



K62-DL20

0/4 ~ 20mA Analog Transmission Module





Chengdu Ebyte Electronic Technology Co.,Ltd

Wireless Modem

User Manual

K62-DL20



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1 Introduction

1. This product is a pair transmission function product. Function: The transmitter collects 4 channels of analog signals (0/4 to 20mA) and transmits the data to the receiver via wireless (LoRa spread spectrum), and the receiver restores 4 channels of analog signals (0/4 to 20mA).

2. Model No. K62-DL20, including transmitting (collecting) end: K62D-40RL20; receiving (reducing) end: K62D-04RL20.



Picture 1-1

3. The module also has a 485 data pass-through function. The 485 data from the transmitter and receiver can be transmitted through LoRa wireless communication.

4. The product is highly easy to use, avoiding long-distance cable distribution, greatly reducing enterprise labor/material costs, and reducing construction and maintenance difficulties.

5. For industrial users, all industrial grade design, after extensive testing, stable and reliable quality.

6. Construction-free installation: It can replace the link cable and transmit far away, eliminating the trouble of cable construction.

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

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

1.1 Features

- ★ 4 x 0/4 to 20mA analog inputs supported on the transmitting (acquisition) side;
- ★ Receive (restore) side supports 4-channel 0/4 ~ 20mA analog output;
- ★ With 485 wireless data transmission function;
- ★ Hardware watchdog for high reliability and recoverability;
- ★ Good over-current, over-voltage, anti-reverse connection, anti-misconnection and other protection functions;
- ★ Rich indicators, a comprehensive view of the status, easy to troubleshoot;
- ★ Signal refresh rate is adjustable, supporting 0.2 to 5s (seconds), making 0/4 to 20mA current more continuous and sensitive;
- ★ Communication channels can be set, up to 83 channels for data communication in one area, without interfering with each other;

- ★ Wireless 433Mhz (LoRa spread spectrum) communication power of 0.1W, communication distance of 4000 meters (open), common scene applications within 500 meters can be stable transmission;
- ★ Customized functions are supported, please contact sales staff.

1.2 Basic parameters

Table 1.1 Basic parameters

category	project	Details
AI input AO output	Number of AI/AO channels	4
	Interface Type	current type
	AI/AO input method	0/4 ~ 20mA
	Connection method	5.08mm industrial grade plug-in terminal
	Refresh rate configuration range	0.2~5s/time (default: 1s/time)
	AI analog signal input	0/4~20mA acquisition. Acquisition accuracy: $\leq \pm 0.03\text{mA}$. Acquisition resolution: 0.001mA. Active signal needs to be connected, and the constant current source voltage needs to be $\geq 10\text{V}$. Input maximum current $I_{\text{max}} \leq 28\text{mA}$, overcurrent may cause product damage.
	AO analog signal output	0/4~20mA output. Output error: $\leq \pm 0.03\text{mA}$. Output accuracy: 0.001mA. The output is an active signal: constant current source output. Load blocking needs to be $\leq 500\Omega$.
physical characteristics	Product Size	110*84.32*25.3mm (L*W*H)
	product weight	164 $\pm$ 5g
	Package weight	710 $\pm$ 10g
working environment	Operating temperature	-40°C~85°C
	storage temperature	-60°C~125°C
	Working humidity	5% to 95% RH
	Storage humidity	1% to 95%
	waterproof level	Not waterproof, with certain moisture resistance
	Dust rating	Completely blocks dust
power supply	Operating Voltage	DC voltage: DC 8V ~ 28V
	Power connector type	5.08mm industrial grade plug-in terminal
	Transmitter power consumption	P_{max} (maximum power consumption) = 0.8W, P_{av} (average power consumption) $\leq 0.5\text{W}$
	Receiver power consumption	P_{max} (maximum power consumption) = 5W, P_{av} (average power consumption) $\leq 2.5\text{W}$
first method of communication	Types of	485
	Whether with isolation	no
	Connection method	5.08mm industrial grade plug-in terminal
second method of communication	Types of	LoRa Wireless Spread Spectrum (SX1262)
	transmit power	160mW (22dBm)
	working 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 practical engineering application distance is less than or equal to 1000 meters.
	air speed	2.4~62.5kbps (default 4.8kbps)
	Receive sensitivity	-138dbm
	Actual frequency calculation formula	Actual frequency=410.125Mhz+channel*1Mhz
	number of channels	83
	Matching Antenna Interface/Impedance/Frequency	SMA female thread inner needle/equivalent impedance 50Ω/433Mhz

1.3 Description of Each Part

1.3.1 Product Dimensions

Note:

1. The size of the sender and receiver are the same, see the figure below.
2. Figure 1-2 below is the reference size of the product, the error is $\pm 0.3\text{mm}$, please refer to the actual product.

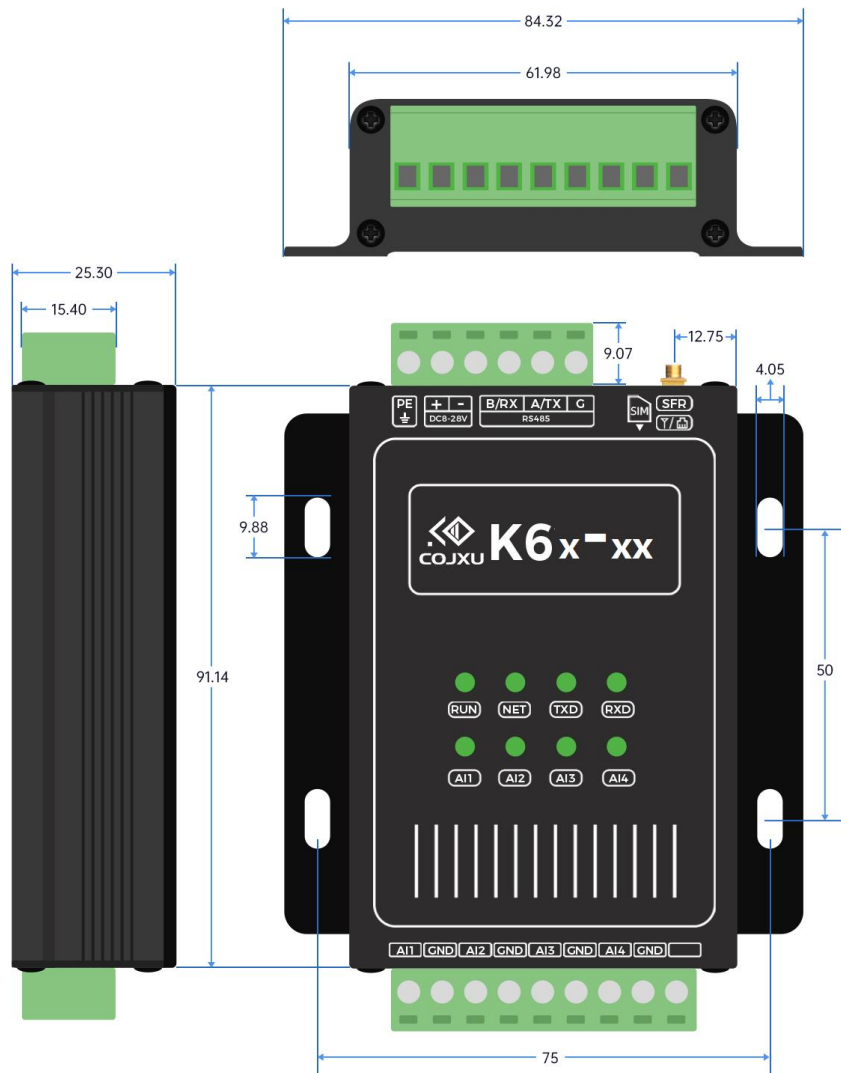


Figure 1-2 Product Dimensions

1.3.2 Product Interface Description

(1) Interface description of the transmitter (collection) end product.

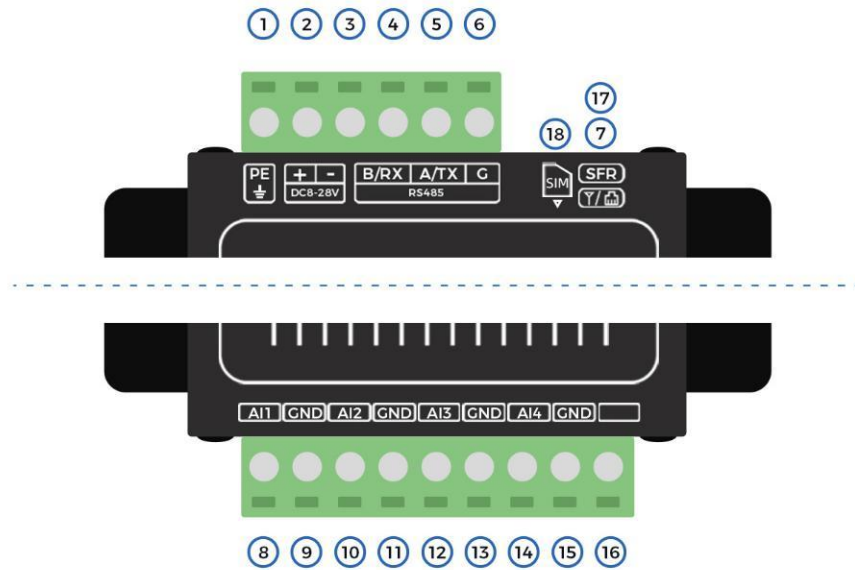


Figure 1-3 Display of the transmitter (collection) end product interface

Table 1.3.2 Pin Function Definition of Transmitter (Acquisition) End Products

serial number	Port and Other Definitions	Function	illustrate
1	PE	protective earth terminal	Lightning protection grounding. If the ground lead is good, it is recommended to connect the product casing to the ground; otherwise, it is OK.
2	+	Positive power supply	The power input is positive, and the DC input voltage range is 8-28V.
3	-	power ground	Power input negative (0V).
4	B/RX	Communication interface B/RXD	485 interface B/(RS232_RXD).
5	A/TX	Communication interface A/TXD	485 interface A/(RS232_TXD).
6	G	communication port	485 ground (can not be connected) / RS232 signal ground (0V).
7	second communication interface	Antenna port/network port	433Mhz antenna port/network port socket
8	AI1	Analog input 1 channel	0/4~20mA analog signal input channel 1.
9	GND	input negative	Input negative (0V).
10	AI2	Analog input 2 channels	0/4~20mA analog signal input channel 2.
11	GND	input negative	Input negative (0V).
12	AI3	Analog input 3 channels	0/4~20mA analog signal input channel 3.
13	GND	input negative	Input negative (0V).

14	AI4	Analog input 4 channels	0/4~20mA analog signal input channel 4.
15	GND	input negative	Input negative (0V).
16		without	Leave it in the air, do not connect.
17	SFR	reset	Press and hold for 3 seconds to restore the factory settings (Set Factory Reset) (indicated by the status of the RUN light).
18	SIM	SIM card slot	Insert a data IoT card or a phone card with a sufficient data plan.

(2) Receive (restore) end product interface description.

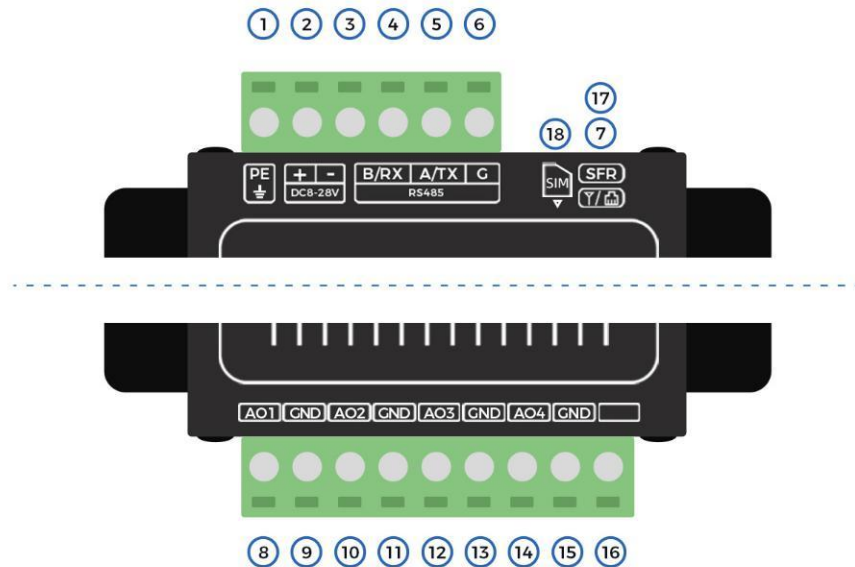


Figure 1-4 Display of the product interface on the receiving (restore) end

Table 1-4 Definition of pin function of receiving (recovery) end product

serial number	Port and Other Definitions	Function	illustrate
1	PE	protective earth terminal	Lightning protection grounding. If the ground lead is good, it is recommended to connect the product casing to the ground; otherwise, it is OK.
2	+	Positive power supply	The power input is positive, and the DC input voltage range is 8-28V.
3	-	power ground	Power input negative (0V).
4	B/RX	Communication interface B/RXD	485 interface B/(RS232_RXD).
5	A/TX	Communication interface A/TXD	485 interface A/(RS232_TXD).
6	G	communication port	485 ground (can not be connected) / RS232 signal ground (0V).
7	second communicati	Antenna port/network port	433Mhz antenna port/network port socket

	on interface		
8	AO1	Analog input 1 channel	0/4~20mA analog signal output channel 1.
9	GND	input negative	Input negative (0V).
10	AO2	Analog input 2 channels	0/4~20mA analog signal output channel 2.
11	GND	input negative	Input negative (0V).
12	AO3	Analog input 3 channels	0/4~20mA analog signal output channel 3.
13	GND	input negative	Input negative (0V).
14	AO4	Analog input 4 channels	0/4~20mA analog signal output channel 4.
15	GND	input negative	Input negative (0V).
16		without	Leave it in the air, do not connect.
17	SFR	reset	Press and hold for 3 seconds to restore the factory settings (Set Factory Reset) (indicated by the status of the RUN light).
18	SIM	SIM card slot	Insert a data IoT card and a phone card with a data plan.

1.3.3 Indicator light description

(1) LED light indication on the transmitting (collecting) end, as shown.

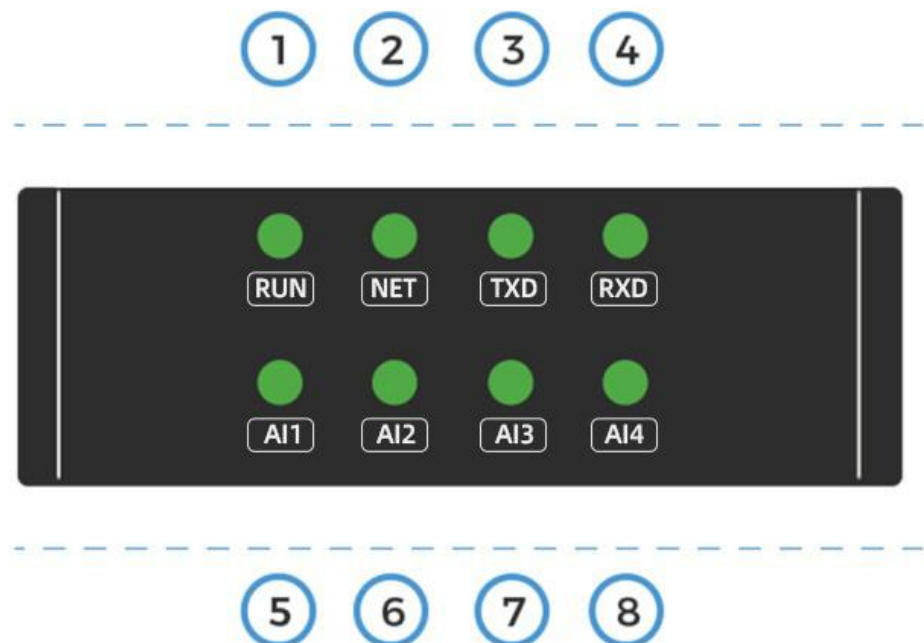


Figure 1-5

Table 1-5 Function table of analog input module

serial number	Indicator name	illustrate
1	RUN	Flashing for 0.5 seconds: indicates that the product is in normal operation; After 3 seconds of steady light, recovery will flash for 0.5 seconds: long press the button for 3 seconds, it means 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	Blinking: Indicates that the product sends out a data signal.
4	RXD	Blinking: Indicates that the product has received a data signal.
5	AI1	Always on: 0/4~20mA signal input is detected; Off: 0/4~20mA signal input is not detected.
6	AI2	Always on: 0/4~20mA signal input is detected; Off: 0/4~20mA signal input is not detected.
7	AI3	Always on: 0/4~20mA signal input is detected; Off: 0/4~20mA signal input is not detected.
8	AI4	Always on: 0/4~20mA signal input is detected; Off: 0/4~20mA signal input is not detected.

(2) LED light indication on the receiving (restore) end, as shown.

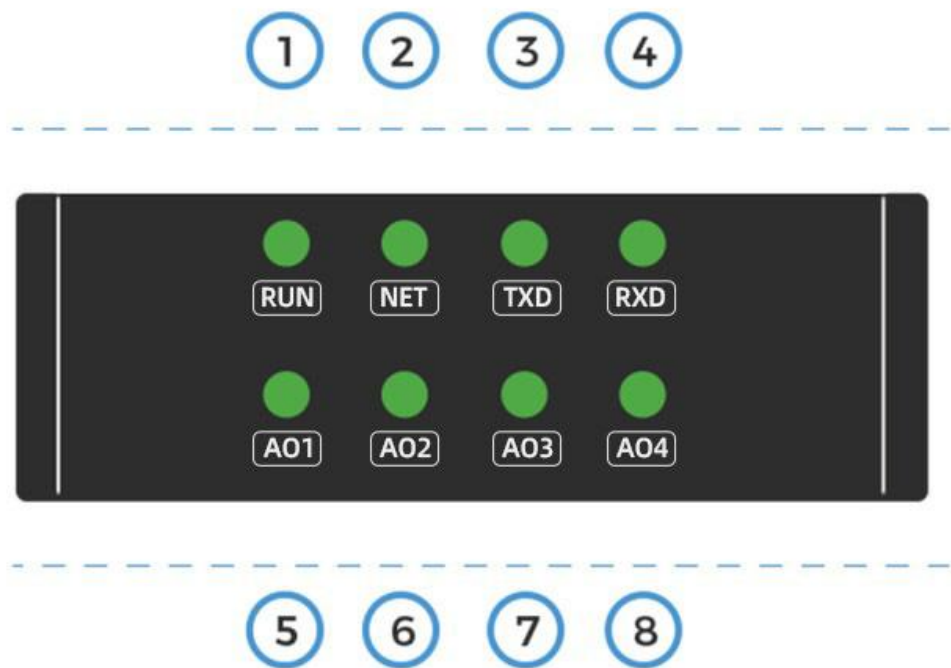


Figure 1-6 Indicator light of analog output module

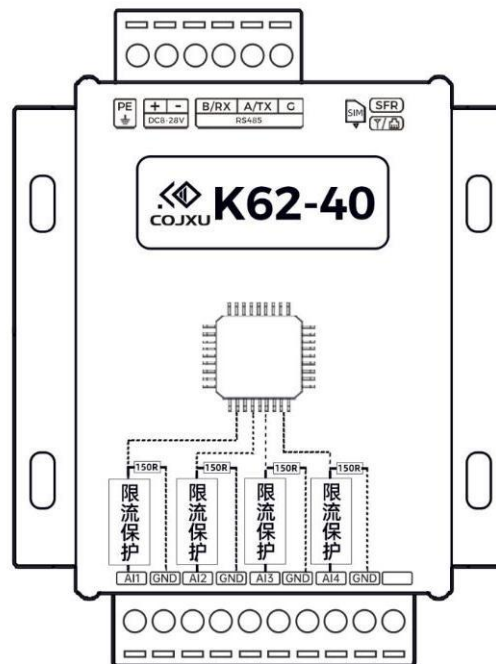
Table 1-6 Function table of analog output module

serial	Indicator name	illustrate
--------	----------------	------------

number		
1	RUN	Flashing for 0.5 seconds: indicates that the product is in normal operation; After 3 seconds of steady light, recovery will flash for 0.5 seconds: long press the button for 3 seconds, it means 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	Blinking: Indicates that the product sends out a data signal.
4	RXD	Blinking: Indicates that the product has received a data signal.
5	AO1	Always on: output 0/4~20mA signal; Off: 0/4~20mA signal is not output.
6	AO2	Always on: output 0/4~20mA signal; Off: 0/4~20mA signal is not output.
7	AO3	Always on: output 0/4~20mA signal; Off: 0/4~20mA signal is not output.
8	AO4	Always on: output 0/4~20mA signal; Off: 0/4~20mA signal is not output.

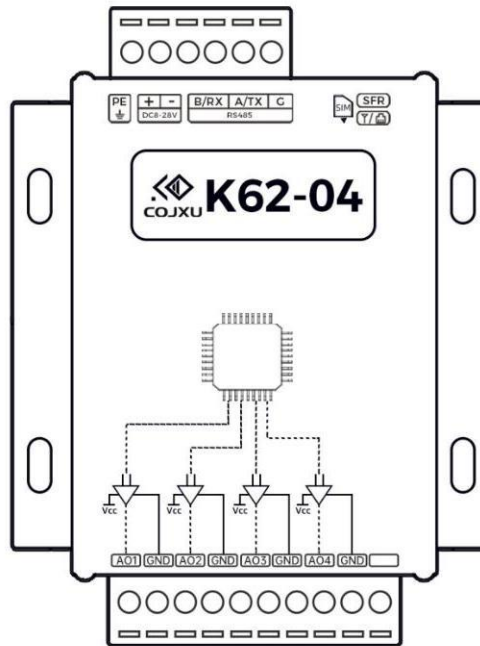
1.4 Internal circuit structure diagram of the product

1.4.1 The internal principle diagram of the transmitter (collection) end product



Internal principle diagram of analog input product

1.4.2 The internal principle diagram of the receiving (restore) end product



Internal schematic diagram of analog output product

2 Quick Start

This chapter is a quick start introduction for this product, users are recommended to read this chapter carefully and follow the instructions once. It will provide a systematic understanding of this product, and users can also select the chapters that interest you to read as needed. For specific details and instructions, please refer to the subsequent chapters.

2.1 List of products and accessories



Figure 2-1 The complete set of products including modules and accessories

Table 2-1 The complete set of products includes modules and accessories

name	model	quantity
0/4~20mA analog input module	K62D-40RL20	1
0/4~20mA analog output module	K62D-04RL20	1
12V/1A adapter power supply	CQ12-120100-CC	2
Power adapter cable	DYX01-A	2
Suction cup antenna (SMA inner thread inner needle/equivalent impedance 50 Ω /433Mhz/3.5dBi gain/feeder length 1 meter)	TX433-XPL-100	2
USB to 485 tool	K1T-UR0	1
Slotted screwdriver	2*50mm slotted screwdriver	1

2.2 Quick access

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

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

1、Antenna connection: Remove the antenna caps of K62-40 and K62-04 products, and tighten the 433Mhz band "suction cup antenna" clockwise on the product; (For more details, see "The second communication mode is: LoRa spread spectrum hardware connection, installation "chapter)

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 supply" to the "power adapter cable".

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



Figure 2-2 Product connection antenna and power supply

(2) Notes.

1、When wiring, please do not connect the wrong port, so as not to damage the product!

2, the transmission of paired products between RF antennas, need to be as open as possible and as far as possible can be seen directly; RF antennas as far as possible around away from: walls, metal shielding, trees, hills, large buildings, etc..

3, the top of the RF antenna can not be attached to the metal, wall and other objects that have great attenuation effect on RF, so as not to affect the transmission of RF signals.

4, the distance between the product RF antenna is best to keep 1 meter and above. High-power RF products from the RF antenna distance is too close, the receiving end can not receive the data. (For more details, please see the "Frequently Asked Questions and Solutions (FAQ)" section)

2.2.2 Step 2: Transmitting (acquisition) end product signal input wiring

(1) In accordance with Figure 2-3 below, connect the 0/4-20mA analog signal generator (or sensor, etc.) output port to the AI and GND interface of the K62-40 acquisition end of this product. (The specific wiring method of the sensor's two, three, four-wire system, see: "analog acquisition input and restore the output hardware connection")

(2) Notes.

- 1, the user needs to confirm that the sensor belongs to the several-wire system sensors, and connected with wires in accordance with the wiring schematic.
- 2, the terminal connection wire, pay attention to the terminal conductive part can not be pressed to the wire insulation layer, so as to avoid poor contact, causing abnormalities.

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

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

(1) In accordance with Figure 2-3 below, connect the AO and GND of the reduction end of this product K62-04 to the signal receiving "positive" and "negative" terminals of the analog acquisition equipment with wires respectively (or connect to a multimeter, note that the multimeter position needs to be set to greater than 20mA current level, the "red meter pen" connected to the product "AO", "black meter pen" connected to the product "GND (")", and tighten the screws on the plug-in terminals of this product. (This part of the wiring schematic see: "analog reduction output (AO) wiring")

(2) Notes.

- 1, the output of this product is an active signal: constant current source output, the load resistance value needs to be $\leq 500 \Omega$.
- 2, using a multimeter measurement, pay attention to the multimeter gear must be correct, so as not to damage the external table, or lead to large measurement errors.
- 3, the terminal connection wire, pay attention to the terminal conductive part can't be pressed to the wire insulation layer, so as to avoid poor contact, causing abnormalities.

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

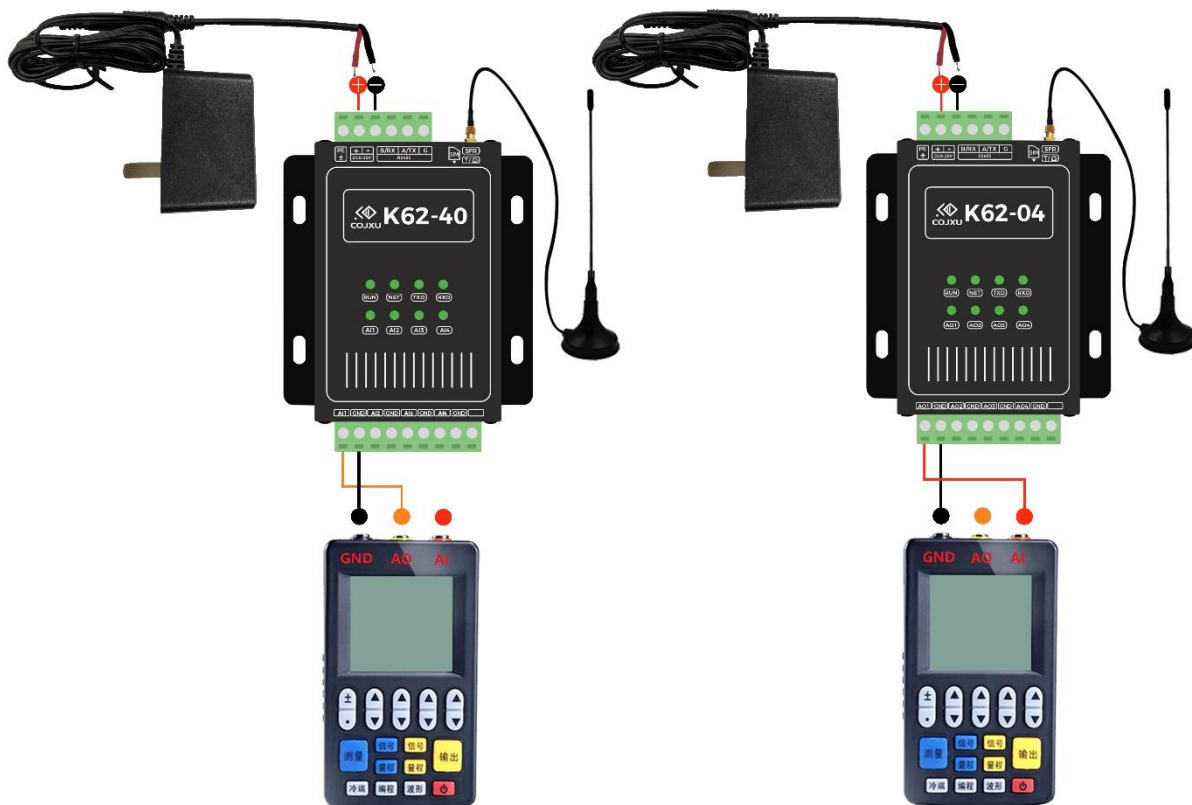


Figure 2-3 Connecting a signal generator tool (can be a sensor and multimeter)

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

(1) Plug the two 12V/1A adapters into the power strip (mains AC220V), and the entire system is powered on.

(2) Observe the status of the indicator light, the input current of the transmitter and the output current of the receiver, as shown in Figure 2-4.

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

NET light of the supporting product is on, it means that the wireless communication between the two modules is successful;

3. The AI light is on, indicating that the acquisition signal is successful; the AO light is on, indicating that the output signal is successful;

4. After confirming that the above is successful, observe whether the signal values of the acquisition end and the restore end are the same (the error is within the product parameter range). If it is the same, it is successful; if it is not the same, you need to check the cause of the exception and handle it according to the precautions in the above steps.



Figure 2-4 Observe the current value of the analog input and output modules

(3) Notes:

1. For more details on the functions of the indicator lights, see the chapter "Indicator Description";

2. If the NET indicator does not light up, it means that the wireless communication is unsuccessful. It is necessary to check whether the antennas of the product are installed correctly, ensure that the distance between the antennas is 1 meter or more, and there is no obstruction between the antennas of the product.

2.2.5 Step 5: On-site installation

(1) Important knowledge points: The necessary conditions for communication between LoRa wireless spread spectrum technology paired products: channel, address, and airspeed . Products with the same three parameters can perform data communication. Conversely, if one parameter is different, data communication cannot be performed.

(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: For the default parameter properties of this product, see the nameplate label on the back of the product for details.

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

Reason: To avoid data conflicts between the same type of products in engineering applications and the field environment; in addition, to avoid forgetting the three parameters of the installed equipment when adding this product next time, which leads to the need to read the parameters on site, causing unnecessary Trouble.

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



Figure 2-5 Screenshot of configuration software

2.3 Model selection overview

2.3.1 Product model selection table

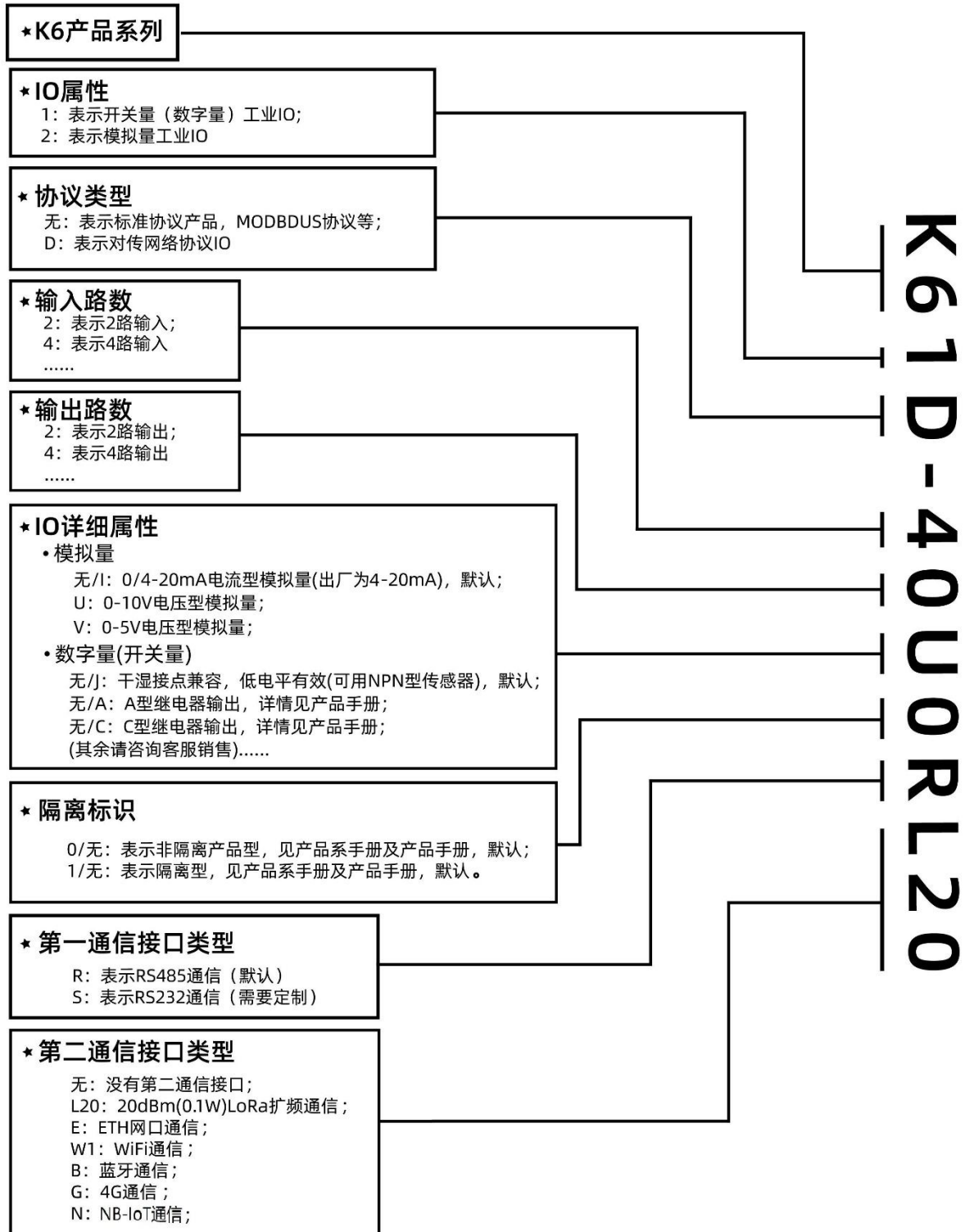
Product number	describe
K41-DG	1-way switch bidirectional 4G remote transmission. It is used in the case of long distance

	and 4G signal
K41-DL20	1-way switch value two-way 433M wireless remote transmission, open communication transmission distance 4KM
K41-DL30	1-way switch value two-way 433M wireless remote transmission, open communication transmission distance 8KM
K42-DG	2-way 0/4~20mA analog one-way 4G remote transmission. It is used in the case of long distance and 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-way 0/4~20mA analog quantity and 1-way switch quantity one-way 4G remote transmission. It is used in the case of long distance and 4G signal
K43-DL20	1 channel 0/4~20mA analog quantity and 1 channel switch value one-way 433M wireless remote transmission, open communication transmission distance 4KM
K43-DL30	1 channel 0/4~20mA analog quantity and 1 channel switch value one-way 433M wireless remote transmission, open communication transmission distance 8KM
K61-DE	4-way switch value unidirectional Ethernet (LAN) remote transmission. It is used for the situation that two network ports in the LAN can ping through
K61-DEW	4-way switch value one-way Ethernet (Internet) remote transmission. Used in different places, as long as there is a network port that can access the Internet
K61-DL20	4-way switch value one-way 433M wireless remote transmission, open communication transmission distance 4KM
K62-DE	4-way 0/4~20mA analog Ethernet (LAN) remote transmission. It is used for the situation that two network ports in the LAN can ping through
K62-DEW	4-way 0/4~20mA analog Ethernet (Internet) remote transmission. Used in different places, as long as there is a network port that can access the Internet
K62-DL20	4 channels 0/4~20mA analog quantity 433M wireless remote transmission, open communication transmission distance 4KM
K71-DG	8-way switch one-way 4G wireless remote transmission. It is used for application scenarios with long distances and 4G signals
K71-DL30	8-way switch value one-way 433M wireless remote transmission, open communication transmission distance 8KM
K72-DG	6 channels of 0/4~20mA analog 4G wireless remote transmission. It is used for application scenarios with long distances and 4G signals
K72-DL30	6 channels 0/4~20mA analog quantity 433M wireless remote transmission, open communication transmission distance 8KM

.....

(For more details, please log in to the official website to check the product model and download the relevant user manual)

2.3.2 Product model naming rules



3 Hardware connection and related knowledge

3.1 Power Hardware Connection

3.1.1 Power supply selection

Power supply selection: According to the product nameplate label, select the appropriate DC regulated power supply. Power supply requirements: strong anti-interference ability, small ripple, and sufficient load capacity; it is best to have functions such as overcurrent protection, overvoltage protection and lightning protection to ensure long-term normal operation of the product. It can also be powered by our standard power adapter.

3.1.2 Power Connection

The wiring diagram of the power supply: please refer to the following figure 3-1

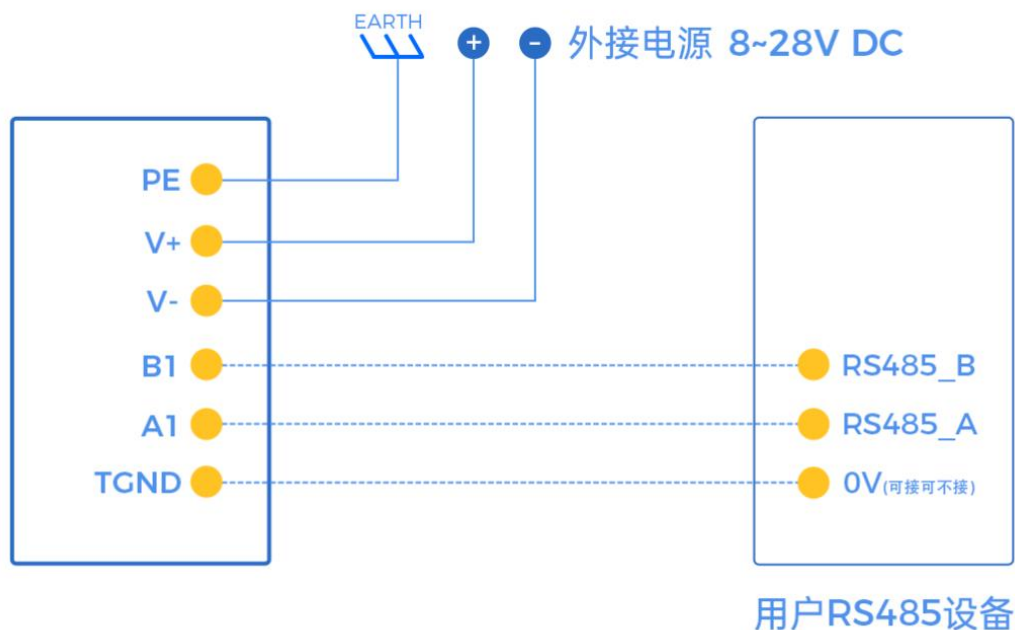


Figure 3-1 485 connection diagram

3.1.3 Precautions and instructions for power connection

- (1) The power interface of this product has the capabilities of overcurrent protection, anti-reverse connection protection, power surge protection, etc.;
- (2) In a complex environment such as a lot of radio frequency interference, strong electromagnetic interference, easy to generate static electricity when dry, complicated wiring, no separate wiring of strong and weak currents, etc., and the earth is well grounded, it is recommended to connect the product "PE" to the earth. It can effectively protect the product

and suppress interference;

(3) The earth connection should conform to the national standard. If it is not guaranteed whether the ground connection conforms to the national standard, it is recommended that the PE of this product is not connected to the ground to prevent interference or even damage to the product.

3.2 Hardware connection of the first communication method

The first communication method: 485

(1) 485 function

1. Configure product parameters;
2. Adopt RS485 remote transmission (pair transmission) products;
3. After the "RS485 transparent transmission" function is enabled, data transparent transmission is performed;
(For details, see "[Product Basic Parameter Read and Change Write](#)" and "[Mode Configuration](#)" "**(2) Transparent Transmission**" and "**(3) 485 Transparent Transmission Filtering**" in the "[Parameter Description](#)" chapter).

(2) 485 hardware connection

Wiring connection: 485 wiring is very simple; just connect the 485 communication product A to A, B to B, and the wiring is completed. For the wiring diagram, see Figure 3-1 above.

(3) 485 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)
4. Stop bit: 1 (default), 2

(4) Product 485 Hardware Protection

This product 485 has the capabilities of overcurrent protection, power surge protection, inductive lightning protection, and EMC electromagnetic compatibility.

(5) 485 bus wiring rules

- 1. With the extension of transmission distance, echo reflection signals will be generated on the 485 bus network. If the transmission distance of the 485 bus exceeds 100 meters, it is recommended to connect a 120 Ω [resistor in parallel at the beginning and end of the 485 network](#) .**
2. In industrial field applications, if the on-site interference source is very complex, there may be a high common-mode voltage between nodes. Although the 485 interface uses a differential transmission method, it has the ability to resist common mode interference. But when the common mode voltage is greater than +12V or less than -9V, it exceeds the limit receiving voltage of the 485 receiver, the receiver will not work, and may even burn the chip and equipment. At this time, 485 opto-isolated repeaters should be used in the 485 bus network to eliminate the effect of common mode voltage.
3. Since the 485 bus transmits a pair of differential signals, the data transmission line between each device on the 485 network is best to use a twisted pair with an additional shielding layer, and the shielding layer should be reliably grounded at one point.
4. In the simple application of the 485 bus, the bus-type topology wiring method is generally used. But in a more complex system, the wiring construction of the bus topology is not only very cumbersome, but also wastes a lot of

connections. By using 485 hubs or 485 repeaters flexibly, the bus topology can be connected into a star or tree topology. It greatly facilitates the pre-construction and post-maintenance work.

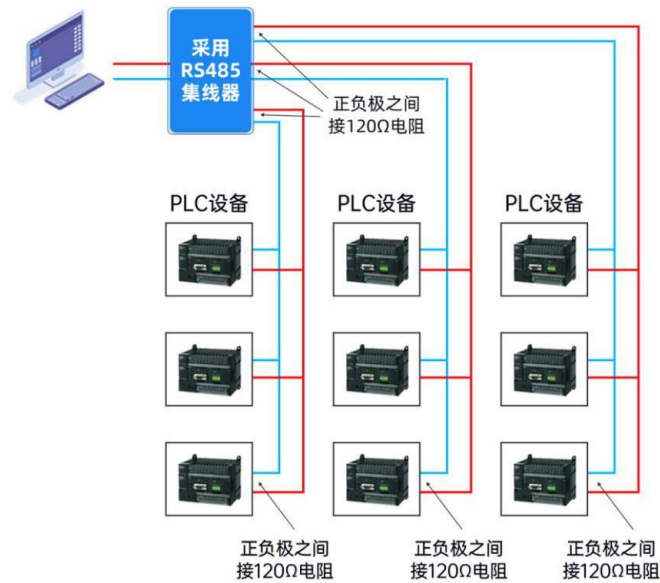


Figure 3-2 485 star topology

5. Pay attention to the load capacity of the 485 bus. The factors that affect the load capacity include: the power supply capacity of the 485 converter connected to the serial port of the host [computer](#), [the communication distance](#), [the quality of the 485 data wire](#), and [the baud rate](#).

6. The passive 485 converter steals electricity from the serial port of the computer, the power supply is poor, and the load capacity is insufficient. If there are many devices on the 485 network, a 485 converter with a power supply should be used. Choose a good 485 dedicated communication cable and use the lowest baud rate as possible. Using 485 repeaters or 485 hubs can improve the load capacity of the 485 bus.

3.3 Hardware connection of the second communication method

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

(1) RF antenna connection, installation and instructions

The connection method of the product antenna: see the "[Product connection antenna and power supply](#)" section above.

(2) What antenna should be used for wireless communication

1. When the user chooses the antenna, the antenna frequency band should match the **wireless operating frequency** and **impedance** requirements of the product. (For parameter details, see the "[Basic Parameters](#)" chapter)

2. Reason: The special frequency band antenna used for this product has good standing wave performance and more stable data transmission.

(3) RF antenna installation

RF antennas of the transmission pair need to be as open as possible and can be viewed directly; the RF antennas should be as far away as possible: walls, metal shields, big trees, hills, large buildings, etc.

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

3. When the suction cup antenna is installed, the wire should be as straight as possible, and the suction cup base should

be attached to the metal object.

4. The distance between the **RF antennas of the product is preferably 1.5 meters or more**. If the high-power RF product is too close to the RF antenna, the receiver cannot receive data.
5. If the measured distance is not ideal, it is recommended to analyze and improve the communication distance from 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. The product comes standard with antenna parameters, see " [Product and Accessories List](#) ". If the **feeder** is not long enough, you need to purchase a feeder extension cable, or purchase an antenna with a longer feeder. Do not peel off the antenna and extend the wires by yourself, which will cause the impedance mismatch of the RF antenna, resulting in serious signal attenuation.

3.4 Analog acquisition input and restore output hardware connection

3.4.1 Two -wire acquisition input (AI) connection

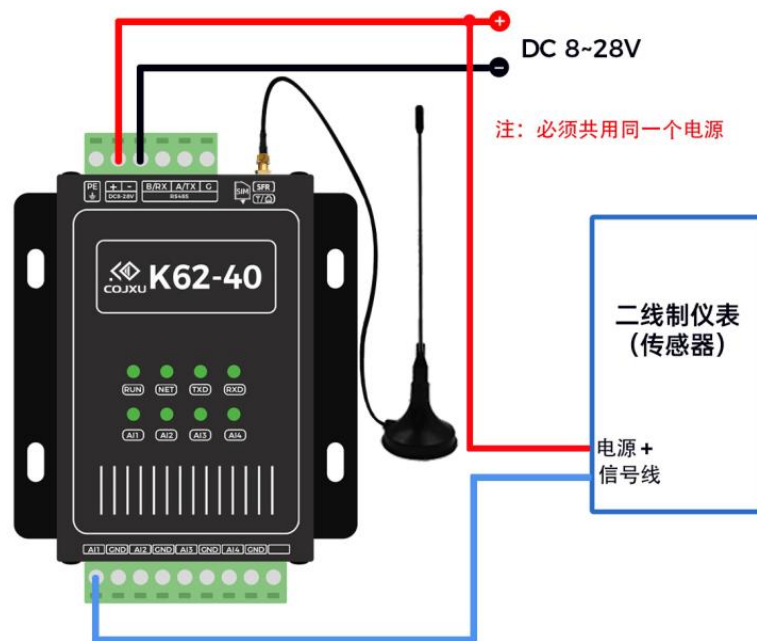


Figure 3-2 Two-wire wiring diagram

3.4.2 Three-wire acquisition input (AI) connection

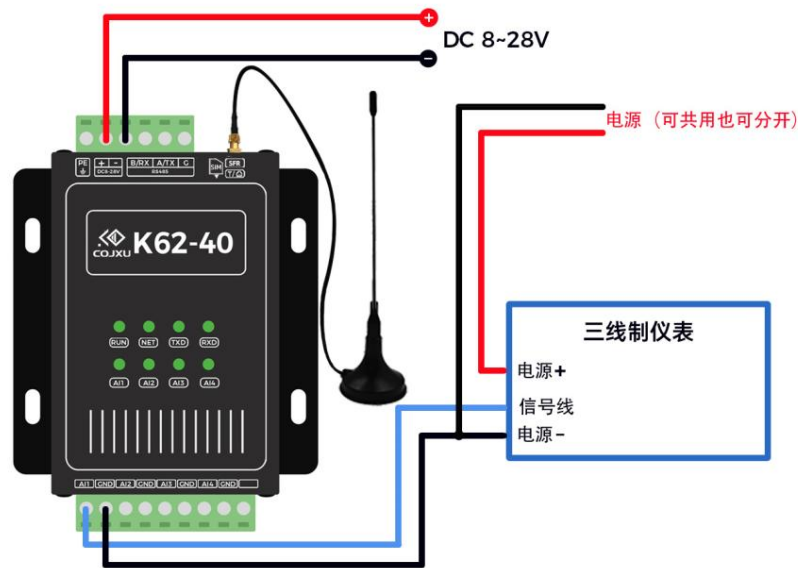


Figure 3-3 Three-wire wiring diagram

3.4.3 wire acquisition input (AI) connection

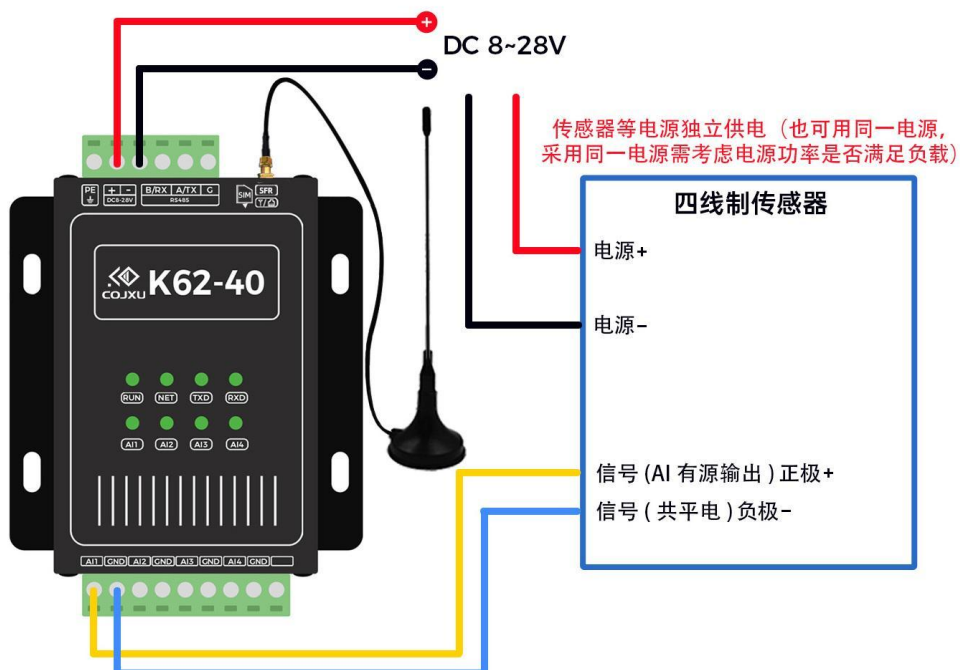


Figure 3-4 Four-wire wiring diagram

3.4.4 Analog restore output (AO) wiring

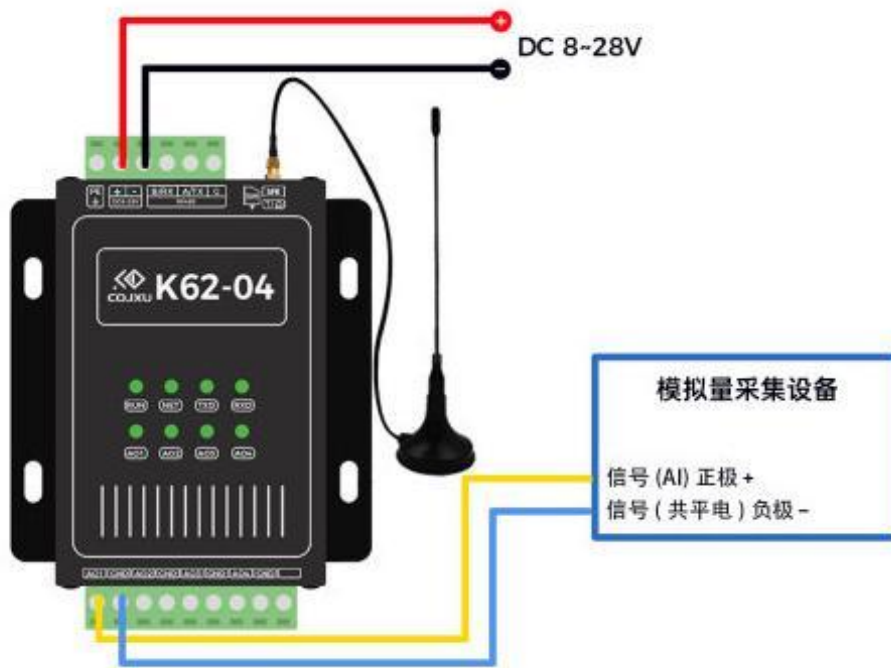


Figure 3-5 Receiver Wiring diagram

(The output is an active signal: constant current source output, the load resistance should be $\leq 500 \Omega$)

3.4.5 Analog impedance and other information

(1) Analog input AI (Analog Input) related

1. Input source information: 0/4~20mA active analog signal, constant current source voltage should be $\geq 10V$.
2. Error, accuracy, limit value: acquisition accuracy: $\leq \pm 0.03mA$; acquisition resolution: 0.001mA; input maximum current $I_{max} \leq 28mA$, overcurrent may cause product damage.
3. The internal impedance of the product: $480 \Omega = 330 \Omega$ (current limiting protection resistance) + 150Ω (high-precision acquisition resistance).

(2) Related to analog output AO (Analog Output)

1. Output source information: 0/4~20mA active analog signal, constant current source output.
2. Error, precision, limit value, etc.: Output error: $\leq \pm 0.03mA$. Output accuracy: 0.001mA. The load impedance should be $\leq 500 \Omega$, and active power supply should not be connected to avoid damage to the product.
3. Internal impedance of the product: constant current source voltage: 24V. Constant current source internal resistance: 500Ω .

(For the internal circuit structure diagram of the product, see "[Product Internal Circuit Structure Diagram](#)")

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

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

4.1 Configuration software tools and driver installation

Bill of materials used in this chapter	
Prepare materials	Quantity/Remarks
Windows system computer	1 set
USB to 485 tool	1
ProductsSwitching Power Supply/Power Adapter	1
product	some
wire	some
CH340 driver (serial port driver)	computer driver installation package
Microsoft.Net_Framework_4.0 and above computer environment driver	computer driver installation package
Interchange Industrial Network IO Setting Tool.exe	Configure the software installation package

4.1.1 Configuration software tools and driver installation package download

(1) Method 1: Go to the official website: www.cojxu.com → Click "Data Download" → "Point-to-point Remote Follow" → Click "LoRa 433M" → Find "Pair Transmission Industrial Network IO Setting Tool", **download the compressed package and unzip it**.

(2) Method 2: Enter 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 already installed, skip this step**.

Confirmation method: Plug the "USB to 485" into the USB of the computer (as shown in Figure 4-1 and Figure 4-2) → right-click on "My Computer/This Computer" → "Management" → "Device Manager" → "Ports" "In the drop-down option, you will see the driver of CH340/CH341 → it means it has been installed, otherwise, it is not installed. (For different computers and configurations, the viewing steps are similar.)

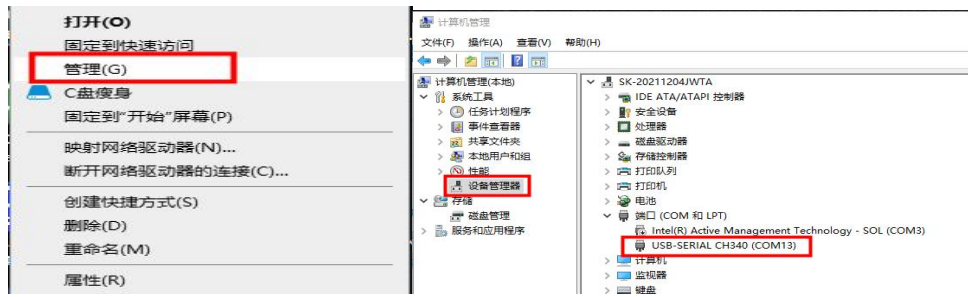


Figure 4-1 Figure 4-2

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

Open the downloaded compressed package and decompress the folder (as shown in Figure 4-3 and Figure 4-4 below) → find the compressed package with the words "CH340" and decompress it → double-click and click "SETUP.EXE" → install → After the installation is complete, it will prompt " Driver installed successfully" → Finish

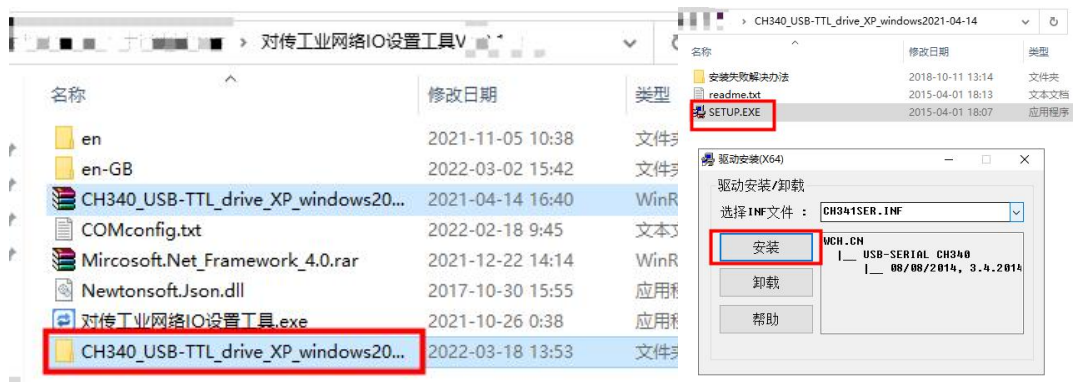


Figure 4-3 Figure 4-4

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

Open the downloaded zip file and decompress the file → find and double-click the "Pair Transmission Industrial Network IO Setting Tool.exe" to run the configuration software → If the operation is successful, the **installation is successful** . (If opening fails, you will need to go to the next step.)



Figure 4-5 Setting tool software interface

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

Cause analysis: The reason for the failure to open may be that the version of Net_Framework in the computer compilation environment is too low, and you need to install version 4.0 or above.

Install Microsoft.Net_Framework_4.0 and above: Open the downloaded zip file and unzip the file → find and unzip "Microsoft.Net_Framework_4.0.rar" → double-click to run "dotNetFx40_Full_x86_x64.exe" → After completion, run the "Intercommunication Industrial Network IO" Set up tool.exe".

4.1.3 Introduction to configuration software tool interface

As shown in Figure 4-6 below

- (1) Communication serial interface. Support CH340/CH341 to drive serial port, can read 485, 232, TTL data.
- (2) Display interface of product basic attributes. Read the company's product type, local S/N code (equipment unique identification code), firmware version, etc.
- (3) RTU product read configuration interface. Read and configure the company's product information parameters, so that the product is suitable for various industrial system environments.
- (4) The second communication interface reads the configuration interface. Read and configure the second communication interface of the company's product, so as to connect the product to various communication types.
- (5) “?” is the relevant parameter comment. When configuring parameters, users can view and understand them as much as they want.
- (6) Chinese and English switching function. This configuration software supports Chinese and English interfaces, which is convenient for foreign and domestic users to use.
- (7) Log column. Users can view the configuration instructions of the company's modules according to the information in the log column, and users can change the configuration module parameters according to the configuration instructions; at the same time, it is also convenient to analyze abnormal problems and solve 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 Introduction to the configuration software tool interface

4.2 Reading and changing the basic parameters of the product

This chapter mainly introduces how to read product device attributes: device type, firmware version, product unique identification code, changing 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 485" tool, and connect the "USB to 485" tool to the computer USB, as shown in Figure 4-7 below.

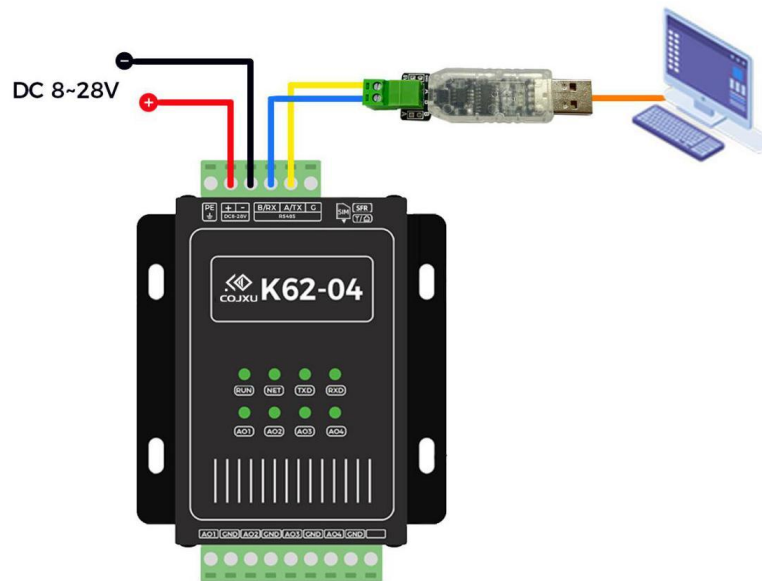


Figure 4-7 Schematic diagram of power supply and 485 hardware wiring

(2) Check the COM port number (as shown in Figure 4-8): There is only one COM port on **the computer**, so you don't need to check it, you can skip this step . (If there are multiple COM ports on the computer, you need to determine the number of COM ports corresponding to this product. The check method is as follows.)

Viewing method: Right-click "My Computer / This Computer" → "Management" → "Device Manager" → "Port" drop-down option, you will see the CH340/CH341 driver, and you can view the corresponding COM port number → Plug and unplug Corresponding "USB to 485" to determine the corresponding COM port number.



Figure 4-8 Computer port of USB to 485 module

4.2.2 Reading the basic parameters of the product

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

(2) Basic parameter default value parameter table, as shown in Table 4-1 below.

Table 4-1

Baud rate:	9600bps	Data bits:	8
------------	---------	------------	---

Check digit:	None (no check digit)	stop bit:	1
--------------	-----------------------	-----------	---

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

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

(If there is an exception, please refer to the exception handling chapter of "The [device cannot be searched by the configuration software](#) ")



Figure 4-9 Basic parameter reading

4.2.3 Serial port parameter change write and restore default

(1) Write content of serial port parameters: 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 products of the user. In other cases, it is recommended that the user does 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 correct (default) parameters → click "Open Serial Port" (if the parameters have been changed and forgotten, they can be restored to factory settings) → "Search/Read Device" → Read successfully → Change as required: baud rate, parity bit, data bit, stop bit parameters → click "Write" → "Log" column to see a successful prompt → click "Save" → click "Restart" → complete changes

Next, you can verify → under the newly written serial port parameters → click "close serial port" → click "open serial port" again → "search/read device" → read successfully, then the settings are changed.



Figure 4-10 Change write serial port parameters

(4) Restore default serial port parameters

1. Press and hold the "SFR" reset button of the product for 3 seconds: the product restores the factory default parameters, that is, the serial port parameters also return to default.
2. The user can also use the current correct COM port number and the current serial port parameters, and through the configuration software of "Inter-communication Industrial Network IO Setting Tool.exe", the product can be changed and written according to the default parameters.

4.3 I/O configuration parameter reading, description and writing

This chapter mainly introduces: the reading and configuration of each parameter of the I/O channel.

4.3.1 I/O configuration parameter reading

(1) I/O configuration parameters read content: AI current input/AO current output, network disconnection recovery time, refresh interval time, channel value.

(2) Steps (as shown in Figure 4-11): Select the correct COM port number and correct (default) parameters → click "Open Serial Port" (if the parameters have been changed and forgotten, they can be restored to 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 of the **sender** and the **receiver is the same.**)



Figure 4-11 I/O configuration parameter reading

4.3.2 I/O configuration parameter description

(1) **AI current input (AO current output):** Input/output current range.

parameter name	Scope and Options	Description property
AI current input (default)	0-20mA, 4-20mA (default)	0/4~20mA acquisition. Acquisition accuracy: $\leq \pm 0.03\text{mA}$. Acquisition resolution: 0.001mA. Active signal needs to be connected, and the constant current source voltage needs to be $\geq 10\text{V}$. Input maximum current $I_{\text{max}} \leq 28\text{mA}$, overcurrent may cause product damage.
AO current output (default)	0-20mA, 4-20mA (default)	0/4~20mA output. Output error: $\leq \pm 0.03\text{mA}$. Output accuracy: 0.001mA. The output is an active signal: constant current source output. Load blocking needs to be $\leq 500\Omega$.

(2) **Network disconnection recovery time** : When the network disconnection recovery time is set to ≥ 30 seconds. After the connection between the sender and the receiver is disconnected, how long is the delay? If the network is still disconnected, the receiver will output 0mA.

Note: When the user uses, the default parameters cannot meet the requirements of the environment and the site, you need to debug and write the appropriate time, and determine the appropriate value of the network disconnection recovery time by observing the product "NET" connection indicator. In case of engineering application, the disconnection of the network will cause the receiver to output 0mA or keep the output value before the disconnection, thus affecting the system instability or malfunction!

parameter name	Scope and Options	illustrate
Network disconnection recovery time:	0 seconds	Turn off disconnection recovery. The receiving end keeps the output value before the disconnection, until the network connection returns to normal, or the initial value is restored by artificial power failure.

	30 seconds to 57600 seconds (default 30 seconds)	Enable disconnection recovery. That is, after the disconnection time is exceeded, the receiving end outputs 0mA.
--	--	--

Example: The network disconnection recovery time is set to: 30 seconds. After the sender and receiver are disconnected, the product will continue to search for connections. If the connection between the sender and the receiver is still disconnected after 30 seconds, the product network indicator "**NET**" light is off, and the receiver returns to the default output parameter of 0mA.

(3) **Refresh interval**: Refers to the time interval for synchronous refresh of the data of the sender and the receiver. Note: The **refresh interval is related to the parameters related to the communication mode**, see Table 4-3 below.

Table 4-2 Refresh interval and communication mode parameter comparison table

Refresh interval: comparison with the parameters related to the communication method			
way of communication	Refresh time (seconds)	Parameters that need to be changed accordingly	illustrate
LoRa	0.2	≥4.8Kbps (airspeed)	The communication method is wireless spread spectrum technology. Users should conduct experiments according to the environment and finally determine a relatively stable parameter.
LoRa	0.5		
LoRa	1 (default)	2.4Kbps (airspeed)	
LoRa	2		
LoRa	5		

(4) **Channel value**: the channel value of the acquisition (or sender).

Channel properties	Value range	illustrate
Current type (default)	0~20mA	Send and receive channel analog current input detection value
Voltage type (can be customized)	0~5V	Send and receive channel analog voltage input detection value
	0~10V	

4.3.3 I/O configuration parameter writing

(1) Refer to "[I/O configuration Refer to Table 4-2 for each parameter and parameter description](#)", and enter the following [parameter](#) writing steps.

(2) I/O configuration parameter writing:

1. Example: Write **4~20mA** file, **60s** disconnection recovery time, **2s** refresh interval.

2. Steps (as shown in Figure 4-12): Select the correct COM port number and correct (default) parameters → click "Open Serial Port" (if the parameters have been changed and forgotten, they can be restored to factory settings) → "Search/Read Device" → "I/O configuration" → pull down to select "**4~20mA**" → input network disconnection recovery time **60s** (0s, 30~57600s) → pull down to select the desired refresh interval time **2s** → click "write" in "3.I/O configuration" Enter → the log column prompts success → According to Table 4-2, configure the LoRa wireless airspeed to **2.4Kbps** → click "Write" in "2.LoRa Configuration" → log column prompts success → click "Save" → read next Check whether the verification is successful → click "Restart" → Repeat "[I/O Configuration " Parameter reading and parameter description "](#)" chapter steps to check.

(Note: For paired products, it is recommended that this parameter should be configured the same for both the sender and the receiver. When using, the user can check the status of the indicator lights. For indicator lights, see the chapter "Indicator Description")



Figure 4-12 Configure as 4~20mA gear

5 The second communication mode parameter reading, description and writing

5.1 The 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): Select the correct COM port number and 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" is successful → click "Read" in the LoRa configuration → "5" displays the current LoRa configuration parameter information → read successfully.



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 identities between devices. Therefore, two devices with the same wireless address can identify and communicate with wireless data. Unlike ModBus addresses, the two exist independently.

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

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

(3) LoRa wireless air rate (airspeed):

1. The faster the airspeed → the shorter the time from sending the data to the receiving end receiving the response data → the shorter the wireless transmission distance.

2. The slower the airspeed → the longer the time from sending the data to the receiving end receiving the response data → the longer the wireless transmission distance.

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

(4) To sum up, only devices with the **same LoRa wireless address, channel, and airspeed** can perform data communication.

5.1.3 LoRa parameter configuration write

(1) Steps (see Figure 4-10 below): Select the correct COM port number and 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" → Read "Device Properties" successfully → Click "Read" in "LoRa Configuration" → "5" shows the current LoRa configuration parameter information → Change the parameters to the information required by the user (be careful

not to exceed the " [LoRa configuration parameters " range](#)) → click "Write" in "LoRa Configuration" → see the "Log" column pops up a prompt indicating that the writing is successful → click "Save" → see the "Log" column pops up to save successfully, then complete the configuration → click "reboot 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: 0~83
- (2) LoRa address: 0~65535
- (3) LoRa airspeed: 2400~625000bps

6 ModBus

6.1 ModBus address table

6.1.1 Function code and register address table

Register address table (function code: 0x03H, 0x06H)					
register address	Number of registers	register properties	register type	register range	Support function code

Register address table (function code: 0x03H, 0x06H)					
register address	Number of registers	register properties	register type	register range	Support function code
40078 (0x004D)	1	ModBus address	read/write	0x01~0xFF (default: 1)	0x03, 0x06
40017 (0x0010)	1	AI1 analog input	read only	0x0000~0x4E20(0~20mA)	0x03
40018 (0x0011)	1	AI2 analog input	read only		
40019 (0x0012)	1	AI3 analog input	read only		
40020 (0x0013)	1	AI4 analog input	read only		
40033 (0x0020)	1	AO1 analog input	read only	0x0000~0x4E20(0~20mA) Read only (does not support control with ModBus)	0x03
40034 (0x0021)	1	AO2 analog input	read only		
40035 (0x0022)	1	AO3 analog input	read only		
40036 (0x0023)	1	AO4 analog input	read only		

6.1.2 Change ModBus address

- (1) Function code: 03, read holding register; 06, write holding register
- (2) Address range: 40001 (0x0000)
- (3) Description: Function code 06, set the ModBus address of the device to 0x10, that is, 0001 0000
- (4) Note: CRC is calculated by ModBus CRC16 calculation method, not fixed.

send	01	06	00 4D	00 10	18 11
	Device address	ModBus function code	address	write value	CRC check code

take over	01	06	00 4D	00 10	18 11
	Device address	ModBus function code	address	write value	CRC check code

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

send	10	03	00 4D	00 01	D4 11
	Device address	ModBus function code	address	write value	CRC check code

take over	10	03	02	00 10	45 8B
	Device address	ModBus function code	returns the number of bytes	write value	CRC check code

6.1.3 Read analog AI input

Function code: 03, read holding register

Address range: 40017(0x0010)~40020(0x0013)

Description: The unit of analog input value is uA

Example: function code 0x03, read AI input.

Assuming AI1 (**current type**) input is 9955uA, the corresponding value should be 0x26E3, AI3 input is 5000uA, the corresponding value is 0x1388, AI2 and AI4 are 0.

ModBus RTU protocol to read analog input:

send	01	03	00 10	00 04	45 CC
	Device ModBus address	function code	Analog starting address	number of reads	CRC check code

take over	01	03	08	26 E3	00 00	13 88	00 00	14 85
	Device ModBus address	function code	returns the number of bytes	Differentia l analog input value	Differentia l analog input value	Differentia l analog input value	Differenti al analog input value	CRC check code

6.1.4 Read analog AO output

Function code: 03, read holding register

Address range: 40033(0x0020)~40036(0x0023)

Description: The unit of analog output value is uA

Example: function code 0x03, read AO output.

Assuming that the output of AO1 (**current type**) is 9955uA, the corresponding value should be 0x26E3, the output of AI3 is 5000uA, the corresponding value is 0x1388, and the corresponding value of AI2 and AI4 is 0.

ModBus RTU protocol to read analog input:

send	01	03	00 20	00 04	45 C3
	Device ModBus address	function code	Analog starting address	number of reads	CRC check code

take over	01	03	08	26 E3	00 00	13 88	00 00	41 85
	Device ModBus address	function code	returns the number of bytes					CRC check code

7 Precautions for use

- (1) Do not operate this radio in some flammable places (such as coal mines, etc.) or near explosive hazards (such as detonators for detonation, etc.).
- (2) Do not use the radio in an environment that exceeds the environmental characteristics of the product, such as high

temperature, humidity, low temperature, strong electromagnetic field or dusty environment.

8 FAQ

8.1 General Questions

1. Once you have the product, how do you test it?

- Please see this manual "Quick Start (users are recommended to read this section first)". If the test process does not go smoothly, please follow the test method below.
- Pay attention to the polarity of the power supply: + is positive, - 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 connected reliably: to be tightened clockwise.
- Incorrect data:
 - 1). Check whether the hardware wiring is correct according to "Analog acquisition input and reduction output connection";
 - 2). Check whether other modules are also powered around.

2. Module power supply requirements?

- The power requirements of the transmitter and receiver can be found in the "Basic Parameters" section of the product, or in the nameplate label on the back of the product.
- A suitable DC regulated power supply should be used, with strong anti-high frequency interference capability, small ripple, and sufficient load carrying capacity; preferably with over-current, over-voltage protection and lightning protection to ensure normal operation of the digital radio. In order to ensure stable communication, it is recommended to set aside more than 50% of the communication distance margin.

3. The RUN light of the module is not lit.

- Green 5.08 plugging terminal screws are not tightened or conductive part pressed to the wire / cable insulation layer, resulting in poor power supply contact.
- The supply voltage is too low, our supply voltage is 8-28V (12VDC, 24VDC is recommended for supply voltage).
- Power supply type: Our power supply requirement is DC voltage.

4. Configuration software does not search for devices

- Check inside the computer management whether there is a USB to 485 driver (no driver can download the driver yourself online, or we provide the driver "CH340 driver").
- USB to 485 wiring method: 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 prompted to open the serial port failure, please check whether there is other software occupying the serial port, or the transmission couples re-plug in the test.
- Poor contact: communication port A, B to check whether the wiring insulation or any other mask in the wiring segment, or whether the terminals are tightened.

- Baud rate has been changed and forgotten: Press and hold the "SFR" button to restore the factory settings, and then apply the configuration software again to read. You can also apply the search baud rate function to search.
- If all the above are correct: search the device with the host computer or try to send data to the device with the serial assistant to see if the device's RXD light is flashing, if the device's RXD light is not flashing, you need to check whether the USB to 485 is damaged.
- Configuration software and the computer is really incompatible and can not be used: then you can use his serial software tools to read the device parameters by viewing the product ModBus command.

5. The two modules do not communicate successfully and the NET lamp does not light up.

- Whether to connect the antenna (the distance between the two antennas should be greater than 1.5M) The antennas cannot be placed in a closed tin cabinet (preferably 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, you need to put a resistor of less than 1K ohm on the AB side of the 485, preferably on both the transmitting and receiving side.
- LoRa communication distance is too far or the surrounding environment has too many metal shades, consider replacing high-power products.

6. Communication between two devices is not successful, but the NET light is always on.

- The sensor at the AI acquisition end is damaged or the sensor is wired incorrectly.
 - 1) Check the AI light of the acquisition module if it is always on, the input signal is detected, and vice versa.
 - 2) Check whether there is any problem with the wiring of the sensor connected to the acquisition equipment. Please verify the sensor type and wire it according to the correct wiring method.
 - 3) The sensor is damaged. Use the multimeter current gear to measure the sensor good or bad, set the multimeter to the current gear, series to the signal output of the sensor and the negative end of the sensor, check the current value (can not be connected to the product acquisition end, so as not to cause measurement errors and errors in judgment).
 - 4) pay attention to the two-wire sensor multimeter measurement method: the positive power supply connected to the positive terminal of the sensor, the negative terminal of the sensor connected to the multimeter current gear red pen, multimeter current gear black pen connected to the negative terminal of the power supply, you can view the current value.
- AO output terminal wiring errors.
 - 1) the user needs to check the wiring method of the acquisition module connected to our AO products, our AO products are active outputs. For details, please refer to the chapter of "Analog Reduction Output (AO) Wiring".
 - 2) the user can verify that our products are not connected to any load, and then the multimeter 0 ~ 20mA current grade red pen connected to the AO signal end, the black pen connected to GND, you can view the current value.

8.2 LoRa-related issues

1. LoRa communication, what should I look for?

- When testing the K62-DL20 module, it must be connected to a matching antenna or 50Ω dummy load, otherwise it will easily damage the transmitting module.
- K62-DL20 often has different communication distance in different environments. The communication distance is often affected by temperature, humidity, obstacle density, obstacle volume, and electromagnetic environment, so we

suggest customers to actually measure it on site.

2. LoRa communication, 4KM or 8KM module, actual communication distance?

LoRa communication, the communication power of 4KM version is usually 0.16W (22dBm); the communication power of 8KM version is usually 1W (30dBm). 8KM transmitting power is 10 times more than 4KM transmitting power.

If you need more stable communication, we suggest you to choose the 8KM version directly.

Communication distance we have measured, the open visual distance is our nominal distance. But the actual application often has a certain amount of obstruction, such as the interval of several walls, or the interval of several tall buildings, etc..

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

- Place the antenna against a window, or even outside a window.
- Adjusting the orientation of the antenna, which generally transmits signals to both sides of the antenna.
- Appropriately reducing the air rate of transmission.
- For more details, please refer to the section "Second communication method: LoRa spread spectrum".

3. How the antenna should be placed?

The placement of the antenna has a great impact on the transmission stability of the module.

- The antenna is sending data to both sides of the antenna and to the upper middle position. So, pay attention to the antenna mast placement direction, which should be parallel to the data receiving and sending end.
- The antenna should be placed in a slightly open position, as close to the window as possible. Do not place it directly next to the wall or metal.
- If the application scenario in the industrial control box, the antenna must be outside the industrial control box, the antenna placed inside the industrial control box signal will be basically blocked out.
- Antenna as high as possible, signal transmission farther.

8.3 Analog input and output related issues

1. No input/output value for AI/AO input, no input/output value for DI/DO input

- The user needs to distinguish clearly which of the two-wire, three-wire, or four-wire system the sensor is, and the user confirms what type the sensor is, and then corresponds to the corresponding wiring method for wiring.
- Two modules are not communicating successfully. Check whether the network is successful.
- The green 5.08 terminal screw is not tightened, resulting in poor analog input contact.
- Green 5.08 terminal block is not plugged in tightly resulting in poor contact.

2. Unstable communication between the two modules.

- Check the LoRa communication parameters of the two modules (channel, airspeed, address) need to be configured and managed to avoid the environment in the same frequency band and and the same type of products, resulting in signal misalignment, and thus unstable.
- The antenna distance between paired products is too far, or too many factors in between on the wireless RF attenuation, the user can see the product distance indented for judgment. If the distance is the reason, you can replace the product antenna position for a better place, or replace the better performance of the antenna.

Revision history

Version	Date	Description	Issued by
1.0	2022-4-1	Initial version	Guo

About us

Technical support: support@cdebyte.com

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

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

Phone: +86 028-61399028

Web: www.ebyte.com

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



Chengdu Ebyte Electronic Technology Co.,Ltd.