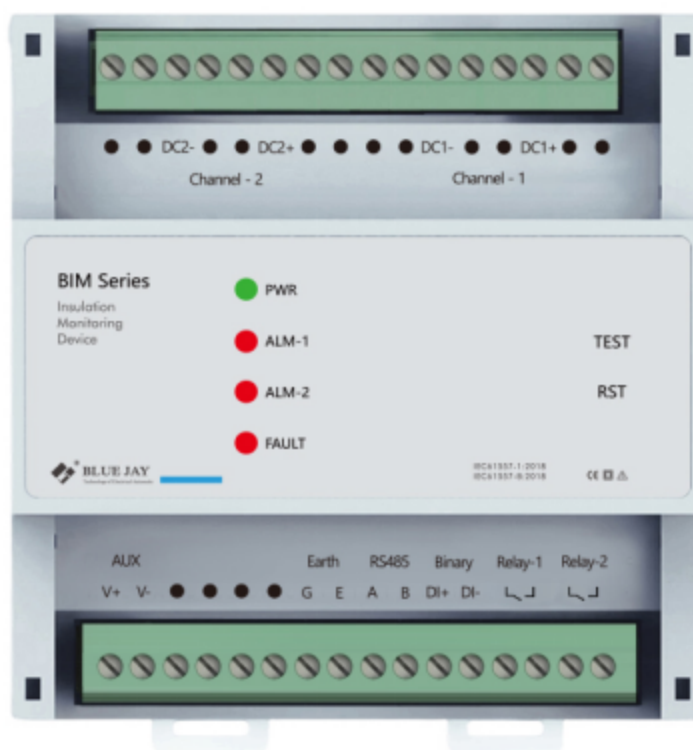


BIM-CH2 Dual Channel Insulation Monitoring Device

User Manual



Version: 1.10

Revision: 2026.05

Read me

When you use BIM-CH2, 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 BIM-CH2, 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

BIM-CH2 Dual Channel Insulation Monitoring Device is designed for online insulation monitoring of two independent DC IT systems with a voltage range of DC 100V to 1000V. It continuously measures the insulation resistance between positive/negative poles and ground in both systems, enabling real-time detection of insulation degradation. When the insulation resistance falls below the preset threshold, the device generates alarm signals to ensure safe and reliable system operation. The device also supports RS485 communication with Modbus-RTU protocol for remote monitoring and system integration.

Based on the bridge circuit principle, the device provides stable and accurate insulation measurement performance. It features LED status indication and a compact DIN-rail mounted housing for easy installation. The product is widely used in DC distribution panels, EV charging systems, UPS systems, energy storage systems, and other DC IT networks.

FEATURES

- Bridge circuit measurement principle;
- Designed for 100-1000V DC unearthed IT systems;
- Dual-channel DC IT system insulation resistance monitoring;
- Separately adjustable response value range: 1kΩ...10MΩ;
- Dual relay outputs for alarm threshold configuration;
- Supports up to 10 types configurable alarm functions;
- Supports manual self-test and wiring connection monitoring;
- RS485 communication with Modbus-RTU protocol;

APPLICATIONS

- EV/HEV DC charging systems;
- DC power distribution and power supply systems;
- New energy generation and energy storage systems;
- Substation DC power supply systems;
- Industrial automation DC power systems;

2.- TECHNICAL PARAMETERS

Parameter	Value		
Power supply	10-30VDC, Power 5W		
DC voltage range	100V~1000V		
DC voltage measurement accuracy	$\leq 2V + 0.3\%$		
Insulation resistance measurement range	1K Ω ~10M Ω (DC system voltage: 100V~1000V)		
Max system leakage capacitance	0-5 μ F		
Insulation monitoring accuracy (When: DC voltage: 100V-1000V)	C_T range	Resistance range	Accuracy
	0~0.8 μ F	$\leq 60k\Omega$	$\leq 3k\Omega$
		$60k\Omega < R < 1M\Omega$	$\leq 5\%$
	0.8 μ F ~3 μ F	$\leq 60k\Omega$	$\leq 6k\Omega$
		$60k\Omega < R < 1M\Omega$	$\leq 20\%$
Insulation resistance value update time after turning on	After insulation monitoring is turned on, the time until the effective resistance value can be read for the first time		4-5s
Insulation resistance value update time	Switch the insulation resistance until the module can read the switched insulation resistance value.		4-5s
Insulation monitoring function switching times	50*10 ⁵ times		
Off-line withstand voltage test	<2mA		
Digital output (DO)	2*DO, passive dry contact, NO Load capacity: 4A@250Vac, 4A@30Vdc		
Digital input (DI)	1*DI, passive dry contact, operating voltage 5-20Vdc 0.25mA@short circuit		
Communication	RS485/ Modbus RTU		
Standard	IEC 61557-1: 2018; IEC 61557-8: 2018		
Dimension	Standard 35 mm DIN rail mounting Dimensions (W x H x D): 108 x 110 x 66 mm		
Storage temperature	-55°C~90°C; $\leq 90\%RH$ (non-condensing, non-corrosive), Altitude: ≤ 3500 m		
Operating temperature	-40°C~75°C; $\leq 90\%RH$ (non-condensing, non-corrosive), Altitude: ≤ 3500 m		

Notes:

1-. When the insulation resistance to earth of the positive pole (RfP) and the negative pole (RfN) differs significantly, with a ratio greater than 5:1, the higher value of RfP or RfN may deviate from the typical insulation resistance.

2-. CY refers to the Y-capacitance from the positive and negative system busbars to earth.

Withstand voltage test

Voltage injection point	Maximum voltage rating	Time
DC+/DC- to GND	4200VDC/3000VAC	≤1min
Power supply +/- to GND	3500VDC/2500VAC	≤1min
RS485 A/B to GND	3500VDC/2500VAC	≤1min
DC+/DC- to Power supply +/-	4200VDC/3000VAC	≤1min
DC+/DC- to A/B	4200VDC/3000VAC	≤1min

Note: The power supply side (+/-), RS485(A/B), and Ground(G) should be isolated from each other.

3.- Function introduction

3.1.- Insulation resistance monitoring function

The BIM-CH2 continuously monitoring the insulation resistance of IT systems (ungrounded systems). When the measured insulation resistance falls below the preset alarm threshold, the corresponding alarm relay trips out, and the LED indicator illuminates to issue an alarm. For proper measurement, the device must be connected between the IT system and the protective earth conductor (E).

After power-on, the "PWR" indicator turns on, and the device enters insulation resistance monitoring by default, the insulation resistance value can be read as fast as 4-5s. The operating mode can be configured via registers 0x006E to "manual trigger insulation monitoring after powered on." In this mode, insulation monitoring does not start automatically after powered on and must be manually enabled or disabled through register commands.

3.2.- Auto and manual reset function

The BIM-CH2 supports both manual reset and automatic reset modes. The reset mode can be selected via register 0x0071. The **RST** button on the front panel is effective for reset function only when manual reset mode is selected.

Automatic reset mode (default): When fault occurs, the output signal is activated immediately (e.g. self-test fault indicator turns on, alarm indicator lights up, relay output is energized). When the fault is cleared, the output signal automatically returns to the normal status.

Manual reset mode: When fault occurs, the output signal is activated immediately (e.g. self-test fault indicator turns on, relay output is energized). Even after the fault is cleared, the output signal remains in the "fault" status until it is manual reset by pressing the **RST** button.

Note: Alarm function 1-10 only support automatic reset. Selecting manual reset for these alarms is invalid.

3.3.- Device manual self-test function

The BIM-CH2 support manual self-test, the function can be triggered by pressing the **TEST** button or remotely via RS485 command.

-. Self-test status query

Check by querying register 0x0515 via RS485 command :

Fault code	Definition
E01	"DC1+, DC1-" any terminal reverse connection
E02	"DC1+, DC1-" any terminal open circuit
E03	G,E grounding terminal open circuit
E04	Any LED light function failure
E05	Relay function failure, no response
E06	RS485 communication connection failure (Reserved)
E07	Internal abnormal value detected
E08	"DC2+, DC2-" any terminal reverse connection
E09	"DC2+, DC2-" any terminal open circuit
E10	Reserved

Notes:

- . The true fault status of code E04 and E05 can only be verified on-site inspection. RS485 queries always return a normal status by default.
- . E06 is reserved function and not enabled in the present version.

3.4.- Alarm function

BIM-CH2 support up to 10 types of configurable alarm function for monitoring critical parameters, the alarm thresholds can be flexibly configured to enable accurate system condition warning and protection.

Alarm No.	Item	Parameter	Value
Alarm-1	IR positive pole alarm	IR+	1KΩ~10MΩ, Default 300KΩ
Alarm-2	IR negative pole alarm	IR-	
Alarm-3	Voltage over threshold	Volt	0-1000V
Alarm-4	System leakage capacitance over threshold (Reserved)	YCap	0-5 μF
Alarm-5	DC offset over threshold	DCoff	20-1kV
Alarm 6-10	Reserved function	Rfu	/

3.5.- DI/ DO function

BIM-CH2 supports 2 channels DO for alarm status output, and 1 channels DI for external control signals input.

Configuration	Parameter	Value
2* Relay output	Mapping	OFF, Alarm 1-10
	Link	OFF, Alarm 1-10
	Logic	AND, OR
	Mode	NC: Normally close NO: Normally open (default)

Configuration	Parameter	Value
1* Relay input	Function	Optional functions are as follows: 0: Off 1: Self-test 2: Reset 3: Switch channel 1 insulation resistance or voltage monitoring 4: Switch channel 2 insulation resistance or voltage monitoring
	Mode	Active high Active low
	Delay	Signal response time delay, ranging from 0000 to 9999ms.

4.- INSTALLATION AND START-UP



The manual you hold contains information and warnings that users should follow in order to guarantee a proper operation of all the instrument functions and keep it in safety conditions. The instrument must not be powered on and used until its definitive assembly is on the cabinet's door.

If the instrument is not used as manufacturer's specifications, the protection of the instrument will be damaged.

When any protection failure is suspected to exist (for example, it presents external visible damage), the instrument must be immediately powered off. In this case contact a qualified service representative.

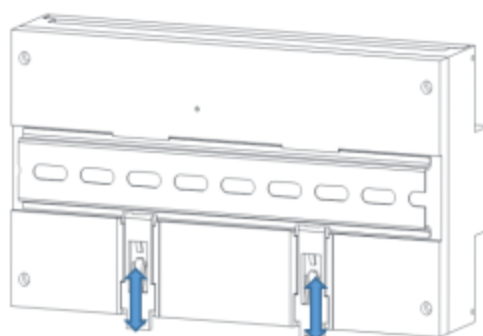
4.1.- Installation

Mounting

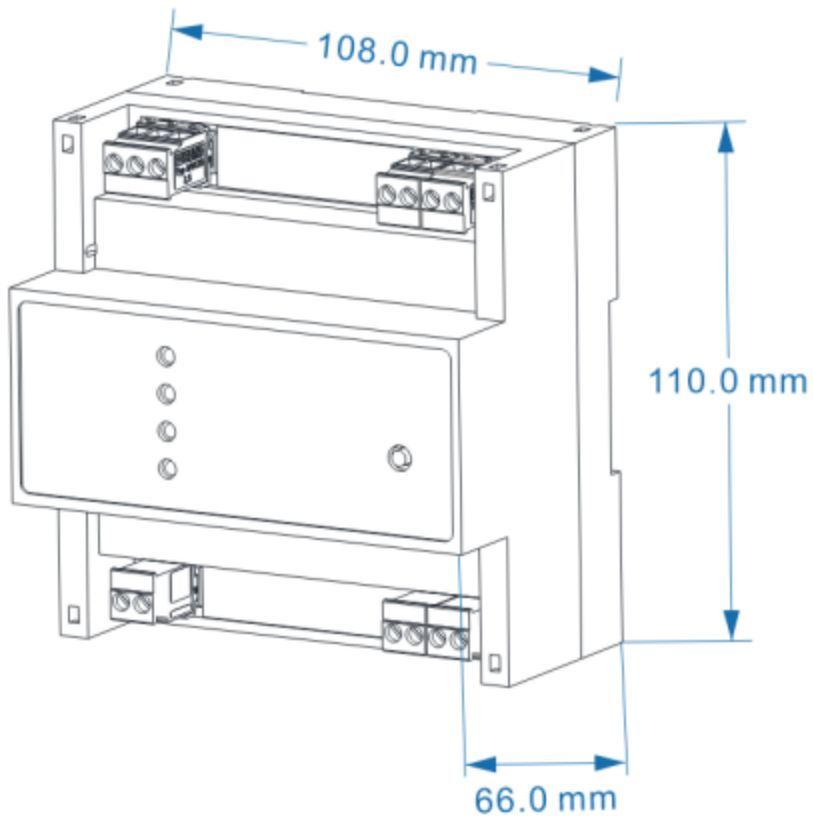
The instrument is to be mounted on the 35mm Din-rail. Keep all connections inside the cabinet.

Note that with the instrument powered on, the terminals could be dangerous to touch. and cover opening actions or elements removal may allow accessing dangerous parts. Therefore, the instrument must not be used until this is completely installed.

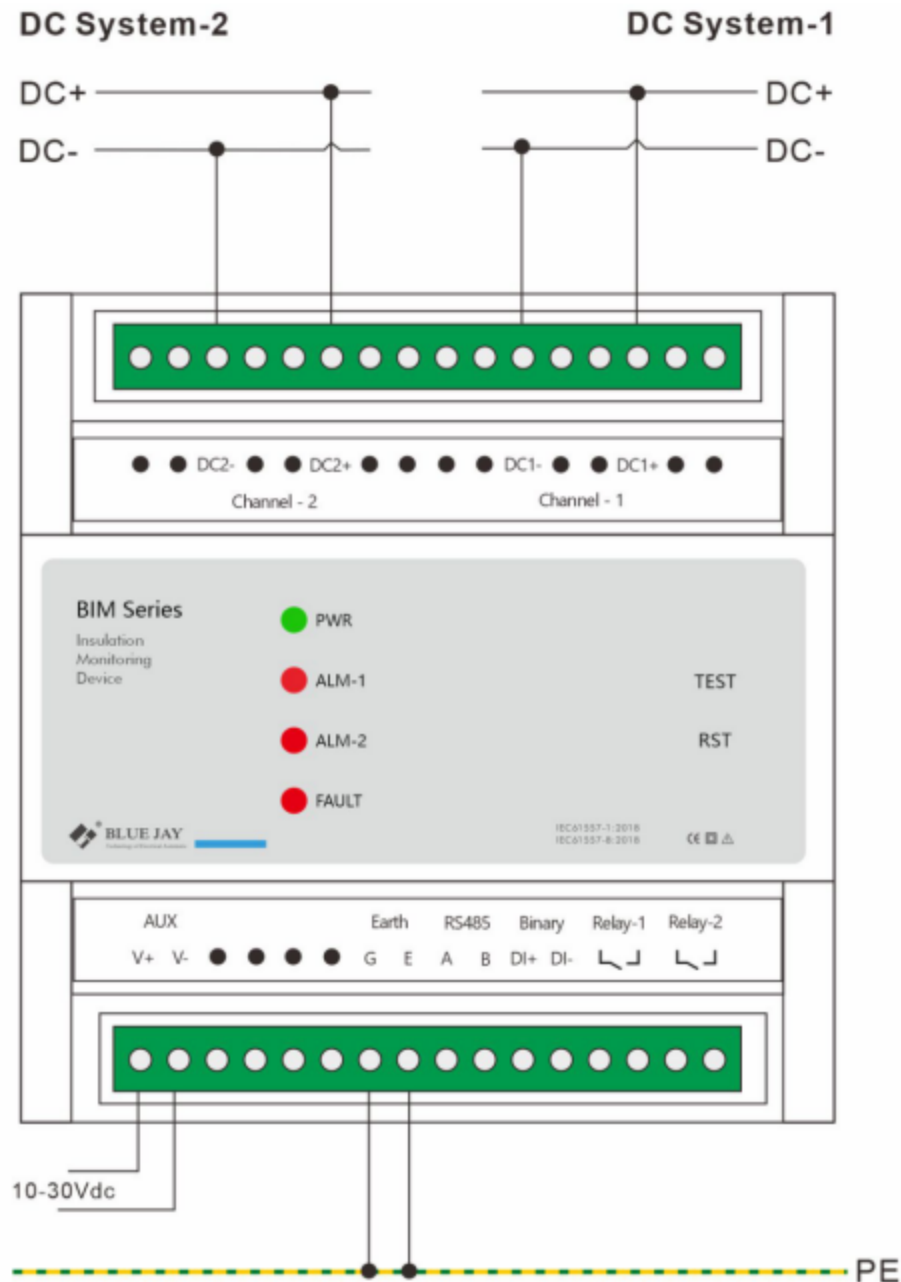
- Step-1** Fasten a section of 35 mm DIN rail (at least 8 inches long) to the mounting surface with appropriate hardware.
- Step-2** Use the white plastic clips on the back of the device to clip onto the rail.
- Step-3** Verify that the device is securely fastened to the wall.



Dimension: W*H*D: 108*110*66 mm



4.2.- Wiring diagram and terminal definition



Terminal	Description
DC1+, DC1-	Connect to channel 1 DC system (+/-)
DC2+, DC2-	Connect to channel 2 DC system (+/-)
V+, V-	Auxiliary power supply 10-30VDC
G, E	System ground wire
A, B	RS485 Communication interface A, B
DI+, DI-	Relay input
	Relay output 1
	Relay output 2

4.3.- Indicator lights and buttons description

After the module is powered on, the PWR indicator is on.



Indicator	Definition
PWR	Off: product is not powered on Green: Device is powered on and operating normally
ALM-1	Off: Relay-1 not trip Red: Relay-1 trip out
ALM-2	Off: Relay-2 not trip Red: Relay-2 trip out
Fault	Self-test fault status indicator Off: no fault Red: self-test fault detected

Button	Definition
TEST	Activate device self-test
RST	Manual reset fault and alarm status

Note:

Simultaneously press both the **TEST** and **RST** buttons for 3s to reset the communication to the default parameters: address 1, baud rate 9600, parity n.8.1. After changing, device must be restarted, then the change can be valid.

5.- COMMUNICATION INTERFACE

5.1.- Connection for RS485

Users can send and receive data frames through the RS485 communication port. The circuit is equipped with 510Ω terminal resistance. Terminals A and B correspond to RS485 outputs A and B respectively.

5.2.- Communication Protocol

This device use Modbus RTU protocol 0x03/0x06 command, default initial baud rate 9600, communication address 001, parity check mode n.8.1. The time interval between each byte in the sent frame shall not exceed 20ms, otherwise the frame will be cleared.

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 03	Read hold register	This function permits to read all the electrical parameters
FUNCTION 06	Write single register	This function permits to write a value into a single holding register.

5.3.- Register map

5.3.1.- Parameter query- basic parameters, read only, function 03 to read

Register	Data	Description
0x0000-0x000A	Reserved	
0x000B	Channel 1 DC bus voltage	Unit: 0.1V
0x000C	Channel 1 Positive pole to ground voltage	Unit: 0.1V
0x000D	Channel 1 Negative pole to ground voltage	Unit: 0.1V
0x0020	Channel 2 DC bus voltage	The same as channel 1
0x0021	Channel 2 Positive pole to ground voltage	
0x0022	Channel 2 Negative pole to ground voltage	
0x0023-0x0028	Reserved	
0x0029	Channel 1 Positive pole insulation resistance	Unit: KΩ (0xFFFF: invalid value; 0xEA60: resistance value greater than 10MΩ)
0x002A	Channel 1 Negative pole insulation resistance	
0x002B	Channel 1 DC alarm status	DC fault % (Valid only when DC voltage ≥ 20V) Offset value: 1: 0 ... 25% → DC positive fault 2: 25 ... 75% → symmetrical fault 3: 75 ... 100% → DC negative fault
0x002C	Channel 1 DC to ground offset voltage	DC to ground offset voltage absolute value Unit: 0.1V (Valid only when DC voltage ≥20V).
0x002D	Channel 2 Positive pole insulation resistance	The same as channel 1
0x002E	Channel 2 Negative pole insulation resistance	
0x002F	Channel 2 DC alarm status	
0x0030	Channel 2 DC to ground offset voltage	

0x0031-0x0033	Reserved	
0x0034	Channel 1 System leakage capacitance	Unit: 0.1μF
0x0035	Reserved	
0x0036	Channel 1 DC component (positive pole impedance %)	Unit 0.1% 0% = positive DC fault 100% = negative DC fault
0x0050	Channel 2 System leakage capacitance	Unit: 0.1μF
0x0051	Channel 2 DC component (positive pole impedance %)	Unit 0.1% 0% = positive DC fault 100% = negative DC fault
0x0052-0x0064	Reserved	

Note: During insulation resistance monitoring, DC voltage is not measured; so, all above DC voltage related RS485 values are 0.

Special code 0XFF, for host reads the slave address

Register	Data	Description
0X0037	Host reads the slave address	Example: Host inquiry: FF 37 A5 AA 2B Slave response: FF 37 01 AB 90 The slave address is 0x01

5.3.2.- Basic parameters, readable& writable, function 03 to read/ 06 to write

Register	Data	Description
0x0064-0x006D	Reserved	
0x006E	Working mode	0: Auto start insulation monitoring after power-on (default) 1: Manual trigger insulation monitoring after powered on (via 0x0070)
0x006F	Voltage monitoring control	1: Turn on channel 1 voltage monitoring function (default) 2: Turn on channel 2 voltage monitoring function 3: Turn on channel 1 and channel 2 voltage monitoring function simultaneously.
0x0070	Insulation monitoring control	1: Turn on channel 1 insulation monitoring function (default) 2: Turn on channel 2 insulation monitoring function
0x0071	Reset mode	0: Manual reset 1: Auto reset (default)
0x0072	Reserved	
0x0073	Trigger self-test	0: Not in self-test status (default) 1: Trigger a device self-test
0x0074-0x00C7	Reserved	

Communication configuration

Register	Data	Description
0x00FA	Modbus ID	Range: 1-247 (default 001)
0x00FB	Comm. port baud rate	0: 1200; 1: 2400; 2: 4800; 3: 9600 (default) ;
0x00FC	Comm. port data format	0: n.8.1 (default) ; 1: o.8.1; 2: e.8.1; 3: n.8.2
0x00FD-0x012B	Reserved	

Note: Modify the communication baud rate and format need to restart device to take effect. Only modify Modbus ID not need restart device.

5.3.3.- Alarm, DI, DO configuration, readable& writable, function 03 to read/ 06 to write

Register	Data	Description
0x012C-0x0135	Reserved	
0x0136	Alarm-1 Channel selection	0: Channel 1 (default) 1: Channel 2
0x0137	Alarm-1 Mode	0: Off (default) ; 1: Rising; 2: Falling
0x0138	Alarm-1 Data	Choose 1 from 8 functions, repeatable: 0: IR+ for Positive insulation resistance (default) 1: IR- for Negative insulation resistance 2: Volt for Voltage 3: YCap for System leakage capacitance 4: DCoff for DC offset alarm 5: Reserved function 6: Reserved function 7: Reserved function
0x0139	Alarm-1 Delay	Range: 0000-9999, default 1000ms
0x013A	Alarm-1 Trip value	Range: 0000-9999 For IR+: default 300, unit: kΩ For IR-: default 300, unit: kΩ For Volt: unit: 0.1V For YCap: unit: 0.1μF For DCoff: unit: 0.1V
0x013B	Alarm-1 Hys.	0-9999: hysteresis value, default 20
0x013C-0x0149	Reserved	
0x014A-0x014F	Alarm-2	The same as Alarm-1
0x0150-0x015D	Reserved	
0x015E-0x0163	Alarm-3	The same as Alarm-1
0x0164-0x0171	Reserved	
0x0172-0x0177	Alarm-4	The same as Alarm-1
0x0178-0x0185	Reserved	
0x0186-0x018B	Alarm-5	The same as Alarm-1
0x018C-0x0199	Reserved	
0x019A-0x019F	Alarm-6	The same as Alarm-1

0x01A0-0x01AD	Reserved	
0x01AE-0x01B3	Alarm-7	The same as Alarm-1
0x01B4-0x01C1	Reserved	
0x01C2-0x01C7	Alarm-8	The same as Alarm-1
0x01C8-0x01D5	Reserved	
0x01D6-0x01DB	Alarm-9	The same as Alarm-1
0x01DC-0x01E9	Reserved	
0x01EA-0x01EF	Alarm-10	The same as Alarm-1
0x01F0-0x0200	Reserved	

Register	Data	Description
0X02BD	DO-1 mapping data	0: OFF (default) 1: Alarm-1 2: Alarm-2 3: Alarm-3 4: Alarm-4 5: Alarm-5 6: Alarm-6 7: Alarm-7 8: Alarm-8 9: Alarm-9 10: Alarm-10
0X02BE	DO-1 link data	0: OFF (default) 1: Alarm-1 2: Alarm-2 3: Alarm-3 4: Alarm-4 5: Alarm-5 6: Alarm-6 7: Alarm-7 8: Alarm-8 9: Alarm-9 10: Alarm-10
0X02BF	DO-1 association logic mode	0: AND; 1: OR (default)
0X02C0	DO-1 default status	0: NC (when power on, relay closes and when reached the trigger condition relay opens). 1: NO (default)
0X02C1-0X0384	Reserved	
0X0300	DO-2 mapping data	
0X0301	DO-2 link data	

0X0302	DO-2 association logic mode	
0X0303	DO-2 default status	
0X0304-0X03E8	Reserved	

Register	Data	Description
0X03E9	DI-1 Function	0: Off (default) 1: Self-test 2: Reset 3: Switch channel 1 insulation resistance or voltage monitoring 4: Switch channel 2 insulation resistance or voltage monitoring
0X03EA	DI-1 Mode	0: Active low 1: Active high (default)
0X03EB	DI-1 Delay	Range 0000-9999ms, default 100ms
0X03ED-0X03FC	Reserved	

5.3.4.- Query alarm status and self-test fault status, read only, function 03 to read

Register	Data	Byte mode		Description
0X0515	Self-test status	Int	2	Bit 0: Self-test progress (0: Self-test completed; 1: Self-test in progress) Bit 1: Reserved Bit 2: Reserved Bit 3: Code E01 fault status (0: Normal; 1: Fault) Bit 4: Code E02 fault status (0: Normal; 1: Fault) Bit 5: Code E03 fault status (0: Normal; 1: Fault) Bit 6: Code E04 fault status (0: Normal; 1: Fault) Bit 7: Code E05 fault status (0: Normal; 1: Fault) Bit 8: Code E06 fault status (0: Normal; 1: Fault) Bit 9: Code E07 fault status (0: Normal; 1: Fault) Bit 10: Code E08 fault status (0: Normal; 1: Fault) Bit 11: Code E09 fault status (0: Normal; 1: Fault) Bit 12-15: Reserved
0X0516-0X0546	Reserved			
0X0547	Alarm status	Int	2	Bit 0: Alarm 1 status (0: Normal; 1: Triggered) Bit 1: Alarm 2 status (0: Normal; 1: Triggered) Bit 2: Alarm 3 status (0: Normal; 1: Triggered) Bit 3: Alarm 4 status (0: Normal; 1: Triggered) Bit 4: Alarm 5 status (0: Normal; 1: Triggered) Bit 5: Alarm 6 status (0: Normal; 1: Triggered) Bit 6: Alarm 7 status (0: Normal; 1: Triggered) Bit 7: Alarm 8 status (0: Normal; 1: Triggered) Bit 8: Alarm 9 status (0: Normal; 1: Triggered) Bit 9: Alarm 10 status (0: Normal; 1: Triggered) Bit 10-15: Reserved
0X0548-0X0578	Reserved			

Note: Bit sequence is from LSB to MSB.

5.3.5.- Factory information query, read only, function 03 to read

Register	Data	Description
0XF000	Manufacturer	BLUE JAY
0XF010	Device model	BIM-CH2
0XF020	Product number	101
0XF030	Firmware version	V0.3
0XF040	Firmware date	2026.01.07
0XF050	Hardware version	V0.5
0XF060	Production week	Reserved
0XF070	SN code	Reserved
0XF080	MAC address (Reserved)	
0XF090-0XFFFF	Reserved	

Note: The above specifications may be updated due to product revisions. Please refer to the actual device query for final information.

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.- MAINTENANCE

The BIM-CH2 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.

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