

GYDCG-UBCH2 Series

(Dual DC channels)

User Manual



Version: 1.14

Revision 2023.05

Read me

When you use GYDCG-UBCH2 Series, 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 GYDCG-UBCH2 Series, and help to solve the various problems at the scene.

1. Before turning on the power supply, be sure that the power supply within the provisions of the instrument;
2. When installation, the current input terminal must non-open, voltage input terminals must Non-short circuit;
3. Communication terminal (RS485) is strictly prohibited to impose on high pressure;
4. Be sure the instrument wiring consistent with the internal system settings;
5. When communicating with the PC, instrument communication parameters must be consistent with the PC.



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

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1. - SUMMARIZE

GYDCG-UBCH2 Series model is based on MODBUS protocol of DC insulation monitoring device, is used in on-line monitoring insulation resistance of the DC floating system (two DC system shared one ground). two DC channels are controlled independently, two DC insulation monitoring non-interference in each other. Users can enable or disable the insulation monitoring function of each DC channel and acquire insulation resistance values by RS485 communication.

This product has the characteristics of high reliability, easy installation, and convenient use. It is one of the important equipment to ensure the safe and stable operation of automobile charging piles.

This product can monitor positive and negative symmetrical and asymmetrical insulation resistance, when the product is turned on, it can real-time monitor the insulation resistance, and user can read the current insulation resistance value at any time. After the product is turned off, the high-voltage switch is disconnected, and the product is completely separated from the DC and the earth.

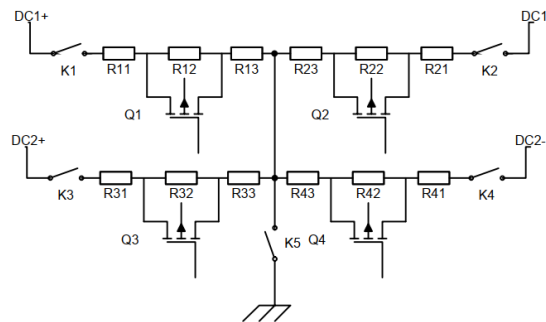


Figure 1 Schematic diagram of double DC- channels insulation monitoring principle

FEATURES

- Two independent control
- Remote monitoring and management
- Monitor positive and negative poles
- Ground insulation resistance
- DC voltage monitoring
- Vehicle side DC voltage monitoring
- Voltage reverse polarity alarm

APPLICATIONS

- Guarantee the safety and stability of charging
- Improvement of the efficiency and charging quality
- Personnel and equipment security
- Electric vehicle safety testing

2. - TECHNICAL PARAMETERS

Basic parameters

Parameter	Value
Power supply	9~30VDC, power 6w
DC voltage range	0~1000VDC
DC voltage measurement accuracy	$\leq 2V + 0.3\%$
Vehicle side voltage range	0~1000VDC
Vehicle side voltage measurement accuracy	$\leq 2V + 0.5\%$
Off-line pressure test	<2mA
Insulation monitoring accuracy	DC voltage 100V~300V: $\leq 3K\Omega + 10\%$ DC voltage 300V~1000V: $\leq 3K\Omega + 5\%$ $C_Y > 0.3\mu F$, Insulation resistance >1M Ω : >10%
Insulation resistance measurement range	1K Ω ~10 M Ω (DC System voltage: 100V~1000V)
Humidity	85%
Storage temperature	- 40°C ~125°C
Operating temperature	- 40°C ~70°C
Standard	IEC 61851-23 (2014-03):2014-11

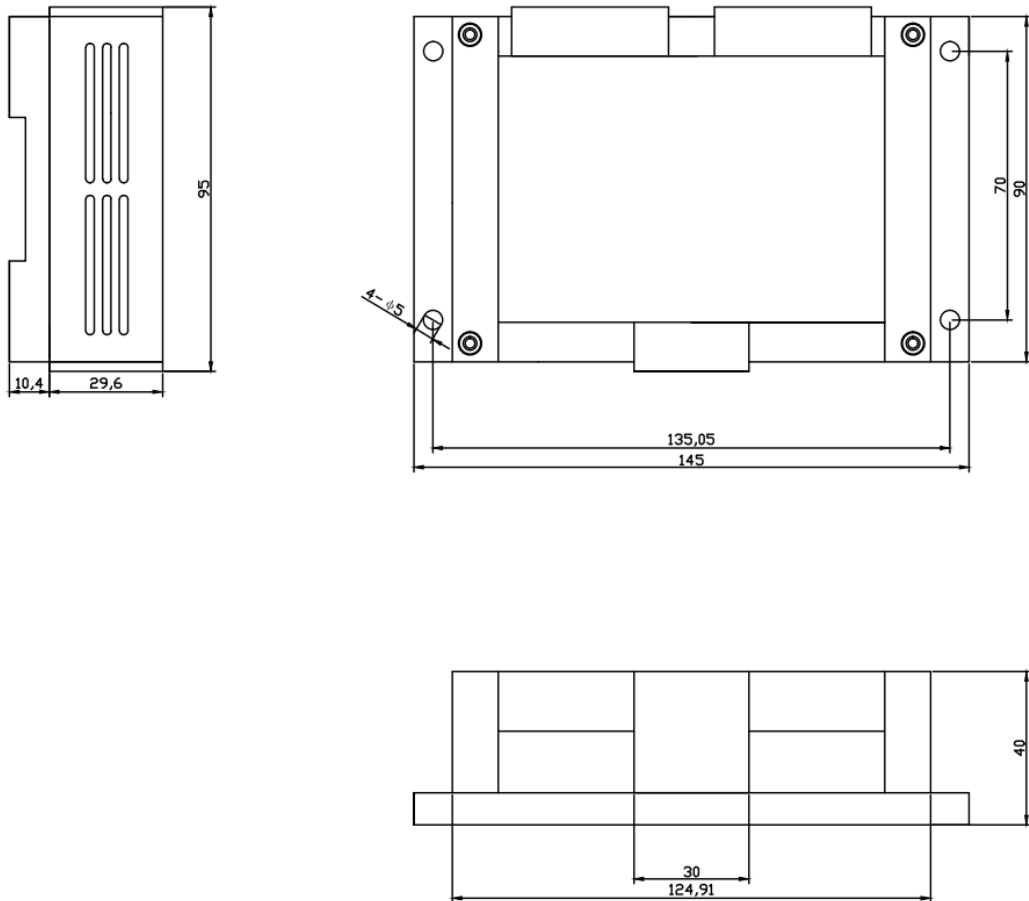
Other parameters

Pressure point	Maximum voltage rating	Time
D+/D- TO GND	4200VDC/3000VAC	$\leq 1\text{min}$
Power supply +/- TO GND	3500VDC/2500VAC	$\leq 1\text{min}$
RS485 A/B TO GND	3500VDC/2500VAC	$\leq 1\text{min}$
EV +/-EV-TO GND	4200VDC/3000VAC	$\leq 1\text{min}$

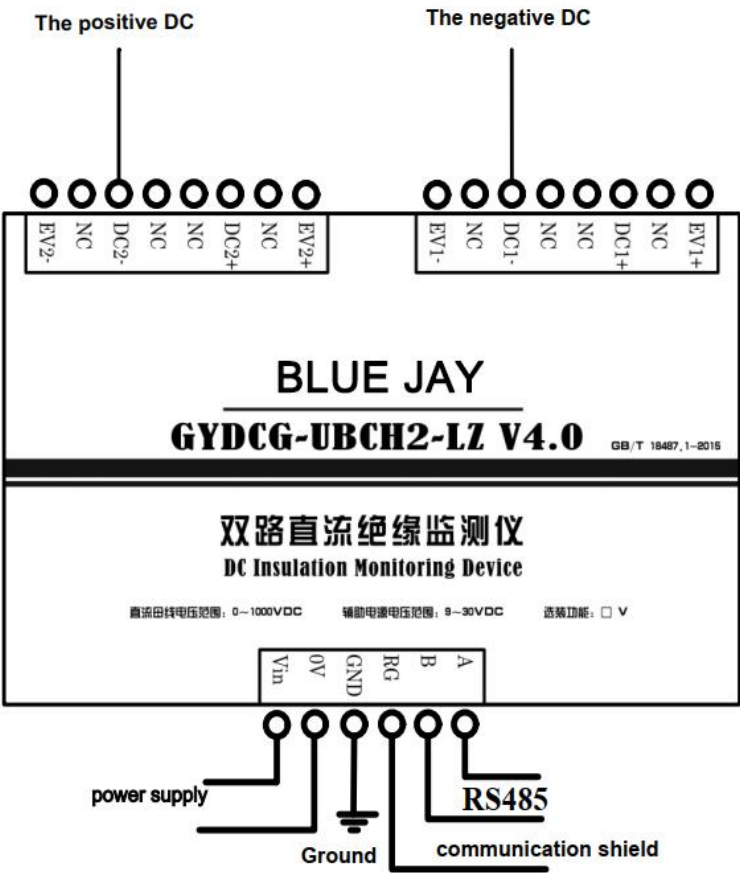
3. - INSTALLATION

3.1. - Mounting

The module can be installed by guide rail or screw fixation. Guide rail using standard width 36mm. External dimensions are shown as follows: (Unit: mm)



3.2. - Connection Terminal



Interface		Definition
DC1+	Positive pole of DC 1	DC1 interface 1
DC1-	Negative pole of DC 1	
DC2+	Positive pole of DC 2	DC2 interface 2
DC2-	Negative pole of DC 2	
EV1+	Positive pole of Vehicle side voltage 1	Use only for UBCH2MV models with Vehicle side voltage measurement
EV1-	Negative pole of Vehicle side voltage 1	
EV2+	Positive pole of Vehicle side voltage 2	
EV2-	Negative pole of Vehicle side voltage 2	
Vin	Positive pole of power supply	9-30VDC
0V	Negative pole of power supply	
GND	Grounding point	
RG	485 Communication Ground port (can leave it unwired)	Reserved , communication shielded line access point
A	485A	
B	485B	

Note:

1. Without vehicle side voltage measurement, there is no need to connect the DC voltage EV+ and EV- on the vehicle side.

Details refer to [Chapter 6](#).

4. - COMMUNICATION INTERFACE

4.1. - Connection for RS485

In RS485 communication system, this IMD module works in slave mode. Baud rate, communication address, parity check mode, can be set by DIP switch, default stop bit 1, data bit 8. The interval between each byte in the sent frame must not exceed 20ms, otherwise the frame will be cleared.

4.1.1 - Communication Parameter configuration bit

Two Dip switch configuration bit 'CONFIG', one of which can be used to configure the communication verification mode. E stands for EVEN parity and O stands for ODD parity. Touse the corresponding check sum, simply dial the corresponding position to "ON". If E and O are set to no, indicates NONE parity. See Figure 2.

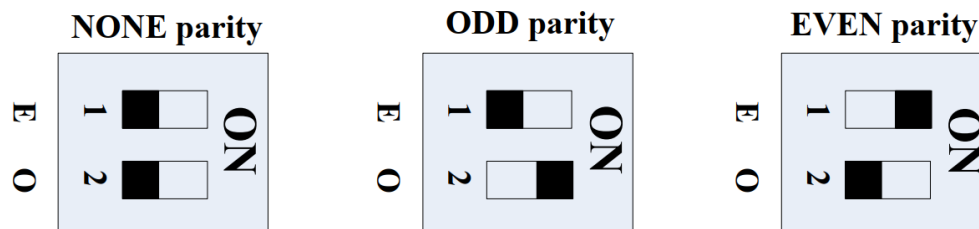


Figure 2 Configuration of communication verification mode

4.1.2 - Initializing Module Communication Parameters

Dip switch configuration bit 'CONFIG', second function can be used to initialize communication parameters. When E and O of CONFIG are dialed to ON at the same time foat least 3 seconds, the baud rate is restored to 9600bps and the communication address is restored to 01H and 02H. The system can be initialized only once after each power on. Thetotal number of times for modifying the baud rate, changing the communication address, andinitializing the baud rate must be less than 1 million. See Figure 3

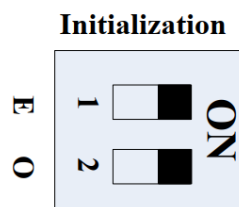


Figure 3 Initial configuration of communication parameters

4.2. - MODBUS © protocol

Standard MODBUS RTU protocol, initial address: A0H, initial baud rate: 9600bps, parity: (parity can be set through CONFIG), stop bit 1, data bit 8. The interval between each byte in the sent frame must not exceed 20ms, otherwise the frame will be cleared.

4.2.1 - Modbus RTU Frame Format:

Address code	1 BYTE	Slave device address 1-247
Function code	1 BYTE	Indicates the function codes like read coils / inputs
Data code	4 BYTE	Starting address, high byte Starting address, low byte Length of registers, high byte Length of registers, low byte
Error Check code	2 BYTE	Cyclical Redundancy Check (CRC)

MODBUS FUNCTIONS:

Code	Meaning	Description
FUNCTION 01	Read Coil Status	Only valid when equipped DO port
FUNCTION 02	Read Input Status	Only valid when equipped DI port
FUNCTION 03	Read holding register	This function permits to read all the electrical parameters
FUNCTION 05	Write Single coil	When DO in remote control mode can work
FUNCTION 06	Write single register	This function permits to write a value into a single holding register.

4.3.1 - Communication protocol RS485

4.3.2 - Dc DC1 input relay control instructions

Instruction 1 Input relay closed

Host inquiry:

Addr. 97 00 00 00 00 00 00 CRC CRC

Slave response:

Addr. 97 00 00 00 00 00 00 CRC CRC

Instruction 2 Input relay is disconnected

Host inquiry:

Addr. 90 00 00 00 00 00 00 CRC CRC

Slave response:

Addr. 90 00 00 00 00 00 00 CRC CRC

4.3.3 - Dc DC2 input relay control instructions

Instruction 1 Input relay closed

Host inquiry:

Addr. 9A 00 00 00 00 00 00 CRC CRC

Slave response:

Addr. 9A 00 00 00 00 00 00 CRC CRC

Instruction 2 Input relay is disconnected

Host inquiry:

Addr. 95 00 00 00 00 00 00 CRC CRC

Slave response:

Addr. 95 00 00 00 00 00 00 CRC CRC

4.3.4 - Dc DC1 data reading instruction

Host inquiry: Addr. 01 00 00 00 00 00 00 CRC CRC

Slave response: Addr.
01
00(H): Dc voltage high bytes
00(L): Dc voltage high bytes
00(H): Positive insulation resistance high bytes
00(L): Positive insulation resistance low bytes
00(H): Negative insulation resistance high bytes
00(L): Negative insulation resistance low bytes
CRC: According to actual calculation
CRC: According to actual calculation

**Slave response:
(reverse connection state
> 160 VDC)** Addr. 70 00 00 00 00 00 00 CRC CRC

Command example:

Host inquiry: A0 01 00 00 00 00 00 5A B3

Slave response: A0 01 01 A4 01 F4 00 78 6A 97

**Slave response:
(reverse connection state)** A0 70 00 00 00 00 00 78 3B B4

4.3.5 - Dc DC2 data reading instruction

Host inquiry: Addr. 03 00 00 00 00 00 00 CRC CRC

Slave response: Addr.
03
00(H): Dc voltage high bytes
00(L): Dc voltage high bytes
00(H): Positive insulation resistance high bytes
00(L): Positive insulation resistance low bytes
00(H): Negative insulation resistance high bytes
00(L): Negative insulation resistance low bytes
CRC: According to actual calculation
CRC: According to actual calculation

**Slave response:
(reverse connection state
> 160 VDC)** Addr. 80 00 00 00 00 00 00 CRC CRC

Command example:

Host inquiry: A0 03 00 00 00 00 00 00 5A B3

Slave response: A0 03 01 A4 01 F4 00 78 6A 97

**Slave response:
(reverse connection state)** A0 07 00 00 00 00 00 00 78 3B B4

4.3.6 – Do.1 Vehicle Side Voltage Data Reading Instruction

Host inquiry: Addr. 02 00 00 00 00 00 00 CRC CRC

Slave response: Addr.
02
00(H): Auto mobile voltage 1 high 8bits
00(L): Car voltage 1 low 8bits
00
00
00
00
CRC
CRC

Slave response:
(reverse connection state
> 20 VDC) Addr. 07 00 00 00 00 00 00 CRC CRC

Command example:

Host inquiry: A0 02 00 00 00 00 00 69 B3

Slave response:
(voltage 420V) A0 02 01 A4 00 00 00 19 BB

Slave response:
(reverse connection state) A0 07 00 00 00 00 00 78 3C B3

4.3.7 – Do.2 Vehicle Side Voltage Data Reading Instruction

Host inquiry: Addr. 05 00 00 00 00 00 00 CRC CRC

Slave response: Addr.
05
00(H): Auto mobile voltage 2 high 8bits
00(L): Car voltage 2 low 8bits
00
00
00
00
CRC
CRC

Slave response:
(reverse connection state
> 20 VDC) Addr. 08 00 00 00 00 00 00 CRC CRC

Command example:

Host inquiry: A0 05 00 00 00 00 00 1F 73

Slave response:
(voltage 420V) A0 05 01 A4 00 00 00 6F 7B

Slave response:
(reverse connection state) A0 08 00 00 00 00 00 C3 B3

5 - Register map

Register	Data	Byte mode		Instruction
0x0010	Bus voltage	float		Unit:0.1V,voltage between positive and negative poles of DC bus
0x0012	DC1 Positive insulation resistance DC2 Positive insulation resistance	float	1	The unit is K Ω , an integer
0x0013	DC1 Negative insulation Resistance DC2 Negative insulation Resistance	float	1	The unit is K Ω , an integer
0x001A	Read version number	float	1	
0x001B	IO state	float	1	Bit1: Whether the current insulation resistance monitoring results are valid. Bit2: Whether the insulation monitoring is on and the high voltage switch is closed. Bit7: Bus voltage back connection alarm (when the back connection voltage is above 170V, this position 1)
0x0102	Insulation monitoring control	float	1	Enable DC1 insulation monitoring. Enable DC2 insulation monitoring.
	Insulation monitoring control			Disable DC1 insulation monitoring. Disable DC2 insulation monitoring.
0x0103	Modify the address	float	1	Change the address from 01H to 02H; Change the address from 02H to 03H;
0x0104	Modify the baud rate	float	1	Change the baud rate to 9600; Change baud rate to 19200
0x66	The host broadcast reads the slave address	float	1	Example of reply from machine FF 66 01 02 50 7E The slave addresses are 0x01 and 0x02

The samples:

Sample1 Start insulation monitoring

Host inquiry:

01 06 01 02 00 11 E9 FA

Slave response:

01 06 02 00 11 78 84

Sample2 Turn off insulation monitoring

Host inquiry:

01 06 01 02 00 00 29 F6

Slave response:

01 06 02 00 00 B8 88

Sample3 Read the DC bus voltage and positive and negative electrode resistance to the ground (read 4 registers)

Host inquiry:

01 03 00 10 00 04 45 CC

Slave response:

01 03 08 03 E8 02 58 EA 60 02 58 A9 7F

Definition: Read the DC voltage 0X03E8(100V), the total insulation resistance 0X0258(600KΩ), the positive insulation resistance 0xEA60 (infinite), the negative insulation resistance 0X0258 (600KΩ).

Sample4 Read IO status:

Host inquiry:

01 03 00 1B 00 01 F4 0D

Slave response:

01 03 02 00 84 B8 27

Definition: Bus voltage reverse connection, insulation monitoring is enabled (ground relay is closed), insulation resistance monitoring is invalid.

Slave response:

01 03 02 00 06 38 46

Definition: There is no reverse connection of bus voltage, insulation monitoring is enabled (ground relay is closed), and insulation resistance monitoring is effective.

Sample5 Read version number

Host inquiry:

01 03 00 1A 00 01 A5 CD

Slave response:

01 03 02 22 01 61 24

Definition: The version number is V2201.

6. - Model Selection Sheet

DC Insulation Monitor (Dual DC channels)	
GYDCG-UBCH2	Dual insulation monitoring DC voltage detection Can monitor two DC voltages at the same time
GYDCG-UBCH2 MV	Dual-circuit insulation monitoring DC voltage detection Vehicle side voltage measurement Can monitor two DC voltages at the same time

Note:

1.For the GYDCG-UBCH2MV model with vehicle side voltage measurement, users can read the voltage data through the communication protocol. Measuring range 0-1000V.

7. - 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;

8. - MAINTENANCE

The GYDCG-UBCH2 does not require any special maintenance. No adjustment, maintenance or repairing action should be done when the instrument is open and powered on, should those actions are essential, high-qualified operators must perform them.

Before any adjustment, replacement, maintenance or repairing operation is carried out, the instrument must be disconnected from any power supply source.

When any protection failure is suspected to exist, the instrument must be immediately put out of service. The instrument's design allows a quick replacement in case of any failure.

9. - FAQs

Question 1: The power indicator LED is off

Check whether the power supply terminal of the module is improperly connected, or the hot swap overcurrent causes the fuse to burn, try to avoid hot plug.

Question 2: Communication failure

Do not use USB-232-485 bipolar interface for communication, If the communication fails again, use the CONFIG mode to restore the factory Settings parameters. ([chapter4.1.2](#))

Question 3: The insulation monitoring resistance is infinite after the simulation of insulation resistance

Check whether the ground cable is connected reliably at GND port.

Question 4: The insulation monitoring resistance is much smaller than actual value

The DC ground capacitance may be too large. Check the DC ground capacitance

Question 5: Communication initialization is invalid

The system can be initialized only once by CONFIG during each power-on.

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

Blue Jay - After-sales service

E-mail: tech@cqbluejay.com