Battery Internal Resistance Monitoring System







or: #1 BMU-12V Battery Cell Resistance Measuring device Battery Cell Resistance Measuring device or: #300 BMU-12V Battery Cell Resistance Measuring device

1, introduction:

it can measure max 648 pcs of 2V battery cells, or max 300 pcs of 12V battery cells.

1. it can display and make alarm for the battery cell voltage, resistance, and temperature.

2. it can show the histogram of the battery cell existing voltage, resistance, and temperature in different color. The normal battery is green color histogram. The closer to alarm parameter, the closer to red color histogram, so that you can easily identify the battery status by the different color histogram.

3. it can show the curve pictures of the battery cell voltage, resistance and temperature parameter during one day time.

4. it can show the histogram of the highest value of each battery cell voltage, resistance and temperature in the past history, so that you can found out the fault battery cell easily.

5. it can show the curve pictures of each battery cell resistance parameter during one year time, so that you can see the resistance variation trend.

6. it can show and make alarm for the battery group voltage, current, temperature, and capacity.

7. it can show the curve picture of the battery group voltage, current and capacity

8. It has the function of battery balancing.

9. with function of fault alarm history. When the existing alarm disappear, it will save this alarm to the alarm history list.

10. the system consist of Monitor JK070-BMU+Battery Group Data Measuring device ZHCL-BMU+ Battery Cell Resistance Measuring device BMU-12/2V.

JK070-BMU: show and set the battery data.

ZHCL-BMU: measure the battery group data, and show it in the monitor JK070-BUM.

BMU-12/2V: measure the battery cell data, and show it in the monitor JK070-BMU.

The monitor JK070-BMU can work with max 6 set of ZHCL-BMU, each set of ZHCL-BMU with max 108 pcs of battery cell measuring device BMU-2V (2V battery cell), or each set of ZHCL-BMU with max 50 pcs of BMU-12V (12V battery cell)

11. protocol Modbus with RS485 or Ethernet port.

12. 7 inch 800*480 TFT screen, resistive touchscreen

13. English and Russian menu.

14. with USB port.



2. Parameter

2.1 size



Picture 2-1 monitor JK070-BMU back side

2.2 parameter

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

2.3 port definition



COMIM description

2	RS232 RXD
3	RS232 TXD
5	GND
7	RS485 +
8	RS485 -
4	RS485 +
9	RS485 -
1	RS485 +
6	RS485-
	2 3 5 7 8 4 9 1 6

Picture 2-2 port definition

function	Port number		definition
	7	RS485+	485A
IORIU	8	RS485-	485B
To boot DC	1	RS485+	485A
TO HOST PC	6	RS485-	485B

3、 operation instruction:

3.1 data inquiry

3.1.1 battery cell data

Choose the "cell information" in the menu, it will show each battery cell data.



3-1 battery cell data

3.1.2 battery cell max value in history

Choose "peak value", it will show each battery cell max value in history





3-2 battery cell max value in history

3.1.3 curve picture for each battery cell resistance variation trend

Choose "trend line", it will show each battery cell resistance variation trend picture.



3-3 battery cell resistance variation trend picture

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3.1.4 batter cell existing voltage, resistance and temperature picture.

Choose the "V.I.T.curve", it will show the batter cell existing voltage, resistance and temperature



3-4 batter cell existing voltage, resistance and temperature picture

3.1.5 existing DC data (battery group data)

Choose the "DC curve", it will show the existing battery group voltage, current and capacity.





3-5 existing DC data (battery group data)

3.2 fault inquiry

3.2.1 the existing fault

Choose "fault", or touch the fault indication picture (\square or \square), will show the existing fault (current fault), no fault will show \square , fault will show \square .



Index	Device	The Fault Content	Starting Time	
2	BMU03[#6]	Communication timeout	2019-11-23 11	:57:46
2	BMU03[#5]	Communication timeout	2019-11-23 11	57:41
3	BMU03[#4]	Communication timeout	2019-11-23 11	:57:35
4	BMU03[#3]	Communication timeout	2019-11-23 11	:57:30
5	BMU03[#2]	Communication timeout	2019-11-23 11	:57:24
5	BMU03[#1]	Communication timeout	2019-11-23 11	:57:19
4				

3-6 exiting fault (current fault)

3.2.2 history fault

Choose " history", will show the history fault.

Histo	ory				Close
Index	Device	The Fault Content	Starting Time	End Time	
(OPiece	s)				Clean
					U10001

3-7 history fault



3.3 system setting

Choose setting, input password (666666), it will show the system setting menu.

3.3.1 input password



3.3.2 system setting



Setting					Sa	ve Clo Ver:V1.0.	o <mark>se</mark> .6
-Communication Protocol: Upper Port: Lower Port:	MODBU COM1 COM2	Addr: IP: Mask:	1 192 163 255 255	3 9 200 5 255 0	Password— *	Apply	
Base Setting			Group Setting		2019 - 11 12 : 0	- 23 : 40	t
Group Count:	6		1# Group	2# Group	-Keyboard-		
Samp. Period:	6	Minur			1	2 3	
Trend Period: Measuring:	6 24	Day Hour	3# Group	4# Group	4	5 6	
					7	8 0	
			5# Group	6# Group			
						U Del	
		-					
Setting		Set Add	ress Emp	o <mark>ty Data </mark> ENGLIS	ан 🔽	Save	Close
Setting		Set Add	ress Emp	oty Data ENGLIS	БН 🔽	Save Ver:1	Close /1.0.6
Setting Communication Protocol: Unper Port	MODBU	Set Add	ress Emp		БН 🔽 Passwo *	Save Ver:U	Close /1.0.6
Setting Communication Protocol: Upper Port: Lower Port:	MODBU COM1 COM2	Set Add Addr: P: Mask:	ress Emp 1 192 255	255 255 255 ENGLIS	5H V Passwo *	Save Ver: rd	Close /1.0.6
Setting Communication Protocol: Upper Port: Lower Port: Base Setting	MODBU COM1 COM2	Set Add Addr: P: Mask:	ress Emp 1 192 255	Data ENGLIS 168 9 200 255 255 0	БН Р аsswo * 2019	Save ////////////////////////////////////	Close /1.0.6 apply Set
Setting Communication Protocol: Upper Port: Lower Port: Base Setting Group Count:	MODBU COM1 COM2	Set Add Addr: P: Mask:	ress Emp 1 192 255	255 255 0	БН Р аsswo * 2019 12	Save Ver: V rd - 11 - 23 : 1 : 14	Close /1.0.6
Setting Communication Protocol: Upper Port: Lower Port: Base Setting Group Count: Samp. Period:	MODBU COM1 COM2 6	Set Add Addr: P: Mask:	ress Emp 1 192 255 Group Setting 1# Group	Data ENGLIS 168 9 200 255 255 0	БН Р аsswo * 2019 12 -Keyboz	Save Ver: l rd - 11 - 23 : 1 : 14 rd	Close /1.0.6 .pply Set
Setting Communication Protocol: Upper Port: Lower Port: Base Setting Group Count: Samp. Period: Trend Period:	MODBU COM1 COM2 6 6 6	Set Add Addr: IP: Mask: Minur Day	ress Emp 1 192 255 Group Setting 1# Group	Data ENGLIS 168 9 200 255 255 0 2# Group	EH Passwo * 2019 12 -Keyboa	Save Ver: 1 rd	Close /1.0.6
Setting Communication Protocol: Upper Port: Lower Port: Base Setting Group Count: Samp. Period: Trend Period: Measuring:	MODBU COM1 COM2 6 6 6 24	Set Add Addr: P: Mask: Minur Day Hour	ress Emp 1 192 255 Group Setting 1# Group 3# Group	Data ENGLIS 168 9 200 255 255 0 2# Group 4# Group	БН Разswo * 2019 12 ГКеуboz 1 4	Save Ver: Ver: Not	Close /1.0.6 .pply Set
Setting Communication Protocol: Upper Port: Lower Port: Base Setting Group Count: Samp. Period: Trend Period: Measuring:	MODBU COM1 COM2 6 6 24	Set Add Addr: IP: Mask: Minur Day Hour	ress Emp 1 192 255 -Group Setting- 1# Group 3# Group	Data ENGLIS 168 9 200 255 255 0 2# Group 4# Group	БН Разswo * 2019 12 -Keyboa 1 4 7	Save Ver: 1 rd	Close /1.0.6 .pply Set 3 6 9
Setting Communication Protocol: Upper Port: Lower Port: Base Setting Group Count: Samp. Period: Trend Period: Measuring:	MODBU COM1 COM2 6 6 24	Set Add Addr: IP: Mask: Minur Day Hour	ress Emp 1 192 255 Group Setting 1# Group 3# Group 5# Group	Data ENGLIS 168 9 200 255 255 0 24 Group 4# Group 6# Group	БН Разяжо * 2019 12 ГКеуboa 1 4 7	Save // // // // // // // // // // // // //	Close /1.0.6 /pply Set 3 6 9 Dei



3-9 system setting

3.3.2.1 input keyboard

input keyboard can delete or input data.

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3.3.2.2 communication setting

Protocol: Modbus RTU.

Upper port: Host PC port COM1/COM2 Lower port: RTU port COM1/COM2 Addr: address for MODBUS_RTU protocol. IP : when user Ethernet port, set the IP address for the JK070-BMU. Mask: when user Ethernet port, set the mask address for the JK070-BMU.

3.3.2.3 password management.

You can delete the old password, use a new password.

3.3.2.4 time setting.

Input the new time, click setting, it will change the new time.

3.3.2.4 system setting.

Base setting:

set the battery group qty, max 6 groups in one system.

Set the circle period of battery detecting and measuring.

Samp. Period: set the curve picture period of the battery cell and battery group Trend Period: set the curve picture period of battery cell resistance trend. Measuring: set the period of automatic battery resistance measuring.

system setting and alarm parameter:

Battery cell type: BUM-12V or BMU-2V, it means 12V or 2V battery cell.

Battery cell qty: range 1~180 cells.

Battery cell over V alarm: set the alarm for the battery cell over voltage.

Battery cell under V alarm: set the alarm for the battery cell under voltage.

Battery cell over T alarm: set the alarm for the battery cell over Temperature voltage.

Battery cell over R alarm: set the alarm for the battery cell over resistance. It will make alarm when the resistance is over this parameter.

Over V: set the alarm for the battery group over voltage.

Under V: set the alarm for the battery group under voltage.

I sensor: battery group charging current sensor

Over I: battery group current alarm.

Battery capacity management parameter.

Rated Cap.: set the parameter for the battery rated capacity. The battery capacity showed in the system will not over this parameter.

End charge I: set the current of charging complete.

End charge V: set the voltage of charging complete. When the system find the battery group voltage is over this parameter, and charging current is less than "End charge I ", the system will think the charging is completed.

Cut-off V: set the voltage of discharging complete. When the battery voltage is less than this parameter, the system will think the battery is totally discharged, and the capacity will be zero.

4、working requirements:

- 1、Should be working less than altitude 2000M
- 2. Working ambient temperature from -10° C to $+45^{\circ}$ C, storage temperature from -40° C to +

60°C.

- 3. Ambient humidity less than 90% (ambient temperature 25° C).
- 4. No conductive and explosive dust, no caustic gas;
- 5. Applicable indoor.

BMU-12V/2V battery cell resistance measuring device

1. introduction

BMU-12V/2V is used to measuring the battery cell data. It has high precision ADC, can measure the battery cell voltage, resistance and temperature. It is with inside discharging resistance. It can work with the ZHCL-BMU to realize the function of battery balancing.

When the BMU-12V/2V is free or measuring the voltage, temperature, the indication light is off

When the BMU-12V/2V is in the process of equalized discharging, the indication light will flicker.

When the BMU-12V/2V is in the process of measuring the battery resistance, the indication light will be on until the measuring process is completed.

2, parameter:

model	-	BMU-12V	BMU-2V	
Battery cell volt	tage	12V	2V	
Resistance	measuring	5~60mΩ	0.1~10mΩ	
range				
Resistance	measuring	3%FS	3%FS	
precision	0 N.			
Resistance R	epeatability	2%RD±0.01mΩ	2%RD±0.005mΩ	
precision				
Resistance value	ue	The actual battery cell Resistanc	e (exclude the cable resistance)	
Voltage measu	ring range	0~15Vdc	0~3Vdc	
Voltage	measuring	0.1%FS	0.1%FS	
precision				
Temperature	measuring	0~60 ℃		
range				
Temperature	measuring	±0.5℃		
precision				
Temperature	measuring	Battery pole temperature	(cable and sensor in one)	
way				
Reverse	connection	Yes, if reverse connection, no damage to the BMU-12V/2V		
protection				
Safe protection		Over current fuse protection		
		(when the BMU-12V/2V unit is broken with inside short circuit, in		
		order to avoid the battery big current discharging to damage the		
		battery, the BMU-12V/2V unit inside fuse will fusing to protect the		
	battery.)			
power		5~24Vdc	1.8~3Vdc	



communication	RJ45
installation	Stick to the battery cell (50mm×50mm×28mm)

explanation:

1. BMU-12V/2V resistance measuring precision details:

- 1. Use a resistance meter to measure it between the battery pole, the testing result is data A.
- 2、Connect the BMU-12V/2V, and show the testing result B in the monitor JK070-BMU.
- 3、Calculate the parameter precision as below:

((60-5)×3%)=±1.65mΩ₀

The resistance measuring precision is full scale (FS) error marking, It is the absolute error/ full scale (FS).

For example: BUM-12V corresponding error is $((60-5)\times3\%)=\pm1.65$ m Ω .

2. BMU-12V/2V Resistance Repeatability Error

Resistance Repeatability precision means repeated measuring (>5 times), and then read the biggest error of these value (RD) range. The resistance Repeatability precision do not mean the measuring precision, it can only mean the variation of each measuring.

3. BMU-12V/2V voltage measuring precision:

The voltage measuring precision is full scale (FS) error marking, It is the absolute error/ full scale (FS).

For example: BUM-12V corresponding error is (15×0.1%)=±0.015V.

note

- BMU-12V and BMU-2V unit should be connected to the correct battery type. If connect the BMU-2V to the 12V battery, it will damage the BMU-2V unit.
- 2 For the function of battery balancing, the discharging current is limited, so it did not have a big effect on a battery cell with a big deviation.

ZHCL-BMU battery group data measuring device

1、introduction

ZHCL-BUM can measure the battery group voltage, current, temperature.

It can collect the data from BMU-12V/2V unit.

It has the function of battery balancing.

RS485 port, communication parameter 9600 , 8 , N , 1, protocol MODBUS-RTU, default communication address is 1.

When power on, it will start the battery data acquisition process.

The current sensor is the 100A current type, other type of sensors is not applicable.

The temperature sensor is specially designed.

2、parameter

model	BMU03A
Voltage range	0~600V
Voltage measuring	0.5%FS±0.5V
precision	
Current range	According to the current sensor
current measuring	0.5%FS±0.5A
precision	
Temperature measuring	-20~60 ℃
range	
Temperature measuring	±1.0℃
precision	
Temperature measuring	Temperature sensot
way	
power	90~300Vdc
communication	RS485(MODBUS)
installation	rail





port	function	note
PWR+,PWR-,PE	Input power	190Vdc~260Vdc
+12V,I,-12V,GND	Measure the battery charging and	
	discharging current	
+12V,T+,T-	Measure the ambient temperature	
DC+,DC-	Measure the voltage	
A,B	RS485	Connect to monitor
		JK070-BMU

RX,TX,GND,VCC	serial communication interface	Connect to BMU-12V/2V

4、note

- 1. Input Power is 90~300Vdc, can not be with 220VAC input.
- 3. It need the ZHCL-BMU to send command to BMU-12V/2V, then the BMU-12V/2V can begin the measuring of resistance
- 4. For the balancing discharging function of BMU12V/2V, it is a long balancing period, in the battery quick charging and discharging process, it has no balancing function. It only have effect when the battery floating charging.



Appendix

tools:

Connection between ZHCL-BMU and BMU12V/2V:





BMU-12V/2V

ZHCL-BMU



To BMU-12V/2V port

to ZHCL-BMU port



BMU-12V/2V + ZHCL-BMU