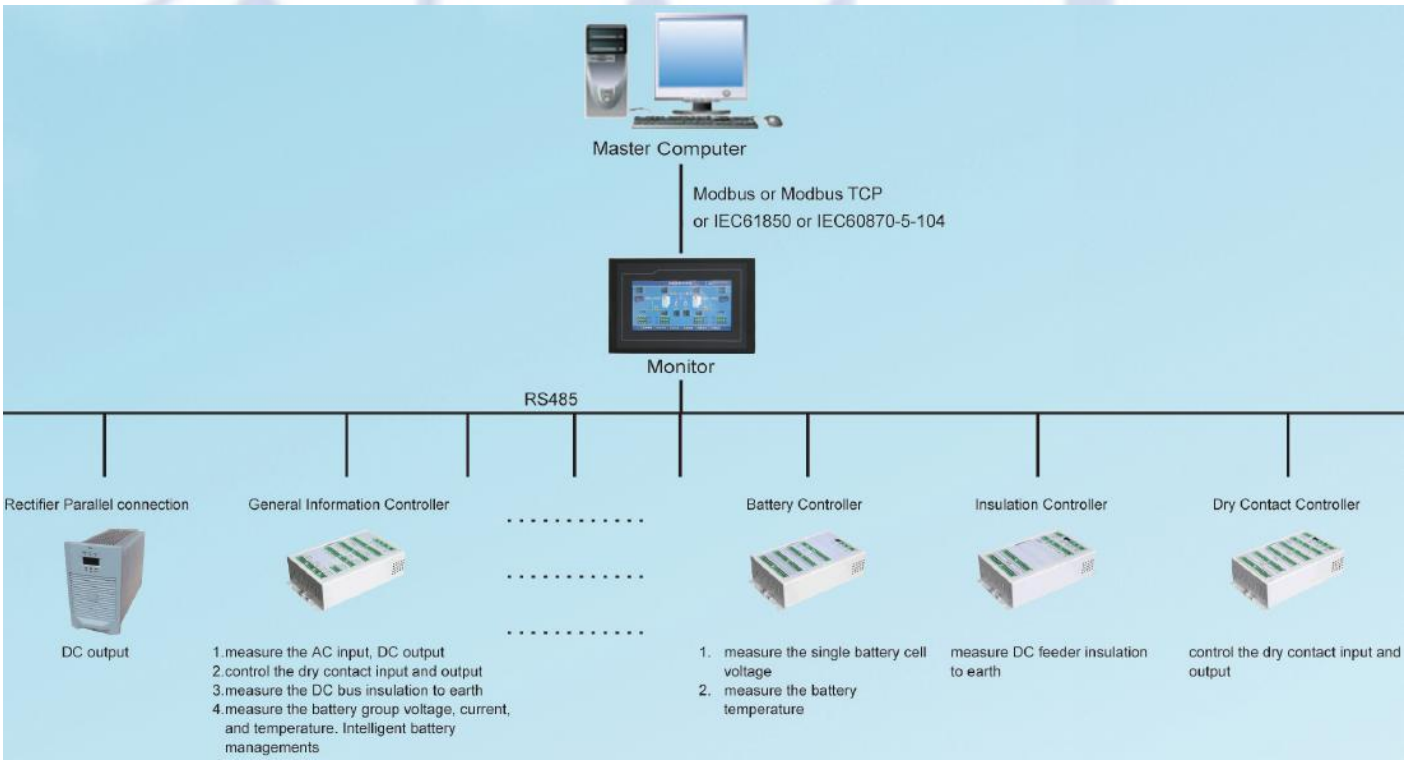
DC System Monitor



Catalog

Chapter 1 Overview

1.1 Function features

The DC system monitor JK070 is modular designed. With a flexible configuration, the monitor can meet the various requirements of different DC power system. The data acquisition controllers are of same dimension, which is easy for installation. They are integrated General Information Controller ZHCL-2/3, Battery Controller DCXJ-19/55, Dry Contact Controller KGL-64, Insulation Controller JYJC-32/64. The category and functions are as follows in Table 1-1.

Name	Model	Function summary
Monitor host	JK070	Color screen 800*480 pixels LCD, touch screen
ZHCL unit	ZHCL-2	Detects 1 AC voltage Detects 3 DC voltage, 2 current,1 temperature Detects 24 DI, provides 8 DO
ZHCL unit	ZHCL-3	Detects 2 AC voltage Detects 6 DC voltage, 4 current,2 temperature Detects 32 DI, provides 8 DO
DCXJ unit	DCXJ-19	Detects 19 battery cell voltage, 1 temperature
DCXJ unit	DCXJ-55	Detects 55 battery cell voltage, 2 temperature
JYJC unit	JYJC-64	Detects 2 bus insulation, 64 branch insulation
JYJC unit	JYJC-32	Detects 2 bus insulation, 32 branch insulation
KGL unit	KGL-64	Detects 64 DI, provides 8 DO

Table 1-1 specification table

1.1.1 Function introduction

- Can manage max 32 rectifier modules;
- 7″ multicolor LCD, touch screen monitor, full graphic display,
- Information inquiry and system setting function
- Provides RS485, RJ45 interface; protocol Modbus, Modbus TCP, IEC61850.
- The real-time clock
- May save more than 10,000 alarm logs and work logs, the records do not lose in case power failure.
- Battery charge management function. Can manage two battery groups.
- Can monitor the AC input, battery status, DC bus info, battery charging and discharging info, charger info and etc.
- Bus insulation, branch insulation detection function. Grounding alarms
- DI alarm function. The user can define the switch input

1.1.2 ZHCL-2 unit

measure 1 AC voltage.
measure 3 DC voltage, 2 current,1 battery ambient temperature.
measure 24 DI, provides 8 group switch quantity output.
measure 1 DC bus insulation.
Can control 5/7 degree V-drop unit.
Applicable to 1 DC bus, 1 battery group, 1 group of chargers system.

1.1.3 ZHCL-3 unit

measure 2 AC voltage .
measure 6 DC voltage, 4 current, 2 battery ambient temperature.
measure 32 DI, provides 8 group switch quantity output.
measure 2 DC bus insulation.
Can control 5/7 degree V-drop unit.
Applicable in 2 DC bus, 2 battery group, 2 group of chargers system.
.

1.1.4 DCXJ-19 unit

measure 19 battery cells rated voltage 12V.
measure 1 battery ambient temperature
Being suitable for9/ 18 battery cells.

1.1.5 DCXJ-55 unit

measure 55 battery cells rated voltage 2V.
measure 2 battery ambient temperature
Being suitable for 54/108 battery cells.

1.1.6 JYJC-64 unit

measure 1 DC bus insulation
Examines 64 feeder insulation
Being suitable uses in the system which feeder quantity is more than 32.

1.1.7 JYJC-32 unit

measure 1 DC bus insulation
measure 32 feeder insulation

Being suitable in the system which feeder quantity is less than 32.

1.1.8 KGL-64 unit

measure 64 dry contact input.
Provide 8 dry contact output.

1.2 Hardware description

Back view and interface:

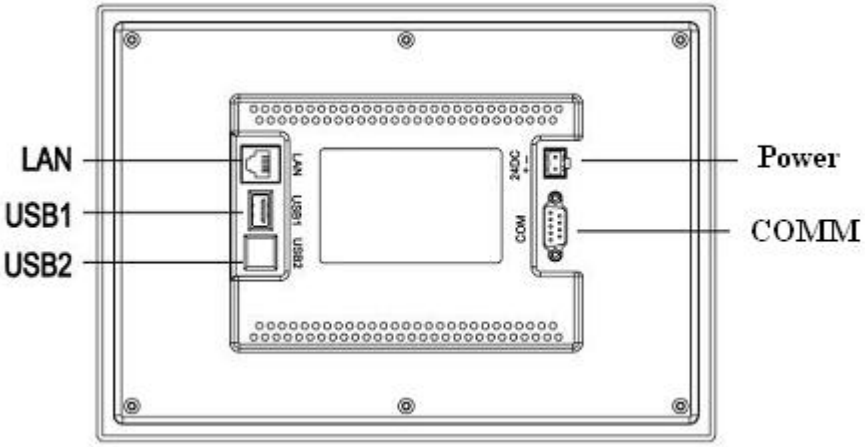


Figure 1-1 monitor back view

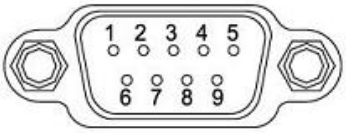
1.2.1 Interface definition

➢ **COMM description**

Interface	Description
USB1	Flash memory
USB2	used for debug
Power	24V DC +-20%
LAN(RJ45) (optional)	Ethernet, Modbus TCP/IP, IEC61850
COMM	1XRS232, 3XRS485

Table 1-2 monitor interface

2.3 port definition



COMM description

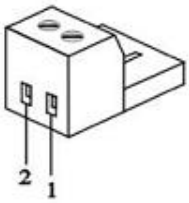
COM1	2	RS232 RXD
	3	RS232 TXD
	5	GND
COM2	7	RS485 +
	8	RS485 −
COM3	4	RS485 +
	9	RS485 −
COM4	1	RS485 +
	6	RS485 −

Picture 2-2 port definition

function	Port number		definition
To RTU	7	RS485+	485A
	8	RS485-	485B
To host PC	1	RS485+	485A
	6	RS485-	485B

Figure 1-2 COMM description

- **Power Connection**



PIN	Define
1	+
2	−

Figure 1-3 Power Connection

1.2.2 Assembly Drawing

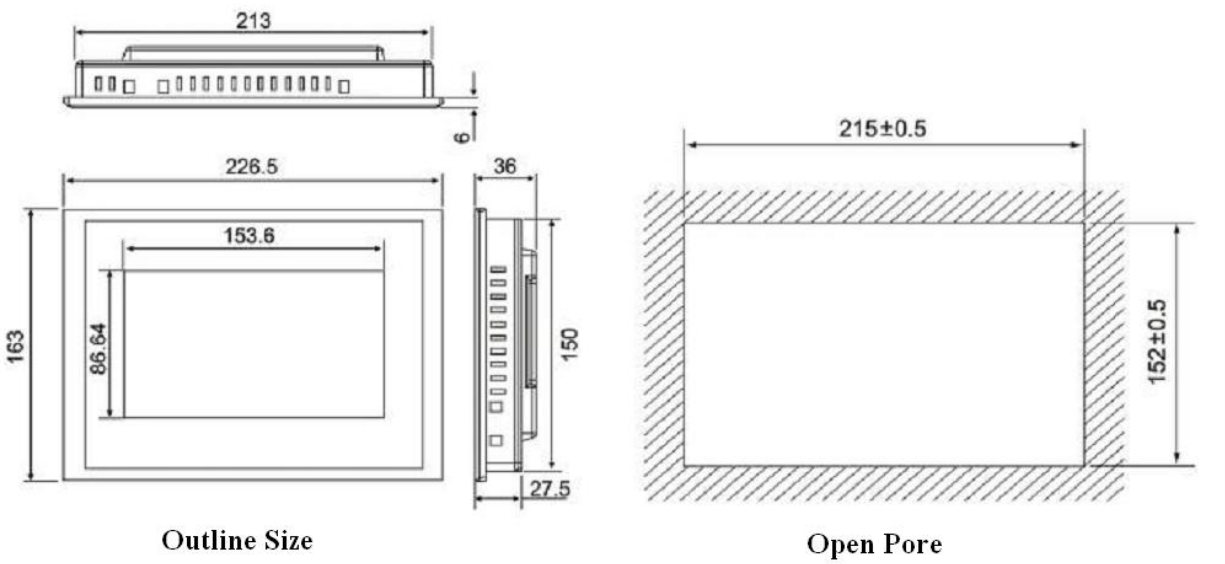


Figure 1-4 Assembly Drawing

1.2.3 Battery replacement

Battery position: Inside PCB
Specifications：CR2032 3V Li-ion

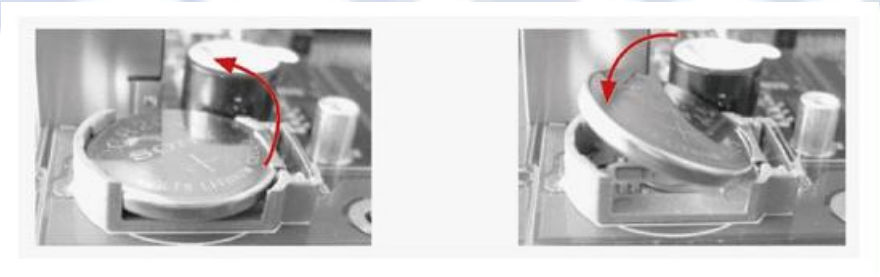


Figure 1-5 battery replacement

Chapter 2: monitor JK070 Operate Specification

2.1 Interface Introduction

The monitor is full graphic and shows the system structure and major measurements.
Operation password: user level password 666666 admin password 888888

2.1.1 Home Page

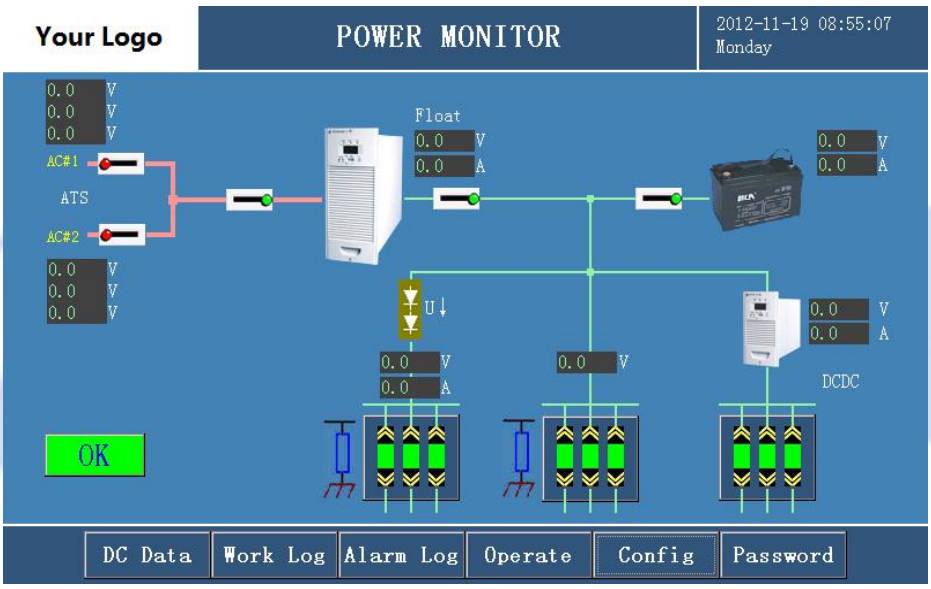


Figure 2-1 Single Battery bank and Single Charger group

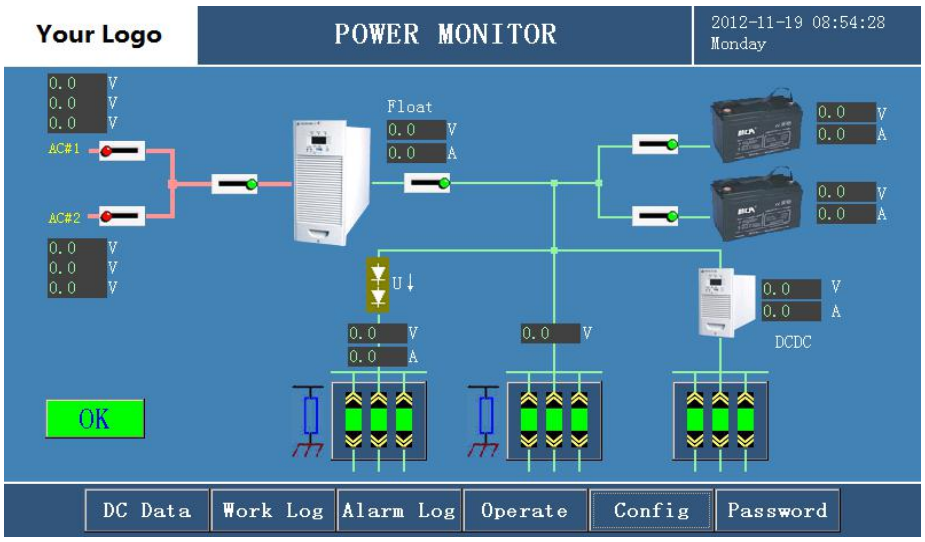


Figure 2-2 Double Battery banks and Single Charger group

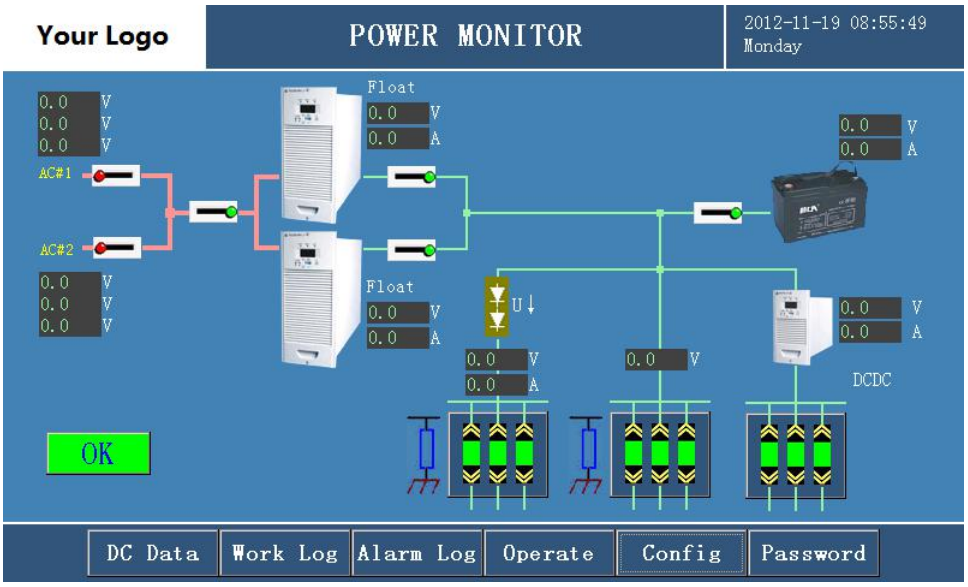


Figure 2-3 Single Battery bank and Double Charger groups

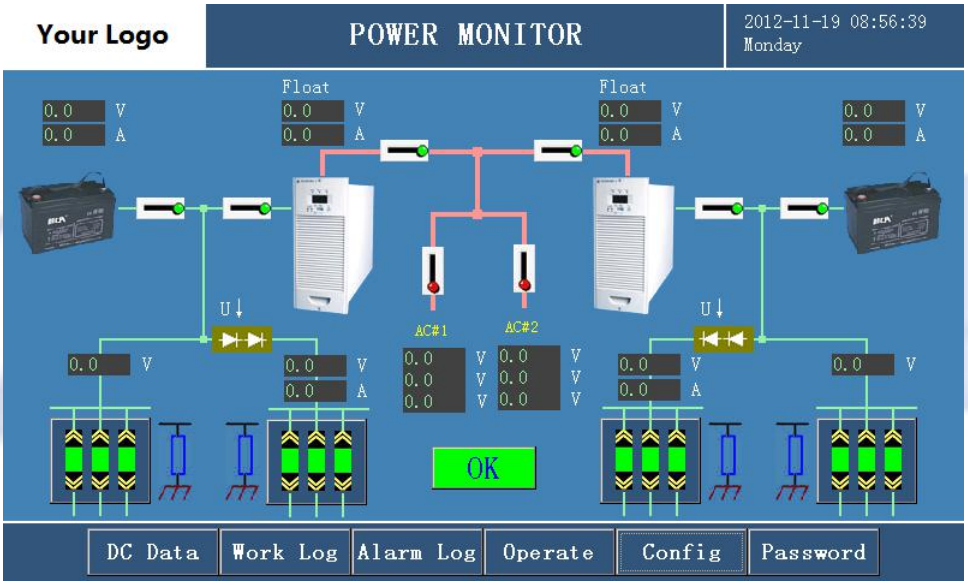
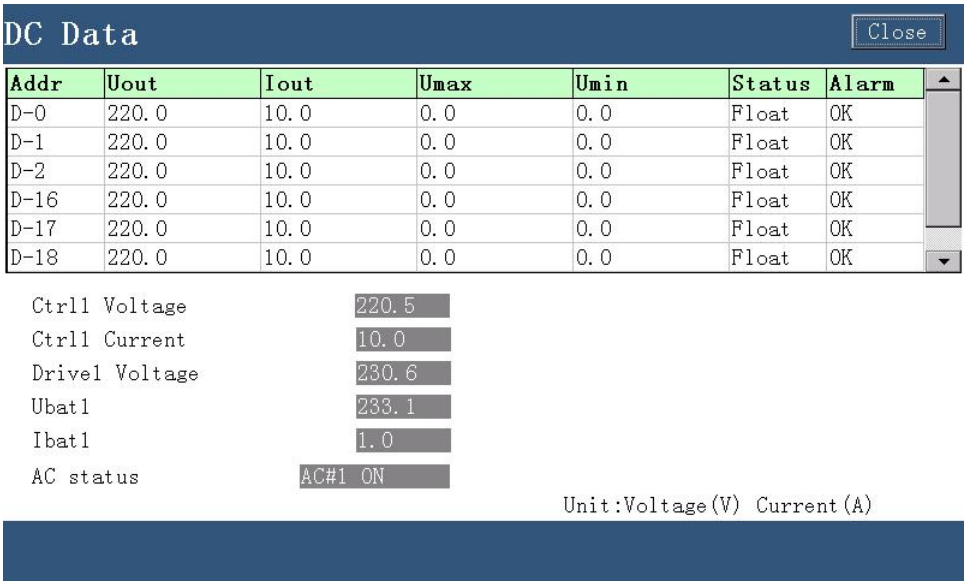


Figure2-4 Double Battery banks and Double Charger groups

There are four homepages to describe the different system structures: Single Battery bank and Single Charger group, Double Battery banks and Single Charger group, Single Battery bank and Double Charger groups, Double Battery bank and Double Charger groups.

The home page shows the important measurements and status of AC, DC, Battery and Bus. The switches are dynamic changes. You can touch the corresponding image to enter sub page with more detailed info.

2.1.2 DC System Detail Info



Addr	Uout	Iout	Umax	Umin	Status	Alarm
D-0	220.0	10.0	0.0	0.0	Float	OK
D-1	220.0	10.0	0.0	0.0	Float	OK
D-2	220.0	10.0	0.0	0.0	Float	OK
D-16	220.0	10.0	0.0	0.0	Float	OK
D-17	220.0	10.0	0.0	0.0	Float	OK
D-18	220.0	10.0	0.0	0.0	Float	OK

Figure 2-5 DC Info

Touch the charger graph and enter the corresponding charger info page. Touch the “DC info” on home page and enter the DC info page for all chargers (AC/DC charger, 48/24V DC/DC converter and 220V DC/DC converter)

The following DC info is available: output voltage, output current, working status, DC control bus voltage, DC switching bus voltage, load current, battery bank voltage/current.

2.1.3 Battery Detail Info

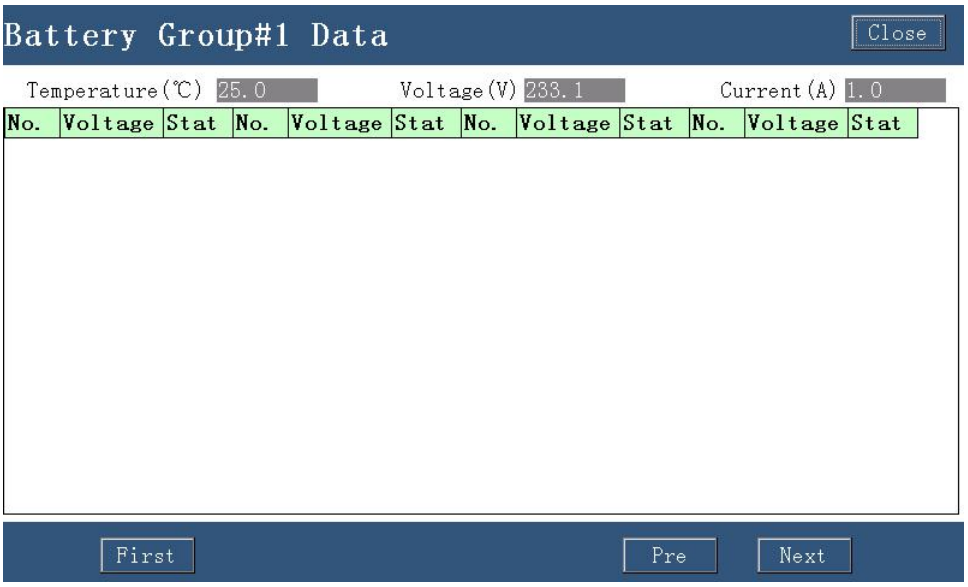
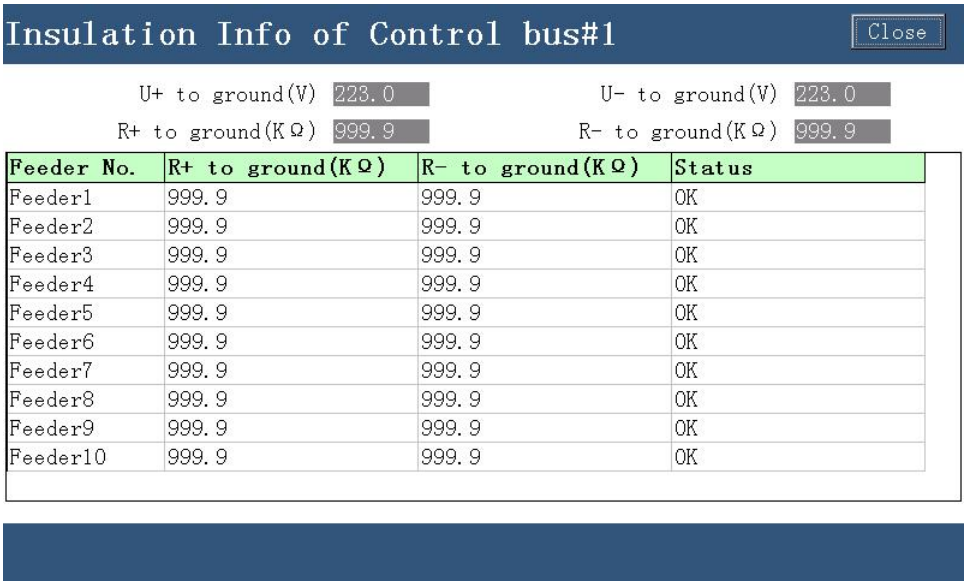


Figure 2-6 battery info

The following info available:

Battery temperature, voltage and current. Single battery cell voltage.

2.1.4 Insulation Info



Feeder No.	R+ to ground(KΩ)	R- to ground(KΩ)	Status
Feeder1	999.9	999.9	OK
Feeder2	999.9	999.9	OK
Feeder3	999.9	999.9	OK
Feeder4	999.9	999.9	OK
Feeder5	999.9	999.9	OK
Feeder6	999.9	999.9	OK
Feeder7	999.9	999.9	OK
Feeder8	999.9	999.9	OK
Feeder9	999.9	999.9	OK
Feeder10	999.9	999.9	OK

Figure 2-7 insulation info

The following info available:

DC bus positive resistance and negative resistance to ground. feeders insulation status.

2.1.5 DI Info

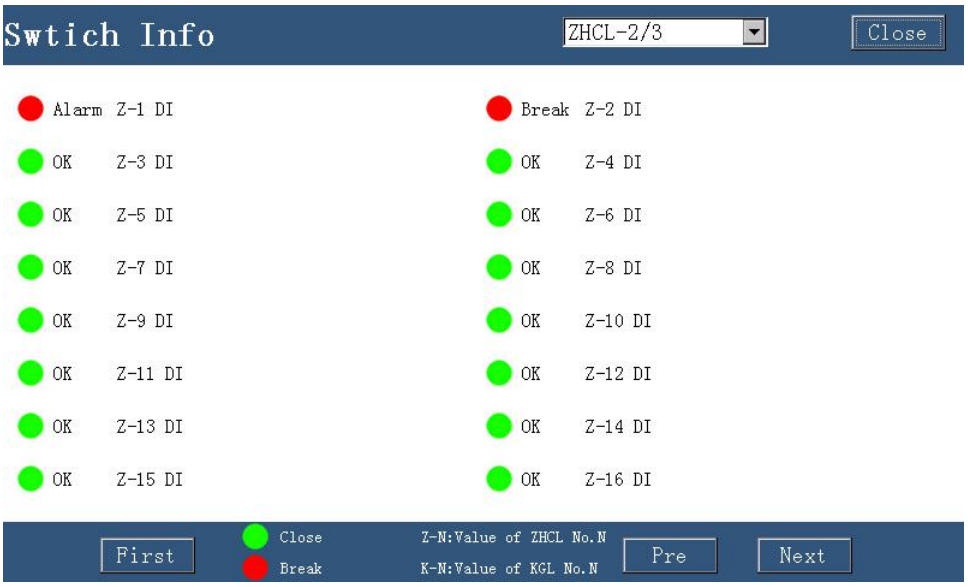


Figure 2-8 DI info

The following info available

Status of each feeder switches (red means warning or break, green means OK or close).

2.1.6 the existing Alarm Info

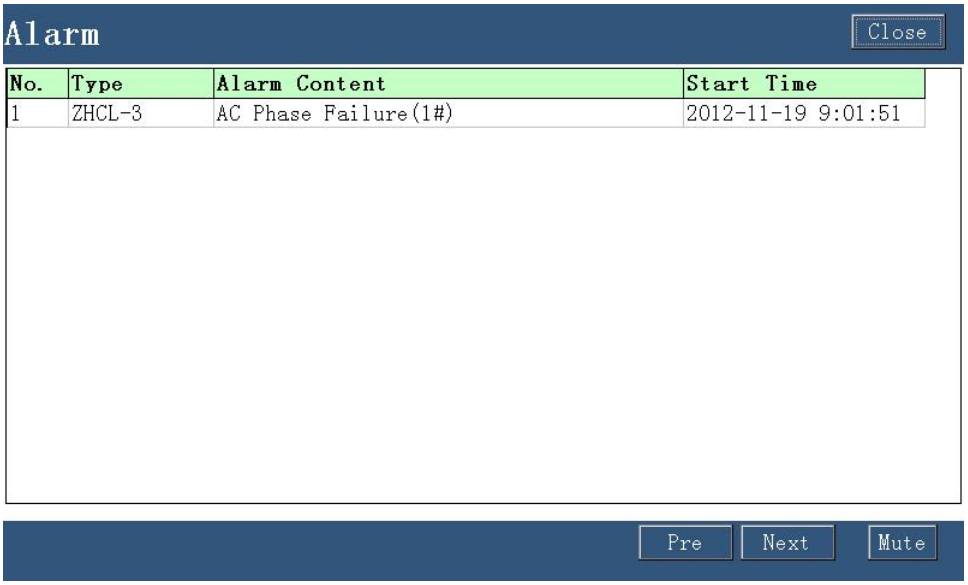


Figure 2-9 current alarm

This page will open when you touch "Alarm" button at homepage.

You can get the following info:

Number of the existing alarm, fault type, alarm content and staring time.

2.1.7 History Alarm Info

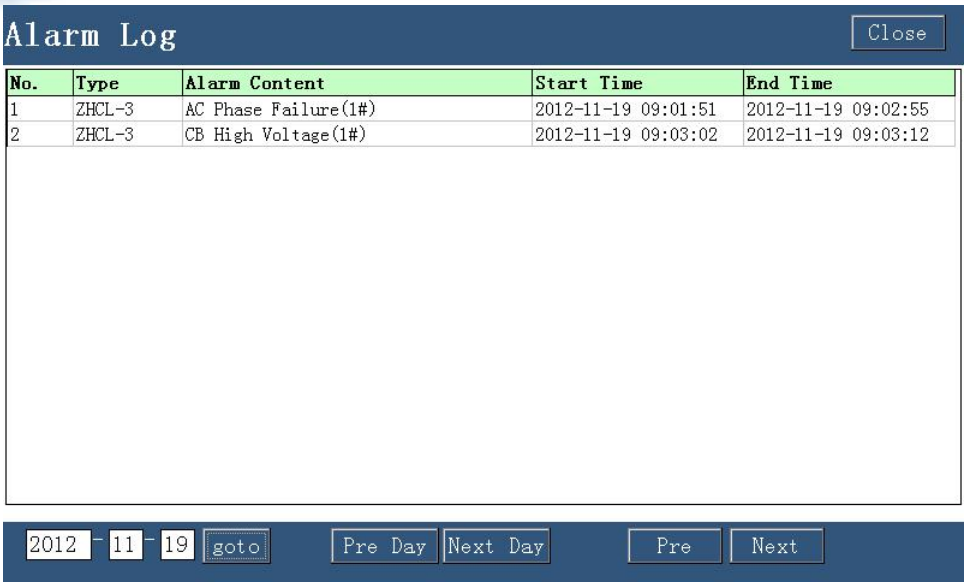


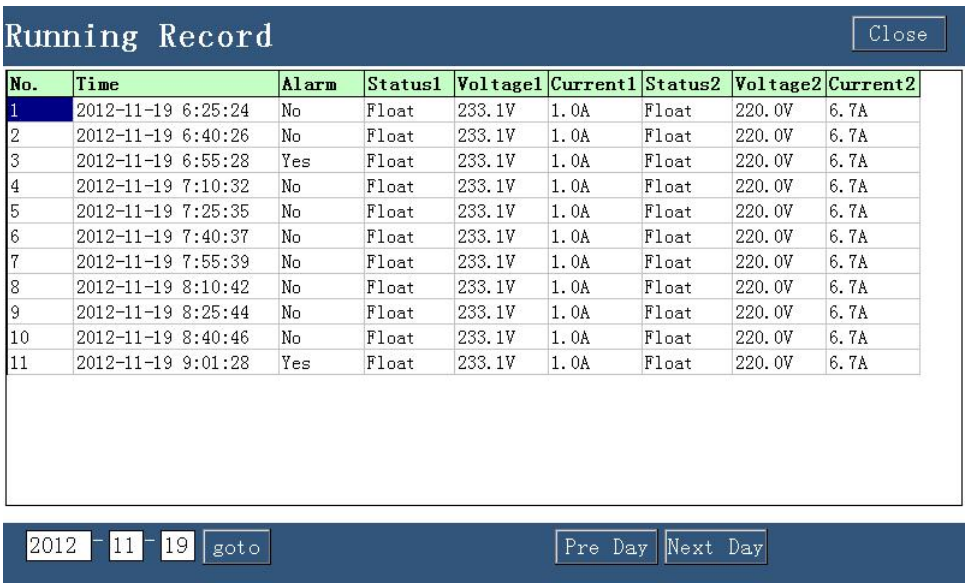
Figure 2-10 alarm log

This page will show when you touch "Alarm Log" button at homepage.

You can get following info:

Fault type, alarm content, starting and ended time.

2.1.8 Running Record



No.	Time	Alarm	Status1	Voltage1	Current1	Status2	Voltage2	Current2
1	2012-11-19 6:25:24	No	Float	233.1V	1.0A	Float	220.0V	6.7A
2	2012-11-19 6:40:26	No	Float	233.1V	1.0A	Float	220.0V	6.7A
3	2012-11-19 6:55:28	Yes	Float	233.1V	1.0A	Float	220.0V	6.7A
4	2012-11-19 7:10:32	No	Float	233.1V	1.0A	Float	220.0V	6.7A
5	2012-11-19 7:25:35	No	Float	233.1V	1.0A	Float	220.0V	6.7A
6	2012-11-19 7:40:37	No	Float	233.1V	1.0A	Float	220.0V	6.7A
7	2012-11-19 7:55:39	No	Float	233.1V	1.0A	Float	220.0V	6.7A
8	2012-11-19 8:10:42	No	Float	233.1V	1.0A	Float	220.0V	6.7A
9	2012-11-19 8:25:44	No	Float	233.1V	1.0A	Float	220.0V	6.7A
10	2012-11-19 8:40:46	No	Float	233.1V	1.0A	Float	220.0V	6.7A
11	2012-11-19 9:01:28	Yes	Float	233.1V	1.0A	Float	220.0V	6.7A

Figure 2-11 running record

Touch "Work Log" at homepage and get running log

System make record every 15 minutes.

Alarm status, charging status, voltage and current status.

2.1.9 System Control Interface

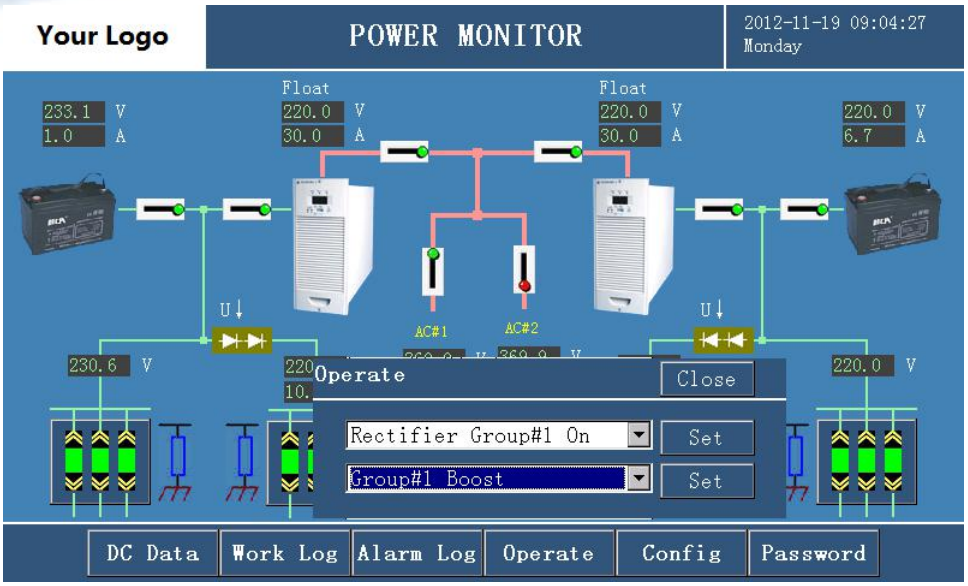


Figure 2-12 system control

Touch " system control" at homepage and enter password, then you can control the charger module ON or OFF, and control the module charging status.

2.1.10 Password set

Figure 2-13 change password

First click "Password" at homepage, then enter password, then enter new password, then click OK.. The password is 1-6 digits. Use admin password to reset if forget the password.

2.2 Configuration Specification

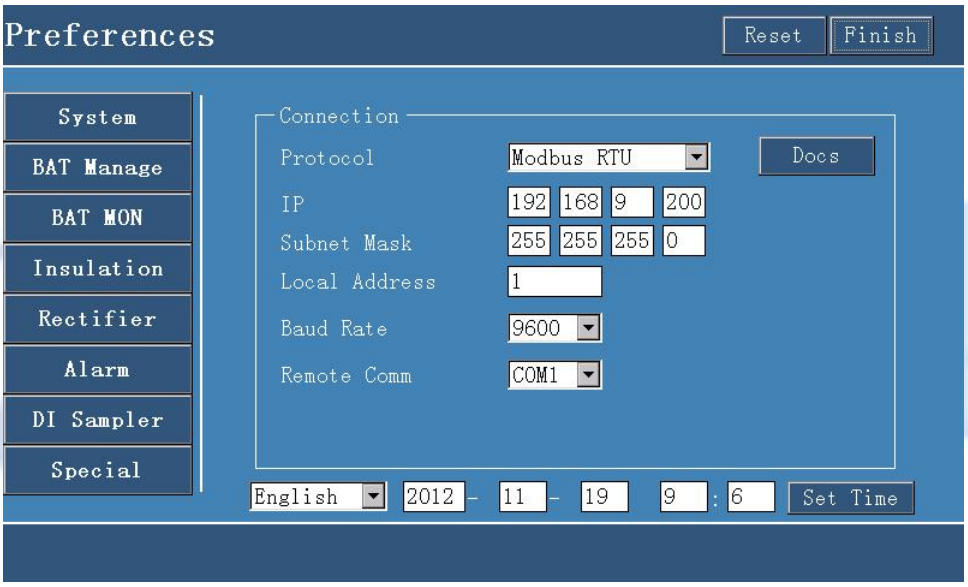


Figure 2-14 Preferences

Click "Config" at homepage and enter the configuration page. The following info available: Communication protocol, IP addresses, subnet mask, local address, baud rate, remote comm, SNTP server address and system time.

You can download Instruction and protocol specification by click 'Docs' button.

Can only enter “special set” with admin password

Enable all sets clicking “Finish” and “OK”

2.2.1 System settings

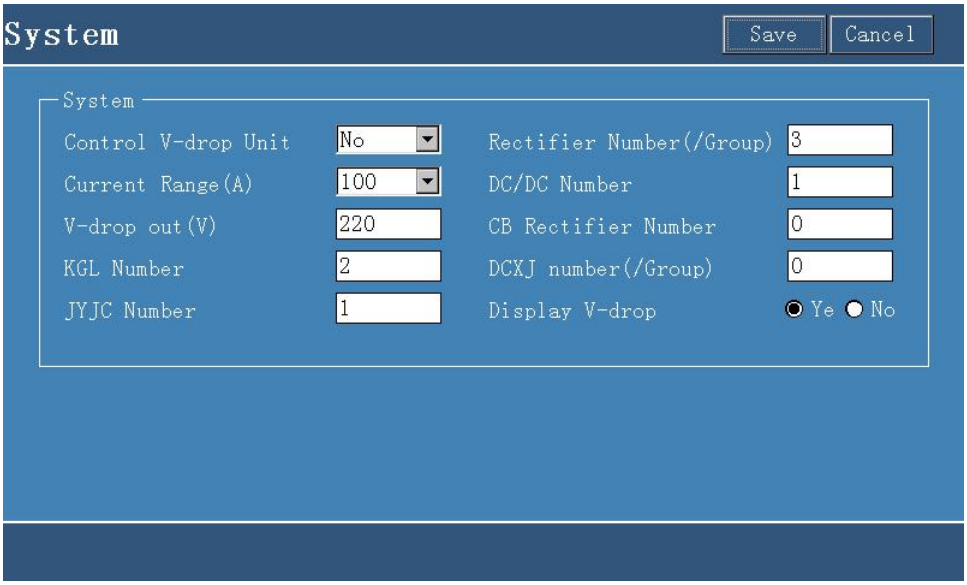


Figure 2-15 System setting

Click “system setting” at “parameter configuration” page to enter “system setting” page.

Can set the quantity of charger and Controller modules and their parameters.

The qty of AC/DC charger module, 24V DC/DC module, and the 220V DC/DC module of group one is no more than 16.

2.2.2 Battery management

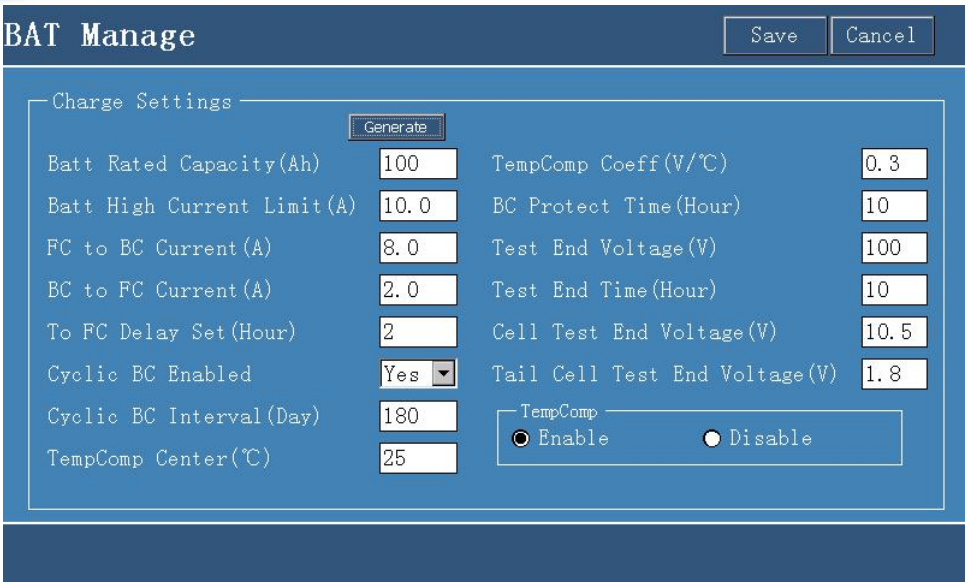


Figure 2-16 Battery management

You can set the battery charging settings.

- Battery charging current limit

  Set the maximum charging current.

- FC to BC Current
- The current from float charging to boost charging. It switches to boost charging when the current exceeds this parameter for over 20 seconds.
- BC to FC Current

  The current from boost charging to float charging. It switches to float charging when the current is less than this parameter for over 20 seconds.
- To FC Delay Set

  The continued boost charging time before switching to float charge.

  When the boost charging completed, maybe the battery is still not full, so you need to continue the boost charging for a period of time. This parameter setting range is 0~9 hour.
- Cyclic BC Enable

  It means you would need the regular boost charging or not.

  If yes, the charger will switch to boost charging automatically from float charging when the float charging time exceeds this preset regular boost charging period.
- Cyclic BC Interval

  This function is only available when you choose the “Cyclic BC Enable” yes.
- TempComp Center

  To set the battery float charging Temperature Compensation datum point degree
- TempComp Coeff

  To set the battery float charging Temperature Compensation coefficient

  Note: About the Temperature Compensation:

  The existing battery temperature is T_{CUR}, TempComp Center temperature is T_{SET}, TempComp Coeff is f, the preset float charging voltage is V_F

  The compensation voltage would be $V_F=V_F+(T_{SET}-T_{CUR})\times f$
- BC protect time

  It means the max boost charging period. When the boost charging period is over this parameter, it will switch to float charging. This parameter range is 0~99 hour.
- Test End Voltage

  It means: Discharging stop voltage.

  When the battery is in the discharging status, to stop discharging when the battery voltage is under this parameter and switch to float charging after 20 seconds. It will begin the battery charging managements process.
- Test End Time

  It means the max discharge time.

  When the battery is in the discharging status, to stop discharging when the battery discharging time is more than this parameter and switch to float charging. It will begin the battery charging managements process.
- Cell Test End Voltage

  It means: Discharging stop voltage of battery cell.

  When the battery is in the discharging status, to stop discharging when the battery cell voltage is under this parameter.
- Tail Cell Test End Voltage

  It means: Discharging stop voltage of the tail battery cell.

  When the battery is in the discharging status, to stop discharging when the tail battery cell

voltage is under this parameter.

2.2.3 Battery cell controller unit settings

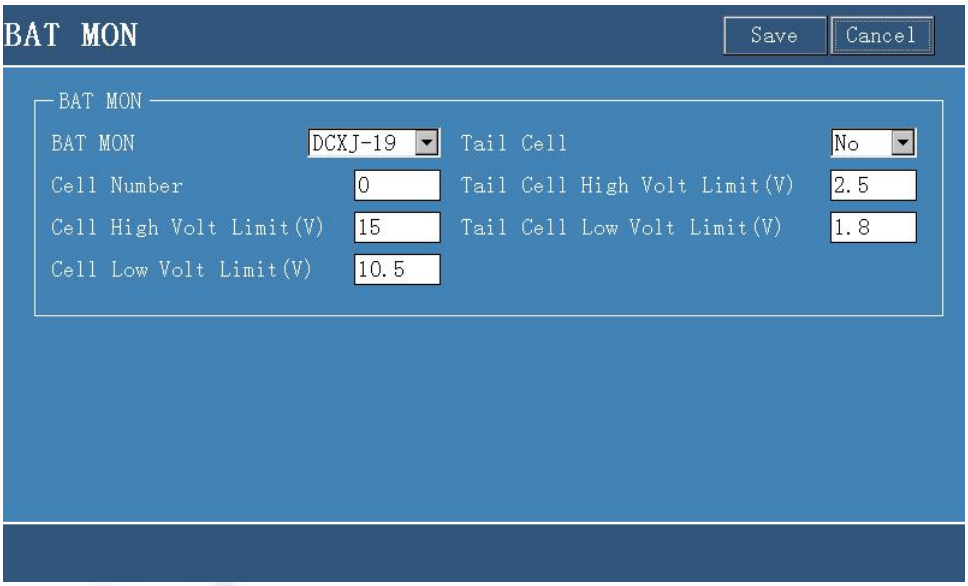


Figure 2-17 battery monitor unit settings

- Model Type：DCXJ-19' or 'DCXJ-55'.
- Cell Number： When select 'DCXJ-19', range 1-18, When select 'DCXJ-55', range 1-110.
- Cell High Volt limit: set the battery cell over voltage alarm, range 0-16V.
- Cell Low Volt limit: set the battery cell under voltage alarm, range 0-16V.
- Tail Cell: valid when model type is DCXJ-19
- Tail Cell High Volt limit: set the Tail battery cell over voltage alarm.
- Tail Cell Low Volt limit: set the Tail battery cell under voltage alarm.

2.2.4 Insulation unit settings

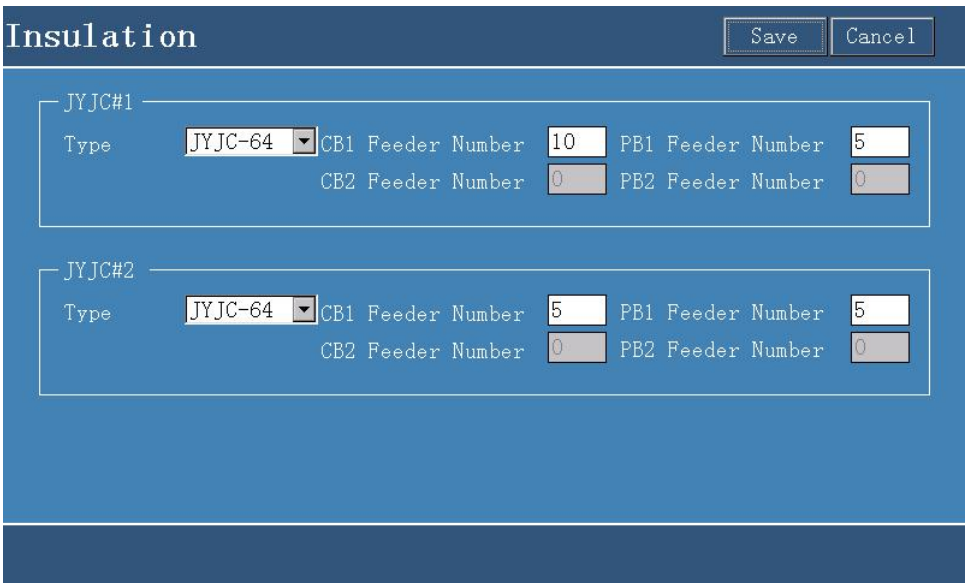


Figure 2-18 Insulation settings

- JYJC type: 'JYJC-32' or 'JYJC-64'.
- CB feeder:
  DC Control Bus Feeder Number: range 0-64.
- PB feeder:
  DC switching Bus Feeder Number: range 0-64.

2.2.5 Rectifier settings

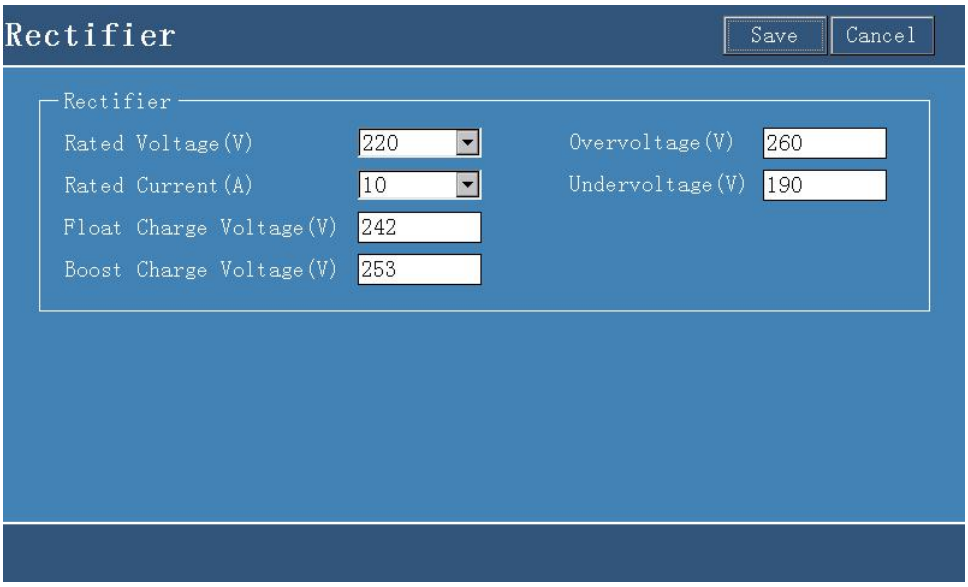


Figure 2-19 Rectifier settings

- Rated voltage：rectifier module rated voltage: could select 110VDC or 220VDC.
- Rated current：rectifier module rated current: could select 5A， 10A，20A，30A，40A.

- Float charge voltage：110VDC module ：95~150V；220VDC module：：190~300V.
- Boost charge voltage：110VDC module ：95~150V；220VDC module：：190~300V.
- Over voltage：module DC output over voltage alarm.
- Under voltage：module DC output under voltage alarm.

2.2.6 Alarm settings

Figure 2-20 Alarm settings

- Line Volt High Limit: AC over voltage alarm, Range 160~480V.
- Line Volt Low Limit: AC under voltage alarm, Range 160~480V.
- CB High Volt Limit: DC Control Bus over voltage alarm, 110VDC system：95~150V；220VDC system：190~300V.
- Batt High Volt Limit: Battery over voltage alarm, 110VDC battery：95~150V；220VDC battery：190~300V.
- Batt Low Volt Limit: Battery under voltage alarm, 110VDC battery：95~150V；220VDC battery：190~300V.
- Batt High Current Limit: battery over current alarm, Range 0~500A.
- Insulation Resistance Limit: DC bus insulation alarm, range 0~200KΩ.

2.2.7 Dry contact settings: DI and DO (Digital Input and Digital Output)

Figure 2-21 Dry Contact settings 1

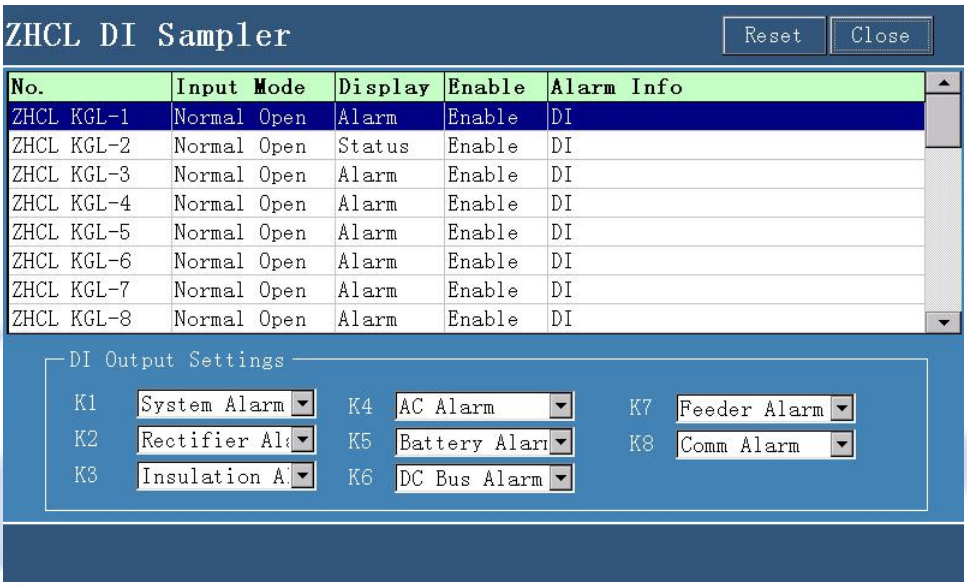


Figure 2-22 Dry contact settings 2

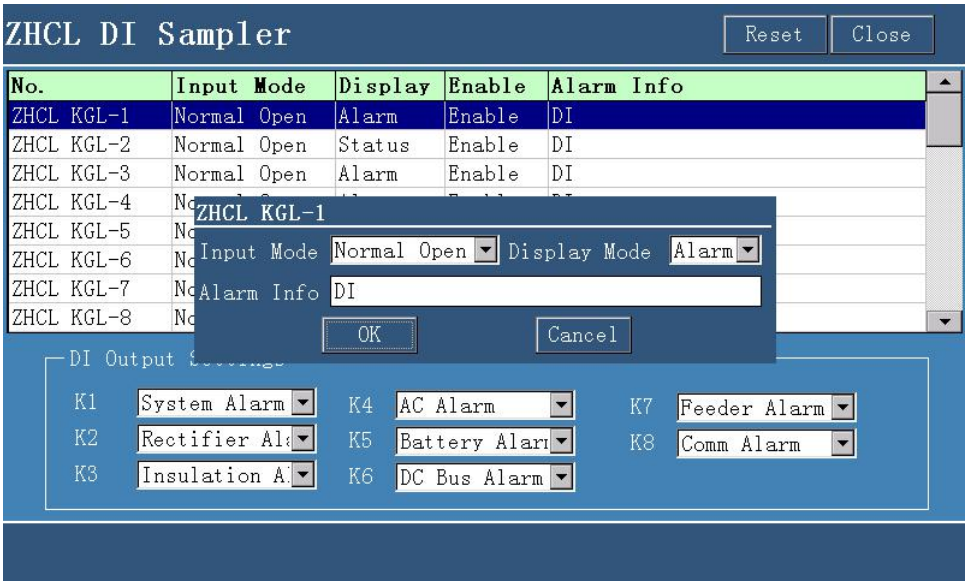


Figure 2-23 Dry contact settings 3

DI input settings: dry contact input settings as below:

- Input mode: dry contact input mode, you can choose the normal status is open or the normal status is close.
- Display: dry contact display type , you can choose the display type is alarm or status.
- Enable: dry contact enable or disable.
- Alarm info: user-defined. Handwriting input supported

DI output settings: dry contact output settings as below:

Could define the dry contact output content for K1~K8.

The dry contact output content could be: System alarm, Rectifier alarm, Insulation alarm, AC alarm, Battery alarm, DC bus alarm, Feeder alarm, Communication alarm, Batt1-Float, Batt1-Boost, Batt1-Test, Batt2-Float, Batt2-Boost, Batt2-Test, Beep.

Note: you can also choose to configure these dry contact in the computer:

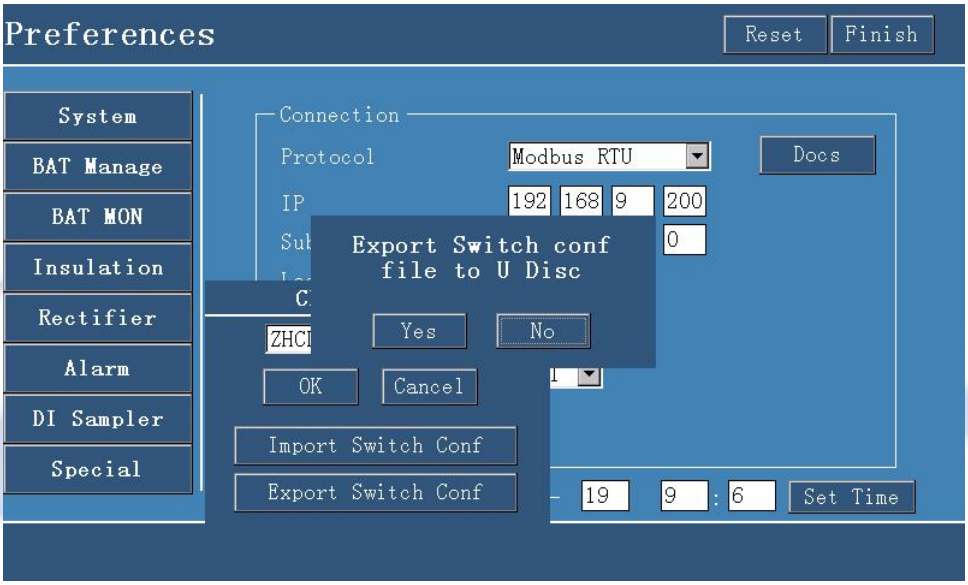


Figure 2-25 Switch settings5

Fistly, Click “export switch configuration” and save the file to the USB memory stick. Then name the file as “kgl”, it include: the file of kgl.xml~kgl16.xml and zhclcfg.xml. Open these file via Altova XMLSpy in PC and switch to “grid mode”, you will can edit these files as below:

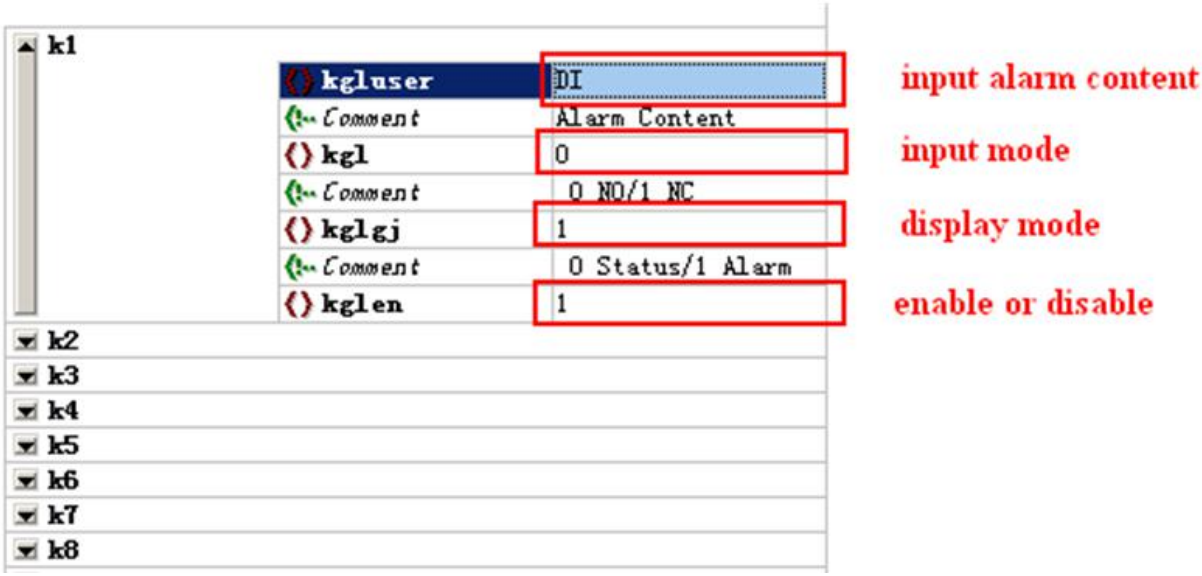


Figure 2-26 Switch settings6

After complete the setting, insert your USB stick to the monitor's USB interface and click " import switch conf ".

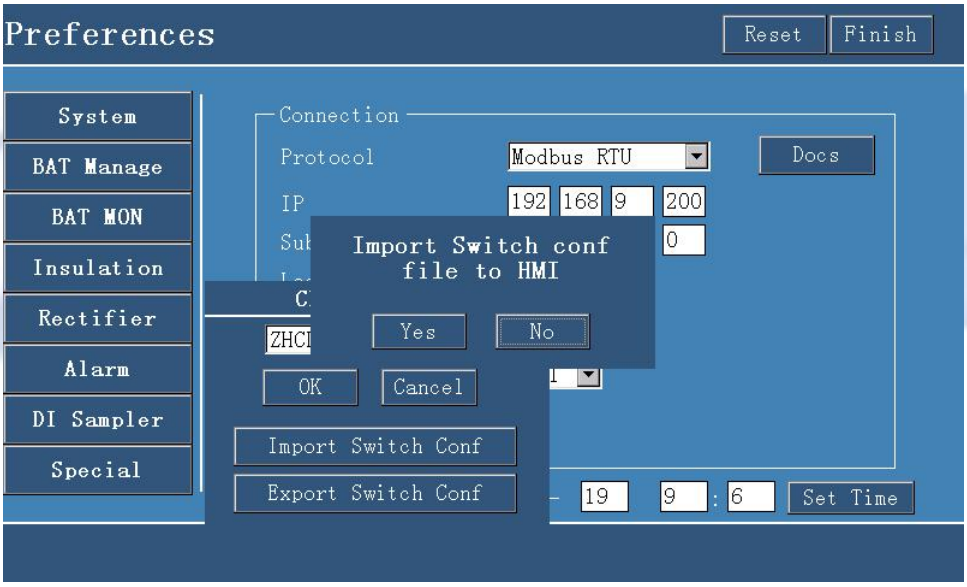


Figure 2-27 Switch settings7

2.2.8 Special settings

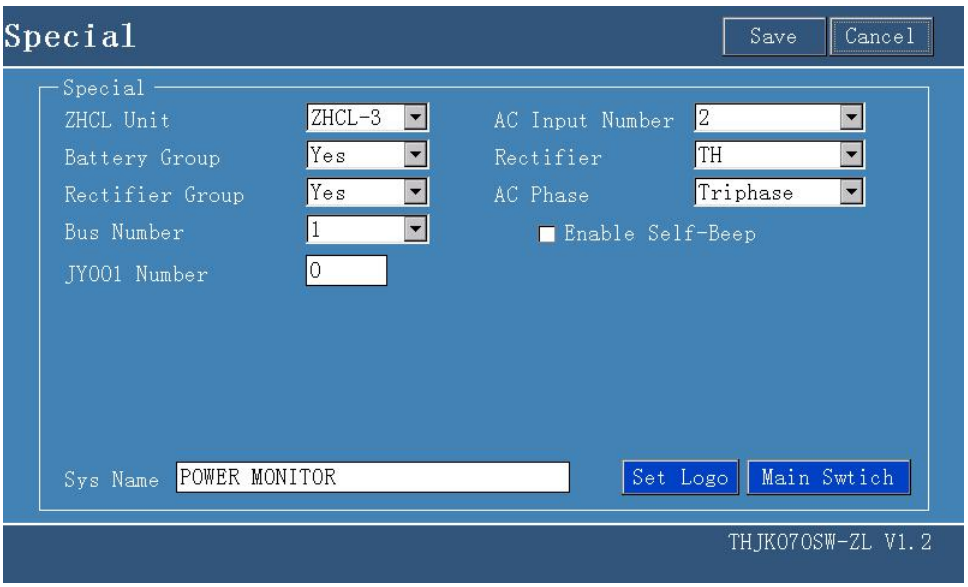


Figure 2-28 Special settings

- ZHCL Unit
  ZHCL-2 or ZHCL-3
- Battery Group
  It means one battery group or two battery groups. If “yes” here, then the second battery group will be the same configured according to first battery group parameter settings. The battery charging parameter of the two battery banks are same.
- Rectifier Group
  It means one group of rectifiers or two group of rectifiers. If “yes” here, then the second group of rectifiers will be the same configured according to first group of rectifiers parameter settings. The rectifiers parameter of the two group of rectifiers are same.
- Bus Number
  Number of DC bus, one DC bus or two DC bus in the system.
- AC input number
  number of AC, one AC input, or two AC input
- Rectifier
  Rectifier communication protocol: TH or MODBUS.
- AC phase
  Single phase or three-phase.
- JY001 number
  Support one JY001 monitor. (insulation monitor)
  When equipped with insulation monitor JY001, the insulation controller module JYJC-64 connecting directly with the system will not work.
- Working mode of JY001
  Independent, master, slave. Under Independent mode, all insulation controller modules under the monitor belongs to #1 DC system. If use two insulation monitors, should define the master and slave monitor.

- Sys Name

  The user can configure the monitor name displayed in the main menu page.

- Set logo

  The user can change the logo picture displayed at top-left in the main menu page.

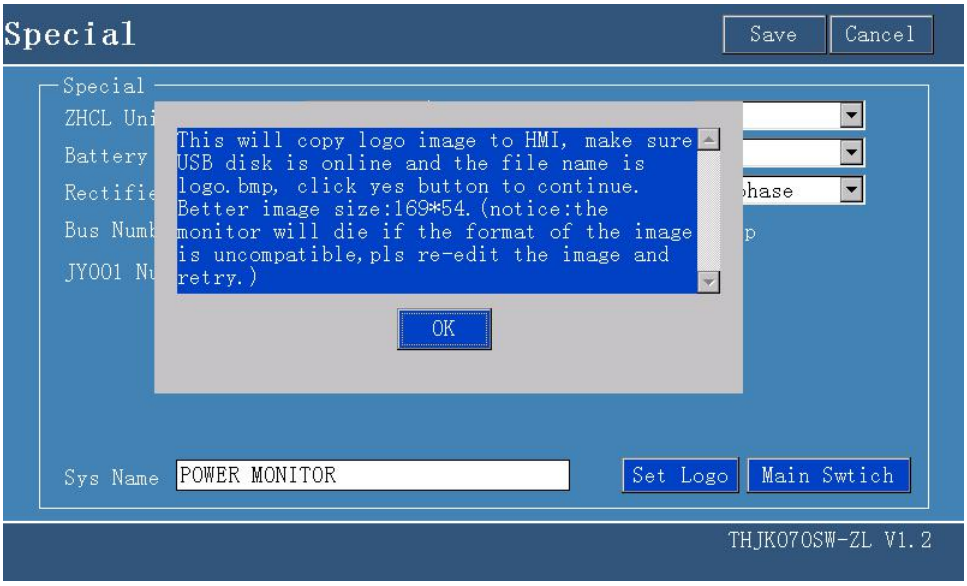


Figure 2-29 change logo

Notice: the best logo picture resolution is 169*54, 16bit-color or 24bit-color bmp format.

- Dynamic Switch settings

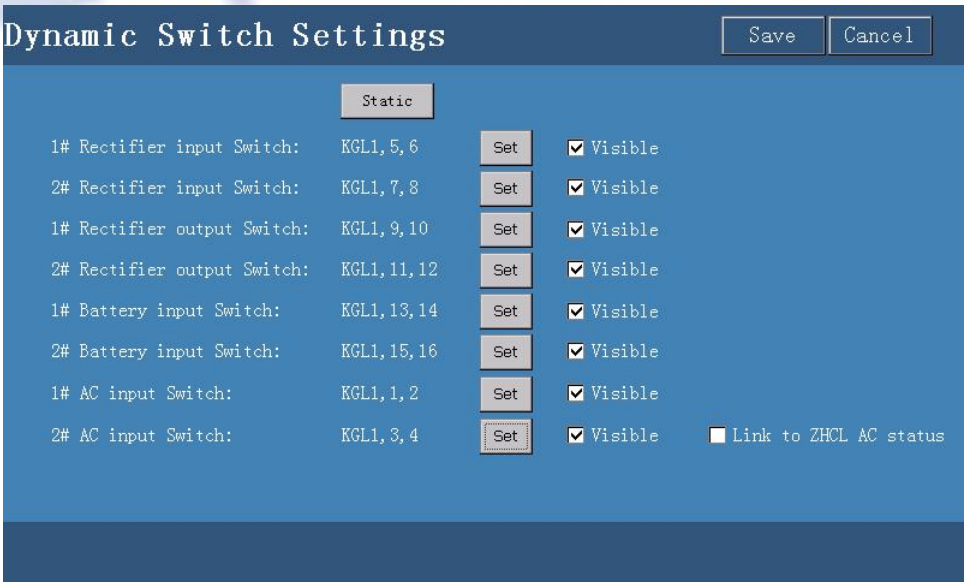


Figure 2-30 Dynamic Switch settings

The user can configure the switches at homepage to DI, Then the homepage may show the real switch state dynamic, such as on/off or break/normal. You can configure them by clicking the Set button. You can also choose to set the switch visible or not.

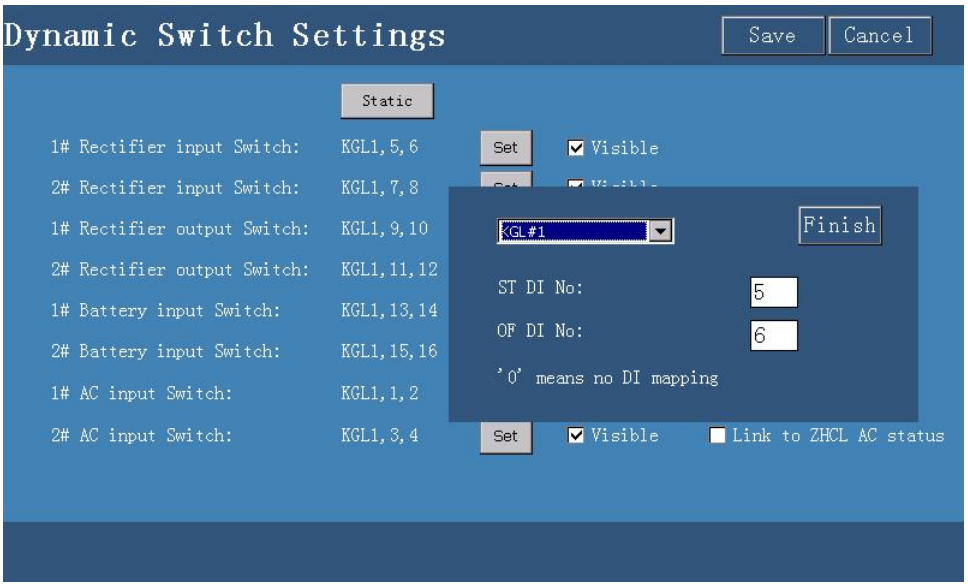


Figure 2-31 Dynamic switch settings

2.2.9 set the starting picture

Click “time out” at starting up page, then click “set starting picture” and follow the instruction.

The Best picture image size is 800*480,16bit，image name “welcome.bmp”