EBYTE

Chengdu Ebyte Electronic Technology Co.,Ltd

Wireless Modem

User Manual



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contents

1.Product Introduction 5
1.1 Features 5
1.2 Basic parameters 6
1.3 Description of dimensions, interfaces , indicators, etc. 7
1.3.1 Product size 7
1.3.2 Product interface description 8
1.3.3 Indicator Light Description 11
1.4 Product internal circuit structure diagram 14
1.4.1 Simplified diagram of the internal principle of the sending (collection) end product 14
1.4.2 Schematic diagram of the internal principle of the receiving (output) end product 14
2.Quick Start (users are recommended to read this chapter first) 15
2.1 Product and Accessories List 16
2.2 Quick Use 16
2.2.1 Step 1: Connect the product to the antenna and power supply 16
2.2.2 Step 2: Signal input wiring of the sending (collection) end product 17
2.2.3 Step 3: Receiving (output) end product signal output wiring 18
2.2.4 Step 4: Power on the product and observe the indicator light status 18
2.2.5 Step 5: On-site installation 19
2.3 Model Selection Overview 20
2.3.1 Product Model Selection Table 20
2.3.2 Product model naming details 22
3.Hardware connection and related knowledge 23
3.1 Power Hardware Connection 23
3.1.1 Power supply selection 23
3.1.2 Power Connection 23
3.1.3 Power connection precautions and instructions 23
3.2 Hardware connection of the first communication method 24
3.2.1 The first communication method: RS485 24
3.3 Second communication mode hardware connection 25
3.3.1 The second communication method is: LoRa spread spectrum hardware connection and installation 25
3.4 Switching input and output hardware connection 26
3.4.1 Wet node: NPN normally open type\PNP normally closed type sensor (DI) wiring method 26
3.4.2 Dry contact: Push button switch (DI) wiring method 26
3.4.3 Switch output (DO) wiring method 27
4.Configuration software driver installation, function parameter reading, description and writing 28
4.1 Configuration software tools and driver installation 28
4.1.1 Configuration software tools and driver installation package download 28
4.1.2 Configuration software tools and driver installation 28
4.1.3 Configuration Software Tool Interface Introduction 30
4.2 Reading and changing basic product parameters 31

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4.2.1 Product hardware connection and COM port selection 31
4.2.2 Reading basic product parameters 32
4.2.3 Serial port parameter modification, writing and restoring defaults 33
4.3 I/O configuration parameter reading, description and writing 34
4.3.1 I/O configuration parameter reading 34
4.3.2 I/O Configuration Parameters Description 35
4.3.3 Writing I/O Configuration Parameters 36
4.4 Mode configuration parameter reading, description and writing 37
4.4.1 Mode configuration parameter reading 37
4.4.2 Mode Configuration Parameter Description 37
4.4.3 One-to-one configuration writing 42
4.4.4 One-to-many (with reply) configuration write 43
4.4.5 One-to-many (no reply) configuration write 44
4.4.6 Channel self-group configuration writing 45
4.4.7 The first communication mode is transparent transmission: data remote transmission function is enabled and written 48
5. Second communication mode parameter reading, description and writing 49
5.1 Second communication method: LoRa 49
5.1.1 LoRa parameter reading 49
5.1.2 LoRa Parameter Description 50
5.1.3 LoRa parameter configuration writing 50
5.1.4 LoRa Configuration Parameter Range 51
6. ModBus 51
6.1 ModBus address table 51
6.1.1 Function code and register address table 51
6.1.2 Change ModBus address 52
6.1.3 Read digital DI input 53
6.1.4 Read the DO output status 53
6.1.5 Control switch DO output 53
7.Precautions for use 54
8. Frequently asked questions and solutions (FAQ) 54
8.1 General issues 54
8.1.1 How to test the product after receiving it? 54
8.1.2 What are the module power supply requirements? 54
8.1.3 The RUN light of the module is not on. 55
8.1.4 Configuration software cannot search for device 55
8.1.5 The two modules fail to communicate successfully and the NET indicator is off 55
8.1.6 The two devices fail to communicate, but the NET indicator is always on 56
8.2 LoRa related issues 56
8.2.1 LoRa communication, what should I pay attention to? 56
8.2.2 LoRa communication, 4KM or 8KM module, actual communication distance? 56
8.2.3 How to place the antenna 57
8.3 Issues related to switch input and output 57
8.3.1 A I/ A O input has no input/output, DI/DO input has no input/output 57

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8.3.2 The communication between two modules is unstable 57
Important Notice 57
Revision History 58
About us 58

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1.Product Introduction

1. This product is a pair transmission product. Function: The transmitter collects **4-channel** switch signals and transmits the data to the receiver via wireless (LoRa spread spectrum) or network port , and the receiver restores the **4-channel** switch signals.

2. Product model K61-DL20, including sending (collection) end: K61D-40 RL20; receiving (output) end: K61D-04RL20.

(For more naming details, see the " Product Model Naming " section)



Figure 1-1

3. The module also has the function of 485 data transparent transmission. The 485 data at the sending and receiving ends can be transparently transmitted through LoRa wireless communication.

4. The product is highly easy to use, avoiding long-distance cable laying, greatly reducing the company's manpower/material costs, and reducing the difficulty of construction and maintenance.

5. Aimed at industrial users, it is designed at full industrial level and has undergone extensive testing, with stable and reliable quality.

6. Construction-free installation: It can replace link cables, has a long transmission distance, and eliminates the trouble of cable construction.

7. Programming-free design: No programming is required, all parameters can be configured through the host computer software , easy to use and reliable operation.

8. Automatic error correction: The terminal has strong error correction capability and can actively correct interfered data packets, greatly improving transmission reliability.

1.1 Features

- The sending (collection) end supports 4-way switch signal input ;
- The receiving (output) end supports 4-way switch signal output ;
- It has the function of data transparent transmission between the first communication interface (RS485 (default)/RS232) and the second communication interface (LoRa/ETH network port...);
- With hardware watchdog, it has high reliability and recoverability ;
- It has good protection functions such as over-current, over-voltage, reverse connection and wrong connection ;
- A variety of indicator lights allow you to fully view the status and troubleshoot easily;

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- The device has a **150ms** de-jitter time, making the input acquisition signal more stable and reliable, and less susceptible to interference;
- Communication channels can be set, and a maximum of 83 channels can be used for data communication in one area without interfering with each other;
- The wireless 433Mhz (LoRa spread spectrum) communication power is 0.1W, the communication distance is 4000 meters (open space), and stable transmission can be achieved within 500 meters in ordinary scenarios;
- are supported , please contact sales .

1.2 Basic parameters

Table 1.1 Basic parameters

category	project	index
DI Input DO Output	Number of DI/DO channels	4
	Interface Type	Switch quantity (digital quantity) type
	Connection	5.08mm industrial grade plug-in terminal
	Refresh rate	When a signal change is detected , it is triggered immediately (de-bounce time 150ms) .
	DI signal input	1. Dry and wet nodes are compatible, and the low-level input of the switch quantity is valid; 2. DI acquisition channel and GND: Low-level action effective voltage input range <0.7V; withstand voltage range < 30V ; cannot be reversed, reverse connection may cause product damage.
	DO signal output	1. The switch output type is: relay normally open contact output; 2. Relay contact load current range: ≤3A.
Physical characteristics	Product size	110 *84.32*25.3mm (length*width*height)
	Product Weight	164 ±5g
	Packing weight	710±10g
Work Environment	Operating temperature	-40℃ ～ 85℃
	Storage temperature	-60℃ ～ 125℃
	Operating humidity	5% ～ 95% RH
	Storage humidity	1% ～ 95%
	Waterproof grade	Not waterproof, but has certain moisture-proof capability
	Dust protection level	Completely blocks dust
power supply	Operating voltage	DC voltage: DC 8 V ~ 28 V
	Power connection type	5.08mm industrial grade plug-in terminal
	Transmitter power consumption	Pmax (maximum power consumption) = 1W, Pav (average power consumption) ≤ 0.5W
	Receiver power consumption	Pmax (maximum power consumption) = 1W, Pav (average power consumption) ≤ 0.5W
First	type	RS 485

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communication method	Is it isolated?	no
	Connection	5.08mm industrial grade plug-in terminal
Second communication method	type	LoRa wireless spread spectrum (SX1262)
	Transmit power	160mW (22dBm)
	Operating frequency	410.125～493.125Mhz (default 410.125Mhz)
	Measured distance	4000 meters (clear and open environment, maximum power, airspeed 2.4K, antenna gain 5dBi, feeder length 1m); the recommended actual engineering application distance is ≤1000 meters.
	Air speed	2.4～62.5kbps (default 4.8kbps)
	Receiving sensitivity	-138dbm
	Actual frequency calculation formula	Actual frequency = 410.125Mhz + channel * 1Mhz
	Number of channels	83
	Matching antenna interface/impedance/frequency band	SMA internal thread inner needle/equivalent impedance 50Ω/433Mhz

1.3 Description of dimensions, interfaces , indicators, etc.

1.3.1 Product size

Note: 1. The dimensions of the transmitter and receiver are the same, see the figure below.

2. The following Figures 1-2 are reference dimensions of the product, with an error of ±0.3mm. Please refer to the actual product.

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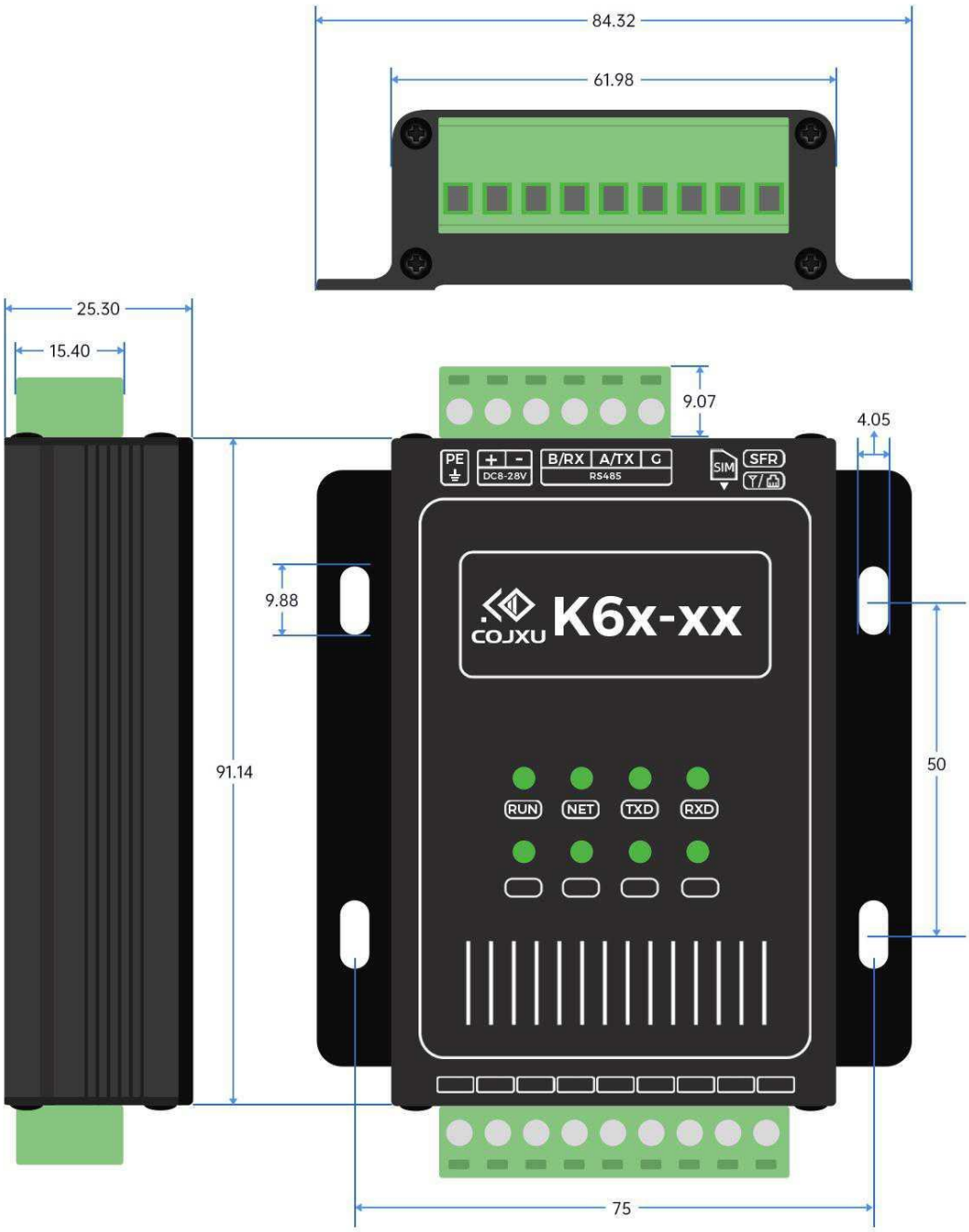


Figure 1-2 Product dimensions

1.3.2 Product interface description

(1) Product interface description of the sending (collection) end

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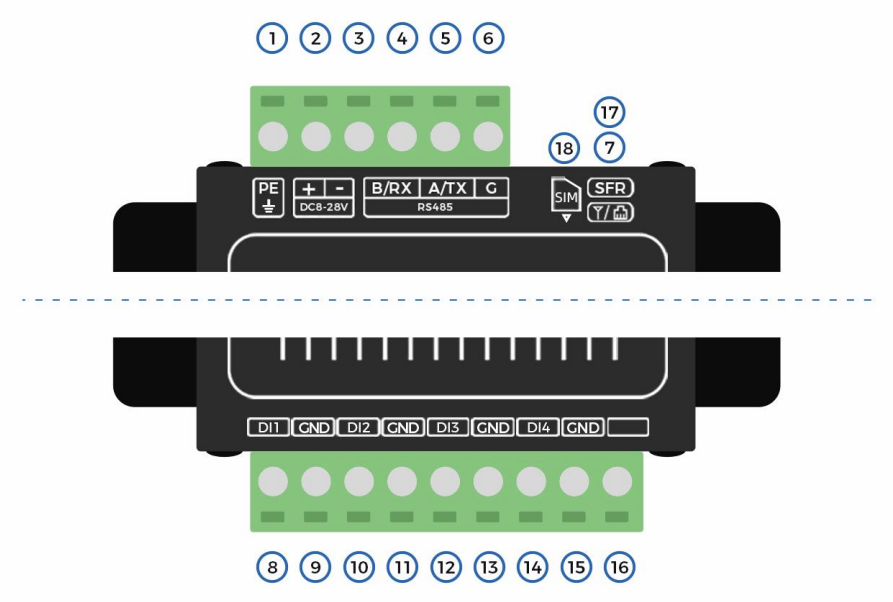


Figure 1-3 Product interface display at the sending (collection) end

Table 1.3.2 Transmitter (collection) end product pin function definition

Serial number	Port and other definitions	Function	illustrate
1	PE	Protective ground terminal	Lightning protection grounding . If the ground lead is in good condition, it is recommended to connect the product housing to the ground ; otherwise, it is OK.
2	+	Positive power supply	Power input positive pole, DC voltage input range DC 8-28 V.
3	-	Power Ground	Negative pole of power input (0V).
4	B /RX	Communication interface B / RXD	RS 485 interface B / (RS232_RXD).
5	A /TX	Communication interface A/TXD	RS 485 interface A / (RS232_TXD).
6	G	Communication port	RS 485 ground (optional) /RS232 signal ground (0V).
7	Second communication interface	Antenna interface/network port	433Mhz antenna interface/network port socket
8	D I1	Switching quantity acquisition channel 1	Switching signal acquisition channel 1. With GND: dry contact input closure is valid; wet contact is less than 0.7V is valid.
9	GND	Input negative	Input negative pole (0V).
10	D I2	Switching quantity acquisition channel 2	Switching signal acquisition channel 2. With GND: dry contact input closure is valid; wet contact is less than 0.7V is valid.

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11	GND	Input negative	Input negative pole (0V).
12	D I	Switching quantity acquisition channel 3	Switching signal acquisition channel 3. With GND: dry contact input closure is valid; wet contact is less than 0.7V is valid.
13	GND	Input negative	Input negative pole (0V).
14	D I	Switching quantity acquisition channel 4	Switching signal acquisition channel 4. With GND: dry contact input closure is valid; wet contact is less than 0.7V is valid.
15	GND	Input negative	Input negative pole (0V).
16		none	Reserved for floating, not connected.
17	SFR	Restore factory settings	Press and hold for 3 seconds to restore to factory settings (Set Factory Reset) (indicated by the RUN light status).
18	SIM	SIM card slot	Insert a data IoT card or a phone card with enough data package. (This product does not have a SIM card slot)

(2) Description of the receiving (output) end product interface .

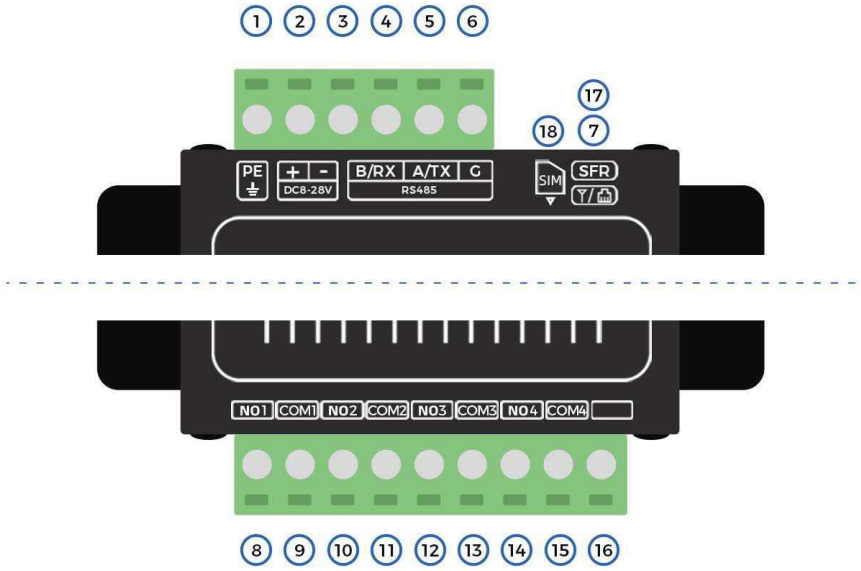


Figure 1 -4 Receiving (output) end product interface display

Table 1-4 Receiving (output) end product pin function definition

Serial number	Port and other definitions	Function	illustrate
1	PE	Protective ground terminal	Lightning protection grounding . If the ground lead is in good condition, it is recommended to connect the product housing to the ground ; otherwise, it is OK.
2	+	Positive power	Power input positive pole, DC input voltage range 8-28 V.

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		supply	
3	-	Power Ground	Negative pole of power input (0V).
4	B /RX	Communication interface B /RXD	RS 485 interface B / (RS232_RXD).
5	A /TX	Communication interface A/TXD	RS 485 interface A / (RS232_TXD).
6	G	Communication port	RS 485 ground (optional) /RS232 signal ground (0V).
7	Second communication interface	Antenna interface/network port	433Mhz antenna interface/network port socket
8	NO1	Switching output channel 1	Relay normally open contact output, contact current ≤3A.
9	COM1	Common terminal 1	Relay output channel 1 common terminal.
10	NO2	Switching output channel 2	Relay normally open contact output, contact current ≤3A.
11	COM2	Public terminal 2	Common terminal of relay output channel 2.
12	NO3	Switching output channel 3	Relay normally open contact output, contact current ≤3A.
13	COM3	Common terminal 3	Common terminal of relay output channel 3.
14	NO4	Switching output channel 4	Relay normally open contact output, contact current ≤3A.
15	COM4	Common terminal 4	Common terminal of relay output channel 4.
16		none	Reserved for floating, not connected.
17	SFR	Restore factory settings	Press and hold for 3 seconds to restore factory settings (Set Factory Reset) (indicated by the RUN light status).
18	SIM	SIM card slot	Insert the data IoT card or a phone card with a data package. (This product does not have a SIM card slot)

1.3.3 Indicator Light Description

(1) The LED indicator on the sending (collecting) end is as shown.

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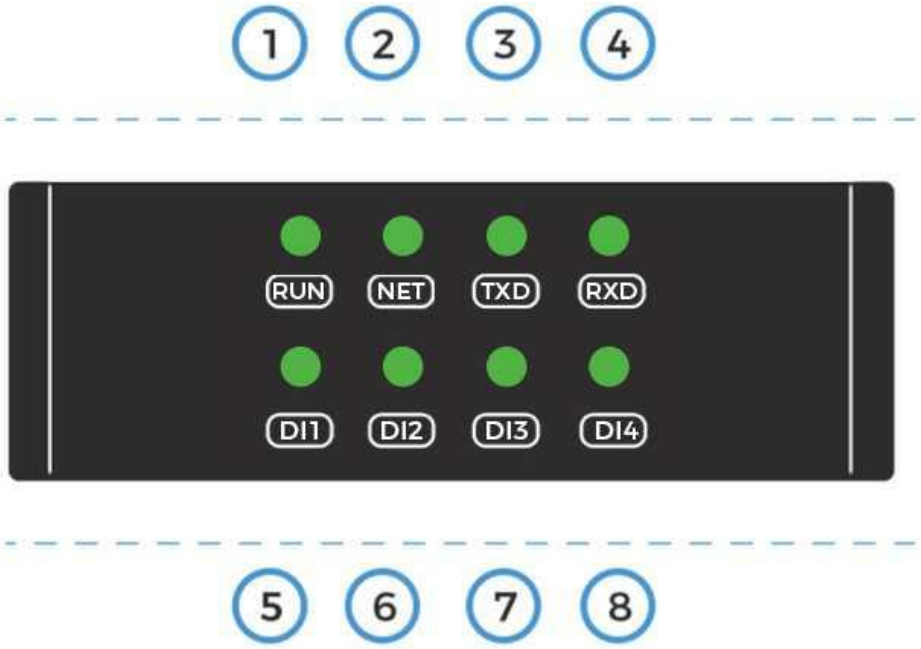


Figure 1-5

Table 1-5 Analog input module function table

Serial number	Indicator light name	illustrate
1	RUN	0.5 second flashing: indicates the product is operating normally; After 3 seconds of steady light, it will resume flashing for 0.5 seconds: Press and hold the button for 3 seconds to indicate that the factory reset is successful.
2	NET	Steady on: The second communication interface is connected successfully; Off: The second communication interface is disconnected.
3	TXD	Flashing: Indicates that the product is sending a data signal.
4	RxD	Flashing: Indicates that the product has received a data signal.
5	DI 1	Always on: the closed switch/low-level valid signal input is collected ; Off: No valid switch signal input is collected .
6	DI2	Always on: the closed switch/low-level valid signal input is collected ; Off: No valid switch signal input is collected .
7	DI3	Always on: the switch closed/low level valid signal input is collected ; Off: No valid switch signal input is collected .
8	DI4	Always on: the switch closed/low level valid signal input is collected ; Off: No valid switch signal input is collected .

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(2) The LED light indication at the receiving (output) end is as shown.

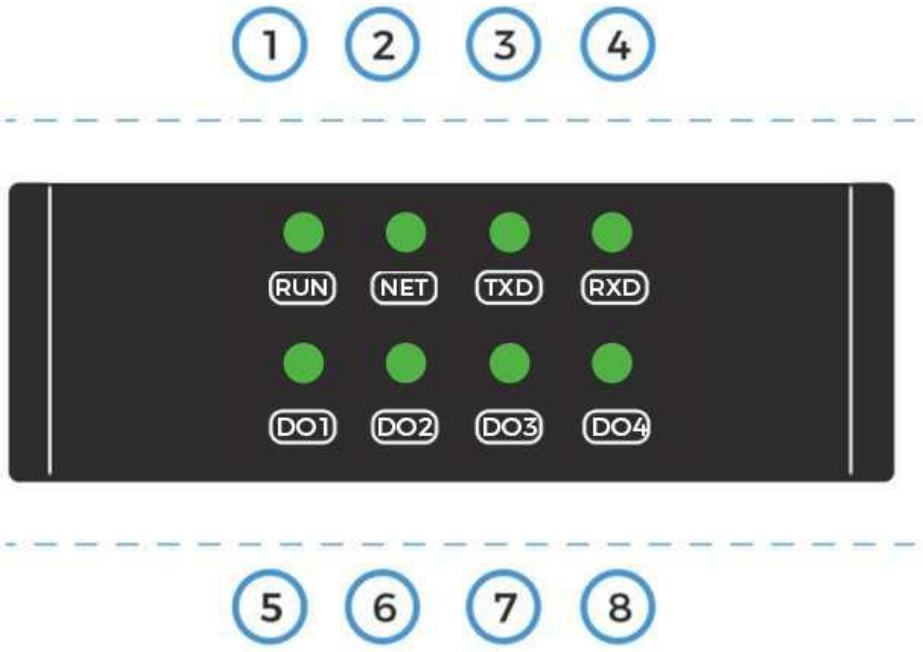


Figure 1-6 Analog output module indicator light

Table 1-6 Analog output module function table

Serial number	Indicator light name	illustrate
1	RUN	0.5 second flashing: indicates the product is operating normally; After 3 seconds of steady light, it will resume flashing for 0.5 seconds: Press and hold the button for 3 seconds to indicate that the factory reset is successful.
2	NET	Steady on: The second communication interface is connected successfully; Off: The second communication interface is disconnected.
3	TXD	Flashing: Indicates that the product is sending a data signal.
4	RxD	Flashing: Indicates that the product has received a data signal.
5	DO1	Always on: the normally open contact of the relay is in action (closed); Off: The normally open contact of the relay is normally open (disconnected).
6	DO2	Always on: the normally open contact of the relay is in action (closed); Off: The normally open contact of the relay is normally open (disconnected).
7	DO3	Always on: the normally open contact of the relay is in action (closed); Off: The normally open contact of the relay is normally open (disconnected).
8	DO4	Always on: the normally open contact of the relay is in action (closed);

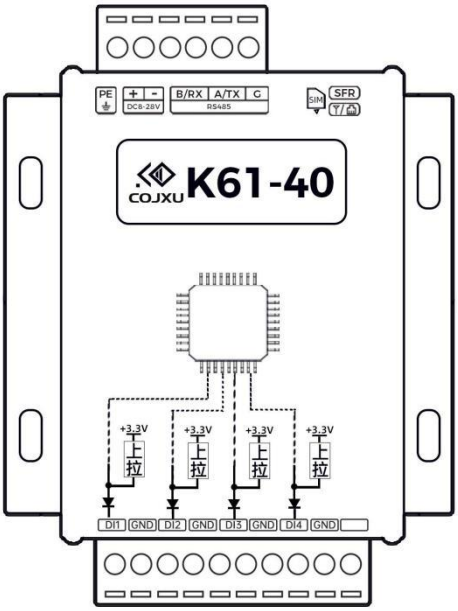
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		Off: The normally open contact of the relay is normally open (disconnected).

1.4 Product internal circuit structure diagram

1.4.1 Simplified diagram of the internal principle of the sending (collection) end product

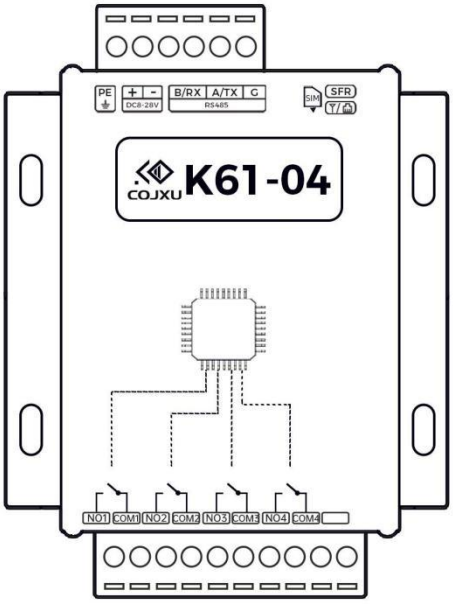


Analog input product internal principle diagram

1.4.2 Schematic diagram of the internal principle of the receiving (output) end product

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Analog output product internal principle diagram

2.Quick Start (users are recommended to read this chapter first)

This chapter is a quick introduction to this product. It is recommended that users read this chapter carefully and follow the instructions . You will have a systematic understanding of this product . Users can also select the chapters you are interested in to read as needed. For specific details and instructions, please refer to other related chapters.

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2.1 Product and Accessories List



Figure 2-1 The whole set of products includes modules and accessories

Table 2-1 The complete product includes modules and accessories

name	model	quantity
Switching signal acquisition module	K61D-40RL20	1
Switching signal output module	K61D-04RL20	1
12V/1A adapter power supply	CQ12-120100-CC	2
Power adapter cable	DYX01-A	2
Suction cup antenna (SMA internal thread inner needle / equivalent impedance 50Ω / 433Mhz / 3.5dBi gain / feeder length 1 meter)	TX433-XPL-100	2
USB to 485 tool	K1T-UR0	1
Small flathead screwdriver	2*50mm slotted screwdriver	1

2.2 Quick Use

2.2.1 Step 1: Connect the product to the antenna and power supply

(1) Connect the antenna and power supply as shown in the figure below.

1. **Antenna connection** : Remove the antenna cap of K61-40 and K61-04 products, and tighten the 433Mhz

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frequency band "suction cup antenna" clockwise onto the product; (For more information, see the " Second communication method: LoRa spread spectrum hardware connection and installation " section)

2. **Power connection : Connect the "** red wire " of the "power adapter cable " to the " + " pole of the product, and the " black wire " to the " - " pole of the product; connect the "12V/1A adapter power" to the "power adapter cable".

(For more details, see the " Power Hardware Connection " section)



Figure 2-2 Connecting the antenna and power supply

(2) Notes:

1、When wiring, please do not connect to the wrong port to avoid damaging the product! !

2、**the RF antennas** of the paired products and they should be able to see directly as much as possible; the RF antennas should be kept away from walls, metal shields, large trees, hills, large buildings, etc.

3、**the RF antenna** should not be placed against metal, walls or other objects that have a significant attenuation effect on the RF signal, so as not to affect the transmission of the RF signal.

4、the product's **RF antennas** should be kept at least 1 meter. If the high-power RF product is too close to the RF antenna, the receiving end will not be able to receive data. (For more details, please see the " Frequently Asked Questions and Solutions (FAQ) " section)

2.2.2 Step 2: Signal input wiring of the sending (collection) end product

(1) According to **Figure 2-3 below** , connect a switch (or sensor, etc.) to the DI and GND interfaces of the **K61-40** acquisition terminal of this product. After tightening the screws on the plug-in terminal of this product, close the switch (or let the sensor output a closed switch signal). When the switch is closed, the corresponding IO light is always on, indicating that the switch closed signal is collected .

(2) Notes :

1. When the input has voltage, 0.7V or less is in the closed state (valid state and the switch signal is closed), and 0.7V or more is in the open state (invalid state and the switch signal is open).

2. When the communication between K61-40 and K61-04 is established successfully, the "NET" light will be on;

3. When the switch signal is collected , the corresponding IO light is always on. If the IO light is not on, please check whether the sensor outputs the closed switch signal normally;

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4. When connecting the terminals to the wires, please tighten the screws on the plug-in terminals of this product. Be careful not to press the conductive part of the terminals onto the insulation layer of the wires to avoid poor contact and abnormalities .

(For more details, please see the " Frequently Asked Questions and Solutions (FAQ) " section)

2.2.3 Step 3: Receiving (output) end product signal output wiring

(1) According to **Figure 2-3 below** , connect the DO and GND of the output terminal of **K61-04 of** this product with wires as shown in the figure below (or connect them to the switch signal acquisition sensor). After receiving the switch signal sent by the transmitter, the K61-04 device will output a closed switch signal, the light bulb in the figure will light up, and the corresponding IO light will also be on.

(2) Notes:

1. This product outputs a switch signal, not a voltage.

2. When both devices are powered on (sending and receiving), check the "NET" light of the K61-04 device. If the "NET" light is on, it means that the communication between the two devices is successfully established;

3. When the corresponding IO light is on, it means that **the K61-40** transmitter receives the switch signal, and the **K61-04** output terminal outputs a closed switch signal:

3. When connecting the terminals to the wires, please tighten the screws on the plug-in terminals of this product. Be careful not to press the conductive part of the terminals to the insulation layer of the wires to avoid poor contact.

(For more details, please see the " Frequently Asked Questions and Solutions (FAQ) " section)

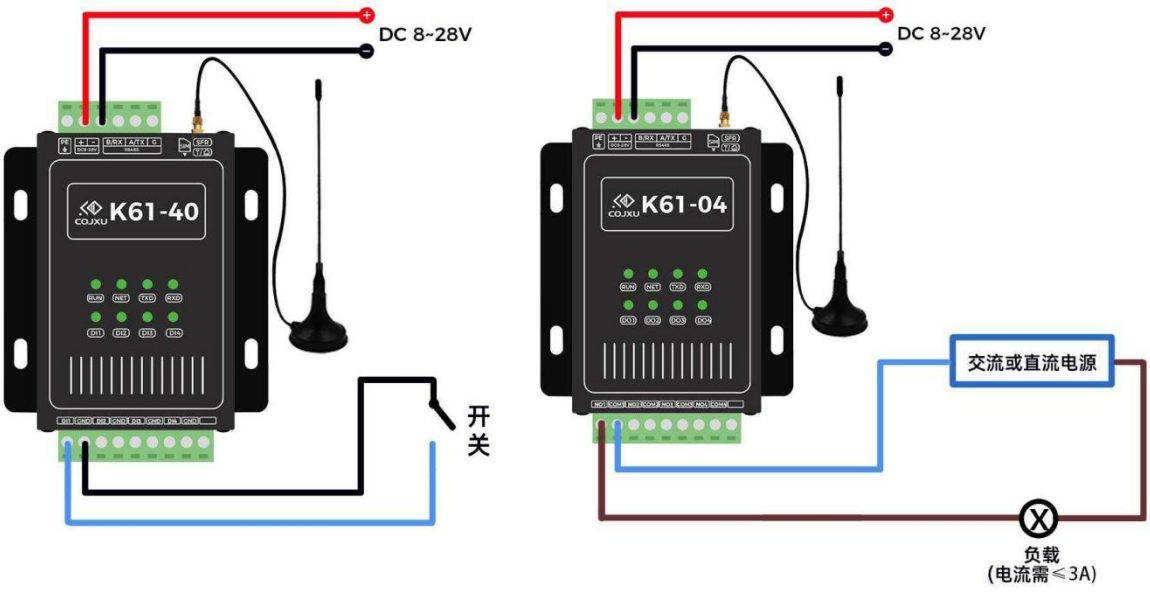


Figure 2-3 Connecting IO ports

2.2.4 Step 4: Power on the product and observe the indicator light status

(1) Plug two 12V/1A adapters into the power strip (AC220V) to power on the entire system.

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collected by the transmitter , and the switch signal output by the receiver, as shown in Figure 2-4.

1. The RUN light flashes once every 0.5 seconds, indicating that the product is powered on successfully;

2. When the NET light of the supporting product is on , it means that the two modules are communicating wirelessly successfully ;

3. If the DI light is on , it means the signal is collected successfully ; if the DO light is on , it means the signal is output successfully ;

(3) Notes:

1. For more details on indicator light functions, see the " Indicator Light Description " section;

2. If the NET indicator light is off, it means that wireless communication is unsuccessful. You need to check whether the product antenna is installed correctly, ensure that the antenna distance is 1 meter or more, and there is no obstruction between the product antennas.

2.2.5 Step 5: On-site installation

(1) Important knowledge point: The necessary conditions for communication between paired products of LoRa wireless spread spectrum technology are: **channel, address, and airspeed . Products with the same** three parameters can communicate data. Conversely, if the parameters are different, data communication is not possible.

(That is, the LoRa channel of the transmitter module is the same as the LoRa channel of the receiver module, the LoRa address of the transmitter module is the same as the LoRa address of the receiver module, and the LoRa wireless airspeed of the transmitter module is the same as the LoRa wireless airspeed of the receiver module)

(2) Default parameters: The default parameter attributes of this product are detailed on the nameplate label on the back of the product.

(3) **Key points:** It is recommended that users configure, record and manage the three parameters of the LoRa wireless spread spectrum of the paired product: channel, address and airspeed when using this product in engineering.

Reason: To avoid data conflicts between the same type of products in engineering applications and on-site environments; in addition, to avoid forgetting these three parameters of the installed equipment when adding this product next time, resulting in the need to go to the site to read the parameters, causing unnecessary trouble.

(4) Configuration operation details: For details on the LoRa wireless parameter configuration method, please see " Driver and Configuration Software Tool Installation ". The configuration software interface is shown in Figure 2-5 below.

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Figure 2-5 Configuration software screenshot

2.3 Model Selection Overview

2.3.1 Product Model Selection Table

Product Model	describe
K41-DG	1-way switch bidirectional 4G remote transmission. Used for long distances and when there is a 4G signal
K41-DL20	1-way switch bidirectional 433M wireless remote transmission, open communication transmission distance 4KM
K41-DL30	1-way switch bidirectional 433M wireless remote transmission, open communication transmission distance 8KM
K42-DG	2-way 0/4~20mA analog one-way 4G remote transmission. Used for long distances and when there is a 4G signal
K42-DL20	2-way 0/4~20mA analog one-way 433M wireless remote transmission, open communication transmission distance 4KM
K42-DL30	2-way 0/4~20mA analog one-way 433M wireless remote transmission, open communication transmission distance 8KM
K43-DG	1 channel 0/4~20mA analog and 1 channel switch unidirectional 4G remote transmission. Used for long distances and 4G signals
K43-DL20	1 channel 0/4~20mA analog and 1 channel switch unidirectional 433M wireless remote transmission, open communication transmission distance 4KM
K43-DL30	1 channel 0/4~20mA analog and 1 channel switch unidirectional 433M wireless remote transmission, open communication transmission distance 8KM
K61-DE	4 -way switch quantity unidirectional Ethernet (LAN) remote transmission. Used when two network ports in the LAN can ping each other

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K61-DEW	4-way switch unidirectional Ethernet (Internet) remote transmission. Used in remote locations as long as there is an Internet access port
K61-DL20	**4-way switch quantity one-way 433M wireless remote transmission, open communication transmission distance 4KM**
K62-DE	4-way 0/4~20mA analog Ethernet (LAN) remote transmission. Used when two network ports in the LAN can ping each other
K62-DEW	4-way 0/4～20mA analog Ethernet (Internet) remote transmission. Used in remote locations as long as there is an Internet access port
K62-DL20	4-way 0/4～20mA analog 433M wireless remote transmission, open communication transmission distance 4KM
K71-DG	8-way switch one-way 4G wireless remote transmission. Used in applications with long distance and 4G signal
K71-DL30	8 -way switch quantity one-way 433M wireless remote transmission, open communication transmission distance 8KM
K72-DG	6-channel 0/4～20mA analog 4G wireless remote transmission. Used in applications with long distance and 4G signal
K72-DL30	6-channel 0/4 ～ 20mA analog 433M wireless remote transmission, open communication transmission distance 8KM

.....

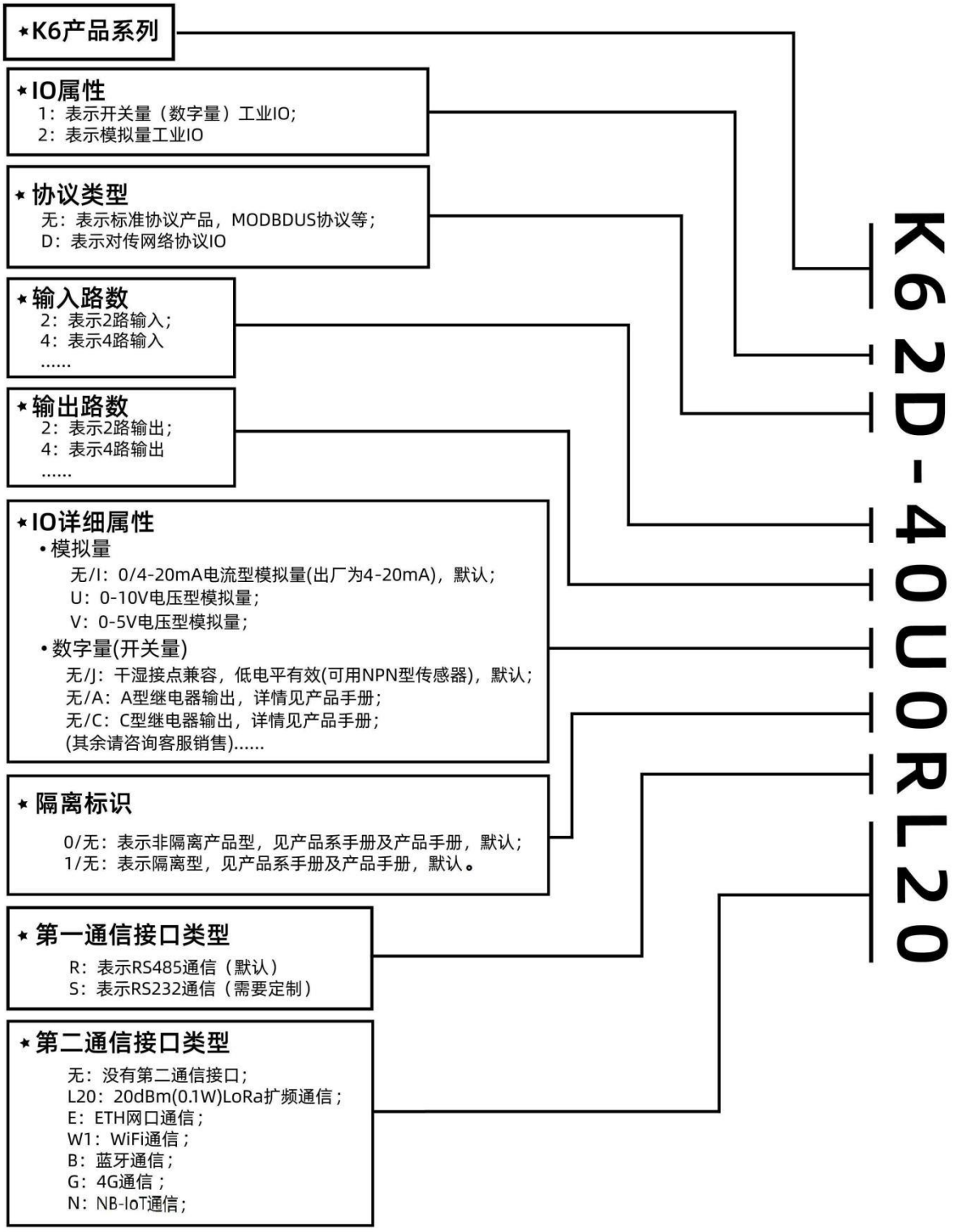
(For more details, please visit the official website to check product models and download relevant user manuals)

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2.3.2 Product model naming details

Take K62D-40U0RL20 as an example:



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3.Hardware connection and related knowledge

3.1 Power Hardware Connection

3.1.1 Power supply selection

Power supply selection: Select a suitable DC regulated power supply according to the product nameplate label. Power supply requirements: strong anti-interference ability, small ripple, and sufficient load capacity; preferably with overcurrent protection, overvoltage protection and lightning protection functions to ensure long-term normal operation of the product. You can also use our standard power adapter for power supply.

3.1.2 Power Connection

Power supply wiring diagram: Please refer to Figure 3-1 below

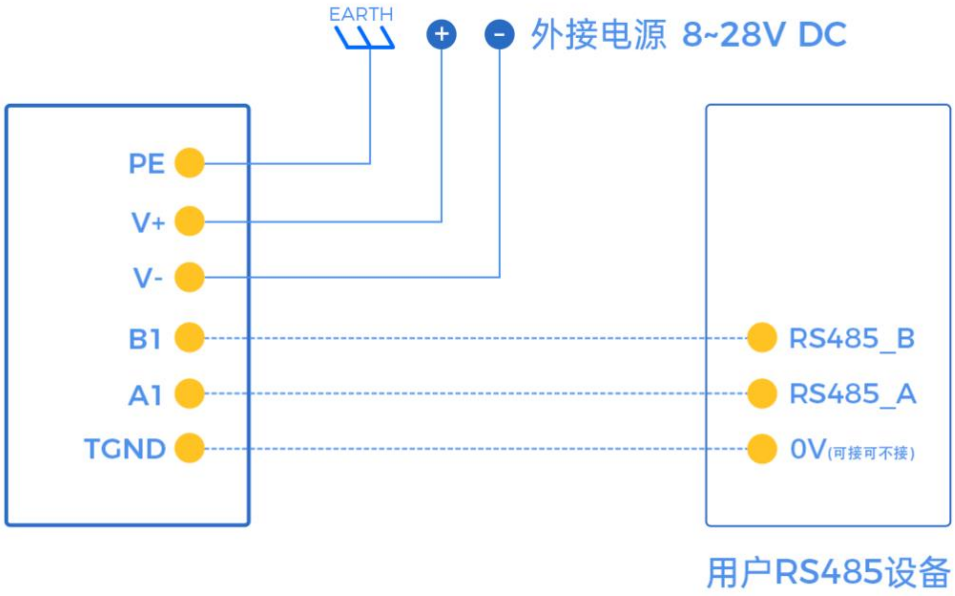


Figure 3-1 RS 485 connection diagram

3.1.3 Power connection precautions and instructions

(1) The power interface of this product has overcurrent protection, reverse connection protection, power surge protection and other capabilities;

(2) In complex environments with a lot of RF interference, strong electromagnetic interference, static electricity easily generated by dryness, complex wiring, and strong and weak currents not separated, and the earth is well grounded, it is recommended to connect the product "PE" to the earth. This can effectively protect the product

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and suppress interference;

(3) The earth connection should comply with national standards. If you are not sure whether the earth connection complies with national standards, it is recommended that the PE of this product should not be connected to the earth to prevent interference or even damage to the product.

3.2 Hardware connection of the first communication method

3.2.1 The first communication method: RS485

(1) RS485 function

1. Configure product parameters;

2. Use RS485 remote transmission (to- ...

3. After turning on the "RS485 transparent transmission" function, data transparent transmission is performed;

(For details, see " **(2) Transparent transmission** " and " **(3) RS485 transparent transmission filtering** " in the " Reading and changing basic parameters of the product " and " Mode configuration parameter description " chapters).

(2) RS485 hardware connection

Wiring connection: RS485 wiring is very simple; just connect RS485 communication product A to A, and B to B, and the wiring is complete. See **Figure 3-1 above for the wiring diagram** .

(3) RS485 parameter value options

1. Baud rate: 1200, 2400, 4800, 9600 (default), 14400, 19200, 38400, 43000, 56000, 57600, 115200

2. Check digit: None (default), Odd, Even, Mark, Space

3. Data bits: 6, 7, 8 (default) , 9

4. Stop bits: 1 (default), 2

(4) Product RS485 hardware protection

The RS485 of this product has overcurrent protection, power surge protection, induction lightning protection, EMC electromagnetic compatibility and other capabilities.

(5) RS485 bus wiring rules

120Ω resistors at the beginning and end of the RS485 network . This is because as the transmission distance increases, echo reflection signals will be generated on the 485 bus network.

2. In industrial field applications, if the interference source is very complex, there may be a high common mode voltage between the nodes. Although the RS485 interface uses differential transmission and has the ability to resist common mode interference. However, when the common mode voltage is greater than +12V or less than -9V, it exceeds the limit receiving voltage of the RS485 receiver, and the receiver will not work, and may even burn the chip and equipment. At this time, the RS485 optical isolation repeater should be used in the RS485 bus network to eliminate the influence of the common mode voltage.

3. Since the RS485 bus transmits a pair of differential signals, the data transmission lines between the devices on the RS485 network are best to use twisted pair cables with an additional shielding layer, and the shielding layer should be reliably grounded at one point.

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4. In simple applications of 485 bus, bus topology wiring is generally adopted. However, in more complex systems, the wiring construction of bus topology is not only very cumbersome, but also wastes a lot of wires. By flexibly using 485 hubs or 485 repeaters, the bus topology can be connected into a star or tree topology. This greatly facilitates the early construction and later maintenance work.

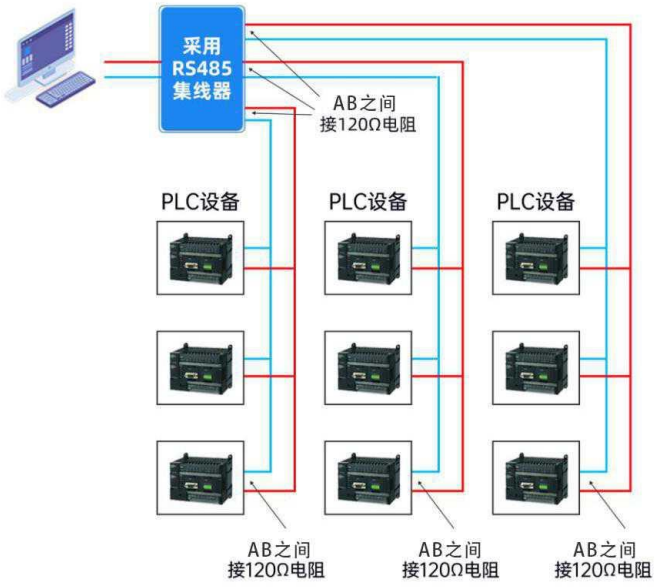


Figure 3-2 RS 485 star topology

5. The load capacity of the RS485 bus must be taken seriously. Factors that affect the load capacity include: the power supply capacity of the RS485 converter connected to the serial port of the host computer , the communication distance, the quality of the RS485 data cable, the baud rate, etc.

6. Passive RS485 converters steal power from the computer's serial port, have poor power supply, and insufficient load capacity. If there are many devices on the RS485 network, you should use a RS485 converter with power supply. Choose a good 485 dedicated communication cable and use the lowest baud rate possible. Using an RS485 repeater or RS485 hub can increase the load capacity of the RS485 bus.

3.3 Second communication mode hardware connection

3.3.1 The second communication method is: LoRa spread spectrum hardware connection and installation

(1) RF antenna connection, installation and instructions

How to connect the product antenna: See the " Connecting the product antenna and power supply " section above.

(2) Which antenna should be used for wireless communication?

1. When users select antennas, the antenna frequency band should match **the wireless operating frequency** and **impedance** requirements of this product. (For parameter details, see the " Basic Parameters " section)

2. Reason: This product uses a dedicated frequency band antenna with good standing wave performance and more stable data transmission.

(3) RF antenna installation

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the RF antennas of the paired products and they should be able to see directly as much as possible. The RF antennas should be kept away from walls, metal shields, large trees, hills, large buildings, etc.

2. **The RF antenna** should not be placed close to metal, walls, ground, trees, sea water or other objects that have a great attenuation effect on RF, so as not to affect the transmission of RF signals.

3. When installing the suction cup antenna, the wire should be straightened as much as possible and the suction cup base should be attached to a metal object.

4. The distance between the product's **RF antennas** should be kept at 1.5 meters or more. If the high-power RF product is too close to the RF antenna, the receiving end will not be able to receive data.

5. If the measured distance is not ideal, it is recommended to analyze and improve the communication distance based on the antenna installation method, antenna quality and LoRa wireless configuration parameters. You can also log in to the official website www.cojxu.com to get in touch and seek help.

6. For the parameters of the standard antenna of the product, see the " Product and Accessories List ". If **the feeder is not long enough** , you need to purchase a feeder extension cable or an antenna with a longer feeder. Do not peel the antenna and extend it by yourself, as this will cause the RF antenna impedance to not match, resulting in severe signal attenuation.

3.4 Switching input and output hardware connection

3.4.1 Wet node: NPN normally open type\PNP normally closed type sensor (DI) wiring method

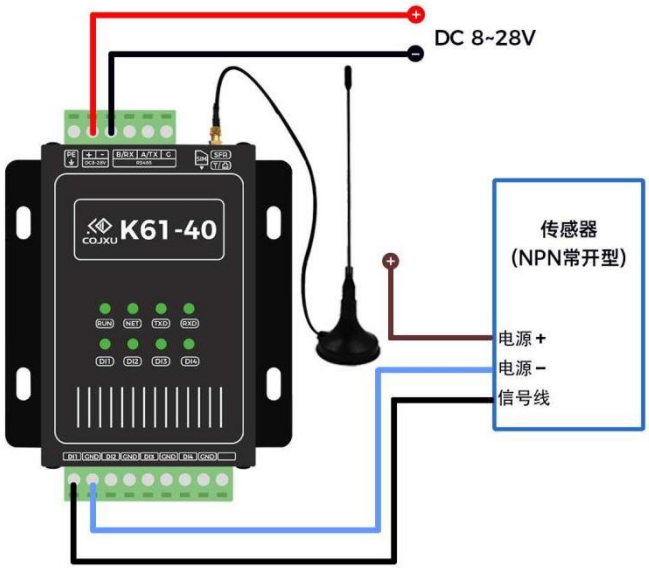


Figure 3-2 Sensor wiring diagram

3.4.2 Dry contact: Push button switch (DI) wiring method

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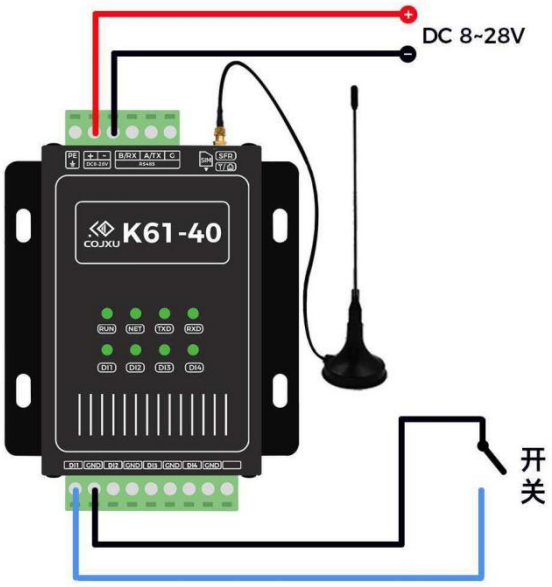


Figure 3-3 Push button switch wiring diagram

3.4.3 Switch output (DO) wiring method

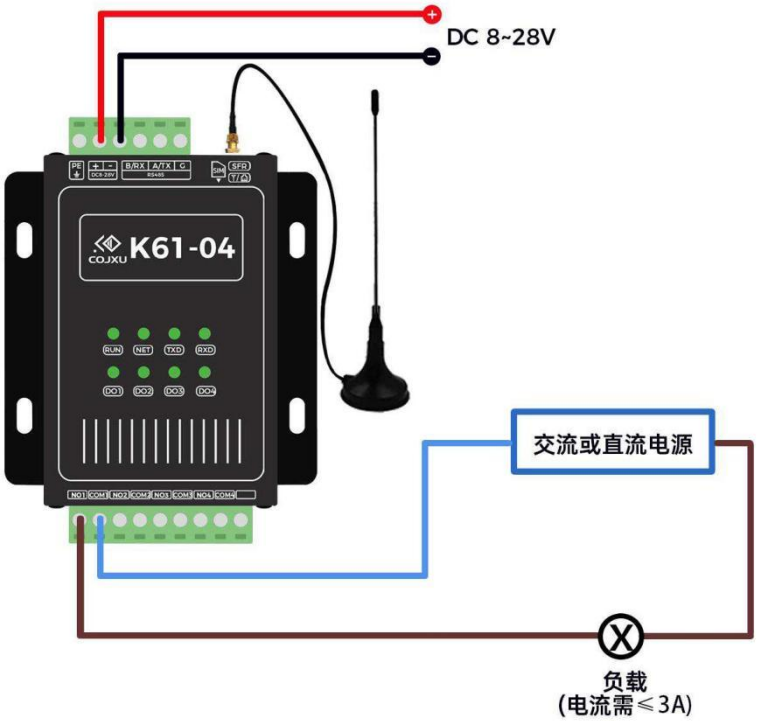


Figure 3-4 Schematic diagram of receiving end wiring **(output : passive switch signal)**

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4.Configuration software driver installation, function parameter reading, description and writing

Serial port tool installation, configuration software installation, basic parameters, device properties, I/O configuration, mode configuration, etc.

4.1 Configuration software tools and driver installation

List of Materials Used in This Chapter	
Prepare materials	Quantity/Remarks
Windows Computer	1 unit
USB to 485 tool	1
Product Switching Power Supply/Power Adapter	1
product	several
wire	several
CH340 driver (serial port driver)	Computer driver installation package
Mircosoft.Net_Framework_4.0 and above computer environment driver	Computer driver installation package
Industrial Network IO Setting Tool.exe	Configuring software installation packages

4.1.1 Configuration software tools and driver installation package download

(1) Method 1: Go to the official website: www.cojxu.com → click "Download" → "Point-to-point Remote Following" → click "LoRa 433M" → find "Industrial Network IO Setting Tool", **download** the compressed package **and decompress it** .

(2) Method 2: Go to the official website:
http://www.cojxu.com/data-download.html?id=47&pid=33#load

4.1.2 Configuration software tools and driver installation

(1) First, confirm whether the "CH340 driver" has been installed. **If it has been installed, please skip this step** .

Confirmation method: Plug the "USB to 485" into the computer USB (see Figure 4-1 and Figure 4-2 below) → Right-click "My Computer/This Computer" → "Manage" → "Device Manager" → "Port" drop-down option will show the CH340/CH341 driver → If it is installed, it means it is not installed. (The steps are similar for different computers and configurations.)

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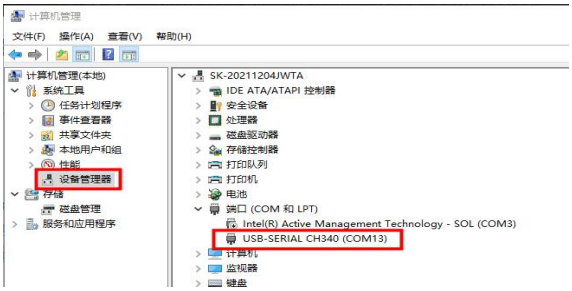
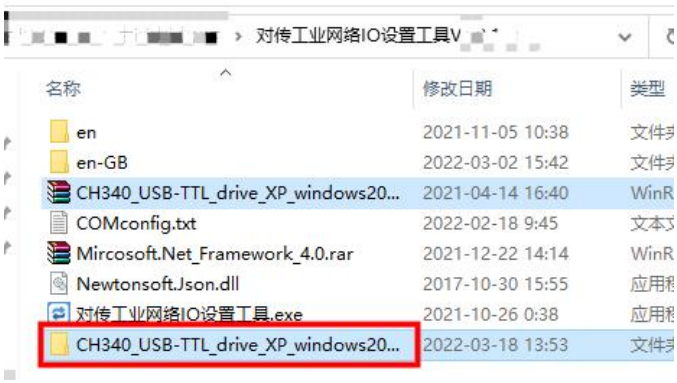


Figure 4-1 Figure 4-2

(2) If the "CH340 driver" is not installed, proceed to the following steps. **If it is already installed, skip this step** .

Open the downloaded compressed file and unzip it (see Figure 4-3 and Figure 4-4 below) → Find the compressed file with the word "CH340" and unzip it → Double-click "SETUP.EXE" → Install → After the installation is complete, it will prompt "Driver installation successful" → Complete



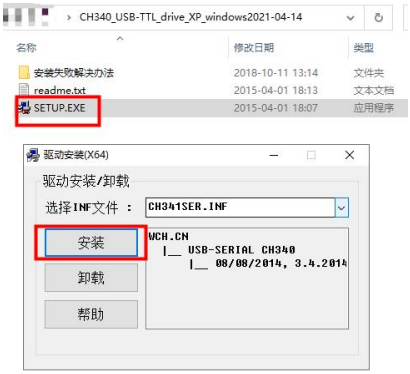


Figure 4-3 Figure 4-4

(3) Run the "Dual Transmission Industrial Network IO Setting Tool.exe" configuration software. (This setting tool supports: Chinese and English)

Open the downloaded compressed file and unzip it → Find and double-click "Industrial Network IO Setting Tool.exe" to run the configuration software → If it runs successfully, **the installation is successful** . (If it fails to open, you need to proceed to the next step.)

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Figure 4-5 Setting tool software interface

(4) If the "Industrial Network IO Setting Tool.exe" configuration software fails to run, proceed to the following steps.

Cause Analysis: The reason for the opening failure may be that the Net_Framework version of the computer compilation environment is too low, and version 4.0 or above needs to be installed.

Install Mircosoft.Net_Framework_4.0 and above: Open the downloaded compressed file and unzip it → Find and unzip "Mircosoft.Net_Framework_4.0.rar" → Double-click to run "dotNetFx40_Full_x86_x64.exe" → After completion, run "Industrial Network IO Setting Tool.exe".

4.1.3 Configuration Software Tool Interface Introduction

As shown in Figure 4-6

(1) Communication serial port interface. Supports CH340/CH341 serial port driver and can read 485, 232, and TTL data.

(2) Product basic attribute display interface. Read the company's product type, the machine's S/N code (device unique identification code), firmware version, etc.

(3) RTU product reading and configuration interface. Read and configure the information parameters of our company's products, so that the products can be applied to various industrial system environments.

(4) Second communication interface reading configuration interface. Read and configure the second communication interface of our products to connect the products to various communication types.

(5) " " indicates the related parameter comments. Users can check them to help understand when configuring parameters.

(6) Chinese and English switching function. This configuration software supports Chinese and English interfaces, which is convenient for domestic and foreign users.

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(7) Log column. Users can view the configuration instructions of our company's modules based on the information in the log column. Users can configure module parameters according to the configuration instructions. It is also convenient for analyzing abnormal problems and solving problems when configuring and writing parameters.

(8) Basic operation interface of the module. Functions such as saving, restarting, and restoring factory settings can better solve abnormal situations such as errors and misoperations when users configure information.



Figure 4-6 Configuration software tool interface overview

4.2 Reading and changing basic product parameters

This chapter mainly introduces how to read the product device attributes: device type, firmware version, product unique identification code, change serial port parameters, etc. The detailed steps are as follows.

4.2.1 Product hardware connection and COM port selection

(1) Wiring connection: Connect the product hardware to the power supply and the "USB to RS485" tool, and connect the "USB to RS485" tool to the computer USB, as shown in Figure 4-7 below.

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Figure 4-7 Schematic diagram of power supply and RS 485 hardware wiring

(2) Check the COM port number (as shown in Figure 4-8): If there is only one COM port on the computer, **you do not need to check it and can skip this step** . (If there are multiple COM ports on the computer, you need to determine which COM port number corresponds to this product. The method for checking is as follows.)

Viewing method: Right-click "My Computer / This Computer" → "Manage" → "Device Manager" → "Port" drop-down option to see the CH340/CH341 driver and the corresponding COM port number → plug and unplug the corresponding "USB to RS485" to determine the corresponding COM port number.



Figure 4-8 Computer port of USB to RS485 module

4.2.2 Reading basic product parameters

(1) Basic parameter reading content: device type, local S/N code, and firmware version.

(2) The default values of basic parameters are shown in Table 4-1.

Table 4-1

Baud rate:	9600 bps	Data bits:	8

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Check digit:	None (no check digit)	Stop bits:	1

(3) Basic parameter reading steps (as shown in Figure 4-9 below)

Steps: Select the correct COM port number → According to Table 4-1, switch to the default serial port parameters → Click "Open Serial Port" → Click "Search/Read Device" → Read successfully. You can read the basic parameters of the product: "1. Device Properties".

(If there is an exception, please refer to the " Configuration software cannot search for the device " exception handling section)



Figure 4-9 Basic parameter reading

4.2.3 Serial port parameter modification, writing and restoring defaults

(1) Serial port parameter writing content: baud rate, check bit, data bit, stop bit.

(2) This function will only be changed and written when 485 data transparent transmission is turned on to match the serial port parameters of other user products. In other cases, it is recommended that users do not change the serial port parameters of this product.

(3) Steps (**as shown in Figure 4-10 below**): Select the correct COM port number and the correct (default) parameters → Click "Open Serial Port" (if you have changed the parameters and forgot, you can restore the factory settings) → "Search/Read Device" → Read successfully → Change the baud rate, parity bit, data bit, stop bit parameters as required → Click "Write" → See the success prompt in the "Log" column → Click "Save" → Click "Restart" → Complete the change

Next, you can verify → Under the newly written serial port parameters → Click "Close Serial Port" → Then click "Open Serial Port" again → "Search/Read Device" → If the reading is successful, the setting change is completed.

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Figure 4-10 Change the serial port parameters

(4) Restore the default serial port parameters

1. Press and hold the product "SFR" reset button for 3 seconds: the product restores the factory settings, that is, the serial port parameters also restore to default.

2. Users can also use the current correct COM port number and current serial port parameters to change and write the product according to the default parameters through the "Industrial Network IO Setting Tool.exe" configuration software.

4.3 I/O configuration parameter reading, description and writing

This chapter mainly introduces: reading and configuring various parameters of I/O channels.

4.3.1 I/O configuration parameter reading

(1) I/O configuration parameter reading content: DI switch signal acquisition /DO switch signal output, network disconnection recovery time, DO digital output, channel value.

(2) Steps (as shown in Figure 4-11): Select the correct COM port number and the correct (default) parameters → Click "Open Serial Port" (if you have changed the parameters and forgot them, you can restore the factory settings) → "Search/Read Device" → "3.I/O Configuration" → Click "Read" in "I/O Configuration" → You can view the above parameters:

(Note: The reading method is the same for both **the sender** and **the receiver** .)



Figure 4-11 I/O configuration parameter reading

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4.3.2 I/O Configuration Parameters Description

(1) **Network disconnection recovery time** : When the network disconnection recovery time is set to ≥ 20 seconds, after the connection between the transmitter and the receiver is disconnected, if the network is still disconnected for a certain period of time, the receiver will output a disconnected switch signal .

Note: When the user uses it, if the default parameters cannot meet the environmental and on-site requirements, it is necessary to debug and write the appropriate time, and determine the appropriate network disconnection recovery time value by observing the product "NET" connection indicator. In order to avoid the network disconnection causing the receiving end to output a disconnected switch signal or maintain the output value before the network disconnection in the engineering application, thus affecting the system instability or malfunction!

Parameter name	Range and options	illustrate
Sending end: Network disconnection recovery time (K61-40)	0 seconds	Turn off network disconnection recovery. The receiving end maintains the output value before the network disconnection until the network connection is restored to normal, or the power is manually turned off to restore the initial value.
	20 seconds to 57600 seconds (default 20 seconds)	Enable network disconnection recovery. That is, after the network disconnection time exceeds, the receiving end outputs a disconnected switch signal .
Receiving end: Network disconnection recovery time: (K61-04)	0 seconds	Turn off network disconnection recovery. The receiving end maintains the output value before the network disconnection until the network connection is restored to normal, or the power is manually turned off to restore the initial value.
	60 seconds to 57600 seconds (60 seconds by default)	Enable network disconnection recovery. That is, after the network disconnection time exceeds, the receiving end outputs a disconnected switch signal

Example: The network disconnection recovery time is set to 20 seconds. After the sender and receiver are disconnected, the product will continue to search for connections. If the sender and receiver are still disconnected after 20 seconds, the product network indicator **"NET" light** will go out , and the receiver will restore the default output to output a disconnected switch signal .

(2) **DO digital output** : the output status of the output terminal.

Parameter name	Value range	illustrate
DO digital output	Jog **(default)**	When the sending end is closed, the receiving end is closed for a long time; when the sending end is disconnected, the receiving end is disconnected.
	Self-locking	The sending end closes and opens once, and the receiving end changes state once (closed to open, open to closed)
	Timed shutdown	The sending end closes and opens, and the receiving end waits for a certain period of time to close. The default is 1S, and the range is (1~5000S)

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(3) **Channel value** : the channel value of the acquisition (or sending end).

Channel properties	Value range	illustrate
DI	action	Collect the closed switch signal
	normal	Collect the disconnected switch signal

4.3.3 Writing I/O Configuration Parameters

(1) Refer to **the parameters in the "** I/O Configuration Parameter Description **"** and **the parameter comparison table 4-12,** and proceed to the following parameter writing steps.

(2) I/O configuration parameter writing:

1. Example: Write DO output self-locking, **60s** network disconnection recovery time, **wireless parameters: air rate 4800, wireless channel 0, module address 0** .

2. Steps (as shown in Figure 4-12): Select the correct COM port number and the correct (default) parameters → Click "Open Serial Port" (if the parameters have been changed and forgotten, you can restore the factory settings) → "Search/Read Device" → "I/O Configuration" → Pull down and select "Self-locking" → Enter the network recovery time of **60s** → Click "Write" in "3.I/O Configuration" → The log column prompts success → According to Table 4-2, configure the LoRa wireless airspeed to **4.8Kbps, wireless channel 0, module address 0** → Click "Write" in "2.LoRa Configuration" → The log column prompts success → Click "Save" → Next, read and verify whether it is successful → Click "Restart" → Repeat the steps in the " **I/O Configuration Parameter Reading and Parameter Description** " section to check.

(Note: For paired products, it is recommended that both **the transmitter** and **receiver** be configured with the same parameters. When using, users can check the indicator light status. For the indicator light, see the " Indicator Light Description " section)



Figure 4-12 Configuration for self-locking

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4.4 Mode configuration parameter reading, description and writing

4.4.1 Mode configuration parameter reading

(1) Mode configuration parameter reading content: **pairing method** , **485 transparent transmission** , **485 transparent transmission filtering** , **correspondence between start/end channel and target device channel**

(2) Steps (as shown in Figure 4-13): Select the correct COM port number and the correct (default) parameters → Click "Open Serial Port" (if you have changed the parameters and forget them, you can restore the factory settings) → "Search/Read Device" → "4. Mode Configuration" → Click "Read" in the mode configuration → You can view the above parameters: (Note: The reading method is the same **for the sender** and **the receiver** .)



Figure 4-13 Mode configuration parameter reading

4.4.2 Mode Configuration Parameter Description

(1) **Pairing method** : Networking method of pair transmission (teletransmission) products, see Table 4-3 below

Table 4-3 Pairing method description

Pairing method	illustrate	other
One-to-one (default)	Data is transmitted between one sending end and one receiving end device.	Factory default
One-to-many (with reply)	1. One transmitter transmits data to multiple receivers, and the channel values of the receivers are the same. 2. After receiving the data, all receiving ends **will** reply to the sending end.	Compared to one-to-many (no reply): 1. Advantages: The NET indicator lights on the sending and receiving ends will indicate the connection, making it easier to determine the network connection. 2. Disadvantages: If there are too many receiving ends and each receiving end sends information to the sending end, data conflicts may easily occur at the sending end, resulting in abnormal output at the receiving end.
One to many (no reply)	1. One transmitter transmits data to multiple receivers, and the channel values of the receivers are the same.	Compared with one-to-many (with reply): 1. Advantages: If there are too many receiving ends, each receiving end will not

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	2. After receiving the data, all receiving ends **will not** reply to the sending end.	send information to the sending end, which will not cause data conflicts at the sending end, and the receiving end output is not prone to abnormalities. 2. Disadvantages: The NET indicator light on the sending end will not indicate that the connection is on, and the status of the NET indicator light can only be checked on the receiving end. 3. When using one-to-many, it is recommended to mix the two types of reply and no reply (that is, multiple receiving ends do not reply, and 1 receiving end replies).
Channel self-organization	The channel correspondence between products can be arbitrarily combined	1. Advantages: high flexibility. 2. Disadvantages: The configuration writing steps are relatively complicated and difficult to understand, requiring users to read the manual carefully to understand and try.

1. **One-to-one** : The corresponding relationship between the channel values of the sender and the receiver, as shown in Figure 4-14

Description: A. The arrow is bidirectional, indicating that the data information flow is bidirectional with reply.

B. The value collected by each channel of the transmitter corresponds to the value output by each channel of the receiver (that is, the signal collected by the transmitter channel CH1 corresponds to the output channel CH1 of the receiver, and so on.)

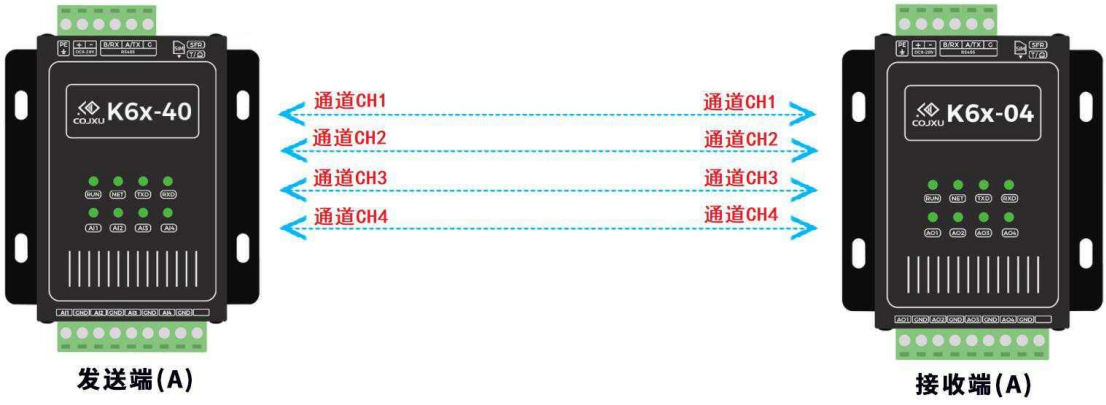


Figure 4-14 One-to-one

2. **One-to-many (with reply)** : The corresponding relationship between the sender and the receiver channel values, as shown in Figure 4-15

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(Note: If all the receivers in a group send replies, too many will cause data conflicts and affect the communication quality. It is recommended that the number of replies sent by the receiver should not exceed 4.)

Description: A. The arrow is bidirectional, indicating that the data information flow is **bidirectional with reply** .

collected by each channel of the transmitter corresponds to the value output by each channel of the receiver (that is, the signal collected by the transmitter channel CH1 corresponds to the output channel CH1 of the receiver, and so on.)

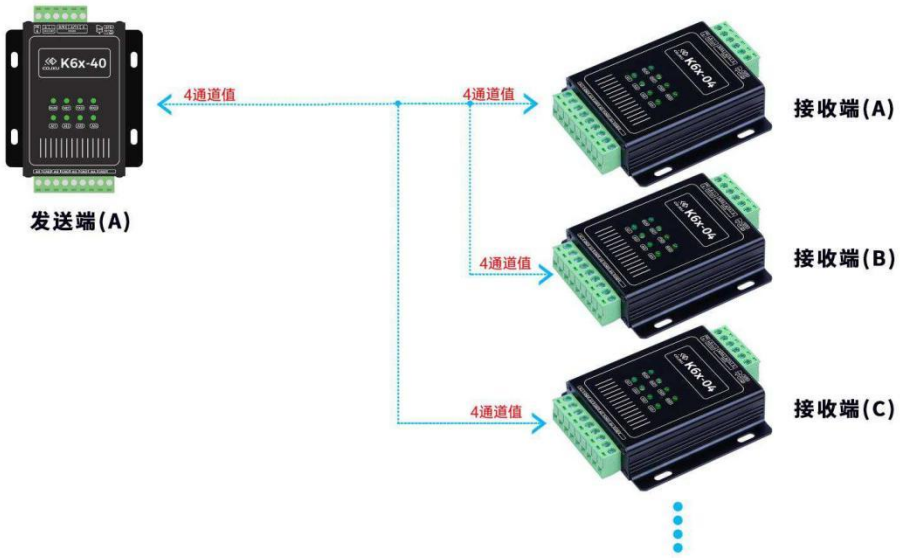


Figure 4-15 One-to-many (with reply)

3. **One-to-many (no reply)** : The corresponding relationship between the sender and the receiver channel values, as shown in Figure 4-16

(Note: In a group, there must be at least one receiving end that replies, otherwise the communication module on the sending end will be restarted, affecting the communication quality .)

Description: A. The arrow is one-way, indicating that the data information flow is **one-way and not replying** .

collected by each channel of the transmitter corresponds to the value output by each channel of the receiver (that is, the signal collected by the transmitter channel CH1 corresponds to the output channel CH1 of the receiver, and so on.)

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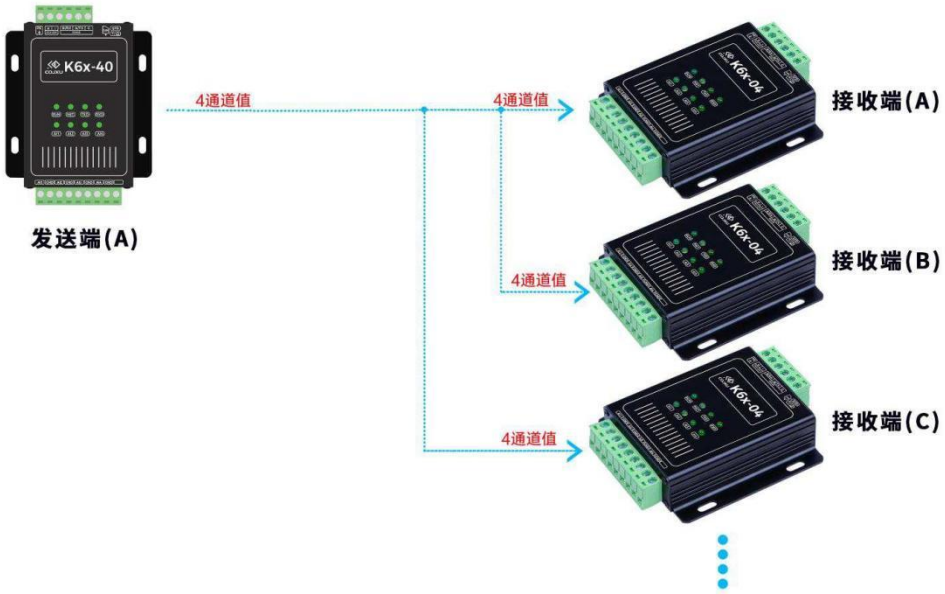


Figure 4-16 One-to-many (no reply)

4. **Channel self-grouping : The values** collected by each channel at the sending end and the values output by each channel at the receiving end can be combined **at will** , and both carry reply information.

Description: A. The arrow is one-way, indicating that the data information flow is **one-way** and not replying.

B. The combination method is as shown in the sample diagrams: Figure 4-17, Figure 4-18, etc.

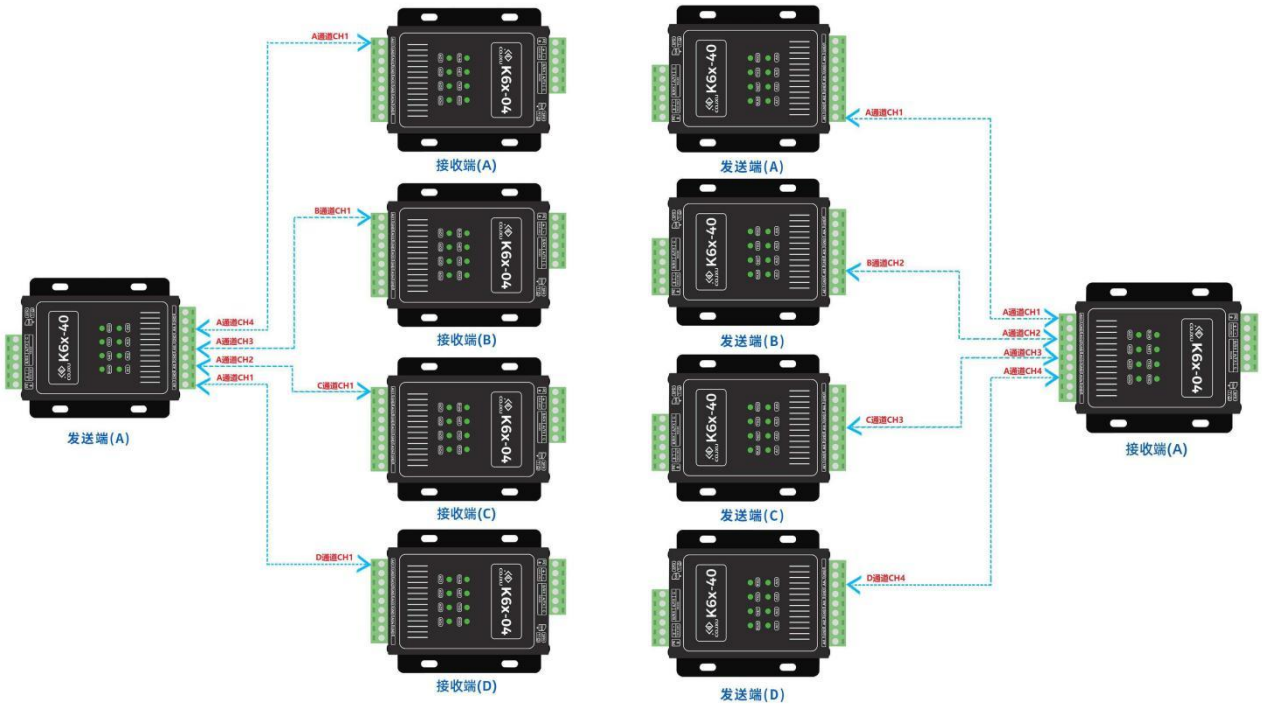


Figure 4-17 Example of self-organization with one transmitter and four receivers Figure 4-18 Example of self-organization with four transmitters and one receiver

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(2) **485 transparent transmission** : The 485 data of the sending end is transmitted to the receiving end through wireless (second communication mode), and the receiving end outputs the data through 485. The schematic diagram is shown in Figures 4 to 20 below. (To enable this function, see "Table 4-4")



Figure 4-20 Schematic diagram of 485 transparent transmission

Table 4-4 485 transparent transmission function enable conditions

485 transparent transmission status	suggestion	illustrate
Off (default)	It is recommended not to enable this feature.	To enable this feature, the user needs to confirm many prerequisites and it can only be used in systems with less stringent requirements. See below for details.
485 transparent transmission status	Prerequisites	illustrate
Open	Used in risk-tolerant systems	1. For each data packet: the risk of user 485 data and product internal RTU data being connected or confused; 2. Collection abnormalities may occur in the collection channel; 3. The output channel may have output abnormalities; 4. The packet loss rate will show different degrees depending on the data length; 5. Users are required to test by themselves whether the stability and tolerance of the system meet the requirements.
	Packet Type	Any type
	Packet size	≤240 bytes
	Refresh Interval	≥2 seconds
	The interval between sending packets	1. Recommended time > 2 seconds; 2. Try not to conflict the sending time with the refresh interval; 3. The refresh interval cannot be an integer multiple to prevent data conflicts. (See the " Refresh Interval " value)

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(3) **485 transparent transmission filtering** : After this function is enabled, the length of the user's 485 data packet is less than the set value and will be filtered out and will not be transparently transmitted.

1. After turning on the "485 transparent transmission" function, the "485 transparent transmission filtering" setting will take effect;

2. The purpose of setting the "485 transparent transmission filtering" parameter is to filter out interference data and reduce the error rate of the system.

（4）**Channel-target correspondence** : The correspondence between the sender channel value and the receiver channel value. For details, see the " **Pairing Method " section of this chapter.**

4.4.3 One-to-one configuration writing

(1) Method 1: Restore factory settings

1. Press and hold the "SFR" factory reset button for 3 seconds (as shown in Figure 4-21 below) to restore the "pairing mode" to the factory settings: one-to-one.

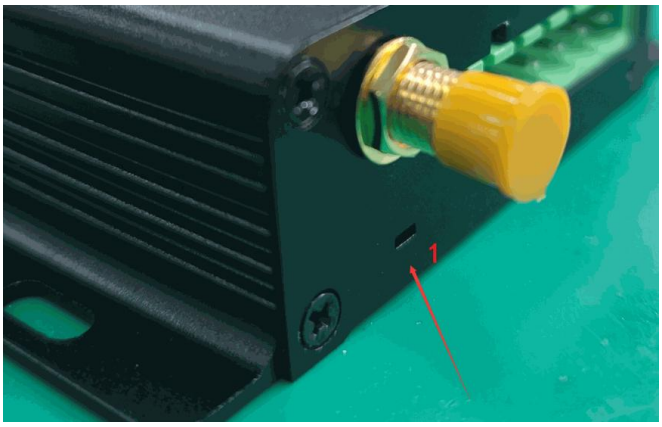


Figure 4-21 Restore to factory defaults (press and hold for 3 seconds with a toothpick)

2. The second communication parameter is configured in pairs: Check the pair communication mode of the product model → Check the second communication configuration writing steps according to the communication mode → Refer to the " Second Communication Mode Parameter Reading, Description and Writing " section.

Example: The second communication mode is: LoRa wireless spread spectrum. In the second communication configuration writing step, the LoRa channel, LoRa address, and LoRa airspeed of the transmitter and receiver need to be configured to be the same. For details, see the " **Second Communication Mode: LoRa "** section.

(2) Method 2: Command configuration is written as "one-to-one"

1. Steps (as shown in Figure 4-20): Open the "Network IO Setting Tool" → Select the correct COM port number and the correct (default) parameters → Click "Open Serial Port" (If the parameters have been changed and forgotten, you can restore the factory settings and follow Method 1) → "Search/Read Device" → "4. Mode Configuration" → Select the pairing method as " **One-to-one** " → Leave the channel correspondence blank → Click "Write" in "4. Mode Configuration" → Observe the log column and it will prompt success → Click "Save" → Click "Restart" → Done.

2. Next, you can check and verify → Repeat the " **Mode Configuration Parameter Reading** " section to

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confirm whether the configuration is successful.



Figure 4-20 Method 2: One-to-one pairing method configuration writing

4.4.4 One-to-many (with reply) configuration write

(1) Configuration write parameter content: pairing mode "one-to-many (with reply)", second communication mode parameter configuration, and precautions.

(2) One-to-many (with reply) configuration writing (**same steps as "one-to-one" configuration writing**)

1. Steps (as shown in Figure 4-20): Open the "Network IO Setting Tool" → Select the correct COM port number and the correct (default) parameters → Click "Open Serial Port" (If the parameters have been changed and forgotten, you can restore the factory settings and follow Method 1) → "Search/Read Device" → "4. Mode Configuration" → Select the pairing method as " **One-to-Many (with Reply)** " → Leave the channel correspondence blank → Click "Write" in "4. Mode Configuration" → Observe the log column and it will prompt success → Click "Save" → Click "Restart" → Done.

2. Next, you can check and verify → Repeat the " Mode Configuration Parameter Reading " section to confirm whether the configuration is successful.



Figure 4-20 One-to-many (with reply) combination pairing configuration write

(3) The second communication parameter is configured in pairs: Check the pair communication mode of the product model → Check the second communication configuration writing steps according to the communication mode → Refer to the " Second Communication Mode Parameter Reading, Description and Writing " section.

Example: The second communication mode is: LoRa wireless spread spectrum. In the second communication configuration writing step, the LoRa channel, LoRa address, and LoRa airspeed of the transmitter and receiver need

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to be configured to be the same. For details, see the " Second Communication Mode: LoRa " section.

(4) **Notes** :

1. In a group, there must be at least one receiving end that replies, otherwise the communication module of the sending end will be restarted, affecting the communication quality.

2. In a group, if all the receiving ends send replies, too many will cause data conflicts and affect the communication quality. It is recommended that the number of replies sent by the receiving end should not exceed 4.

To summarize: 1≤The number of receiving ends (with replies) in a group≤4.

Correct combination example: 1 sender + n receivers: 1 sender and one receiver are configured as "one-to-many (with reply)" mode, and the other **receivers** are configured as "one-to-many (without reply)" mode. See Figure 4-22.

4.4.5 One-to-many (no reply) configuration write

(1) Configuration write parameter content: pairing mode "one-to-many (no reply)", second communication mode parameter configuration, and precautions.

(2) One-to-many (with reply) configuration writing (**same steps as "one-to-one" configuration writing**)

1. Steps (as shown in Figures 4 to 20 below): Open the "Network IO Setting Tool" → Select the correct COM port number and the correct (default) parameters → Click "Open Serial Port" (If the parameters have been changed and forgotten, you can restore the factory settings and follow Method 1) → "Search/Read Device" → "4. Mode Configuration" → Select the pairing method as " **One-to-Many (No Reply)** " → Do not fill in the channel correspondence → Click "Write" in "4. Mode Configuration" → Observe the log column and it prompts success → Click "Save" → Click "Restart" → Complete.

2. Next, you can check and verify → Repeat the " Mode Configuration Parameter Reading " section to confirm whether the configuration is successful.



Figure 4-21 One-to-many (no reply) combination pairing configuration write

(3) The second communication parameter is configured in pairs: Check the pair communication mode of the product model → Check the second communication configuration writing steps according to the communication mode → Refer to the " Second Communication Mode Parameter Reading, Description and Writing " section.

Example: The second communication mode is: LoRa wireless spread spectrum. In the second communication configuration writing step, the LoRa channel, LoRa address, and LoRa airspeed of the transmitter and receiver need to be configured to be the same. For details, see the " Second Communication Mode: LoRa " section.

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(4) **Notes** :

1. In a group, there must be at least one receiving end that replies, otherwise the communication module of the sending end will be restarted, affecting the communication quality.

2. In a group, if all the receiving ends send replies, too many will cause data conflicts and affect the communication quality. It is recommended that the number of replies sent by the receiving end should not exceed 4.

To summarize: 1≤The number of receiving ends (with replies) in a group≤4.

Correct combination example: 1 sender + n receivers: 1 sender and one receiver are configured as "one-to-many (with reply)" mode, and the other **receivers** are configured as "one-to-many (without reply)" mode. See Figure 4-22.

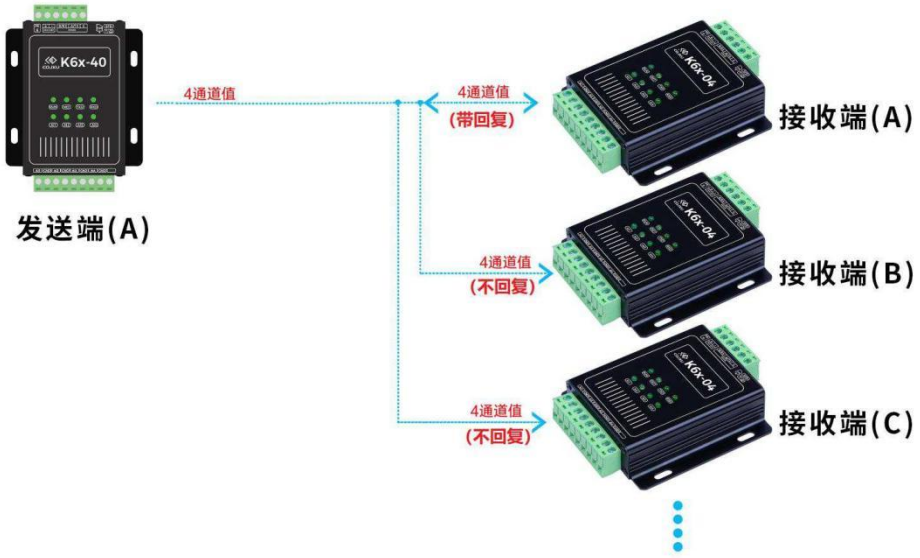


Figure 4-22 Combination pairing of “one-to-many (with reply)” and “one-to-many (without reply)”

4.4.6 Channel self-group configuration writing

The corresponding configuration of the sending channel and the receiving channel needs to be written. When using, the user needs to record the corresponding relationship between the sending channel and the receiving channel.

For example: Sender S/N: D1 257C00 000 271 , Receiver S/N: D1258C00000 294 and D1258C00000 310. The corresponding relationship between the sender channel and the receiver channel is as shown in the figure below.

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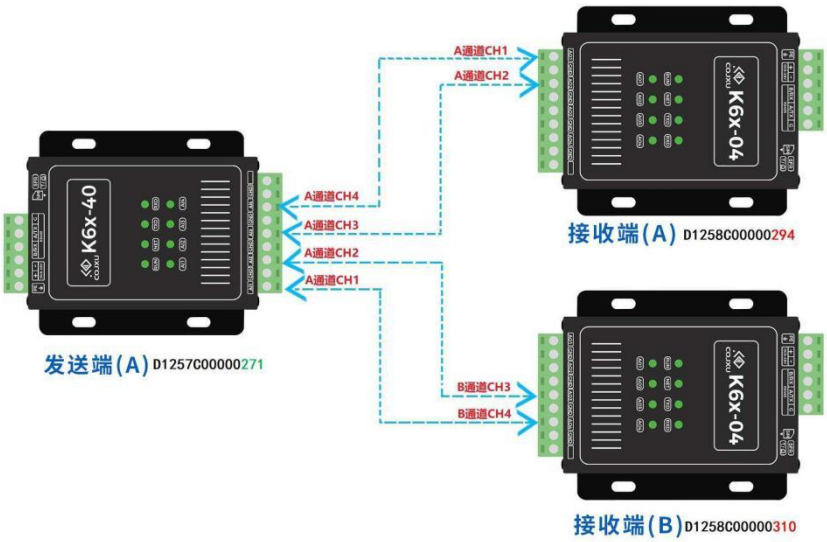


Figure 4-23 Channel self-grouping (Example: 1 to 2 channel combination relationship)

(1) Sending end configuration writing

1. Configure the written parameters: pairing mode "channel self-grouping", channel self-grouping information, and second communication mode parameter configuration.

2. Steps (as shown below): Open the "Network IO Setting Tool" → Select the correct COM port number and the correct (default) parameters → Click "Open Serial Port" (If the parameters have been changed and forgotten, you can restore the factory settings and follow method 1) → "Search/Read Device" → "4. Mode Configuration" → Select the pairing method as " **Channel Self-Grouping** " → The channel correspondence is shown in Figure 4-23 above; the target S/N unique identification code and channel configuration are written as shown in Figure 4-24 below → Click "Write" in "4. Mode Configuration" → Observe the log column and it prompts success → Click "Save" → Click "Restart" → Complete.

3. Next, you can check and verify → Repeat the " **Mode Configuration Parameter Reading** " section to confirm whether the configuration is successful.



Figure 4-24 D1 257C00 000 271 sender configuration writing steps

4. The second communication parameter is configured in pairs: Check the pair communication mode of the product model → Check the second communication configuration writing steps according to the

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communication mode → Refer to the " Second Communication Mode Parameter Reading, Description and Writing " section.

Example: The second communication mode is: LoRa wireless spread spectrum. In the second communication configuration writing step, the LoRa channel, LoRa address, and LoRa airspeed of the transmitter and receiver need to be configured to be the same. For details, see the " **Second Communication Mode: LoRa "** section.

(2) Receiver configuration writing

1. D1258C00000 294 configuration steps (as shown in Figure 4-25): (Configuration method: same as the sending end)

A. Configuration write parameter content: pairing mode "channel self-grouping", channel self-grouping information, and second communication mode parameter configuration.

B. Open the "Network IO Setting Tool" → Select the correct COM port number and the correct (default) parameters → Click "Open Serial Port" (If the parameters have been changed and forgotten, you can restore the factory settings and follow method 1) → "Search/Read Device" → "4. Mode Configuration" → Select the pairing method as " **Channel Self-Grouping** " → The channel correspondence is shown in Figure 4-23 above; the target S/N unique identification code and channel configuration are written as shown in Figure 4-25 below → Click "Write" in "4. Mode Configuration" → Observe the log column and it prompts success → Click "Save" → Click "Restart" → Complete.

C. Next, you can check and verify → repeat the " **Mode Configuration Parameter Reading** " section to confirm whether the configuration is successful.



Figure 4-25 D1258C00000 294 receiver configuration writing steps

D. The second communication parameter is configured in pairs: Check the pair communication mode of the product model → Check the second communication configuration writing steps according to the communication mode → Refer to the " Reading, Description and Writing of Second Communication Mode Parameters " section.

Example: The second communication mode is: LoRa wireless spread spectrum. In the second communication configuration writing step, the LoRa channel, LoRa address, and LoRa airspeed of the transmitter and receiver need to be configured to be the same. For details, see the " **Second Communication Mode: LoRa "** section.

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2. D1258C00000 294 configuration steps (as shown in Figure 4-26): (Configuration method: same as the sending end)

A. Configuration write parameter content: pairing mode "channel self-grouping", channel self-grouping information, and second communication mode parameter configuration.

B. Open the "Network IO Setting Tool" → Select the correct COM port number and the correct (default) parameters → Click "Open Serial Port" (If the parameters have been changed and forgotten, you can restore the factory settings and follow method 1) → "Search/Read Device" → "4. Mode Configuration" → Select the pairing method as " **Channel Self-Grouping** " → The channel correspondence is shown in Figure 4-23 above; the target S/N unique identification code and channel configuration are written as shown in Figure 4-26 below → Click "Write" in "4. Mode Configuration" → Observe the log column and it prompts success → Click "Save" → Click "Restart" → Complete.

C. Next, you can check and verify → repeat the " **Mode Configuration Parameter Reading** " section to confirm whether the configuration is successful.



Figure 4-26 D1258C00000 310 receiving end configuration writing steps

D. The second communication parameter is configured in pairs: Check the pair communication mode of the product model → Check the second communication configuration writing steps according to the communication mode → Refer to the " Reading, Description and Writing of Second Communication Mode Parameters " section.

Example: The second communication mode is: LoRa wireless spread spectrum. In the second communication configuration writing step, the LoRa channel, LoRa address, and LoRa airspeed of the transmitter and receiver need to be configured to be the same. For details, see the " **Second Communication Mode: LoRa** " section.

4.4.7 The first communication mode is transparent transmission: data remote transmission function is enabled and written

(1) 485 transparent transmission function is enabled

1. Steps (as shown in Figure 4-21): Open the "Network IO Setting Tool" → Select the correct COM port number and the correct (default) parameters → Click "Open Serial Port" (If the parameters have been changed and forgotten, you can restore the factory settings and follow method 1) → "Search/Read Device" → "4. Mode Configuration" → Select "Open" in the RS485 transparent transmission drop-down box, select "One-to-one"

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for pairing mode, and enter the value of RS485 transparent transmission filter according to usage (default 0) → Click "Write" in "4. Mode Configuration" → Observe the log column and it prompts success → Click "Save" → Click "Restart" → Complete.

2. Next, you can check and verify → Repeat the " **Mode Configuration Parameter Reading** " section to confirm whether the configuration is successful.



Figure 4-21 485 transparent transmission is enabled

5. Second communication mode parameter reading, description and writing

5.1 Second communication method: LoRa

5.1.1 LoRa parameter reading

Read : LoRa channel, LoRa address, LoRa air rate.

Steps (as shown in Figure 4-9 below): Select the correct COM port number and the correct (default) parameters → Click "Open Serial Port" (if the parameters have been changed and forgotten, you can restore the factory settings) → "Search/Read Device" → Read "Device Properties" successfully → Click "Read" in LoRa Configuration → "5" shows the current LoRa configuration parameter information → Read successfully.

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Figure 4-9 LoRa parameter reading

5.1.2 LoRa Parameter Description

(1) LoRa wireless address: It can be understood as the address number of the module, which can be used to identify the identity between devices. Therefore, only two devices with the same wireless address can recognize and communicate wirelessly. Different from ModBus address, the two exist independently.

(2) LoRa wireless channel: The actual frequency of RF transmission is related to the channel. Only two devices with the same channel can perform wireless data communication.

Formula: LoRa wireless transmission actual frequency = 410.125 (850.125) MHz + channel * 1 MHz

(3) LoRa wireless air rate (airspeed):

1. **The faster the airspeed, the shorter the time from sending data to receiving response data, and the shorter the wireless transmission distance.**

2. **The slower the airspeed, the longer the time from sending data to receiving the response data, and the longer the wireless transmission distance.**

3. For the relationship between airspeed and refresh interval, see the "Collection Frequency and Range Configuration" section.

(4) In summary: Only devices with the **same LoRa wireless address** , **channel** , and **airspeed** can communicate data.

5.1.3 LoRa parameter configuration writing

(1) Steps (as shown in Figure 4-10): Select the correct COM port number and the correct (default) parameters → Click "Open Serial Port" (if the parameters have been changed and forgotten, you can restore the factory settings) → "Search/Read Device" → Read "Device Properties" successfully → Click "Read" in "LoRa Configuration" →

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"5" shows the current LoRa configuration parameter information → Change the parameters to the information required by the user (note that they cannot exceed the " LoRa Configuration Parameter Range") → Click "Write" in "LoRa Configuration" → A prompt pops up in the "Log" column indicating that the write is successful → Click "Save" → A pop-up pop-up appears in the "Log" column indicating that the save is successful, and the configuration is complete → Click "Restart" the device.

(2) Next, you can verify whether the parameters are correct: repeat the " LoRa parameter reading steps " operation steps.



Figure 4-10 LoRa configuration writing

5.1.4 LoRa Configuration Parameter Range

(1) LoRa channel: 0 to 83

(2) LoRa address: 0 to 65535

(3) LoRa airspeed: 2400～625000bps

6. ModBus

6.1 ModBus address table

6.1.1 Function code and register address table

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Register address table (function code: 0x03H, 0x06H)					
Register Address	Number of registers	Register attributes	Register Type	Register parameter range	Support function code
4 0078 (0x 004D)	1	ModBus Address	Read/Write	0x01～0xFF (default: 1)	0x03, 0x06
1001 7 (0x001 0)	1	DI1 switch input	Read-only	0x00~0x01	0x02
100 18 (0x001 1)	1	DI1 switch input	Read-only		
100 19 (0x001 2)	1	DI1 switch input	Read-only		
1002 0 (0x001 3)	1	DI1 switch input	Read-only		
00017 (0x0010)	1	DO1 switch output	Read/Write	0~1	0x01, 0xF
0001 8 (0x001 1)	1	DO1 switch output	Read / Write		
0001 9 (0x001 2)	1	DO1 switch output	Read / Write		
000 20 (0x001 3)	1	DO1 switch output	Read / Write		

6.1.2 Change ModBus address

(1) Function code: 03, read holding register; 06, write holding register

(2) Address range: 4 0078 (0x 004D)

(3) Description: Function code 06, set the device ModBus address to 0x10, i.e. 0001 0000

(4) Note: CRC is calculated using the ModBus CRC16 method and is not fixed.

send	01	06	00 4D	00 10	18 11
	Device ModBus address	Function code	address	Write value	CRC checksum

take over	01	06	00 4D	00 10	18 11
	Device ModBus address	Function code	address	Write value	CRC checksum

Description: Function code 03, query device ModBus address is 0x10, that is, 0001 0000.

send	10	03	00 4D	00 01	D4 11
	Device ModBus address	Function code	address	Write value	CRC checksum

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take over	10	03	02	00 10	45 8B
	Device ModBus address	Function code	Returns the number of bytes	Write value	CRC checksum

6.1.3 Read digital DI input

Function code: 02 , read (switch quantity) input status

Address range: 10017 (0x0010) to 10020 (0x0013)

Note: The device defaults to dry contact input. When DI and GND are short-circuited, the read value should be 1; when DI and GND are not short-circuited, the read value should be 0.

example:

Read the value of a switch input, short-circuit the DI input terminal DI1 and GND. The read switch input value is 0x01. The corresponding binary is 0000 0001. Each bit represents the state of a switch input, and the lowest bit is DI1.

ModBus RTU protocol reads switch input:

send	01	0 2	00 10	00 0 1	B8 0F
	Device ModBus address	Function code	Analog start address	Read quantity	CRC checksum

take over	01	0 2	0 1	01	60 48
	Device ModBus address	Function code	Returns the number of bytes	Switch input value	CRC checksum

6.1.4 Read the DO output status

Function code: 01, read coil status

Address range: 00017 (0x0010) ~ 00020 (0x0013)

Note: The relay of the device has passive output. When the coil is not energized, the relay NO port and COM port are normally open, and the value is 0. When the coil is energized, the phenomenon is the opposite, the relay NO port and COM port are closed, and the value is 1. Query the relay status through instructions.

example:

Read the status of 2 switch outputs. Assume that DO1 and DO2 are closed. The return value is 03, corresponding to the binary bit 0000 0011. The lower four bits represent the status of the switch output, which are DO4, DO3, DO2, and DO1.

Modbus RTU protocol reads switch output:

send	01	01	00 10	00 04	3C 0C
	Device ModBus address	Function code	Switch value starting address	Read switch quantity	CRC checksum

take over	01	01	01	03	11 89
	Device ModBus address	Function code	Returns the number of bytes	Switch output value	CRC checksum

6.1.5 Control switch DO output

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Function code: 0F, write multiple coil states

Address range: 00017 (0x0010) ~ 00020 (0x0013)

Description: The relay of the device has passive output, the coil is not energized, and the relay NO port and COM port are disconnected; the coil is energized, and the NO port and COM port are closed. The relay state is controlled by instructions.

example:

Function code 0x0F writes DO1 and DO2 switch outputs, making NO1 and COM1 closed; making NO2 and COM2 closed. The written value should be 0x03, corresponding to the binary bit 0000 0011

Modbus RTU protocol writes switch output:

send	01	0F	00 10	00 04	01	03	BF 54
	Device ModBus address	Function code	Switch address	Write switch quantity	Number of bytes	Write value	CRC checksum

take over	01	0F	00 10	00 04	55 CD
	Device ModBus address	Function code	Switch address	Write value	CRC checksum

7.Precautions for use

(1) Do not operate this radio in flammable places (such as coal mines, etc.) or near explosive dangerous objects (such as detonators, etc.).

(2) Do not use the product in an environment that exceeds the environmental characteristics of the product, such as in an environment with high temperature, humidity, low temperature, strong electromagnetic field, or high dust.

8. Frequently asked questions and solutions (FAQ)

8.1 General issues

8.1.1 How to test the product after receiving it?

- Please read the "Quick Start" in this manual (users are recommended to read this chapter first) If the test process is not smooth, please collect according to the following methods .
- Pay attention to the polarity of the power supply: " + " is positive and " - " is negative .
- Pay attention to the voltage range of the power supply: If you are not using our matching power supply, please note that the power supply range of the module is 8-28V (DC).
- The SMA connector of the antenna is securely connected: tighten it clockwise.
- The data is incorrect: 1. Check whether the hardware wiring is correct according to " Switch Input and Output Hardware Connection "; 2. Check whether other modules are powered on nearby.

8.1.2 What are the module power supply requirements?

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- For the power requirements of the transmitter and receiver, please refer to the " Basic Parameters " section of the product, or see the nameplate label on the back of the product.
- A suitable DC regulated power supply should be selected, which should have strong anti-high frequency interference capability, small ripple, and sufficient load capacity; it is also best to have overcurrent, overvoltage protection and lightning protection functions to ensure the normal operation of the digital radio. In order to ensure stable communication, it is recommended to reserve more than 50% of the communication distance margin .

8.1.3 The RUN light of the module is not on.

- The green 5.08 plug-in terminal screws are not tightened or the conductive part presses on the insulation layer of the wire / cable, resulting in poor power contact.
- The power supply voltage is too low. Our power supply voltage is 8-28V (12VDC or 24VDC is recommended).
- Power supply type: DC voltage.

8.1.4 Configuration software cannot search for device

- Check whether there is a USB to 485 driver in the computer management (if there is no driver, you can download the driver yourself from the Internet, or the driver "CH340 driver" we provide).
- The wiring method of USB to 485: A to A, B to B.
- Check whether the COM port opened in the host computer corresponds to the COM port number of the device and whether the baud rate is correct (factory default: 9600, 8N1).
- When it prompts that the serial port opening fails, please check whether there is other software occupying the serial port, or re-plug the transmitter and test again.
- Poor contact: Check the A and B terminals of the communication port to see if there is an insulating layer or other obstructions inside the terminal , or whether the terminal is tightened.
- The baud rate has been changed and forgotten: long press the "SFR" button to restore the factory settings, and then use the configuration software to read it again. You can also use the search baud rate function to search.
- If the above situations are all correct: use the host computer to search for the device or use the serial port assistant to try to send data to the device to see if the RXD light of the device flashes. If the RXD light of the device does not flash, you need to check whether the USB to 485 converter is damaged.
- The configuration software and computer are indeed incompatible and cannot be used: you can use other serial port software tools to read the device parameters by viewing the product ModBus instructions.

8.1.5 The two modules fail to communicate successfully and the NET indicator is off

- Are the antennas connected (the distance between the two antennas should be greater than 1.5M). The antennas cannot be placed in a closed metal cabinet (it is best to place them in an open area).
- Check whether the configuration information of the communication module is consistent (channel, airspeed, address).
- The 485 communication distance is too far, so a resistor of less than 1K ohm needs to be connected to the AB end of 485, preferably at both the sending and receiving ends.
- If the LoRa communication distance is too far or there are too many metal obstructions in the surrounding environment, consider replacing it with a high-power product.

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8.1.6 The two devices fail to communicate, but the NET indicator is always on

- The D I acquisition end is damaged or the sensor wiring is incorrect.

  1. Check the D I light of the acquisition module. If it is always on, the input signal is collected , otherwise it is not.

  2. Check whether there is any problem with the sensor connection to the acquisition device. Please verify the sensor type and connect it in the correct way.

  3. Sensor damage : Use a multimeter to measure the voltage of the sensor signal line .

- The D O output terminal wiring is wrong.

  1. Users need to check the wiring method of the acquisition module connected to our company's DO products. Our company's DO products are passive outputs. For details, please refer to the " Switch Input and Output Hardware Connection " section.

  2. Users can verify by connecting our company's DO product without any load, and then connecting the buzzer of the multimeter to the DO signal end to observe whether it will sound when the port outputs .

8.2 LoRa related issues

8.2.1 LoRa communication, what should I pay attention to?

- When testing the K61 - DL20 module , a matching antenna or a 50Ω dummy load must be connected, otherwise the sending module may be easily damaged.
- K6 1 -DL20 often has different communication distances in different environments. The communication distance is often affected by temperature, humidity, obstacle density, obstacle volume, and electromagnetic environment . Customers are advised to conduct actual measurements on site.

8.2.2 LoRa communication, 4KM or 8KM module, actual communication distance?

For LoRa communication, the communication power of the 4KM version is usually 0.16W (22 dBm) ; the communication power of the 8KM version is usually 1W (30 dBm) . The transmission power of 8KM is 10 times that of 4KM .

If you need more stable communication, it is recommended that you directly choose the 8KM version.

We have measured the communication distance, and the open visible distance is our nominal distance. However, in actual applications, there are often certain obstructions, such as several walls or several high-rise buildings in between.

We recommend that customers actually test the communication distance. We also have the following suggestions to improve the stability of LoRa wireless communication.

- The antenna is placed near the window or even outside the window;
- Adjust the direction of the antenna. The antenna generally sends signals to both sides of the antenna.
- Appropriately reduce the air transmission rate;
- For more details, please refer to the " Second communication method: LoRa spread spectrum " section.

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8.2.3 How to place the antenna

The placement of the antenna greatly affects the transmission stability of the module.

- The antenna sends data to both sides and the upper middle position of the antenna. Therefore, pay attention to the placement direction of the antenna pole, which should be parallel to the data receiving and sending ends.
- The antenna should be placed in a slightly open area, as close to a window as possible. Do not place it directly against a wall or metal.
- If the application scenario is in an industrial control box, the antenna must be outside the industrial control box. If the antenna is placed inside the industrial control box, the signal will basically be blocked.
- Place the antenna as high as possible.

8.3 Issues related to switch input and output

8.3.1 A I/ A O input has no input/output, DI/DO input has no input/output

- Check the wiring. The user needs to distinguish whether the sensor is **a two-wire, three-wire, or four-wire system** . The user confirms the type of sensor and then connects it according to the corresponding wiring method.
- The two modules failed to communicate successfully. Check whether the network is established successfully.
- The green 5.08 terminal screws are not tightened, resulting in poor contact of the analog input.
- The green 5.08 terminal block is not plugged in tightly, resulting in poor contact.

8.3.2 The communication between two modules is unstable

- Check the LoRa communication parameters (channel, airspeed, address) of the two modules and configure and manage them to avoid signal confusion and instability caused by products of the same frequency band and type in the environment.
- The antenna distance between the paired products is too far, or there are too many factors that cause wireless radio frequency attenuation in the middle. Users can make judgments by retracting the product distance. If it is due to distance, the product antenna position can be changed to a better place, or a better-performing antenna can be replaced.

Important Notice

- Chengdu Ebyte reserves the final right of interpretation and modification of all contents in this manual.
- Due to the continuous improvement of the product hardware and software, this manual may be changed without prior notice. The latest version of the manual shall prevail.
- Protecting the environment is everyone's responsibility: To reduce paper usage, this manual is only printed in

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Chinese. The English manual is only available in electronic format. If necessary, please download it from our official website. In addition, unless otherwise requested by the user, when placing a bulk order, we will only provide product manuals in proportion to the order quantity. Not every digital radio will be provided with a manual. Please understand.

Revision History

Version	Revisions	Maintainer	Revision Date
v1.2	Added: DO output mode default description	Karry	2025-6-4

About us

Technical support: service@cdebyte.com

Documents and RF Setting download link: www.cdebyte.com

Thank you for using Ebyte products! Please contact us with any questions or suggestions: info@cdebyte.com

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Web: www.cdebyte.com

Address: B5 Mold Park, 199# Xiqu Ave, High-tech District, Sichuan, China

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