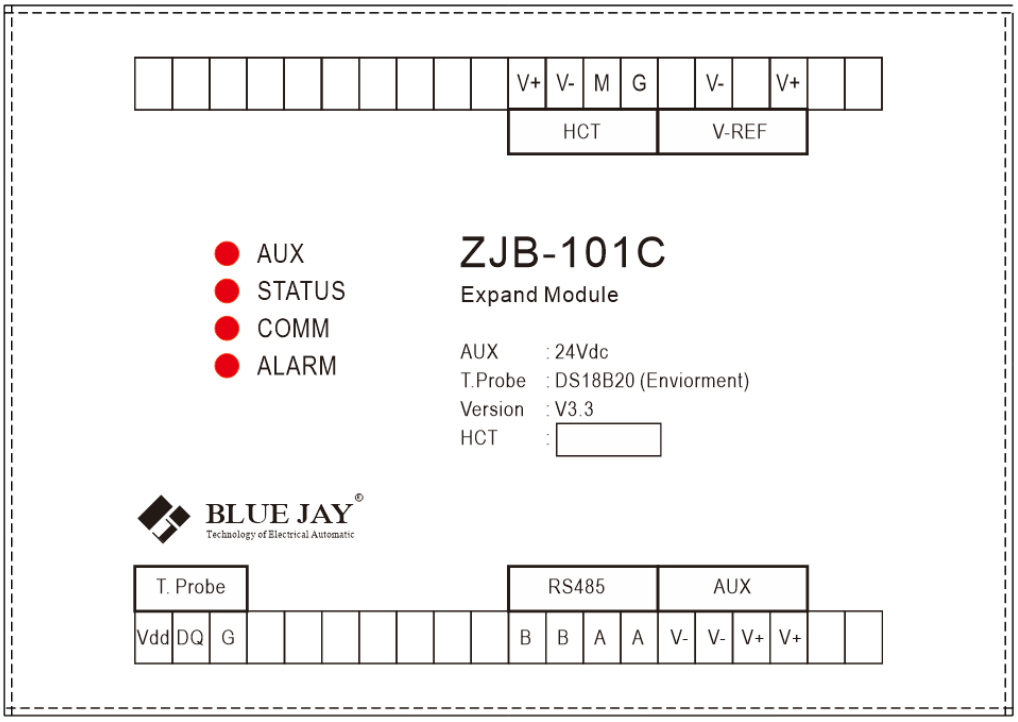


Terminal No.	Description
1+,2+,3+…11+,12+,13,	Connect to the corresponding pole of each battery.
V,DQ,GND	Connect a DS18B20 digital temperature sensor.
B,B,A,A	Connect to the CU-COMM port of ZJB-101.
Pow+, Pow-	Power supply terminal,connected to the 24V power supply terminal of ZJB-101, and also can use an external 24VDC power supply .
NC	Normally close port.
F+,F-	The discharge terminal for internal resistance test. Connected to the positive and negative terminals of the 12 batteries under test;

3.2.3 - ZJB-101C module terminal definition

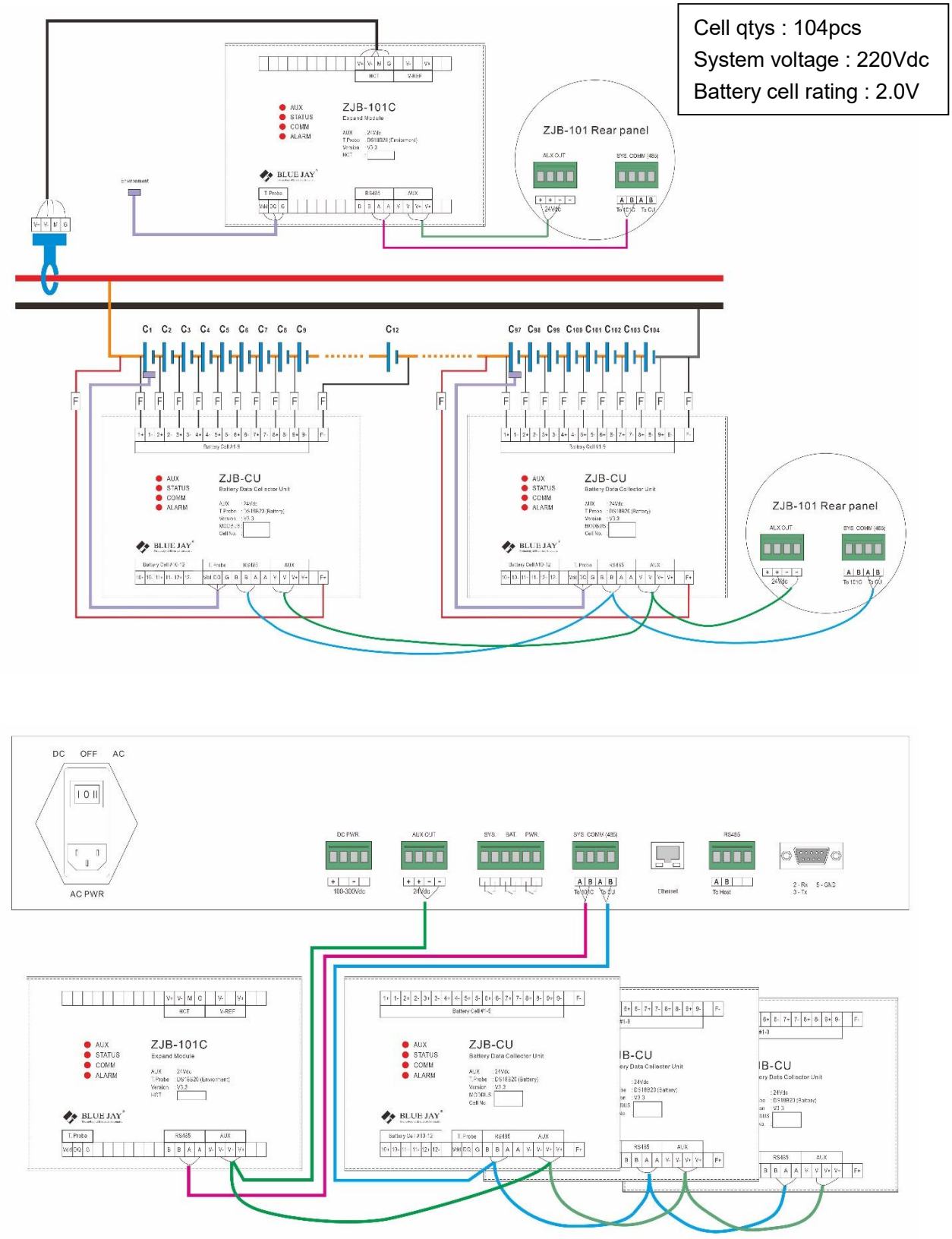
One ZJB-101 equipped with one ZJB-101C modular battery bank parameter acquisition module.

Provide battery bank terminal voltage , battery charge and discharge current monitoring and collected environment temperature for compensation and alarm use:



Terminal No.	Description
+12V,-12V,M,G	Connects to Hall CT or shunt sampling boards
V+	Positive pole of the battery bank under test
V-	Negative pole of the battery bank under test
A,B	Connect to the CU-COMM port of ZJB-101.
24V+,24V-	Power supply,connected to the 24V power supply terminal of ZJB-101, and also can use an external 24VDC power supply .

3.3.- Typical wiring



4. - WORKING MODE AND FUNCTION

4.1.- Working mode introduction

The ZJB-101 monitoring system has three working modes, which can be switched automatically:

Equalized working mode	After the equalized mode is turned on, the system automatically judges the charging and discharging status of the battery bank. When the battery is in the floating charging status, it will automatically enter the equalized mode. After the equalized completed, it will automatically exit the equalized mode and enter the voltage internal resistance test mode.
Internal resistance test mode	After entering this mode, will complete the internal resistance test of the monitored batteries one by one, and the test data is automatically saved after test completed; It can also start the internal resistance test of the set cell battery, no need to conduct internal resistance test on all batteries.
Temperature test mode	Each ZJB-CU equipped with an external temperature sensor, can monitor the battery temperature at the same installation position. ZJB-101C is also equipped with an external temperature sensor to provide environment temperature parameters.

4.2.- Function introduction

4.2.1.- Battery status monitoring

Real-time monitoring the battery bank terminal voltage and charge and discharge current.

Real-time judge the battery charge and discharge status:

Equalizing charging,
Discharge state,
Floating charging (Under this status, can be transferred to the equalized mode).

4.2.2.- Charge and discharge capacity monitoring

Continuously monitor the charge and discharge capacity of the battery bank.

4.2.3.- Cell battery information analysis

The system refreshes the monitoring data every second, so that users can quickly know the information of the entire battery bank. and the main interface on the TFT screen displays:

Highest/lowest voltage,
Largest internal resistance,
Serial number,
Cell battery average voltage.

4.2.4.- Alarm and record

Real time display detailed system and cell alarm information and record the occurrence time and detailed information.

When the system returns to normal, record the recovery time and system information.

4.2.5.- Event logging

Record various system operation events:

System startup time,
Manual internal resistance test time,
Automatic internal resistance test time.

4.2.6.- History record and review

Cell information can be automatically or manually stored in the historical data.
Automatic storage time interval can be set, the fastest can be set to store every 1 minute.

4.2.7.- Battery open circuit and off line monitoring

By analyzing the sampling information of the battery analog quantity to judge battery is in open circuit or off line status, then alarm and record.

4.2.8.- User rights management

The monitoring system has different authority passwords to prevent misoperate, including:

Setting passwords,
Debugging passwords.

4.2.9.- Communication interruption prompt

The ZJB-101 real time display communication status of the subsystem and the host computer. Use different icons or numbers to alarm if the communication interruption.

4.2.10.- USB interface data download

All system monitoring information can be download through the USB interface, including:

System information,
Cell battery information,
Alarm information,
Record information,
History record,
Parameter settings, etc.

4.2.11.- Various alarm types

The system has an audible and visual alarm function.

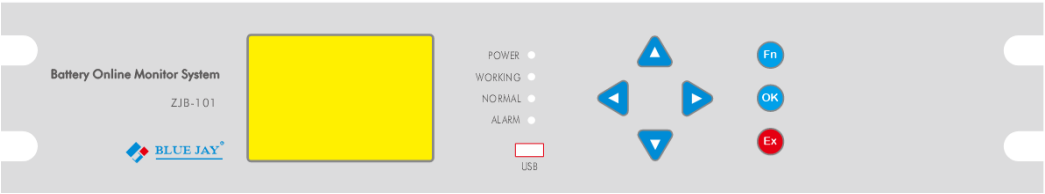
When the measured data exceeds threshold value, it will be displayed in different colors, the alarm indicator light , and provide a passive output alarm contact .

5. - SCREEN DISPLAY

5.1.- Panel introduction

The main panel consists of three parts:

Display part
Indicator light and USB interface
Key part



Display part	4.0-inch TFT LCD display, all information can be viewed .
Indicator light and USB interface	4 indicator lights: Power, Working, Normal, Alarm, “Working” light flashes once per second. USB interface used to download data;
Key part	Including 7 keys: ↑,↓,←,→,Fn, OK, Ex

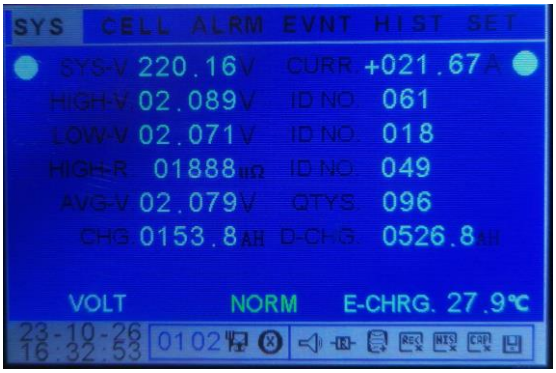
Key description

Press and hold (Fn)	Enter password **1000** for parameter setting and function operation.
Press (Fn)	After entering password, press[Fn] to select function ,press again to cancel it.
OK	**-. On "setting" menu:** press and hold to enter time settings **-. Parameter setting:** Select the parameter item , press "OK" to set parameters, after setting ,press" OK "to save and exit .
Ex	**-. On detailed history record menu:** press to return main menu of history record.
↑,↓	**-. Non-parameter input:** Press to select a column; press and hold to quickly switch the columns of the current page. **-. Parameter setting:** Press "↑" to add to100, press and hold "↑" to add to 1000; press "↓" to subtract to 100, press and hold "↓" to subtract to 1000. **-. Time setting:** Modify time value.
←,→	**-. Non-parameter input:** Switch pages **-. Parameter setting:** Press "→" to add to1, press and hold "→" to add to 10; press "←" to subtract to 1, press and hold "←" to subtract to 10. **-. Time setting:** Select editing object.

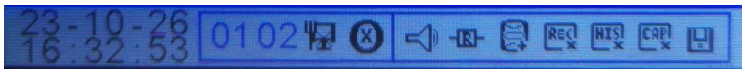
5.2.- Screen introduction

ZJB-101 has 6 monitoring pages:

System (SYS)
Cell battery (CELL)
Alarm display (ALRM)
Event record (EVNT)
History record (HIST)
Set(SET)



There is a fixed status bar at the bottom of the screen, which provides various information as shown in the figure:



Press and hold “FN”, then enter password in lower right corner. default is 1000.

After entering password, the icon change from  to  , means enter function setting .

Time information	Displays year, month, day, hour, minute, and second, In SET page, press and hold "OK" to modify the time information .
Communication status	Voltage and current module communication status Cell sampling module communication status PC communication status Setting rights **Note:** When voltage and current module successful communication with cell sampling module, the number appear green color, when communication failed, the number appear blue color.
Function icons	Buzzer ON/OFF  Internal resistance test  History record  Clear record  Clear history  Charge and discharge capacity reset  USB download 

Notes:

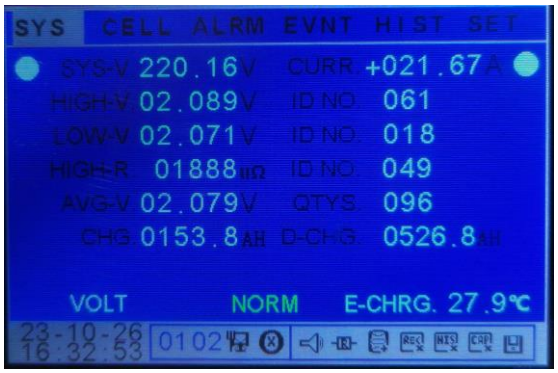
1. The "Fn" option can only be used after entering the setting password.
   press "Fn" to enter the function option, press again to exit the function option,
   press "←" and "→" keys to switch the function option,
   press "OK" to execute the selected function.

2. Execute clear records and clear history operations need to be operate on its corresponding page.

3. When execute the internal resistance test operation in the setting item.
   if the "cell internal resistance detection serial number" is not 0, internal resistance test will be only executed on the battery with the set serial number, otherwise, from the No. 1 battery to execute the complete internal resistance.

5.2.1- System (SYS) introduction

After ZJB-101 is powered on, default enters to system monitoring page, when each subsystem is connected to the battery bank, the following content will be displayed:



-. System operation mode:

Voltage test mode
Internal resistance test mode
Temperature test mode

-. System status:

Normal status (Green color)
Alarm status (Red color)

-. Battery status:

Equalizing charging (White color)
Float charging (White color)
Discharge (White color)
Off line (Red color)
Open circuit (Red color)

-. Environment temperature

SYS-V.	Battery bank terminal voltage	**CURRENT**	Charging/Discharging current
HIGH-V.	Highest voltage of battery in systems	**ID NO.**	Identity number of the battery
LOW-V.	Lowest voltage of battery in systems	**ID NO.**	Identity number of the battery
HIGH-R.	Highest internal resistance of battery in systems	**ID NO.**	Identity number of the battery
AVG-V.	Average voltage of the battery in system	**QTYS.**	Total battery quantities in system
INPUT	Charged capacity from charger/rectifier	**OUTPUT**	Discharged capacity from battery system

Notes:

1. If the corresponding monitoring item exceeds the set threshold value, the item will be displayed in red, otherwise it will be displayed in white.

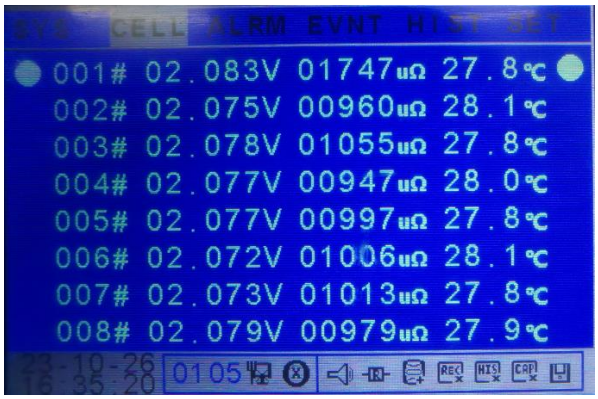
2. The charging capacity and discharging capacity updated every second, and if the user not to reset it, they will continue to accumulate until 9999.9AH.

3. Due to the charging current setting the actual energy storage efficiency of the battery, the discharging current and the both sides values of the cycle may be inconsistent, so suggest to regular reset the value to ensure the data is more consistent with the actual battery status.

5.2.2- Cell battery (CELL) introduction

This page displays all the cell battery information including:

Voltage,
Internal resistance,
Environment temperature, etc.



Each sub-page displays 8 battery information.
press the "↑" and "↓" to move the cursor,
press and hold the "↑" and "↓" keys to quickly switch to the previous or next page.

Notes:

1. If the current cell battery information not fault, it displayed in white, otherwise it displayed in red.

2. Each ZJB-CU has only one temperature sensor, so the same string of batteries connected to the same ZJB-CU shows same temperature.

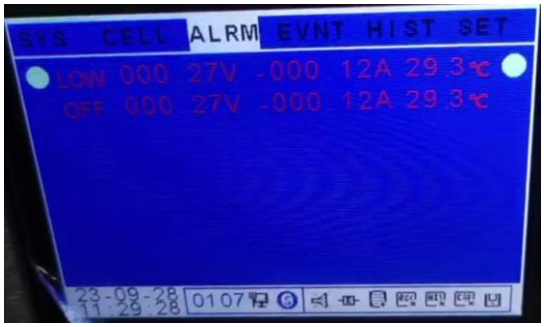
5.2.3- Alarm display (ALRM) introduction

Cell battery abnormal alarm: this page will display the ID NO. and abnormal status of fault cell battery in red color.

Abnormal status definitions are:

Battery voltage is too high,
Battery voltage is too low,
Battery internal resistance exceeds threshold value,
Battery temperature exceeds threshold value.

Battery bank system abnormal alarm: this page will display the abnormal status of the battery bank system abnormal status in red color.



Abnormal status definitions are:

HIGH	Battery bank voltage upper threshold value
LOW	Battery bank voltage lower threshold value
OPEN	Battery open circuit
OFF	Battery bank off line
I↑.	Battery bank discharge overcurrent
CHG↑	Cell discharge reaches threshold value
T↑.	Environment temperature upper threshold
T↓.	Environment temperature lower threshold

Each sub-page displays 8 alarm information.
press the "↑" and "↓" to move the cursor,
press and hold the "↑" and "↓" keys to quickly switch to the previous or next page.

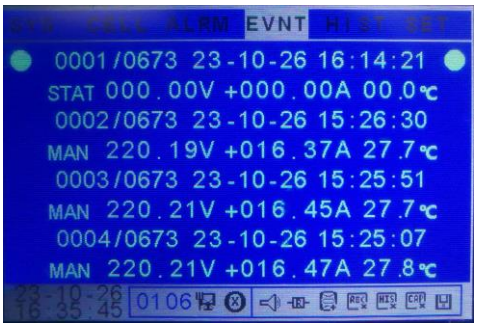
Notes:

1. Each ZJB-CU has only one temperature sensor, so the same string of batteries connected to the same ZJB-CU shows same temperature.

5.2.4- Event record (EVNT) introduction

ZJB-101 automatically records the important events of the battery bank and stores them on "EVNT" page. An event record information consists of 6 parts:

Event SN,
Time stamp,
Event type,
SYS. voltage,
SYS. current,
Environment temperature.



System alarm events are displayed in red color.
Restoration of over threshold status and operation events are displayed in white color.

Each sub-page displays 4 event records; it can record total 1000 pieces' event records.
press the "↑" and "↓" to move the cursor,
press and hold the "↑" and "↓" keys to quickly switch to the previous or next page.

System alarm events:

HIGH	Battery bank voltage upper threshold value
LOW	Battery bank voltage lower threshold value
OPEN	Battery open circuit
OFF	Battery bank off line
I↑.	Battery bank discharge overcurrent
CHG↑	Cell discharge reaches threshold value
T↑.	Environment temperature upper threshold
T↓.	Environment temperature lower threshold

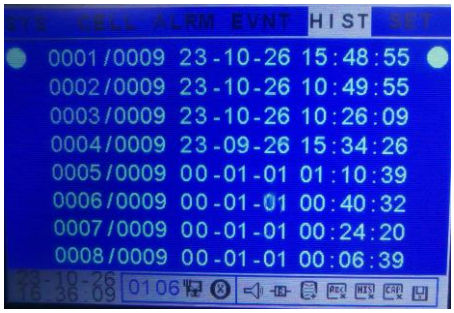
Operation record events:

STAT	Device start time
MAN	Manual enter internal resistance test
AUTO	Automatic timing enter internal resistance test

5.2.5- History record (HIST) introduction

When ZJB-101 automatically completes the internal resistance test each time, it will record the cell data information once (need user to set interval record time not be 0, user can also manual record the current battery data through “Fn” key.

Total can record 1000 sets battery history information.



Each sub-page displays 8 record information.
press the "↑" and "↓" to move the cursor,
press and hold the "↑" and "↓" keys to quickly switch to the previous or next page.

Notes:

1. When cursor selects the corresponding history data, press "OK" can view the detailed data, press "Ex" to return to the upper level menu and time column.

2. If current cell battery information is within normal range, it displayed in white, and if it over threshold, it displayed in red.

5.2.6- Set(SET) introduction

This page can configuration parameters of ZJB-101, use for:

Judgment over threshold
Internal resistance automatic monitoring interval
Communication settings,

Total of 23 setting items:

Setting method: press "↑" and "↓" to select setting item, then press "OK" to set parameters, after setting ,press" OK "to save and exit .

Detailed description of each parameter:

Items	Description
QTYS of Cell	Quantities of the cells battery bank
SYS. Upper Volt.	Alarm @ system voltage is > setting value (When alarm triggers ,event type in the event record page display “HIGH”)
SYS. Lower Volt.	Alarm @ system voltage < setting value (When alarm triggers ,event type in the event record page display “LOW”)
SYS. Over Current	Alarm @ system discharge current is > setting value
SYS. Off line	Battery bank off line voltage judgment threshold
Ri Upper Limit	Alarm @ battery internal resistance > setting value
Vc Upper limit	Alarm @ cell voltage > setting value
Vc Lower limit	Alarm @ cell voltage < setting value
Cell Cut-off Volt.	Alarm @ cell cut-off voltage < setting value
Cell Equalize Volt.	ZJB-CU have internal discharge circuit, if detect cell over setting voltage, will do equalizing discharge.
Cell Open Circuit	Battery open circuit voltage judgment threshold
Equalizing Charging	Display equalizing charging @ charging current >setting value
Open Circuit Current	Judgement battery bank off line/open circuit threshold value
Cell Over Temp.	Alarm @ cell battery temperature>setting value
Envir. Upper Temp.	Alarm @ environment temperature >setting value
Envir. Lower Temp.	Alarm @ environment temperature <setting value
Ri Auto Test Interval:	If set to non-zero value, automatic internal resistance test according to set days, automatic test time is 00:00:00; If set to 0, function disabled.
Alarm sensitivity	Range 0000-9999
HIST Interval	If set to non-zero value, record cell battery information at set intervals; If set to 0, function disabled.
Ri Manual Test NO.	If set to non-zero value, manual start internal resistance test, only carry out the test on the serial number cell battery; If set to 0, test all cell battery.
Cell Equalize State	If set to non-zero value, it is ON; 0 is OFF.
MODBUS ID	Address @ communicating with host computer.
MODBUS Baud Rate	Baud rate @ communicating with host computer, 0:1200,1:2400,2:4800,3:9600,4:115200.

6. - SAFETY CONSIDERATIONS

All installation specification described at the previous chapters named: **INSTALLATION AND STARTUP, INSTALLATION MODES and SPECIFICATIONS.**

Please note that with the instrument powered on, the terminals could be dangerous to touching and cover opening actions or elements removal may allow accessing dangerous parts. This instrument is factory-shipped at proper operation condition.

◆ The device must have a professional installation and maintenance.
◆ Any operation of the device, you must cut off the input signal and power.

7. - TECHNICAL SERVICE

For any inquiry about the instrument performance or whether any failure happens, contact to Blue Jay's technical service.

Blue Jay - After-sales service

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