

CBM3000

Circuit Breaker Manager

User Manual



Version:1.0

Revision :2023.04

Read me

When you use CBM3000, be sure to carefully read this user manual, 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 CBM3000, and help to solve the various problems at the scene.

1. The power supply must be connected in strict accordance with the marked voltage level, and the wiring must be strictly in accordance with the markings on the terminals on the back.
2. During installation, the terminals should be tightened, and the equipment should be fixed in a place that is strong, fire-resistant, and not easy to vibrate. The effect is best when the equipment is looking up, so it should be installed vertically, and the height should be 1.8M.
3. During the withstand voltage test, it is necessary to disconnect the high voltage live display sensor plug, disconnect the temperature and humidity sensor plug and the wireless receiving head.
4. All digital contacts must be passive access.
5. Wiring according to the actual wiring mark, subject to change without prior notice.
6. The company is not responsible for improper use or malfunctions not caused by this product.



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

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1.- SUMMARIZE

CBM3000 Circuit Breaker Manager is a new generation product mainly design and development for 3 ~ 35KV indoor switchgear, it is suitable for switchgear cabinet, handcart cabinet, fixed cabinet, RMU and other types switchgears. The product provides real-time display for temperature and humidity; automatic heating dehumidification control; circuit breaker status indication; spring storage and grounding switch indicator; also show the circuit diagram and the simulation sub-switch LED to indicate.

Products all use industrial-grade electronic components, Rigorous design and manufacturing process make high reliability, long life, and strong anti-interference capability. Meet standards DL/T538-2006 [High voltage live display device technical conditions].

APPLICATIONS

- Automatically cut off the power
- Monitor the operating status of electrical equipment
- Monitor electrical energy consumption in power systems
- Power equipment in substations and power plants
- Ensuring the Safety and Reliability of Power Systems
- Reduce energy consumption and enhance equipment safety
- Automated remote control and monitoring

FEATURES

- Automatically cut off the power
- With door lock indicator (NC/NO)
- Optional high voltage indicator
- Optional RS485 communication
- Switchgear inside temperature & humidity display (LED or LCD)
- With electronic thermostat can automatic control fan /heater
- With primary side analog diagram to show switchgear inner wiring
- Integrated led indicator to show switch position, breaker position, earth switch position, VCB spring energy state

2.- TECHNICAL PARAMETERS

Basic parameters

Auxiliary Power	85~265Vac/dc
Power consumption	15VA
Display screen	LCD with 4 button operation key
Communication	RS-485, MODBUS-RTU
Environment temperature	-10 ~ +60°C
Environment humidity	RH 20% ~ 95% (No condensation)
Altitude	<3000m
Withstand voltage	AC2000V/1min
Dielectric strength	100Mohm
Electromagnetic compatibility	Comply with IEC255-22
Dimensions	250x190x68mm (WxHxD)
Install hole open	226x165mm

Temperature protection relay

Temperature set range	-20C ~80C
Resolution	0.1C
Humidity set range	0% ~ 100%
Resolution	0.1%RH

Integrate power metering

Network	1P2W, 3P3W, 3P4W
Rated voltage	AC100V, 220V, 380V depends on VT
Burden	<0.1VA (Per phase)
Rated current	AC1A, 5A depends on CT
Burden	<0.4VA (Per phase)
Accuracy level	full scale 0.5%, RMS
Frequency range	40~65Hz, accuracy: $\pm 0.02\text{Hz}$
Power	KW and Kvar, accuracy: 0.5%
Energy	Kwh 0.5S class, Kvarh 2.0 class

Other protection functions

High voltage indicator sensitive	[Rated voltage] x 0.15~0.65
Door lock relay act voltage	>[Rated voltage] x 0.65

3.- INSTALLATION AND START-UP



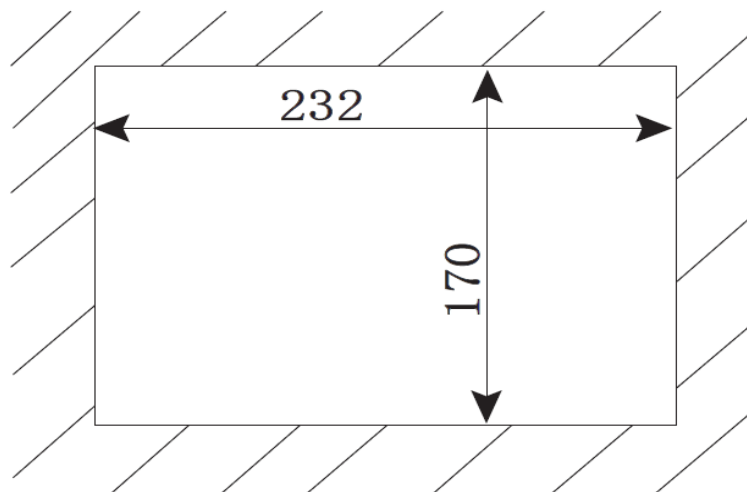
The manual you hold in your hands contains information and warnings that the user should respect in order to guarantee a proper operation of all the instrument functions and keep its safety conditions. The instrument must not be powered and used until its definitive assembly on the cabinet's door.

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

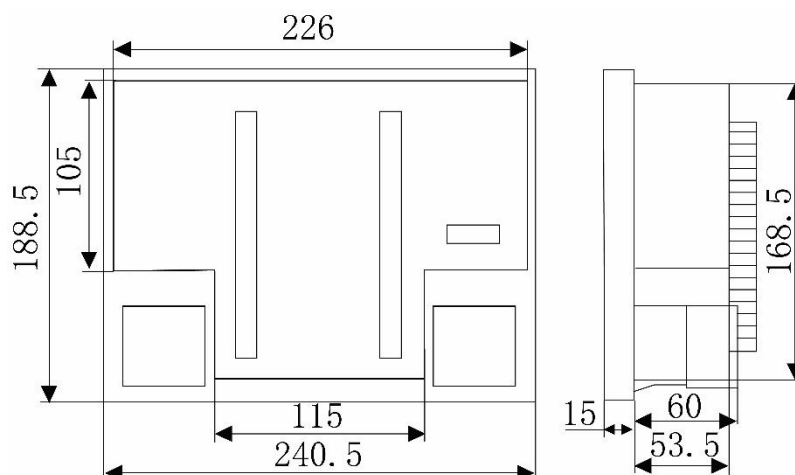
When any protection failure is suspected to exist (for example, it presents external visible damages), the instrument must be immediately powered off. In this case contact a qualified service representative.

3.1.- Dimension:

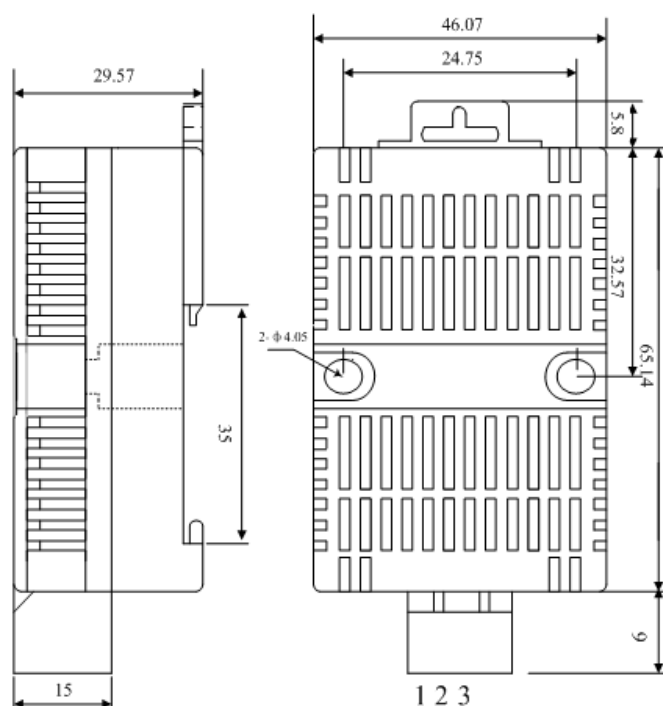
3.1.1- Installation hole: unit mm



3.1.2- Physical Dimensions: unit mm

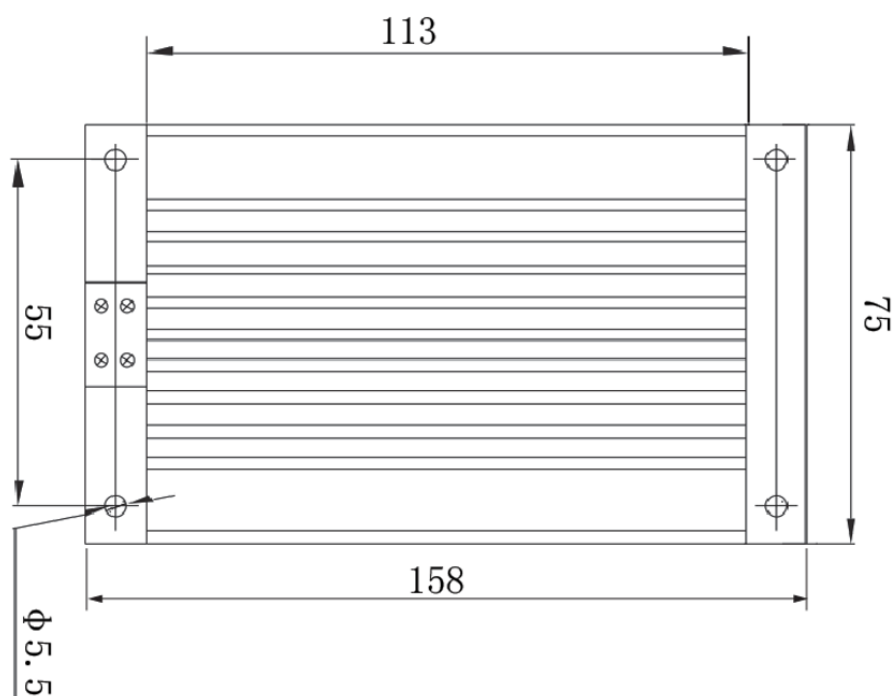


3.1.3- Sensor mounting



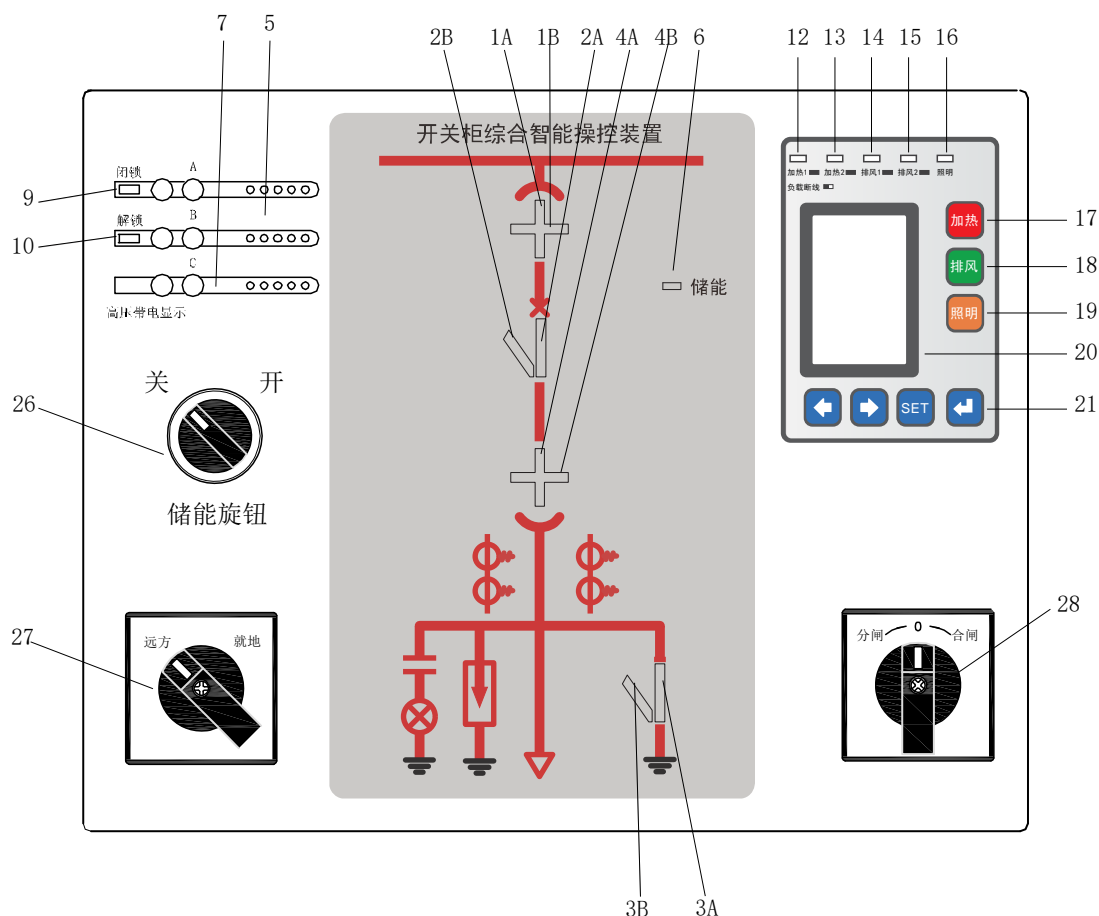
- ▲ Using 35mm rail mounting or screw.
- ▲ Fixed installation (pitch 37mm diameter 4mm).
- ▲ Using the interface plug-ins to connect temperature and humidity sensors and instruments

3.1.4- Heater size



3.2.- Basic functions introduction

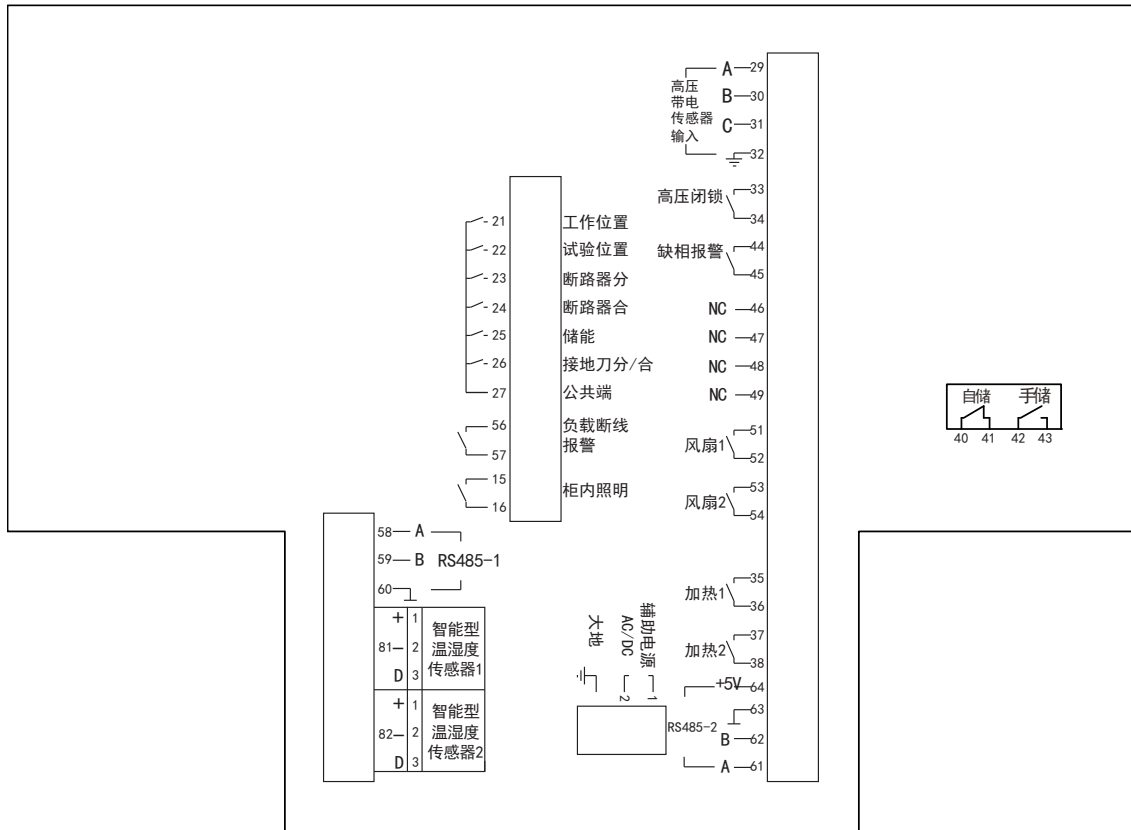
3.2.1- Front panel introduction



No.	Description
1A,4A	working position indication
1B,4B	test position indication
2A	Circuit breaker (VCB) closed indication
2B	Circuit breaker (VCB) opened indication
3A	Grounding switch closed indication
3B	Grounding switch opened indication
5	Voice alarm speaker
6	Spring storage indicator
7	High voltage indicator
9	Door locked indicator
10	Door unlocked indicator
12	Heater_1 working condition indicator

13	Heater_2 working condition indicator
14	Fan_1 working condition indicator
15	Fan_2 working condition indicator
16	Cabinet lighting ON indicator
17	Forced Heating
18	Forced cooling
19	Button "open cabinet lighting/ Move the cursor right"
20	LCD screen area
21	Operation button
26	Switch for spring storage Off/On
27	Switch for Remote/local selection
28	Switch for Closing/opening

3.2.2- Rear panel introduction



No.	Description		No.	Description		
21	VCB working	DI terminal from VCB	33	Switchgear safety		Passive NO node
22	VCB test		34	locker		
23	VCB opened		44	Phase lose		
24	VCB closed		45			
25	Spring storage		51	Fan 1 controlled by Probe 1		
26	Ground switch Opened/Closed		52			
27	COM port for VCB		53	Fan 2 controlled by Probe 2		
56	Sensor, disconnect detect	Passive DO	54			
57	loop		35	Heater 1 controlled by Probe 1		
15	Light loop	Passive DO	36			
16			37	Heater 2 controlled by Probe 2		
58	RS485 port A	COMM	38		Wireless probe terminal	
59	RS485 port B		61	A		
60	RS485 GND		62	B		
81	Temperature Humidity Probe 1	Input	63	GND		
82	Temperature Humidity Probe 2		64	+		
29	Phase A high voltage sensor	Input	1	Power supply		
30	Phase B high voltage sensor		2	AC/DC110~220V		
31	Phase C high voltage sensor			GND		
32	Ground for high voltage sensor		40~43 Spring storage/released			

4. - OPERATION MODE

4.1 - Button description



On and off function of the heating output relay.



On and off function of the exhaust output relay.



Control the lighting function on or off.



Set the menu to scroll upwards during programming or switch forward;
Long press is the self-check function



Set the menu to scroll upwards during programming or switch next;



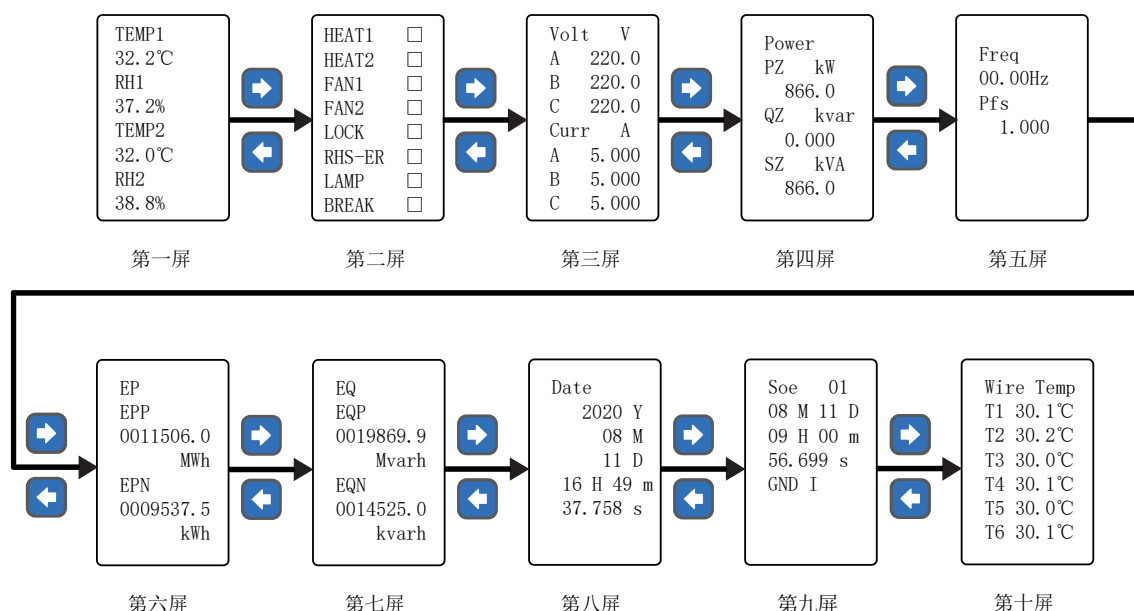
Enter the programming menu, exit the menu level by level.



Confirm and save the entered information or displayed settings.

4.2.-Parameter setting

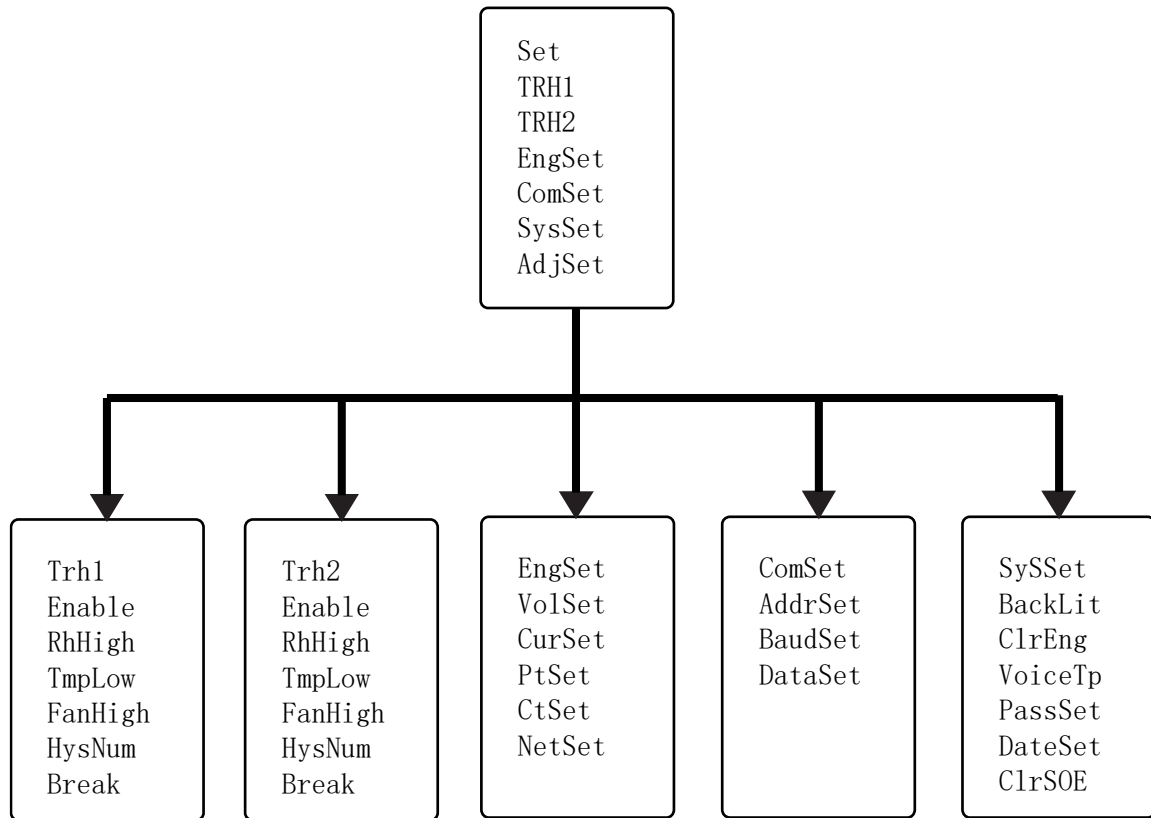
In the measurement state, press the " " " keys, the screen will display the following data in sequence:



Screen No.	Definition
Screen-1	Temperature and humidity values and exhaust air heating control status
Screen-2	The working status of the relay
Screen-3	The effective value of three-phase voltage and current
Screen-4	Active power, reactive power and apparent power
Screen-5	Power factor and frequency
Screen-6	Active energy consumed and generated
Screen-7	Reactive energy consumed and generated
Screen-8	RTC
Screen-9	Event logging
Screen-10	Multi-channel wireless temperature measurement value



Press "SET" key to enter the menu programming state, enter the correct password (factory password is 0001,) to confirm the specific parameter settings. It needs to be saved after setting up and exit. The programming menu structure and description are shown in the following table:



Menu layer

Level-1	Level-2	Level-3	Description
Temperature and humidity 1 and 2	Status	ON	" ON " and " OFF " are optional
	Dehumidifying	Start>XX%; Stop< XX%	Start 5%RH~99%RH Stop 0%RH~94%RH
	Heating	Start<XXXX°C; Stop >XXXX°C	Start -40°C ~+35°C Stop -35°C ~+40°C
	Cooling	Start >XXXX°C; Stop <XXXX°C	Start -35°C ~+125°C Stop -40°C ~+120°C
	Hysteresis	XX	left and right arrows to select, and Enter key to confirm.
	Delay	XX sec	
	Load disconnection	ON	"ON" and "OFF" are optional
Electrical test settings	Voltage range	100V	100V or 380V, Default 100V
	Current range	5A	5A or 1A, Default 1A
	Voltage ratio	XXXX	Voltage magnification ratio
	CT ratio	XXXX	Current magnification ratio
	Wiring mode	4P3L	3P4L\3P3L3CT\3P3L2CT
Comm	Device address	XXX;	001~255
	Baud rate	XXXX	2400,4800,9600,19200
	Data Format	n.8.1	n.8.1 \0.8.1\e.8.1\ n.8.2
SYS	Backlight control	XXXX Min	left and right arrows to select, and Enter key to confirm.
	Reset counter	ON	" ON " for reset to zero
	Voice	ON	" ON " and " OFF " are optional
	Reset password	XXXX	Enter the 4-digit new password

 Notes: Part of the content is modifiable or optional.

5.- FUNCTIONS INTRODUCTION

5.1- Status indication function

Functions	Definition
1.VCB indicate	1. When the handcart is in the working position (working position contact is closed), the handcart indicator red (1A, 4A) light is on;
	2. When the handcart is in the test position (the contact in the test position is closed), the green (1B, 4B) lights of the driving indicator are on;
	3. When the handcart is in the working position or between the test position and the working position, close the grounding knife forcibly, and the indicator lights (1A, 1B, 4A, 4B) of the handcart will continue to flash;
	4. When the handcart is not in the cabinet (the contacts in the working and test positions are not closed and the contacts of the circuit breaker are disconnected), the red and green (1A, 4A, 1B, 4B) lights of the handcart indicator are not on;
2.Circuit breaker status indicate	1. When the circuit breaker is closed (the contact of the circuit breaker is closed), the indicator light (2A) of the circuit breaker is on;
	2. When the circuit breaker is open (circuit breaker sub-contact is closed), the circuit breaker indicator green (2B) light is on;
	3. When the circuit breaker is not in the cabinet (both closed and open contacts of the circuit breaker are not closed), the red and green (2A, 2B) indicators of the circuit breaker are off;
3.Ground switch indicate	1) When the grounding switch is closed (the opening/closing contact of the grounding switch is closed), the grounding switch indicator red (3A) light is on;
	2.When the grounding switch is not closed (the opening/closing contact of the grounding switch is not closed), the green (3B) light of the grounding switch is on
4.Spring status indicate	When the contact is closed, the energy storage indicator red light (6) is on;

Note: The above access must be passive contacts.

5.2- Intelligent voice warning function

Warning 1:

When the circuit breaker is closed and the handcart is between the test position and the working position (the contacts of the test position and the working position are both disconnected), the 1A, 4A, 1B, 4B, 2B indicator lights flash, and the 2A indicator light is always on. Lights up and there is a voice prompt **"Please turn off the circuit breaker"**

Warning 2:

When the handcart is in the working position or between the test position and the working position, close the grounding knife forcibly, the 1A, 4A, 1B, 4B, 3B indicator lights will flash, the 3A indicator light will always be on and there will be a voice prompt **"Please open the grounding switch "**

Warning 3:

When both the grounding knife and the circuit breaker are closed, when the trolley is accidentally pushed to switch from the test position to the working position, the 2B and 3B indicator lights will flash at the same time, accompanied by language prompts "Please switch off the circuit breaker" and **"Please switch off the grounding switch"**

Warning 4:



When the circuit is electrified and the human body senses a signal, there will be a voice prompt of **"This circuit is electrified"**

5.3- High voltage indicate and lock function



Functions	Definition
1.High voltage live display	When the three phases A, B, and C are charged (voltage $\geq 15\%$ of the rated voltage), the corresponding three-phase indicators (7) of A, B, and C will start to glow;
2.High voltage live lock	<p>When any one of the three phases A, B, and C is electrified (voltage $\geq 65\%$ of the rated voltage), the high-voltage lock indicator red light (9) is on, the high-voltage unlock indicator green light (10) is off, and the corresponding high-voltage lock contact output pops open;</p> <p>When the three phases are not charged, the green light (10) of the high-voltage unlocking indicator is on, the red light (9) of the high-voltage locking indicator is off, and the output of the corresponding high-voltage locking contact is closed;</p>
3.High voltage phase loss alarm	<p>When any one or two of the three phases A, B, and C are charged (voltage $\geq 65\%$ of the rated voltage), the phase loss alarm contact output is closed;</p> <p>When all three phases are not charged or all three phases are charged, the phase loss alarm contact The output is turned on.</p>

Note: A, B, C three-phase matching sensor, its output short-circuit current must reach $220\mu A \pm 10\%$.

5.4- Operation function


Functions	Definition
1.Switch off/on storage	
2.Opening/closing operation	
3.Remote/local conversion	
4.Test	<p>In the measurement state, long press " " button for ≥ 3 seconds to enter the test mode, all indicator lights are on for 3 seconds, the relay is closed for 3 seconds, and the voice repeats "This circuit is electrified"</p> <p>(The test content does not include high voltage electrification Indicator light and lock indicator light)</p>
5.Cabinet lighting	<p>In the measurement state, press the button  to start the cabinet lighting with corresponding instructions: the second LCD screen displays that the lighting relay is closed</p>

5.5- Working mode

Functions	Definition
1.Measurement	In the measurement state, the area 20 displays the current channel, temperature, humidity value, electrical parameter value, switch status, etc., and can choose to cycle display. For the specific interface, please refer to the "Instructions for Use" below.
2.Control	When the temperature or humidity of the environment meets the pre-set working conditions, the heater or fan is started, and the corresponding indicator light is on. When the load fails and does not work according to the conditions, the corresponding load disconnection relay is closed, and the Appears on the display.
3.Control test	Under normal working conditions, press  button to force heat; press  button to force cooling.

5.6- Setting mode

Enter/exit system setting mode

Enter the system: Under normal condition, press  button to enter the system setting mode. Press the left and right keys to enter the password. refer to the following "Instructions" for each setting interface.

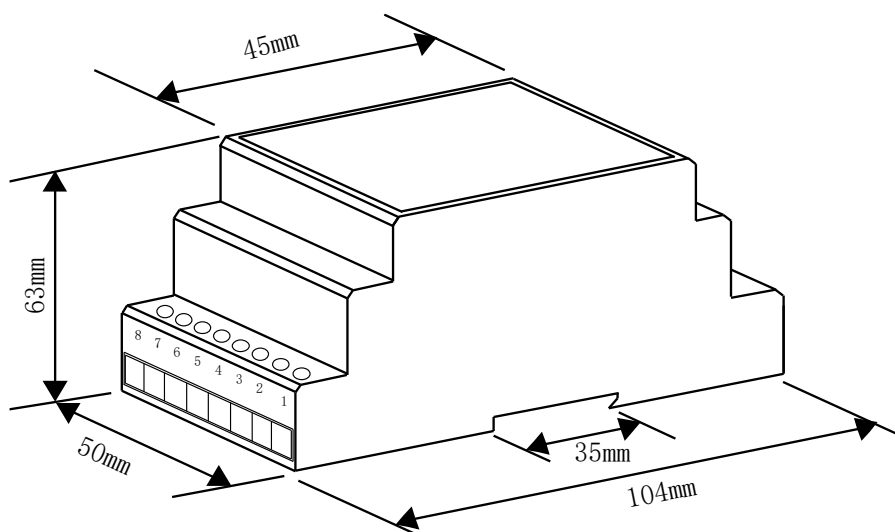
Note: The default password is **0001**.

5.7- Wireless temperature measurement function

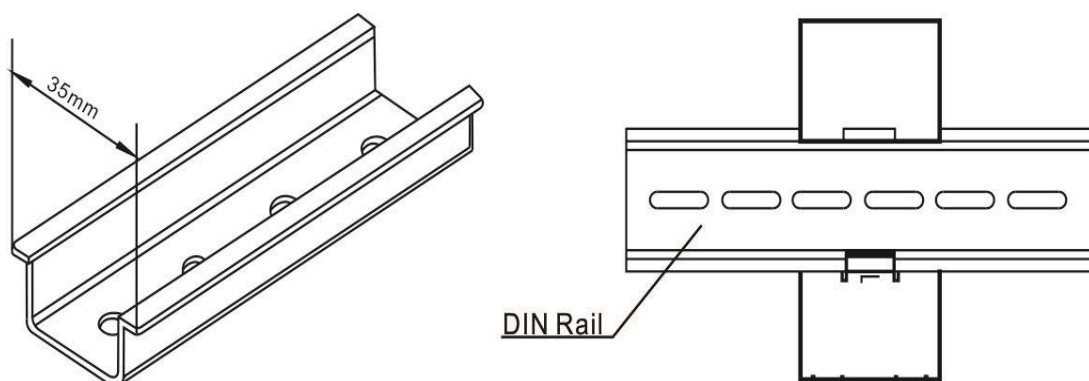
5.7.1- Wireless Temperature Receiver:

Each device can be equipped with 1 wireless temperature receiver and 9 (according to customer needs can be expanded to 12) wireless temperature collector, each 3 serial number connected wireless temperature collector is a group.

Dimension: unit(mm)



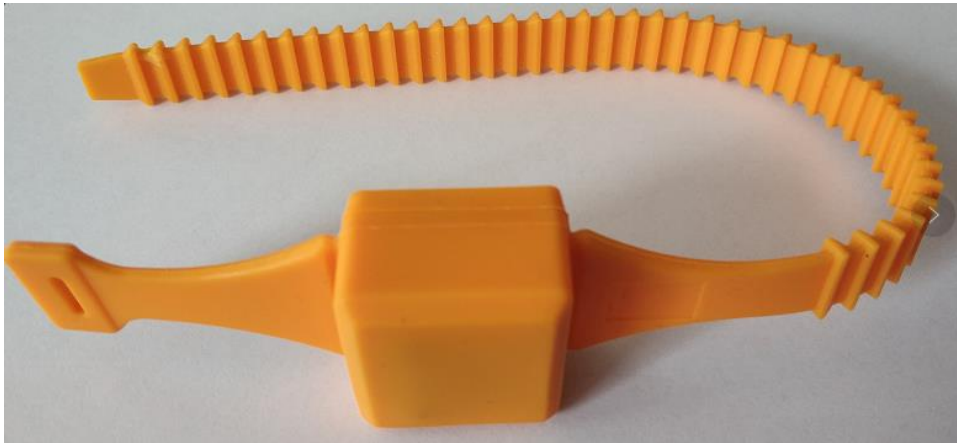
Installation: 35mm Din rail



5.7.2- Wireless temperature collector:

The specific installation method of the wireless temperature collector is shown in the figure below. Each collector has a temperature-sensing point, and the temperature measured by the collector is the temperature of the temperature-sensing point.

If the collector is placed in the air, the measured temperature is ambient temperature. In order to accurately measure the temperature of the surface of the object, it should be ensured that the temperature-sensing surface of the collector is in close contact with the surface of the object to be measured.



Watch strap wireless temperature collector

Each control device can be equipped with 1 wireless temperature receiver and 9 (can be expanded to 12 according to customer needs) wireless temperature collectors, and every 3 serial numbers connected wireless temperature collectors form a group.

Note: When installing, follow the position marked on the label on the wireless temperature collector. If the installation location is not corresponding, the temperature displayed on the control device from T1 to T12 is not the temperature of the actual location.

The supporting wireless receiving box (rail-mounted installation) must be installed in the handcart room of the circuit breaker, and connected to the control device through a 4-core connecting line (preferably shielded cable). The corresponding connection relationship is as follows:

Wiring method of wireless temperature receiver:

8	7	6	5	4	3	2	1
+5V	⊥	485B	485A	power light		N	L

The connection method between the wireless temperature receiver and the control terminal

Wireless routing adapter terminal number		Temperature measurement terminal number
8	+5V	64
7	⏚	63
6	485B	62
5	485A	61
4	power light	

When a wireless temperature sensor detects that the surface temperature of the target point exceeds the upper alarm limit, the red alarm light on the front of the device flashes, the corresponding serial number of the wireless temperature measurement display interface changes to "!" Flashes, and the information is saved in the event record; When the surface temperature of the target point exceeds the upper limit of the alarm, the alarm output relay draws in; when the surface temperature of the target point drops to the exit alarm temperature point (Th-5°C), the device automatically exits the alarm state of this aspect.

Technical Parameters

Resolution	0.1°C
Measurement accuracy	< ± 1°C
Measurement range	-40°C-150°C
Measurement interval	0.5s
Sending interval	1-60s (Adjustable)
Battery life	>= 5 years
Working temperature	-20°C ~80°C
Working environment humidity	≤95%RH
Collection point and receiver distance	≤80 meters (open viewing distance)
Receiver size	60*45*26mm
Positioning hole diameter	3mm
Positioning hole center distance	69.6mm

6.- COMMUNICATION INTERFACE

6.1.- MODBUS © protocol

CBM3000 can choose RS485 communication interface and support standard Modbus-RTU communication protocol.

Modbus RTU Frame Format:

Address	1-247
Baud	2400bps,4800bps, 9600bps,192000 bps
Data format	N. 8. 1 O. 8. 1 E. 8. 1 N. 8. 2

Note:

For detailed Modbus-RTU communication protocol description, please visit <http://www.modbus.org>, can refer to document Modbus_Application_Protocol_V1_1a.pdf.

6.2. - Register Map

Addr.	Data	Description	Byte
Secondary side parameters (integer data)			
0x00	Ua	Phase-line voltage data, unit 0.1V	1
0x01	Ub		1
0x02	Uc		1
0x03	Uab	Phase-phase voltage data, unit 0.1V	1
0x04	Ubc		1
0x05	Uca		1
0x06	Ia	Current data, unit 0.001A	1
0x07	Ib		1
0x08	Ic		1
0x09	Pa	Split phase active power, unit 0.1W	1
0x0a	Pb		1
0x0b	Pc		1
0x0c	P Σ	Total active power, unit 1W	1
0x0d	Qa	Split phase reactive power, unit 0.1var	1
0x0e	Qb		1
0x0f	Qc		1
0x10	Q Σ	Total reactive power, unit 1var	1
Reserved			1
0x14	S Σ	Total apparent power, unit 1VA	1
Reserved			1
0x18	cosQ	Power factor 0~1.000	1
0x19	FR	Frequency 0.01Hz	1
0x1a	Ep+	Positive active energy, unit Wh	2
0x1c	Ep-	Reverse active energy (generated)	2
0x1e	Eq+	Inductive reactive energy, unit Varh	2
0x20	Eq-	Capacitive reactive energy, unit Varh	2
Reserved			1
0x28	T1	Temperature sensor 1,Unit 0.1°C	1
0x29	RH1	Humidity sensor 1,Unit 0.1%RH	1
0x2A	T2	Temperature sensor 2,Unit 0.1°C	1

0x2B	RH2	Humidity sensor 2, Unit 0.1%RH	1
Reserved			1
0x44	DI	Input signal status: 0 for opened, 1 for closed [Bit 0] VCB working [Bit 1] VCB test [Bit 2] VCB opened [Bit 3] VCB closed [Bit 4] Spring storage [Bit 5] Ground switch	1
0x45	DO	Output signal status: 0 for opened, 1 for closed [Bit 0] Heater_1 [Bit 1] Heater_2 [Bit 2] Fan_1 [Bit 3] Fan_2 [Bit 4] Door locker [Bit 5] Phase loose [Bit 6] Light lamp [Bit 7] Load disconnect	1
Primary side parameters (floating point data)			
0x100	Ua	Phase-line voltage data, unit V	2
0x102	Ub		2
0x104	Uc		2
0x106	Uab	Phase-phase voltage data, unit V	2
0x108	Ubc		2
0x10a	Uca		2
0x10c	Ia	Current data, unit A	2
0x10e	Ib		2
0x110	Ic		2
0x112	Pa	Split phase and total active power, unit kW	2
0x114	Pb		2
0x116	Pc		2
0x118	$P\Sigma$		2
0x11a	Qa	Split phase and total reactive power, unit kvar	2
0x11c	Qb		2
0x11e	Qc		2
0x120	$Q\Sigma$		2

Reserved			2
0x128	SΣ	Total apparent power KVA	2
Reserved			2
0x130	COSQ	Power factor 0~1.000	2
0x132	FR	Frequency 0.01Hz	2
0x134	Ep+	Positive active energy, Unit kWh	2
0x136	Ep-	Reverse active energy (generated)	2
0x138	Eq+	Inductive reactive energy, unit kVarh	2
0x13a	Eq-	Capacitive reactive energy, unit kVarh	2
Wireless temperature measurement (integer data)			
0x300	WX_T1	Wireless probe-1(0.1°C)	1
0x301	WX_T2	Wireless probe-2	1
0x302	WX_T3	Wireless probe-3	1
0x303	WX_T4	Wireless probe-4	1
0x304	WX_T5	Wireless probe-5	1
0x305	WX_T6	Wireless probe-6	1
0x306	WX_T7	Wireless probe-7	1
0x307	WX_T8	Wireless probe-8	1
0x308	WX_T9	Wireless probe-9	1
0x309	WX_T10	Wireless probe-10	1
0x30A	WX_T11	Wireless probe-11	1
0x30B	WX_T12	Wireless probe-12	1
0x30C	WX_T13	Wireless probe-13	1
0x30D	WX_T14	Wireless probe-14	1
0x30E	WX_T15	Wireless probe-15	1

7.- TECHNICAL SERVICE

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

1. If there is any not understand in the description when user installation instructions, please contact technical directly.
2. Company technology will answer any questions at any time.
3. Issues arising from the use of the product within one working day to respond.
4. These products is 1-year warranty, free of charge maintenance for life.

Blue Jay - After-sales service

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