HRC200

INDUSTRIAL REMOTE CONTROL

USER MANUAL

SmartGen MAKING CONTROL SMARTER

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Table 1 Software Version

Date	Version	Note
2021-07-02	1.0	Original release.
2022-11-25	1.1	Add HEM4000 protocol and HEM4100 protocol; Modify the paring key of remote controller as F1+F2.

Table 2 – Notation Clarification

Sign	Instruction
⚠️NOTE	Highlights an essential element of a procedure to ensure correctness.
⚠️CAUTION	Indicates a procedure or practice, which, if not strictly observed, could result in damage or destruction of equipment.
☠️WARNING	Indicates a procedure or practice, which could result in injury to personnel or loss of life if not followed correctly.

CONTENT

1 OVERVIEW

HRC200 is a long-distance wireless remote control with LoRa wireless chip transmission and remote control distance of more than 200m. Used with engine controller, it can realize remote start, stop, load, unload, emergency stop and other functions. HRC200 adopts fully sealed structure, IP65 protection level, which can effectively prevent dust, water or others from entering the controller, making the controller operate stably and reliably, suitable for field, mining, urban construction and other application sites with complex working conditions.

2 PERFORMANCE AND CHARACTERISTICS

HRC200 industrial remote control is composed of remote control HRC200R and receiver HRC200M, applying LoRa wireless transmission chip.

Remote Control:

——Can realize remote start, stop, load, unload, emergency stop and other functions, indicate engine running/alarm, remote control battery, command send/receive status;

——Powered by 4 AA batteries;

——With remote control distance of more than 200m, 15 optional communication channels;

——Whole protection level can reach IP65.

Receiver:

——With RS485 interface, 5 output ports and 2 input ports, can control engine controller via RS485 interface or relay output port;

——With power, RS485, LoRa communication status indicator; 15 optional communication channels;

——Supply range DC (8~35)V;

——Can set its parameters via PC;

——Modular structure design, anti-flaming ABS plastic shell, light weight, compact structure and easy installation;

——Standard Π type 35mm guide rail installation or screw installation is applied.

3 SPECIFICATION

Table 3 Technical Parameters

Item	Contents
Remote Control HRC200R	
Working Voltage	Powered by 4 AA alkaline batteries.
Overall Consumption	Can last about 72 hours.
Case Dimension (LxWxH)	156.9mmx63mmx53mm (without antenna)
Working Conditions	Temperature: (-25~+70)°C Humidity: (20~95)%RH Actual working temperature is limited by battery characteristics.
Storage Condition	Temperature: (-30~+80)°C
Weight	0.2kg (without battery)
Receiver HRC200M	
Working Voltage	DC (8~35)V
Overall Consumption	≤1.2W
Aux. Input Port	B- connected is active.
Aux. Output Port	Relay normally open volt-free output, specification DC30V/2A
RS485 Interface	Isolated, half-duplex, 2400/4800/9600/19200 baud rate can be set, Modbus-RTU communication protocol, longest communication distance 1,000m.
LINK	SmartGen special interface for program upgrade.
Case Dimension (LxWxH)	105mmx72.5mmx34mm
Working Conditions	Temperature: (-25~+70)°C Humidity: (20~95)%RH
Storage Condition	Temperature: (-30~+80)°C
Weight	0.2kg

4 PANEL AND WIRING TERMINAL DESCRIPTION

4.1 HRC200R REMOTE CONTROL PANEL INDICATORS AND KEYS

Fig.1 Remote Control Panel Description

Table 4 Indicators Description

Indicators	Description
Power Status	Indicator flashes yellow during pairing process; Indicator keeps red on when battery voltage is low; it keeps green on when battery voltage is normal.
Connection Status	Indicator flashes yellow during pairing process; Press the key, indicator flashes red once when sending, indicator flashes green once when receiving success; Indicator displays yellow when communication abnormal situation lasts over 5s; indicator flashes yellow once after pressing the key.
Common Alarm/Running Status	Indicator flashes yellow during pairing process; Indicator keeps green on during normal running; Indicator flashes red when common alarm occurs; It will extinguish when communication abnormal situation lasts over 5s.

Table 5 Keys Description

Icon	Key	Description
⏻	Power	Long press this key 2s to power on the remote control, then long press this key 2s again to power off the remote control.
I	Start	Press this key to send start command.
O	Stop	Press this key to send stop command.
F1	F1	Press this key to send F1 command. (see the following description.)
F2	F2	Press this key to send F2 command. (see the following description.)
⇄	Load	Press this key to send load command.
⇄	Unload	Press this key to send unload command.
●	Emergency Stop	Press this key to send emergency stop command, turn it clockwise to reset. (When this key is pressed, load/unload/start/F1/F2 keys are all inactive, communication status indicator keeps flashing red.)
	No Key Operation	If can't receive the data and no key operation within 10 minutes, remote control power will automatically shut off.

4.2 HRC200M RECEIVER PANEL INDICATORS AND INTERNAL KEYS
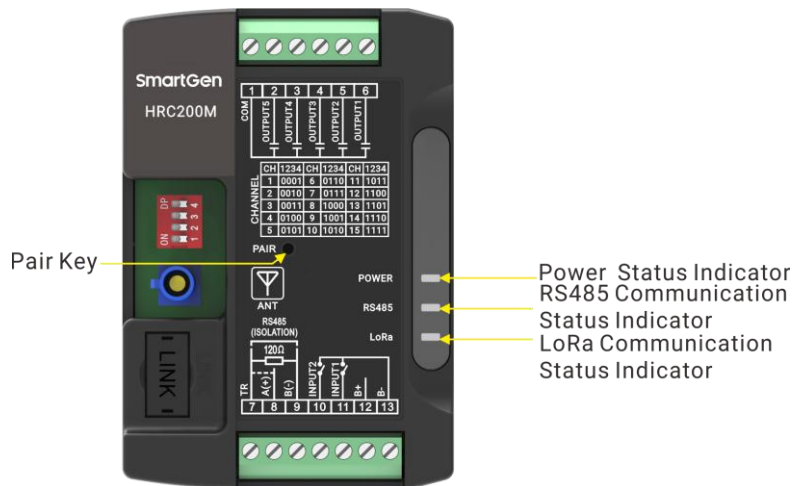
Fig.2 Receiver Panel Description

Table 6 Indicators and Keys Description

Indicator	Description
POWER (Indicator: green)	Always illuminating: power is normal; Always extinguishing: power is abnormal.
RS485 (Indicator: green)	Flashing: RS485 communication is normal; Always extinguishing: RS485 communication fails.
LoRa (Indicator: green)	Flashing: communication with remote control is normal; Always extinguishing: communication with remote control fails.
PAIR (key)	Long press it 6s to enter pairing mode; Press it again after entering pairing mode can cancel pair.

4.3 COMMUNICATION CHANNEL CONFIGURATION

The remote control configures the communication channel via jumper cap. Jumper cap leftmost and rightmost positions are inactive, it is 1 when the middle four positions are connected to the jumper cap, otherwise it is 0. The default jumper cap position is 1111 (515MHz).
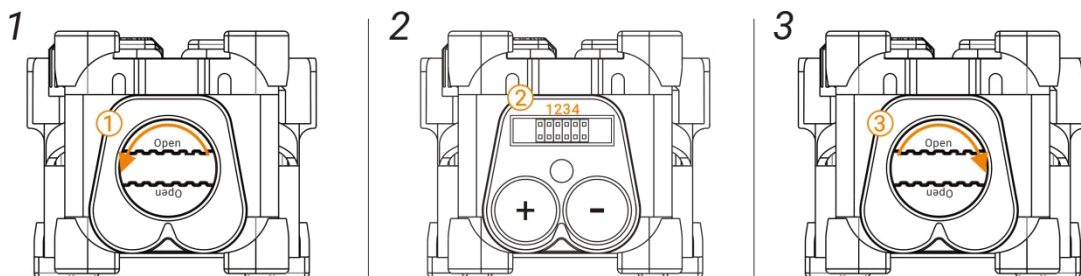
Fig.3 Communication Channel Configuration

Table 7 Communication Channel Configuration Steps

Step	Description
1	Turn the bottom screw cover anticlockwise to open the base.
2	Change the middle four jumper cap positions to configure the communication channel and replace the battery at the same time.
3	Turn the bottom screw cover clockwise to close the base.

The receiver configures the communication channel via dial switch. It is 1 when the dial switch is set to ON position, otherwise it is 0. The default dial switch position is 1111 (515MHz).

Table 8 Communication Channels

No.	ON DP 1 2 3 4	Channel Frequency (MHz)
1	0001	445
2	0010	450
3	0011	455
4	0100	460
5	0101	465
6	0110	470
7	0111	475
8	1000	480
9	1001	475
10	1010	485
11	1011	490
12	1100	495
13	1101	500
14	1110	505
15	1111	515
It is 1 when the dial switch is set to ON position, otherwise it is 0.		

NOTE: When the dial switch is configured as 0000, it is configuration mode (refer to 4.1).

4.4 PAIRING

Table 9 Pairing Description

Method	Process
Method 1: Remote control waits for receiver pairing.	1. Turn the remote control and receiver to the same channel. (see the communication channel configuration, default channel is 515MHz.)
	2. Turn on the remote control power, its power indicator keeps on. Long press F1+F2 key 6s, all indicators are flashing yellow, which means entering pairing mode. Press F1+F2 key again during LoRa pairing can cancel pair.
	3. Turn on the receiver power, POWER indicator keeps on. Insert a slender needle less than 3.5mm in diameter into the PAIR hole vertically, then long press PAIR key 6s.

| Method	Process
	4. If pairing successfully within 60s, remote control COMM indicator extinguishes after illuminating green 2s, receiver LoRa and RS485 indicators extinguish, POWER indicator keeps green for a long time. Otherwise, COMM indicator keeps red for a long time when the pairing fails.
Method 2: Receiver waits for remote control pairing.	1. Turn the remote control and receiver to the same channel. (see the communication channel configuration, default channel is 515MHz.)
	2. Turn on the receiver power, POWER indicator keeps on. Insert a slender needle less than 3.5mm in diameter into the PAIR hole vertically, then long press PAIR key 6s, LoRa, RS485 and POWER indicator flash green. Press PAIR key again during LoRa pairing can cancel pair.
	3. Turn on the remote control power, its power indicator keeps on. Long press F1+F2 key 6s.
	4. If pairing successfully within 60s, remote control COMM indicator extinguishes after illuminating green 2s, receiver LoRa and RS485 indicators extinguish, POWER indicator keeps green for a long time. Otherwise, COMM indicator keeps red for a long time when the pairing fails.

4.5 RS485 INTERFACE

Receiver connects to engine controller via RS485 interface, 120Ω terminal matching resistor is recommended to use (when RS485 A(+) and TR terminal is short connected), RS485 communication line must use twisted shielded pair line.
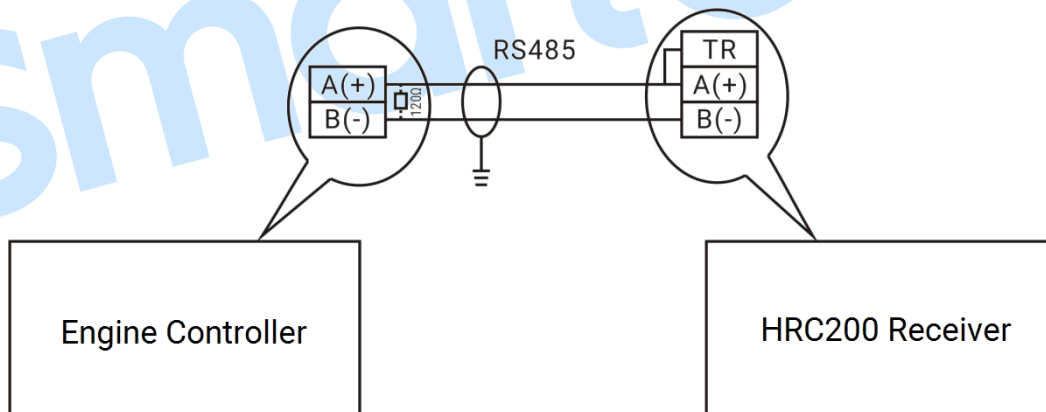
Fig.4 RS485 Connection Diagram
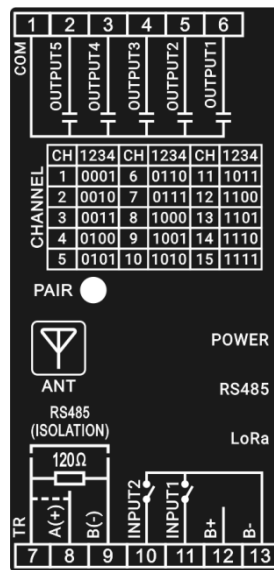
Fig.5 Mask Diagram

Table 10 Wiring Terminal Description

No.	Function	Cable Size	Remark
1	COM	0.75mm^2	Relay common port.
2	AUX. OUTPUT5	0.75mm^2	Normally open volt-free output, capacity DC30V/2A.
3	AUX. OUTPUT4	0.75mm^2	Normally open volt-free output, capacity DC30V/2A.
4	AUX. OUTPUT3	0.75mm^2	Normally open volt-free output, capacity DC30V/2A.
5	AUX. OUTPUT2	0.75mm^2	Normally open volt-free output, capacity DC30V/2A.
6	AUX. OUTPUT1	0.75mm^2	Normally open volt-free output, capacity DC30V/2A.
7	TR	/	RS485 communication line uses twisted shielded pair line. When 120Ω terminal matching resistor is required, A(+) and TR terminal should be short connected.
8	RS485 A(+)	0.5mm^2	
9	RS485 B(-)	0.5mm^2	
10	AUX. INPUT2	0.75mm^2	B- connected is active.
11	AUX. INPUT1	0.75mm^2	B- connected is active.
12	B+	0.75mm^2	Externally connects power positive.
13	B-	0.75mm^2	Externally connects power negative.

5   PROGRAMMABLE PARAMETERS

5.1   PC PARAMETER SETTING

Before operation, please remember the dial switch position of HRC200M, then set switch to configuration mode (namely 0000 position). PC connects to receiver via RS485 communication conversion module, then the related parameter configuration of receiver can be done via PC software. After the configuration is completed, dial switch must recover to previous position.
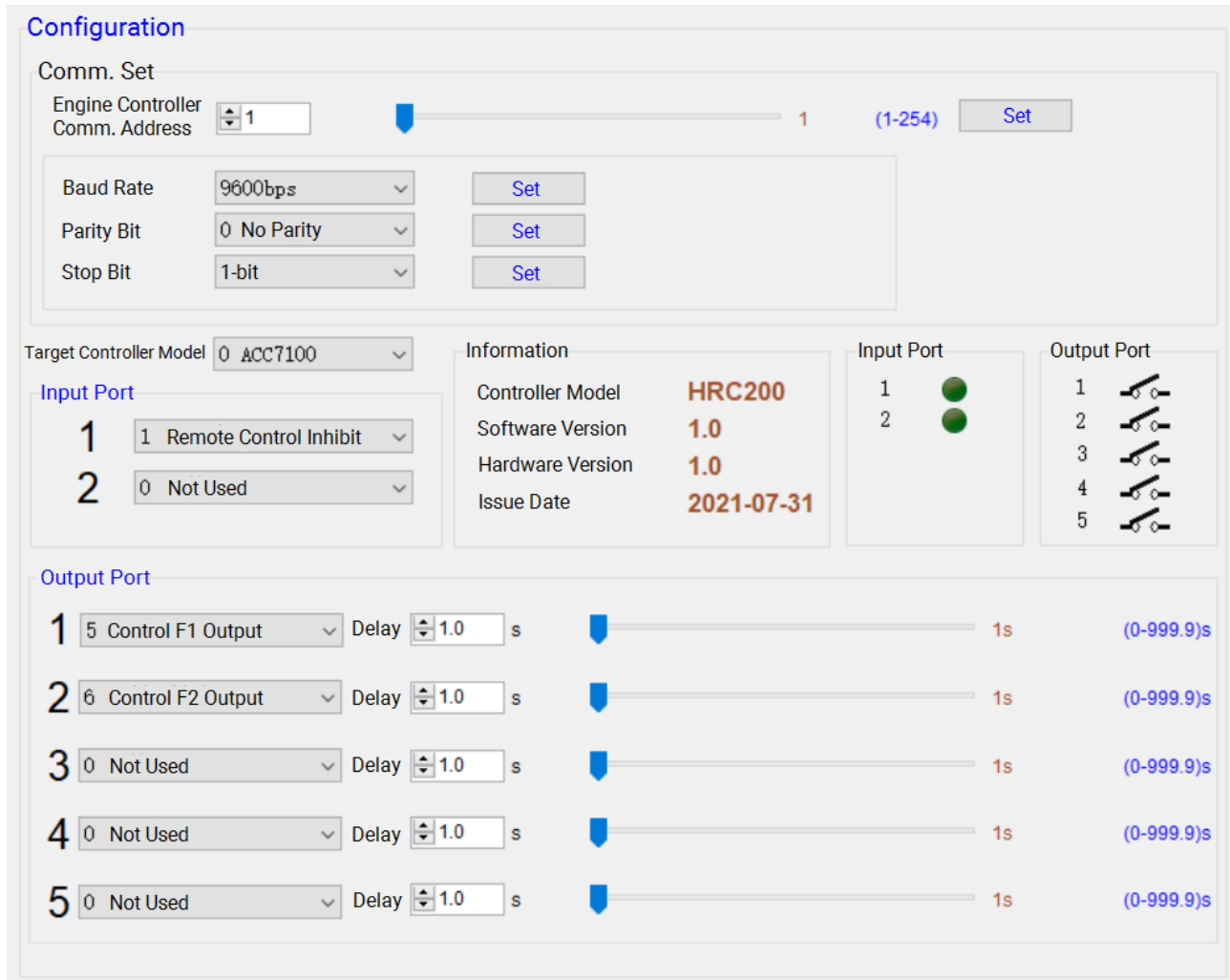
Fig.6 PC Configuration Interface

5.2   PARAMETER RANGE AND DEFINITION

Table 11 Parameter Content and Range

No.	Item	Range	Default	Description
1	Comm. Address	1-254	1	
2	Baud Rate	(0-3)	2	0: 2400bps 1: 4800bps 2: 9600bps 3: 19200bps
3	Parity Bit	(0-2)	0	0: No Parity 1: Odd Parity

No.	Item	Range	Default	Description
				2: Even Parity
4	Stop Bit	(0-1)	0	0: 1-bit 1: 2-bit
5	Aux. Input 1	(0-9)	1	0: Not Used 1: Remote Control Inhibit 2: Simulate Start Key 3: Simulate Stop Key
6	Aux. Input 2	(0-9)	0	4: Simulate Unload Key 5: Simulate Load Key 6: Simulate F1 Key 7: Simulate F2 Key 8: Simulate Running Status 9: Simulate Alarm Status
7	Aux. Output 1	(0-6)	5	0: Not Used
8	Aux. Output 2	(0-6)	6	1: Start Control
9	Aux. Output 3	(0-6)	0	2: Stop Control
10	Aux. Output 4	(0-6)	0	3: Unload Control
11	Aux. Output 5	(0-6)	0	4: Load Control 5: F1 Control 6: F2 Control
12	Aux. Output 1 Output Delay	(0-999.9)s	1.0s	When it is set as 0, relay continuously outputs when the remote control key is firstly pressed, relay stops output when the key is pressed again. When it is set as other values, relay disconnects output after outputting set delay value.
13	Aux. Output 2 Output Delay	(0-999.9)s	1.0s	
14	Aux. Output 3 Output Delay	(0-999.9)s	1.0s	
15	Aux. Output 4 Output Delay	(0-999.9)s	1.0s	
16	Aux. Output 5 Output Delay	(0-999.9)s	1.0s	

6 SYSTEM APPLICATION DIAGRAM

Remote control communicates with receiver via LoRa, engine controller and receiver can be controlled by RS485 communication or digital input/output port.

Fig.7 HRC200 System Application Diagram
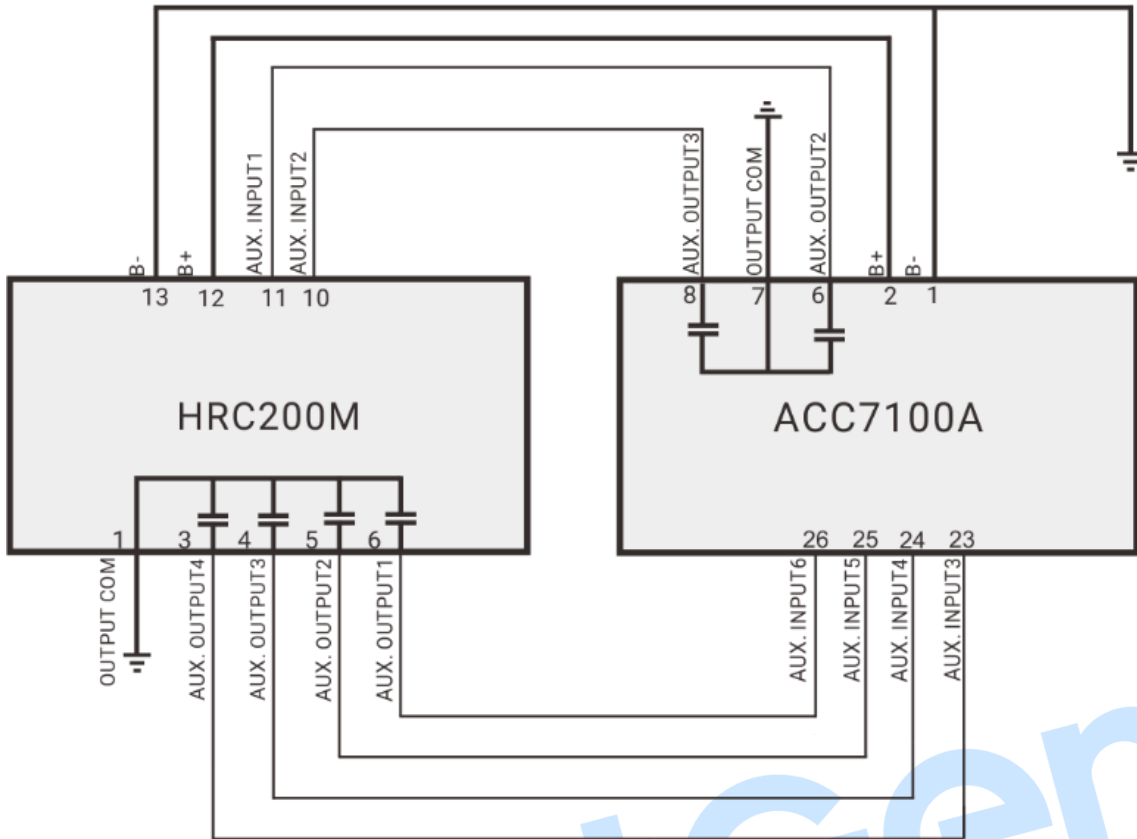
**Fig.8 HRC200M Digital Control Application Diagram**

Table 12 Parameter Configuration

	No.	Item	Parameter
HRC200	1	Aux. Input 1	8: Running Status
	2	Aux. Input 2	9: Alarm Status
	3	Aux. Output 1	2: Stop Control
	4	Aux. Output 2	4: Load Control
	5	Aux. Output 3	3: Unload Control
	6	Aux. Output 4	1: Start Control
ACC7100A	1	Aux. Output 2	38: Start Success Output
	2	Aux. Output 3	42: Common Alarm
	3	Aux. Input 3	34: Simulate Stop Key
	4	Aux. Input 4	35: Simulate Load Key
	5	Aux. Input 5	36: Simulate Unload Key
	6	Aux. Input 6	37: Simulate Start Key

7 OVERALL AND INSTALLATION DIMENSIONS

7.1 REMOTE CONTROL OVERALL DIMENSION

Unit: mm
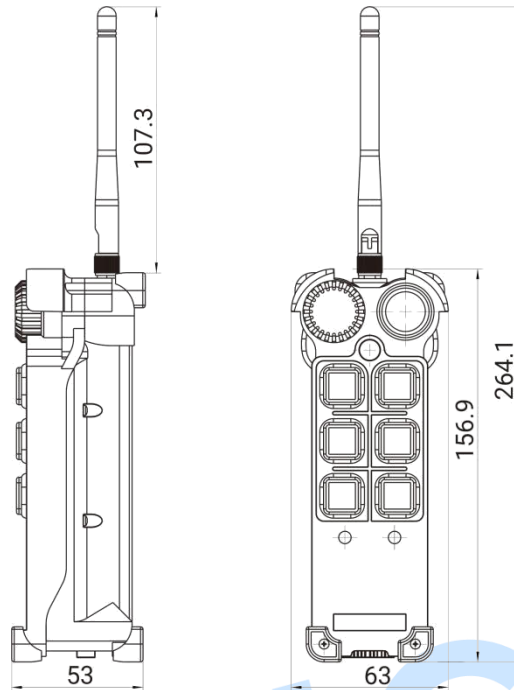
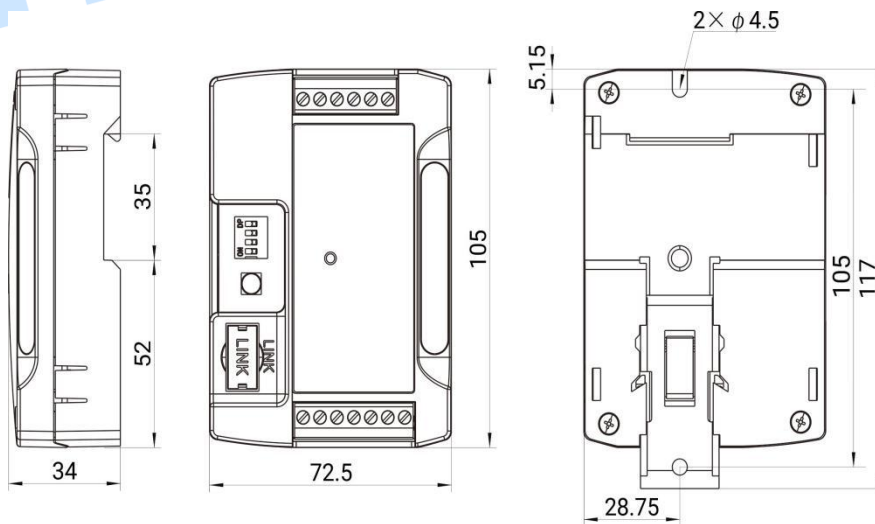

Fig.9 HRC200R Overall Dimension
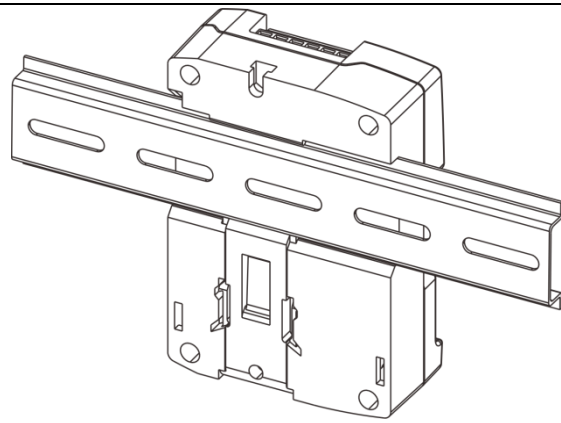
7.2 RECEIVER OVERALL DIMENSION

Installation method can be 35mm guide rail installation or screw (M4) installation. Overall dimension is as follows:
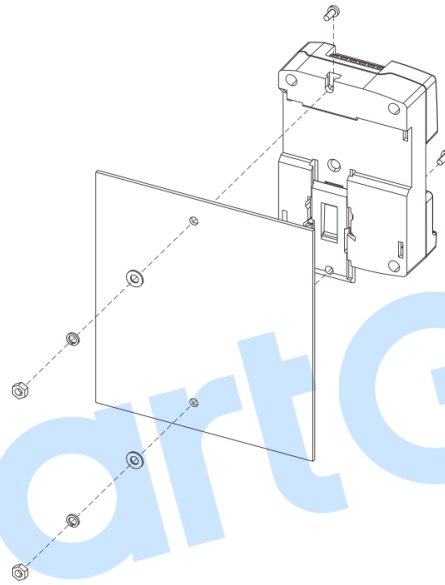
Unit: mm

Fig.10 HRC200M Overall Dimension

Fig.11 HRC200M Guide Rail Installation

Fig.12 HRC200M Screw Installation

8 TROUBLESHOOTING

Table 13 Troubleshooting

Symptom	Possible Solutions
Receiver Inactive for Power	Check the power supply.
RS485 Comm. Abnormal	Check the connection line; Check whether communication address, baud rate, parity bit, stop bit set is correct; Check whether A(+) and B(-) of RS485 are reversely connected; Try to connect 120Ω terminal matching resistor.
Pairing Failure	Check whether the channel of remote control and receiver is same.
Receiver and PC Fails to Connect	Check whether the receiver dial switch is set to 0000 position.
Remote Control Key Inactive	Check whether the emergency stop key is pressed, when it is pressed, other function keys are inactive.

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