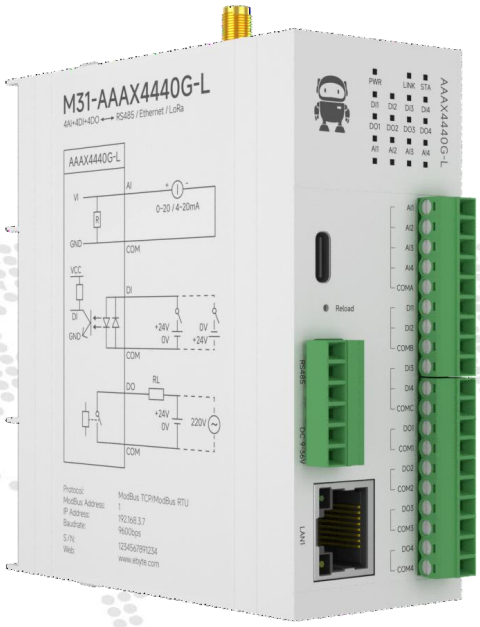
Chengdu Ebyte Electronic Technology Co.,Ltd

Wireless Modem

User Manual



M31+LoRa Distributed IO Host
User Manual V1.1

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1. Product Overview

1.1. Product Introduction



The LoRa distributed IO host series is a powerful wireless remote control and acquisition device. The device adopts LoRa wireless technology (built-in wireless module) and can be controlled by sending Modbus RTU commands through the serial port or remote LoRa networking device. It can be used with our company's "Wireless Data Transmission Radio" to realize wireless remote acquisition and control of switch quantity analog quantity (DI/DO/AI/AO) input and output signals.

LoRa technology is a low-power, long-distance wireless communication technology, especially suitable for remote monitoring and control applications in industrial environments. It has a wide coverage range and excellent penetration ability, and can stably and reliably transmit data in complex industrial environments. The application of LoRa technology enables our products to replace wired with wireless, reducing the difficulties of inconvenient wiring, inconvenient maintenance, and large construction volume, and provides a more economical, stable, flexible and convenient control and acquisition solution.

In addition, the LoRa distributed IO host series adopts an expandable design. Users can choose the corresponding IO expansion modules for splicing according to their needs. It supports up to 16 IO expansion modules to meet the needs of different application scenarios.

1.2. Features

- Adopting the latest LoRa technology (wireless module built into the device) , the transmission distance is longer and the performance is more powerful ;
- LoRa wireless transmission reduces communication wiring;
- Support multiple combinations of switch input DI/switch output DO/analog input AI/analog output AO to choose from ;
- Support standard Modbus RTU protocol;
- Support various configuration software/PLC/touch screen;
- Support LoRa, Ethernet port, and serial port communication methods to collect and control I/O ;
- Supports 1 to 255 Modbus address settings. The 4 -bit DIP switch can set 1 to 16 address codes. Address codes greater than 16 can be set through the configuration tool .
- Support custom Modbus address settings;
- Support 8 baud rate configurations;
- Support positioning hole and guide rail installation;

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- Adopting distributed IO structure, up to 16 IO expansion modules can be connected;
- Widely used in signal acquisition and control of industrial field equipment.

1.3. Product application topology diagram

Use with E95-DTU

Can be configured through E95-DTU series radio connection configuration tool, and control LoRa distributed IO host through standard MODBUS RTU instructions

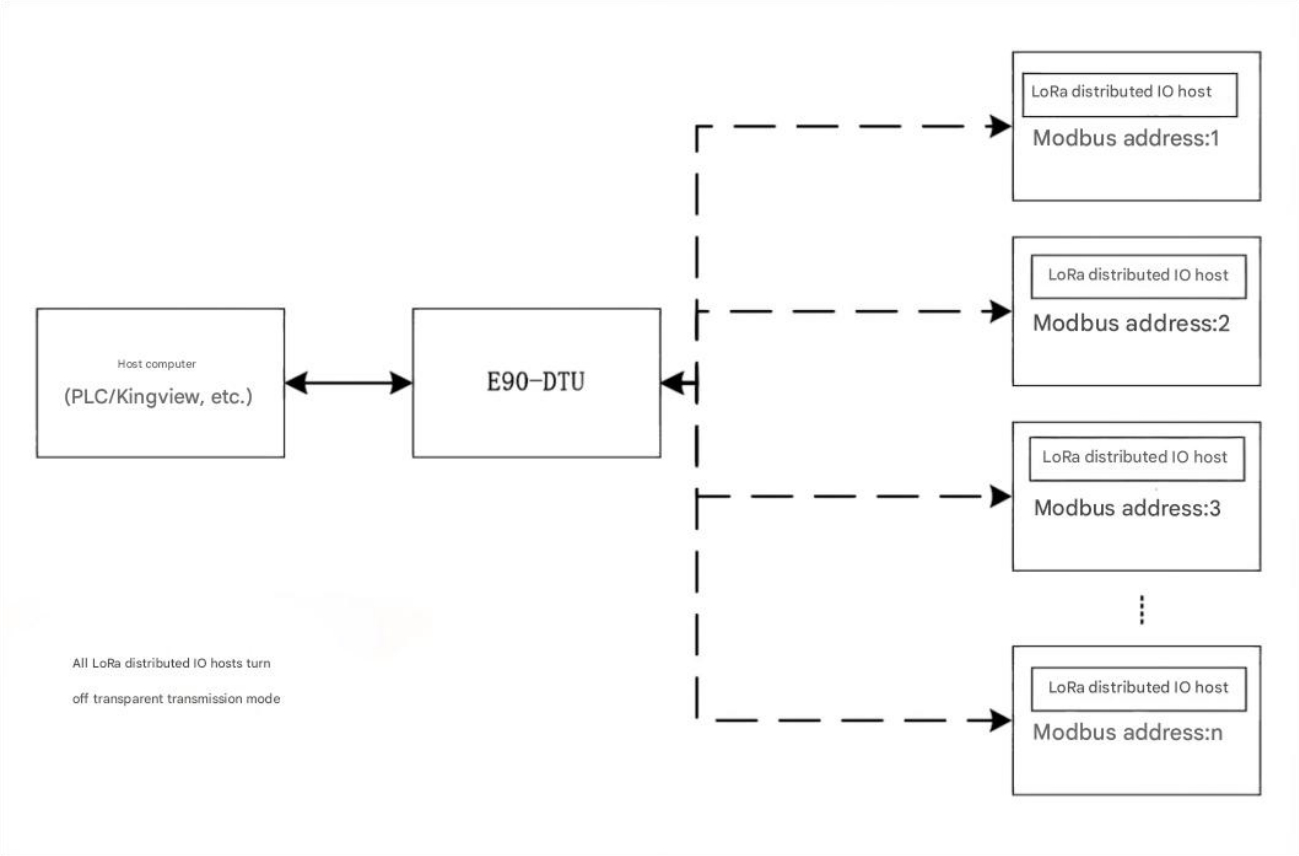


Diagram of using with E95-DTU

Transparent transmission

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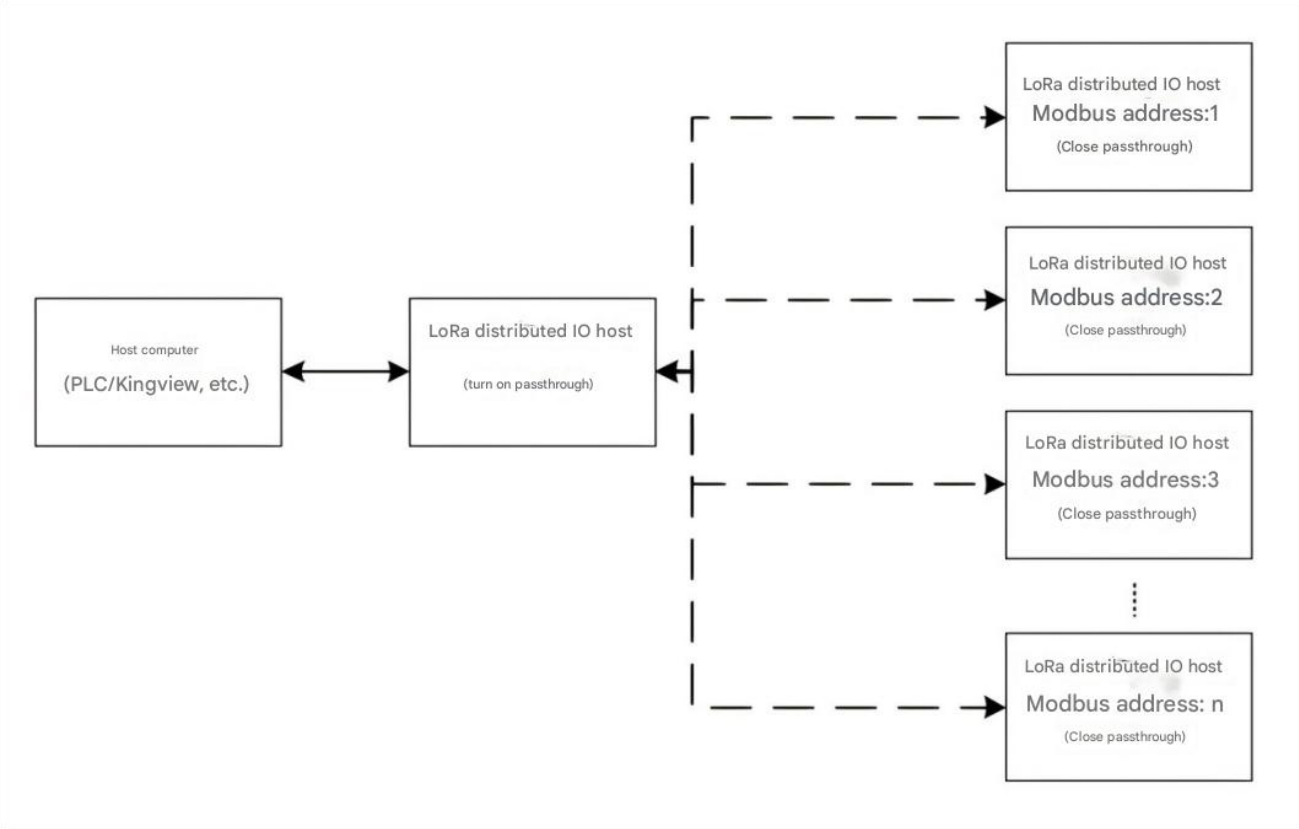


Diagram of using with transparent transmission

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2. Technical indicators

2.1. Product Model List

Product Model	DI (switch input)	DO (Relay output)	AI (Analog Input)	AO (Analog Output)	Operating frequency
M31-AXXX8000G-L	8	—	—	—	410.125 ~ 493.125MHz
M31-XAXX0800G-L	—	—	8	—	410.125 ~ 493.125MHz
M31-XXAX0080G-L	—	8	—	—	410.125 ~ 493.125MHz
M31-XXXA0008G-L	—	—	—	8	410.125 ~ 493.125MHz
M31-AAAX4440G-L	4	4	4	—	410.125 ~ 493.125MHz
M31-XAXA0404G-L	—	—	4	4	410.125 ~ 493.125MHz
M31-AXAX8080G-L	8	8	—	—	410.125 ~ 493.125MHz
M31-AAAX4440G-L9	4	4	4	—	850.125 ~ 930.125MHz
M31-XAXA0404G-L9	—	—	4	4	850.125 ~ 930.125MHz
M31-AXAX8080G-L9	8	8	—	—	850.125 ~ 930.125MHz

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2.2. Specifications

category	name	parameter
power supply	Operating voltage	DC 9 ~ 36 V
	Power indicator	PWR red LED indicator
Wireless parameters	M31- XXXXXXXX G-L operating frequency band	410.125-493.125MHz
	M31- XXXXXXXX G-L9	850.125 ~ 930.125MHz
	Transmit power	30dBm (maximum power about 1W)
	Transmission distance	10km (clear and open environment, maximum power, antenna gain 5 dBi, height 2m)
	M31- XXXXXXXX G-L channel	23 (0-83 software configurable)
	M31- XXXXXXXX G-L 9 channels	18 (0-80 software configurable)
	airspeed	2.4k-62.5k (6 airspeed options)
	Subcontractor length	240Bytes
	Antenna Options	SMA antenna base (external screw and internal hole)
communication	Communication interface	LoRa, RS485 , RJ45
	Baud rate	2400-230400 (8 baud rates available)
	Communication Protocol	LoRa: Standard Modbus RTU protocol RS485: Standard Modbus RTU protocol Ethernet: Standard Modbus TCP protocol
MODBUS	Device Address	be modified by software and hardware DIP switches
D I Input	Input Type	NPN, PNP
	Input voltage	12~24V
	Input Impedance	7.2kΩ
	Collection frequency	Max 1K Hz
	Input Instructions	DI green LED indicator
AI Input	Acquisition characteristics	Single-ended input/differential input (optional)
	Input Type	Single-ended current: 0-20mA, 4-20mA Differential current: 0-20mA, 4-20mA, ±20mA Differential voltage: 0-5V, ±5V, 0-10V, ±10V
	AI Resolution	16 bits (differential) / 12 bits (single-ended)
	AI Precision	1‰(differential)/3‰(single-ended)
	Collection frequency	Single-ended maximum 100Hz/differential maximum 40Hz
	Input instructions	AI green LED indicator
DO Output	DO output type	Type A relay (normally open)

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	DO output mode	Level output
	Relay contact capacity	5A 30V DC , 5A 250V AC (the total current of the same COM common terminal supports a maximum of 8A)
	Output indication	DO green LED indicator
A O Output	Output Type	0-20mA, 4-20mA
	A O output accuracy	3‰
	Input instructions	AO green LED indicator
other	Product size	1 10 mm * 40 mm * 100 mm (length * width * height)
	Working temperature and humidity	-40 ~ +85℃, 5% ~ 95%RH (no condensation)
	Storage temperature and humidity	-40 ~ +105℃, 5% ~ 95%RH (no condensation)
	Installation	Positioning holes and guide rail installation

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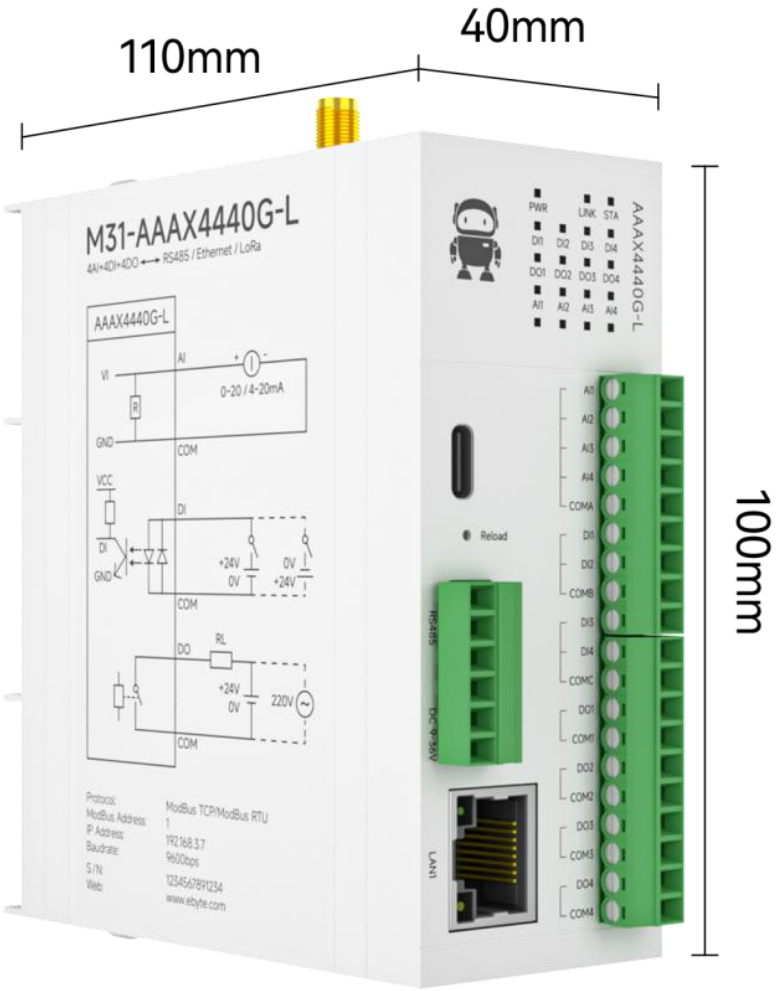
2.3. Device default parameters

category	name	parameter
Wireless parameters	airspeed	2.4K
	M31-XXXXXXXXG-L channel	twenty three
	M31-XXXXXXXXG-L9 channel	18
	Module address	0
	Network ID	0
	Subcontractor length	240Bytes
	Transparent mode	closure
Basic parameters	Modbus software address	1
	Modbus Hardware Address	0
	Baud rate	9600bps
	Check digit	None
	Data bits	8
	Stop bits	1
Network parameters	Working Mode	TCP Server
	DHCP	closure
	Gateway Address	192.168.3.1
	Subnet Mask	255.255.255.0
	Local IP	192.168.3.7
	Local port	502
	Target IP	192.168.3.3
	Destination Port	502
	DNS Server	114.114.114.114

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2.4. Dimensions



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2.5. Ports, buttons and LED indicators

2.5.1. M31-AXXX8000G-L

M31-AXXX8000G-L port and button description:		
Interface	name	Function
DI1	DI1 switch input	DI1 switch input interface, used with COM1
COM1	COM terminal of DI1	COM terminal of DI1
DI2	DI2 switch input	DI2 switch input interface, used with COM2
COM2	COM port of DI2	COM2 port of DI2
DI3	DI3 switch input	DI3 switch input interface, used with COM3
COM3	COM port of DI3	COM port of DI3
DI4	DI4 switch input	DI4 switch input interface, used with COM4
COM4	COM port of DI4	COM port of DI4
DI5	DI5 switch input	DI1 switch input interface, used with COM5
COM5	COM port of DI5	COM port of DI5
DI6	DI6 switch input	DI6 switch input interface, used with COM6
COM6	COM port of DI6	COM port of DI6
DI7	DI7 switch input	DI7 switch input interface, used with COM7
COM7	COM port of DI7	COM port of DI7
DI8	DI8 switch input	DI8 switch input interface, used with COM8
COM8	COM port of DI8	COM port of DI8
VO+	Power output positive	The positive pole of the power output is consistent with the power supply voltage of the device
VO+	Power output positive	The positive pole of the power output is consistent with the power supply voltage of the device
VO-	Power output negative pole	The negative pole of the power output is consistent with the power supply voltage of the device
Reload	Factory Reset/Auto Negotiation	Press and hold for 5-10 seconds to restore factory settings; double-click within 2 seconds to automatically negotiate expansion modules
A(RS485)	RS485 A interface	RS485 A interface
B(RS485)	RS485 B interface	RS485 B interface
G(RS485)	RS485 G interface	RS485 G interface
PE	Grounding	Grounding
V- (DC9 ~ 36V)	Negative pole of power supply	DC (9~36V) power negative terminal interface
V+ (DC9 ~ 36V)	Positive power supply	DC (9-36V) power positive terminal interface
LAN1	Network port	Standard RJ45 network cable interface
ANT	Antenna interface	External thread inner hole, length 10mm, characteristic impedance 50Ω

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M31-AXXX8000G-L LED indicator description:		
Interface	name	Function
PWR	Power indicator	Red LED light; on: system power supply is normal; off: system power supply is abnormal
LINK	Link indicator	Yellow LED light; on: there is a link; off: there is no link; flashes quickly when there is data exchange
STA	Status indicator	Blue LED light; flashing alternately indicates normal operation; constant on or off indicates abnormal device status
DI1	DI1 input indicator	Green LED light; on: DI1 valid input; off: DI1 invalid input
DI2	DI2 input indicator	Green LED light; on: DI2 valid input; off: DI2 invalid input
DI3	DI3 input indicator	Green LED light; on: DI3 valid input; off: DI3 invalid input
DI4	DI4 input indicator	Green LED light; on: DI4 valid input; off: DI4 invalid input
DI5	DI5 input indicator	Green LED light; on: DI5 valid input; off: DI5 invalid input
DI6	DI6 input indicator	Green LED light; on: DI6 valid input; off: DI6 invalid input
DI7	DI7 input indicator	Green LED light; on: DI7 valid input; off: DI7 invalid input
DI8	DI8 input indicator	Green LED light; on: DI8 valid input; off: DI8 invalid input

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2.5.2. M31-XAXX0800G-L

M31-XAXX0800G-L port and button description:		
Interface	name	Function
AI1	AI1 analog input	AI1 analog input interface, used with COM1
COM1	AI1 analog input ground	AI1 analog input ground interface
AI2	AI2 analog input	AI2 analog input interface, used with COM2
COM2	AI2 analog input ground	AI2 analog input ground interface
AI3	AI3 analog input	AI3 analog input interface, used with COM3
COM3	AI3 analog input ground	AI3 analog input ground interface
AI4	AI4 analog input	AI4 analog input interface, used with COM4
COM4	AI4 analog input ground	AI4 analog input ground interface
AI5	AI5 analog input	AI5 analog input interface, used with COM5
COM5	AI5 analog input ground	AI5 analog input ground interface
AI6	AI6 analog input	AI6 analog input interface, used with COM6
COM6	AI6 analog input ground	AI6 analog input ground interface
AI7	AI7 analog input	AI7 analog input interface, used with COM7
COM7	AI7 analog input ground	AI7 analog input ground interface
AI8	AI8 analog input	AI8 analog input interface, used with COM8
COM8	AI8 analog input ground	AI8 analog input ground interface
VO+	Power output positive	The positive pole of the power output is consistent with the power supply voltage of the device
VO+	Power output positive	The positive pole of the power output is consistent with the power supply voltage of the device
VO-	Power output negative pole	The negative pole of the power output is consistent with the power supply voltage of the device
Reload	Factory Reset/Auto Negotiation	Press and hold for 5-10 seconds to restore factory settings; double-click within 2 seconds to automatically negotiate expansion modules
A(RS485)	RS485 A interface	RS485 A interface
B(RS485)	RS485 B interface	RS485 B interface
G(RS485)	RS485 G interface	RS485 G interface
PE	Grounding	Grounding
V- (DC9 ~ 36V)	Negative pole of power supply	DC (9~36V) power negative terminal interface
V+ (DC9 ~ 36V)	Positive power supply	DC (9-36V) power positive terminal interface
LAN1	Network port	Standard RJ45 network cable interface
ANT	Antenna interface	External thread inner hole, length 10mm, characteristic impedance 50Ω

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M31-XAXX0800G-L indicator light description:		
Interface	name	Function
PWR	Power indicator	Red LED light; on: system power supply is normal; off: system power supply is abnormal
LINK	Link indicator	Yellow LED light; on: there is a link; off: there is no link; flashes quickly when there is data exchange
STA	Status indicator	Blue LED light; flashing alternately indicates normal operation; constant on or off indicates abnormal device status
AI1	AI1 input indicator	Green LED light; On: Normal input reaches 1% or more of the range; Off: No effective access; Fast flashing: Exceeds the range by 10%
AI2	AI2 input indicator	Green LED light; On: Normal input reaches 1% or more of the range; Off: No effective access; Fast flashing: Exceeds the range by 10%
AI3	AI3 input indicator	Green LED light; On: Normal input reaches 1% or more of the range; Off: No effective access; Fast flashing: Exceeds the range by 10%
AI4	AI4 input indicator	Green LED light; On: Normal input reaches 1% or more of the range; Off: No effective access; Fast flashing: Exceeds the range by 10%
AI5	AI5 input indicator	Green LED light; On: Normal input reaches 1% or more of the range; Off: No effective access; Fast flashing: Exceeds the range by 10%
AI6	AI6 input indicator	Green LED light; On: Normal input reaches 1% or more of the range; Off: No effective access; Fast flashing: Exceeds the range by 10%
AI7	AI7 input indicator	Green LED light; On: Normal input reaches 1% or more of the range; Off: No effective access; Fast flashing: Exceeds the range by 10%
AI8	AI8 input indicator	Green LED light; On: Normal input reaches 1% or more of the range; Off: No effective access; Fast flashing: Exceeds the range by 10%

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2.5.3. M31-XXAX0080G-L

M31-XXAX0080G-L Port and button description:		
Interface	name	Function
DO1	DO1 switch output	DO1 switch output interface, used with COM1
COM1	COM port of DO1	COM port of DO1
DO2	DO2 switch output	DO2 switch output interface, used with COM2
COM2	COM port of DO2	COM port of DO2
DO3	DO3 switch output	DO3 switch output interface, used with COM3
COM3	COM port of DO3	COM port of DO3
DO4	DO4 switch output	DO4 switch output interface, used with COM4
COM4	COM port of DO4	COM port of DO4
DO5	DO5 switch output	DO5 switch output interface, used with COM5
COM5	COM port of DO5	COM port of DO5
DO6	DO6 switch output	DO6 switch output interface, used with COM6
COM6	COM port of DO6	COM port of DO6
DO7	DO7 switch output	DO7 switch output interface, used with COM7
COM7	COM port of DO7	COM port of DO7
DO8	DO8 switch output	DO8 switch output interface, used with COM8
COM8	COM port of DO8	COM port of DO8
VO+	Power output positive	The positive pole of the power output is consistent with the power supply voltage of the device
VO+	Power output positive	The positive pole of the power output is consistent with the power supply voltage of the device
VO-	Power output negative pole	The negative pole of the power output is consistent with the power supply voltage of the device
Reload	Factory Reset/Auto Negotiation	Press and hold for 5-10 seconds to restore factory settings; double-click within 2 seconds to automatically negotiate expansion modules
A(RS485)	RS485 A interface	RS485 A interface
B(RS485)	RS485 B interface	RS485 B interface
G(RS485)	RS485 G interface	RS485 G interface
PE	Grounding	Grounding
V- (DC9 ~ 36V)	Negative pole of power supply	DC (9~36V) power negative terminal interface
V+ (DC9 ~ 36V)	Positive power supply	DC (9-36V) power positive terminal interface
LAN1	Network port	Standard RJ45 network cable interface
ANT	Antenna interface	External thread inner hole, length 10mm, characteristic impedance 50Ω

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M31-XXAX0080G-L indicator light description:		
Interface	name	Function
PWR	Power indicator	Red LED light; on: system power supply is normal; off: system power supply is abnormal
LINK	Link indicator	Yellow LED light; on: there is a link; off: there is no link; flashes quickly when there is data exchange
STA	Status indicator	Blue LED light; flashing alternately indicates normal operation; constant on or off indicates abnormal device status
DO1	DO1 output indicator	Green LED light ; on: DO1 relay closed; off: DO1 relay open
DO2	DO2 output indicator	Green LED light; on: DO2 relay closed; off: DO2 relay open
DO3	DO3 output indicator	Green LED light; on: DO3 relay closed; off: DO3 relay disconnected
DO4	DO4 output indicator	Green LED light; on: DO4 relay closed; off: DO4 relay disconnected
DO5	DO5 output indicator	Green LED light; on: DO5 relay closed; off: DO5 relay open
DO6	DO6 output indicator	Green LED light; on: DO6 relay closed; off: DO6 relay open
DO7	DO7 output indicator	Green LED light; on: DO7 relay closed; off: DO7 relay open
DO8	DO8 output indicator	Green LED light; on: DO8 relay closed; off: DO8 relay disconnected

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2.5.4. M31-XXXA0008G-L

M31-XXXA0008G-L Port and button description:		
Interface	name	Function
AO1	AO1 analog output (positive)	AO1 analog output (positive) interface, used with GND1
GND1	AO1 analog output (negative)	AO1 analog output (negative) interface
AO2	AO2 analog output (positive)	AO2 analog output interface, used with GND2
GND2	AO2 analog output (negative)	AO2 analog output (negative) interface
AO3	AO3 analog output (positive)	AO3 analog output interface, used with GND3
GND3	AO3 analog output (negative)	AO3 analog output (negative) interface
AO4	AO4 analog output (positive)	AO4 analog output interface, used with GND4
GND4	AO4 analog output (negative)	AO4 analog output (negative) interface
AO5	AO5 analog output (positive)	AO5 analog output (positive) interface, used with GND5
GND5	AO5 analog output (negative)	AO5 analog output (negative) interface
AO6	AO6 analog output (positive)	AO6 analog output interface, used with GND6
GND6	AO6 analog output (negative)	AO6 analog output (negative) interface
AO7	AO7 analog output (positive)	AO7 analog output interface, used with GND7
GND7	AO7 analog output (negative)	AO7 analog output (negative) interface
AO8	AO8 analog output (positive)	AO8 analog output interface, used with GND8
GND8	AO8 analog output (negative)	AO8 analog output (negative) interface
VO+	Power output positive	The positive pole of the power output is consistent with the power supply voltage of the device
VO+	Power output positive	The positive pole of the power output is consistent with the power supply voltage of the device
VO-	Power output negative pole	The negative pole of the power output is consistent with the power supply voltage of the device
Reload	Factory Reset/Auto Negotiation	Press and hold for 5-10 seconds to restore factory settings; double-click within 2 seconds to automatically negotiate expansion modules
A(RS485)	RS485 A interface	RS485 A interface
B(RS485)	RS485 B interface	RS485 B interface
G(RS485)	RS485 G interface	RS485 G interface
PE	Grounding	Grounding
V- (DC9 ~ 36V)	Negative pole of power supply	DC (9~36V) power negative terminal interface
V+ (DC9 ~ 36V)	Positive power supply	DC (9-36V) power positive terminal interface
LAN1	Network port	Standard RJ45 network cable interface
ANT	Antenna interface	External thread inner hole, length 10mm, characteristic impedance 50Ω

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M31-XXXA0008G-L indicator light description:		
Interface	name	Function
PWR	Power indicator	Red LED light; on: system power supply is normal; off: system power supply is abnormal
LINK	Link indicator	Yellow LED light; on: there is a link; off: there is no link; flashes quickly when there is data exchange
STA	Status indicator	Blue LED light; flashing alternately indicates normal operation; constant on or off indicates abnormal device status
AO1	AO1 output indicator	Green LED light : On: Normal output reaches 1% of the range or above; Off: Less than 1% of the range;
AO2	AO2 output indicator	Green LED light: On: Normal output reaches 1% of the range or above; Off: Less than 1% of the range;
AO3	AO3 output indicator	Green LED light: On: Normal output reaches 1% of the range or above; Off: Less than 1% of the range;
AO4	AO4 output indicator	Green LED light: On: Normal output reaches 1% of the range or above; Off: Less than 1% of the range;
AO5	AO5 output indicator	Green LED light: On: Normal output reaches 1% of the range or above; Off: Less than 1% of the range;
AO6	AO6 output indicator	Green LED light: On: Normal output reaches 1% or above of the range; Off: Less than 1% of the range;
AO7	AO7 output indicator	Green LED light: On: Normal output reaches 1% of the range or above; Off: Less than 1% of the range;
AO8	AO8 output indicator	Green LED light: On: Normal output reaches 1% of the range or above; Off: Less than 1% of the range;

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2.5.5. M31-AAAX4440G-L

M31-AAAX4440G-L port and button description:		
Interface	name	Function
AI1	AI1 analog input	AI1 analog input interface, used with COMA
AI2	AI2 analog input	AI2 analog input interface, used with COMA
AI3	AI3 analog input	AI3 analog input interface, used with COMA
AI4	AI4 analog input	AI4 analog input interface, used with COMA
COMA	AI analog input common terminal	AI1-AI4 share the COMA common port
DI1	DI1 switch input	DI1 switch input interface, used with COMB
DI2	DI2 switch input	DI2 switch input interface, used with COMB
COMB	DI switch input common terminal	DI1-DI2 share COMB common terminal
DI3	DI3 switch input	DI3 switch input interface, used with COMC
DI4	DI4 switch input	DI4 switch input interface, used with COMC
COMC	DI switch input common terminal	DI3-DI4 share COMC common terminal
DO1	DO1 switch output	DO1 switch output interface, used with COM1
COM1	COM port of DO1	COM port of DO1
DO2	DO2 switch output	DO2 switch output interface, used with COM2
COM	COM port of DO2	COM port of DO2
DO3	DO3 switch output	DO3 switch output interface, used with COM3
COM3	COM port of DO3	COM port of DO3
DO4	DO4 switch output	DO4 switch output interface, used with COM4
COM4	COM port of DO4	COM port of DO4
Reload	Factory Reset/Auto Negotiation	Press and hold for 5-10 seconds to restore factory settings; double-click within 2 seconds to automatically negotiate expansion modules
A(RS485)	RS485 A interface	RS485 A interface
B(RS485)	RS485 B interface	RS485 B interface
G(RS485)	RS485 G interface	RS485 G interface
PE	Grounding	Grounding
V- (DC9 ~ 36V)	Negative pole of power supply	DC (9~36V) power negative terminal interface
V+ (DC9 ~ 36V)	Positive power supply	DC (9-36V) power positive terminal interface
LAN1	Network port	Standard RJ45 network cable interface
ANT	Antenna interface	External thread inner hole, length 10mm, characteristic impedance 50Ω

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M31-AAAX4440G-L indicator light description:		
Interface	name	Function
PWR	Power indicator	Red LED light; on: system power supply is normal; off: system power supply is abnormal
LINK	Link indicator	Yellow LED light; on: there is a link; off: there is no link; flashes quickly when there is data exchange
STA	Status indicator	Blue LED light; flashing alternately indicates normal operation; constant on or off indicates abnormal device status
DI1	DI1 input indicator	Green LED light; on: DI1 valid input; off: DI1 invalid input
DI2	DI2 input indicator	Green LED light; on: DI2 valid input; off: DI2 invalid input
DI3	DI3 input indicator	Green LED light; on: DI3 valid input; off: DI3 invalid input
DI4	DI4 input indicator	Green LED light; on: DI4 valid input; off: DI4 invalid input
DO1	DO1 output indicator	Green LED light; on: DO1 relay closed; off: DO1 relay open
DO2	DO2 output indicator	Green LED light; on: DO2 relay closed; off: DO2 relay open
DO3	DO3 output indicator	Green LED light; on: DO3 relay closed; off: DO3 relay disconnected
DO4	DO4 output indicator	Green LED light; on: DO4 relay closed; off: DO4 relay disconnected
AI1	AI1 input indicator	Green LED light; On: Normal input reaches 1% or more of the range; Off: No effective access; Fast flashing: Exceeds the range by 10%
AI2	AI2 input indicator	Green LED light; On: Normal input reaches 1% or more of the range; Off: No effective access; Fast flashing: Exceeds the range by 10%
AI3	AI3 input indicator	Green LED light; On: Normal input reaches 1% or more of the range; Off: No effective access; Fast flashing: Exceeds the range by 10%
AI4	AI4 input indicator	Green LED light; On: Normal input reaches 1% or more of the range; Off: No effective access; Fast flashing: Exceeds the range by 10%

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2.5.6. M31-XAXA0404G-L

M31-XAXA0404G-L port and button description:		
Interface	name	Function
AI1	AI1 analog input	AI1 analog input interface, used with GND1
GND1	AI1 analog input ground	AI1 analog input ground interface
AI2	AI2 analog input	AI2 analog input interface, used with GND2
GND2	AI2 analog input ground	AI2 analog input ground interface
AI3	AI3 analog input	AI3 analog input interface, used with GND3
GND3	AI3 analog input ground	AI3 analog input ground interface
AI4	AI4 analog input	AI4 analog input interface, used with GND4
GND4	AI4 analog input ground	AI4 analog input ground interface
AO1	AO1 analog output (positive)	AO1 analog output (positive) interface, used with GND1
GND1	AO1 analog output (negative)	AO1 analog output (negative) interface
AO2	AO2 analog output (positive)	AO2 analog output interface, used with GND2
GND2	AO2 analog output (negative)	AO2 analog output (negative) interface
AO3	AO3 analog output (positive)	AO3 analog output interface, used with GND3
GND3	AO3 analog output (negative)	AO3 analog output (negative) interface
AO4	AO4 analog output (positive)	AO4 analog output interface, used with GND4
GND4	AO4 analog output (negative)	AO4 analog output (negative) interface
VO+	Power output positive	The positive pole of the power output is consistent with the power supply voltage of the device
VO+	Power output positive	The positive pole of the power output is consistent with the power supply voltage of the device
VO-	Power output negative pole	The negative pole of the power output is consistent with the power supply voltage of the device
Reload	Factory Reset/Auto Negotiation	Press and hold for 5-10 seconds to restore factory settings; double-click within 2 seconds to automatically negotiate expansion modules
A(RS485)	RS485 A interface	RS485 A interface
B(RS485)	RS485 B interface	RS485 B interface
G(RS485)	RS485 G interface	RS485 G interface
PE	Grounding	Grounding
V- (DC9 ~ 36V)	Negative pole of power supply	DC (9~36V) power negative terminal interface
V+ (DC9 ~ 36V)	Positive power supply	DC (9-36V) power positive terminal interface
LAN1	Network port	Standard RJ45 network cable interface
ANT	Antenna interface	External thread inner hole, length 10mm, characteristic impedance 50Ω

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M31-XAXA0404G-L indicator light description:		
Interface	name	Function
PWR	Power indicator	Red LED light; on: system power supply is normal; off: system power supply is abnormal
LINK	Link indicator	Yellow LED light; on: there is a link; off: there is no link; flashes quickly when there is data exchange
STA	Status indicator	Blue LED light; flashing alternately indicates normal operation; constant on or off indicates abnormal device status
AI1	AI1 input indicator	Green LED light; On: Normal input reaches 1% or more of the range; Off: No effective access; Fast flashing: Exceeds the range by 10%
AI2	AI2 input indicator	Green LED light; On: Normal input reaches 1% or more of the range; Off: No effective access; Fast flashing: Exceeds the range by 10%
AI3	AI3 input indicator	Green LED light; On: Normal input reaches 1% or more of the range; Off: No effective access; Fast flashing: Exceeds the range by 10%
AI4	AI4 input indicator	Green LED light; On: Normal input reaches 1% or more of the range; Off: No effective access; Fast flashing: Exceeds the range by 10%
AO1	AO1 output indicator	Green LED light: On: Normal output reaches 1% of the range or above; Off: Less than 1% of the range;
AO2	AO2 output indicator	Green LED light: On: Normal output reaches 1% or above of the range; Off: Less than 1% of the range;
AO3	AO3 output indicator	Green LED light: On: Normal output reaches 1% of the range or above; Off: Less than 1% of the range;
AO4	AO4 output indicator	Green LED light: On: Normal output reaches 1% of the range or above; Off: Less than 1% of the range;

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2.5.7. M31-AXAX8080G-L

M31-AXAX8080G-L port and button description:		
Interface	name	Function
DI1	DI1 switch input	DI1 switch input interface, used with COMA
DI2	DI2 switch input	DI2 switch input interface, used with COMA
DI3	DI3 switch input	DI3 switch input interface, used with COMA
DI4	DI4 switch input	DI4 switch input interface, used with COMA
COMA	DI switch input common terminal	DI1-DI4 share COMA common terminal
DI5	DI5 switch input	DI5 switch input interface, used with COMB
DI6	DI6 switch input	DI6 switch input interface, used with COMB
DI7	DI7 switch input	DI7 switch input interface, used with COMB
DI8	DI8 switch input	DI8 switch input interface, used with COMB
COMB	DI switch input common terminal	DI5-DI8 share COMB common terminal
DO1	DO1 switch output	DO1 switch output interface, used with COMC
DO2	DO2 switch output	DO2 switch output interface, used with COMC
DO3	DO3 switch output	DO3 switch output interface, used with COMC
DO4	DO4 switch output	DO4 switch output interface, used with COMC
DO5	DO5 switch output	DO5 switch output interface, used with COMC
DO6	DO6 switch output	DO6 switch output interface, used with COMC
DO7	DO7 switch output	DO7 switch output interface, used with COMC
DO8	DO8 switch output	DO8 switch output interface, used with COMC
COMC	COM port of DO	DO1-DO8 share COMC for use
Reload	Factory Reset/Auto Negotiation	Press and hold for 5-10 seconds to restore factory settings; double-click within 2 seconds to automatically negotiate expansion modules
A(RS485)	RS485 A interface	RS485 A interface
B(RS485)	RS485 B interface	RS485 B interface
G(RS485)	RS485 G interface	RS485 G interface
PE	Grounding	Grounding
V- (DC9 ~ 36V)	Negative pole of power supply	DC (9~36V) power negative terminal interface
V+ (DC9 ~ 36V)	Positive power supply	DC (9-36V) power positive terminal interface
LAN1	Network port	Standard RJ45 network cable interface
ANT	Antenna interface	External thread inner hole, length 10mm, characteristic impedance 50Ω

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M31-AXAX8080G-L indicator light description:		
Interface	name	Function
PWR	Power indicator	Red LED light; on: system power supply is normal; off: system power supply is abnormal
LINK	Link indicator	Yellow LED light; on: there is a link; off: there is no link; flashes quickly when there is data exchange
STA	Status indicator	Blue LED light; flashing alternately indicates normal operation; constant on or off indicates abnormal device status
DI1	DI1 input indicator	Green LED light; on: DI1 valid input; off: DI1 invalid input
DI2	DI2 input indicator	Green LED light; on: DI2 valid input; off: DI2 invalid input
DI3	DI3 input indicator	Green LED light; on: DI3 valid input; off: DI3 invalid input
DI4	DI4 input indicator	Green LED light; on: DI4 valid input; off: DI4 invalid input
DI5	DI5 input indicator	Green LED light; on: DI5 valid input; off: DI5 invalid input
DI6	DI6 input indicator	Green LED light; on: DI6 valid input; off: DI6 invalid input
DI7	DI7 input indicator	Green LED light; on: DI7 valid input; off: DI7 invalid input
DI8	DI8 input indicator	Green LED light; on: DI8 valid input; off: DI8 invalid input
DO1	DO1 output indicator	Green LED light; on: DO1 relay closed; off: DO1 relay open
DO2	DO2 output indicator	Green LED light; on: DO2 relay closed; off: DO2 relay open
DO3	DO3 output indicator	Green LED light; on: DO3 relay closed; off: DO3 relay disconnected
DO4	DO4 output indicator	Green LED light; on: DO4 relay closed; off: DO4 relay disconnected
DO5	DO5 output indicator	Green LED light; on: DO5 relay closed; off: DO5 relay open
DO6	DO6 output indicator	Green LED light; on: DO6 relay closed; off: DO6 relay disconnected
DO7	DO7 output indicator	Green LED light; on: DO7 relay closed; off: DO7 relay open
DO8	DO8 output indicator	Green LED light; on: DO8 relay closed; off: DO8 relay disconnected

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2.5.8. M31-AAAX4440G-L9

M31-AAAX4440G-L9 port and button description:		
Interface	name	Function
AI1	AI1 analog input	AI1 analog input interface, used with COMA
AI2	AI2 analog input	AI2 analog input interface, used with COMA
AI3	AI3 analog input	AI3 analog input interface, used with COMA
AI4	AI4 analog input	AI4 analog input interface, used with COMA
COMA	AI analog input common terminal	AI1-AI4 share the COMA common port
DI1	DI1 switch input	DI1 switch input interface, used with COMB
DI2	DI2 switch input	DI2 switch input interface, used with COMB
COMB	DI switch input common terminal	DI1-DI2 share COMB common terminal
DI3	DI3 switch input	DI3 switch input interface, used with COMC
DI4	DI4 switch input	DI4 switch input interface, used with COMC
COMC	DI switch input common terminal	DI3-DI4 share the common terminal COMC
DO1	DO1 switch output	DO1 switch output interface, used with COM1
COM1	COM port of DO1	COM port of DO1
DO2	DO2 switch output	DO2 switch output interface, used with COM2
COM	COM port of DO2	COM port of DO2
DO3	DO3 switch output	DO3 switch output interface, used with COM3
COM3	COM port of DO3	COM port of DO3
DO4	DO4 switch output	DO4 switch output interface, used with COM4
COM4	COM port of DO4	COM port of DO4
Reload	Factory Reset/Auto Negotiation	Press and hold for 5-10 seconds to restore factory settings; double-click within 2 seconds to automatically negotiate expansion modules
A(RS485)	RS485 A interface	RS485 A interface
B(RS485)	RS485 B interface	RS485 B interface
G(RS485)	RS485 G interface	RS485 G interface
PE	Grounding	Grounding
V- (DC9 ~ 36V)	Negative pole of power supply	DC (9~36V) power negative terminal interface
V+ (DC9 ~ 36V)	Positive power supply	DC (9-36V) power positive terminal interface
LAN1	Network port	Standard RJ45 network cable interface
ANT	Antenna interface	External thread inner hole, length 10mm, characteristic impedance 50Ω

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M31-AAAX4440G-L9 indicator light description:		
Interface	name	Function
PWR	Power indicator	Red LED light; on: system power supply is normal; off: system power supply is abnormal
LINK	Link indicator	Yellow LED light; on: there is a link; off: there is no link; flashes quickly when there is data exchange
STA	Status indicator	Blue LED light; flashing alternately indicates normal operation; constant on or off indicates abnormal device status
DI1	DI1 input indicator	Green LED light; on: DI1 valid input; off: DI1 invalid input
DI2	DI2 input indicator	Green LED light; on: DI2 valid input; off: DI2 invalid input
DI3	DI3 input indicator	Green LED light; on: DI3 valid input; off: DI3 invalid input
DI4	DI4 input indicator	Green LED light; on: DI4 valid input; off: DI4 invalid input
DO1	DO1 output indicator	Green LED light; on: DO1 relay closed; off: DO1 relay open
DO2	DO2 output indicator	Green LED light; on: DO2 relay closed; off: DO2 relay open
DO3	DO3 output indicator	Green LED light; on: DO3 relay closed; off: DO3 relay disconnected
DO4	DO4 output indicator	Green LED light; on: DO4 relay closed; off: DO4 relay disconnected
AI1	AI1 input indicator	Green LED light; On: Normal input reaches 1% or more of the range; Off: No effective access; Fast flashing: Exceeds the range by 10%
AI2	AI2 input indicator	Green LED light; On: Normal input reaches 1% or more of the range; Off: No effective access; Fast flashing: Exceeds the range by 10%
AI3	AI3 input indicator	Green LED light; On: Normal input reaches 1% or more of the range; Off: No effective access; Fast flashing: Exceeds the range by 10%
AI4	AI4 input indicator	Green LED light; On: Normal input reaches 1% or more of the range; Off: No effective access; Fast flashing: Exceeds the range by 10%

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2.5.9. M31-XAXA0404G-L9

M31-XAXA0404G-L9 port and button description:		
Interface	name	Function
AI1	AI1 analog input	AI1 analog input interface, used with GND1
GND1	AI1 analog input ground	AI1 analog input ground interface
AI2	AI2 analog input	AI2 analog input interface, used with GND2
GND2	AI2 analog input ground	AI2 analog input ground interface
AI3	AI3 analog input	AI3 analog input interface, used with GND3
GND3	AI3 analog input ground	AI3 analog input ground interface
AI4	AI4 analog input	AI4 analog input interface, used with GND4
GND4	AI4 analog input ground	AI4 analog input ground interface
AO1	AO1 analog output (positive)	AO1 analog output (positive) interface, used with GND1
GND1	AO1 analog output (negative)	AO1 analog output (negative) interface
AO2	AO2 analog output (positive)	AO2 analog output interface, used with GND2
GND2	AO2 analog output (negative)	AO2 analog output (negative) interface
AO3	AO3 analog output (positive)	AO3 analog output interface, used with GND3
GND3	AO3 analog output (negative)	AO3 analog output (negative) interface
AO4	AO4 analog output (positive)	AO4 analog output interface, used with GND4
GND4	AO4 analog output (negative)	AO4 analog output (negative) interface
VO+	Power output positive	The positive pole of the power output is consistent with the power supply voltage of the device
VO+	Power output positive	The positive pole of the power output is consistent with the power supply voltage of the device
VO-	Power output negative pole	The negative pole of the power output is consistent with the power supply voltage of the device
Reload	Factory Reset/Auto Negotiation	Press and hold for 5-10 seconds to restore factory settings; double-click within 2 seconds to automatically negotiate expansion modules
A(RS485)	RS485 A interface	RS485 A interface
B(RS485)	RS485 B interface	RS485 B interface
G(RS485)	RS485 G interface	RS485 G interface
PE	Grounding	Grounding
V- (DC9-36V)	Negative pole of power supply	DC (9~36V) power negative terminal interface
V+ (DC9-36V)	Positive power supply	DC (9-36V) power positive terminal interface
LAN1	Network port	Standard RJ45 network cable interface
ANT	Antenna interface	External thread inner hole, length 10mm, characteristic impedance 50Ω

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M31-XAXA0404G-L9 indicator light description:		
Interface	name	Function
PWR	Power indicator	Red LED light; on: system power supply is normal; off: system power supply is abnormal
LINK	Link indicator	Yellow LED light; on: there is a link; off: there is no link; flashes quickly when there is data exchange
STA	Status indicator	Blue LED light; flashing alternately indicates normal operation; constant on or off indicates abnormal device status
AI1	AI1 input indicator	Green LED light; On: Normal input reaches 1% or more of the range; Off: No effective access; Fast flashing: Exceeds the range by 10%
AI2	AI2 input indicator	Green LED light; On: Normal input reaches 1% or more of the range; Off: No effective access; Fast flashing: Exceeds the range by 10%
AI3	AI3 input indicator	Green LED light; On: Normal input reaches 1% or more of the range; Off: No effective access; Fast flashing: Exceeds the range by 10%
AI4	AI4 input indicator	Green LED light; On: Normal input reaches 1% or more of the range; Off: No effective access; Fast flashing: Exceeds the range by 10%
AO1	AO1 output indicator	Green LED light: On: Normal output reaches 1% of the range or above; Off: Less than 1% of the range;
AO2	AO2 output indicator	Green LED light: On: Normal output reaches 1% of the range or above; Off: Less than 1% of the range;
AO3	AO3 output indicator	Green LED light: On: Normal output reaches 1% of the range or above; Off: Less than 1% of the range;
AO4	AO4 output indicator	Green LED light: On: Normal output reaches 1% of the range or above; Off: Less than 1% of the range;

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2.5.10. M31-AXAX8080G-L9

M31-AXAX8080G-L9 port and button description:		
Interface	name	Function
DI1	DI1 switch input	DI1 switch input interface, used with COMA
DI2	DI2 switch input	DI2 switch input interface, used with COMA
DI3	DI3 switch input	DI3 switch input interface, used with COMA
DI4	DI4 switch input	DI4 switch input interface, used with COMA
COMA	DI switch input common terminal	DI1-DI4 share COMA common terminal
DI5	DI5 switch input	DI5 switch input interface, used with COMB
DI6	DI6 switch input	DI6 switch input interface, used with COMB
DI7	DI7 switch input	DI7 switch input interface, used with COMB
DI8	DI8 switch input	DI8 switch input interface, used with COMB
COMB	DI switch input common terminal	DI5-DI8 share COMB common terminal
DO1	DO1 switch output	DO1 switch output interface, used with COMC
DO2	DO2 switch output	DO2 switch output interface, used with COMC
DO3	DO3 switch output	DO3 switch output interface, used with COMC
DO4	DO4 switch output	DO4 switch output interface, used with COMC
DO5	DO5 switch output	DO5 switch output interface, used with COMC
DO6	DO6 switch output	DO6 switch output interface, used with COMC
DO7	DO7 switch output	DO7 switch output interface, used with COMC
DO8	DO8 switch output	DO8 switch output interface, used with COMC
COMC	COM port of DO	DO1-DO8 share COMC for use
Reload	Factory Reset/Auto Negotiation	Press and hold for 5-10 seconds to restore factory settings; double-click within 2 seconds to automatically negotiate expansion modules
A(RS485)	RS485 A interface	RS485 A interface
B(RS485)	RS485 B interface	RS485 B interface
G(RS485)	RS485 G interface	RS485 G interface
PE	Grounding	Grounding
V- (DC9 ~ 36V)	Negative pole of power supply	DC (9~36V) power negative terminal interface
V+ (DC9 ~ 36V)	Positive power supply	DC (9-36V) power positive terminal interface
LAN1	Network port	Standard RJ45 network cable interface
ANT	Antenna interface	External thread inner hole, length 10mm, characteristic impedance 50Ω

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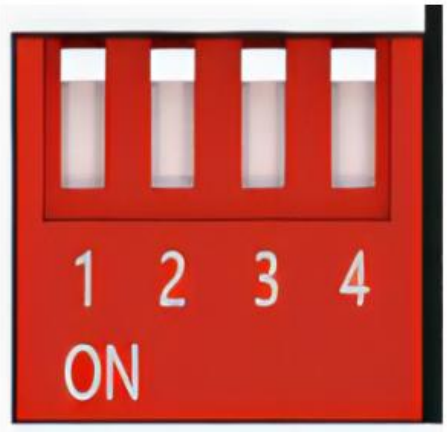
M31-AXAX8080G-L9 indicator light description:		
Interface	name	Function
PWR	Power indicator	Red LED light; on: system power supply is normal; off: system power supply is abnormal
LINK	Link indicator	Yellow LED light; on: there is a link; off: there is no link; flashes quickly when there is data exchange
STA	Status indicator	Blue LED light; flashing alternately indicates normal operation; constant on or off indicates abnormal device status
DI1	DI1 input indicator	Green LED light; on: DI1 valid input; off: DI1 invalid input
DI2	DI2 input indicator	Green LED light; on: DI2 valid input; off: DI2 invalid input
DI3	DI3 input indicator	Green LED light; on: DI3 valid input; off: DI3 invalid input
DI4	DI4 input indicator	Green LED light; on: DI4 valid input; off: DI4 invalid input
DI5	DI5 input indicator	Green LED light; on: DI5 valid input; off: DI5 invalid input
DI6	DI6 input indicator	Green LED light; on: DI6 valid input; off: DI6 invalid input
DI7	DI7 input indicator	Green LED light; on: DI7 valid input; off: DI7 invalid input
DI8	DI8 input indicator	Green LED light; on: DI8 valid input; off: DI8 invalid input
DO1	DO1 output indicator	Green LED light; on: DO1 relay closed; off: DO1 relay open
DO2	DO2 output indicator	Green LED light; on: DO2 relay closed; off: DO2 relay open
DO3	DO3 output indicator	Green LED light; on: DO3 relay closed; off: DO3 relay disconnected
DO4	DO4 output indicator	Green LED light; on: DO4 relay closed; off: DO4 relay open
DO5	DO5 output indicator	Green LED light; on: DO5 relay closed; off: DO5 relay open
DO6	DO6 output indicator	Green LED light; on: DO6 relay closed; off: DO6 relay open
DO7	DO7 output indicator	Green LED light; on: DO7 relay closed; off: DO7 relay open
DO8	DO8 output indicator	Green LED light; on: DO8 relay closed; off: DO8 relay disconnected

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2.6. DIP switch

Diagram of DIP switch:



Device address composition: hardware address + software offset address
The default device address is: 1 (hardware address 0 + software address 1 = device address 1).
Device address setting range: 1 to 255.
Hardware address: It adopts binary form and is realized by the DIP switch (4 bits) (factory default is 0); for example: if DIP switches 1, 2, and 3 are set to ON, it means that the hardware address is 1+2+4=7, and the adjustment range of the hardware address is (0-15).
Software address: This is achieved by setting the “offset address” in the configuration tool software (factory default is 1).
For example: If the hardware address is set to 5 and the software address is set to 113, the device address is 118 (the maximum setting value of the software address is 240, and the value exceeding 240 will not take effect if saved).

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3. Quick Use

Note: Taking 410.125~493.125MHz devices as an example, the wireless frequency band of LoRa distributed IO needs to be consistent with the wireless frequency band of the data transmission radio!

3.1. Remote Control via Lora Wireless

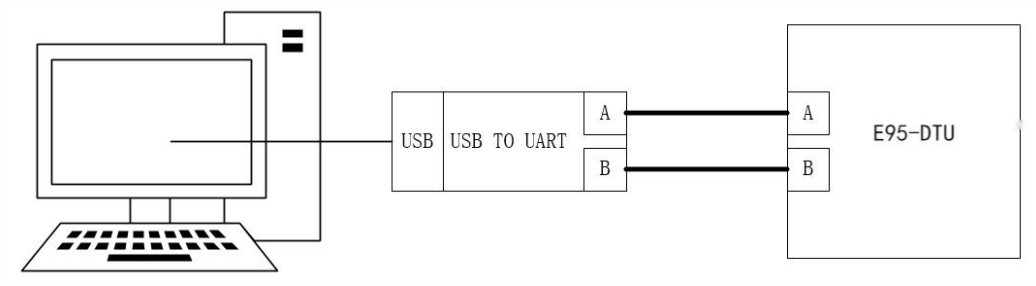
3.1.1. Equipment preparation

For connection testing we need to prepare the following equipment:

Device	Quantity
USB to RS485 Module	1
LoRa distributed IO host series (Using M31-AXAX8080G-L)	1
Lora DTU(Using E95 -DTU(400SL30))	1
Power adapter 12V 1A DC	2

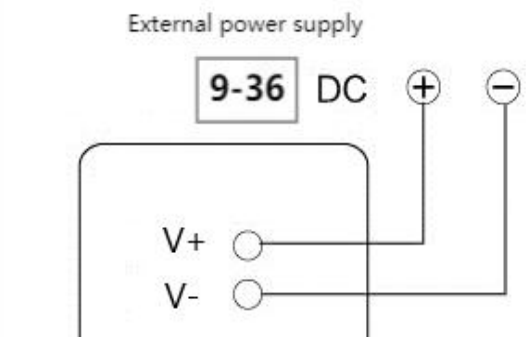
3.1.2. Device Connection

E95 -DTU uses USB to RS485 to connect to the computer.



Schematic diagram of connecting radio to computer

The LoRa distributed IO host series only needs to connect the power line



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LoRa distributed IO host series connection diagram

3.1.3. Parameter configuration

the LoRa distributed IO host series maintains the following status:



Factory default state (Modbus hardware address is 0)

【Note】: The parameters of this test software adopt the factory default parameters.

When the LoRa distributed IO host series is networked with the E95 radio , the following parameters must be consistent :

project	value
Baud rate	9600
Parity	8N1
airspeed	2.4k
Sub-contract length	240Bytes
Channel	twenty three
Module Address	0
Network ID	0

the LoRa distributed IO host series and the E95 -DTU data transmission radio can use the factory default parameters .

To ensure successful communication, it is necessary to check whether the dip switches of the LoRa distributed IO host series are in the factory state, as shown in the figure.



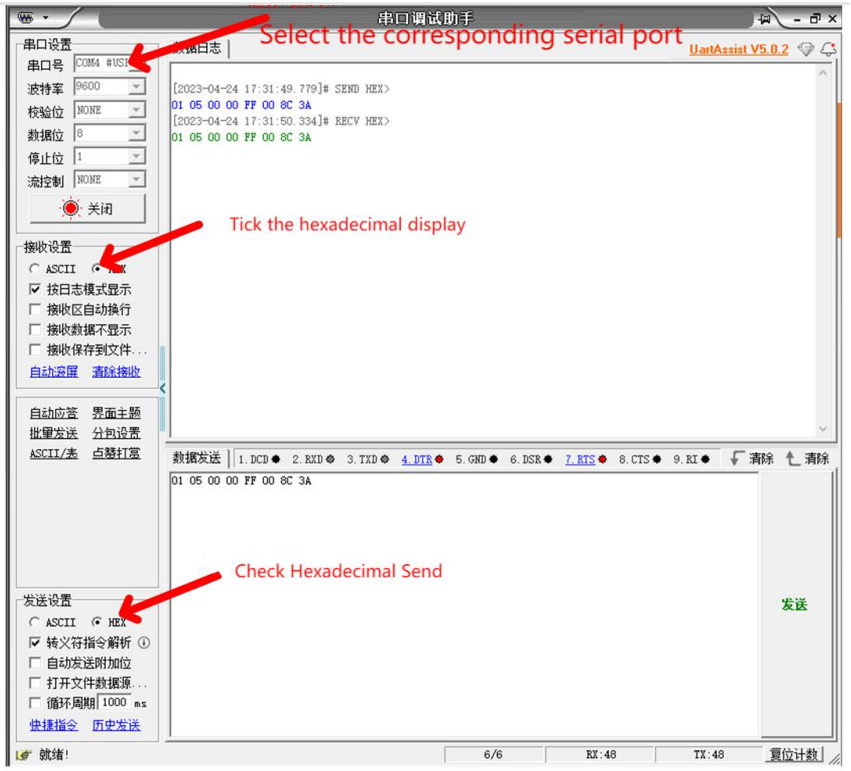
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Factory status of DIP switch

3.1.4. Control Testing

Open the serial port to connect to E95 -DTU, select the corresponding baud rate parameters, select hexadecimal transmission, and cancel automatic line wrap, as shown in the figure. (**UartAssist Download.for testing only.)**

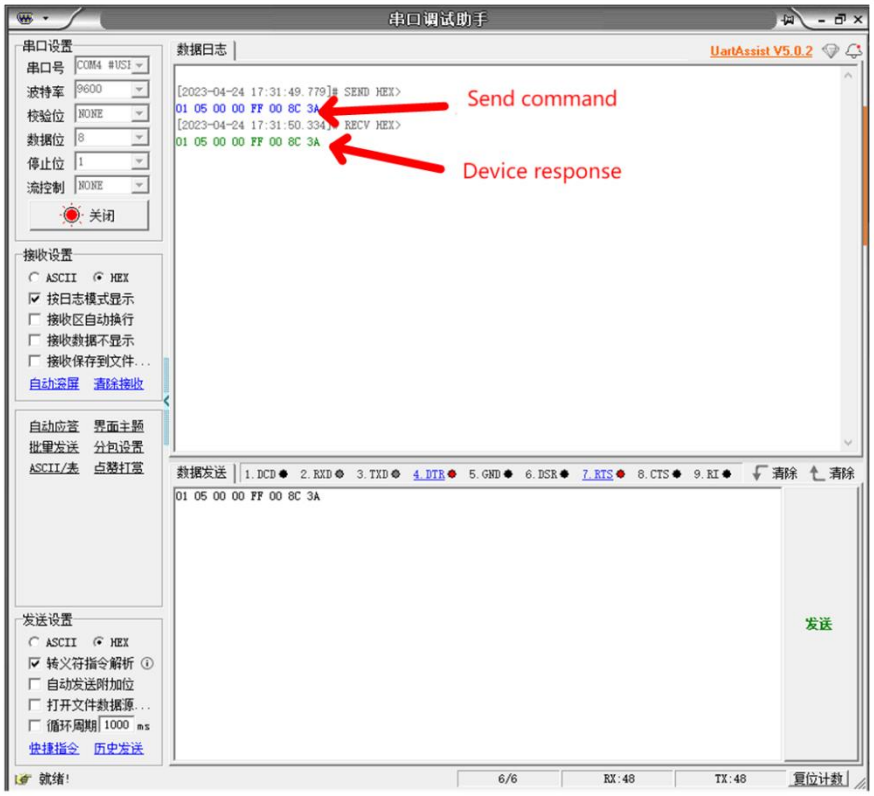


Serial port configuration diagram

Send 01 05 00 00 FF 00 to E95 -DTU via the serial assistant (turn on the first relay)
You can see that the LoRa distributed IO host series responds and closes the specified coil.

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Schematic diagram of sending control instructions to the serial port

Manually press the IN1 button and send 01 02 00 00 00 08 to E95 -DTU through the serial port assistant (read discrete input)

The serial port receives the current status of the discrete input returned by the device.



Schematic diagram of the effect of reading discrete input

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Other acquisition control instructions

Function	instruction
Control multiple relays (8-way fully open)	01 0F 00 00 00 08 01 FF 7D 01 (including CRC check)
Control multiple relays (8-way off)	01 0F 00 00 00 08 01 00 3D 41 (including CRC check)
Query coil status	01 01 00 00 00 08 3B 7D (including CRC check)
Query discrete input	01 02 00 00 00 08 7F 7D (including CRC check)

3.2. Modbus transparent transmission control

The LoRa distributed IO host series has a transparent transmission function, which can send Modbus instructions with non-local addresses through wireless LoRa modulation technology. Here, two LoRa distributed IO host series are used for control testing.

3.2.1. Equipment preparation

For connection testing we need to prepare the following equipment:

name	quantity
DC12V power adapter	2 units
USB to RS485	1
LoRa distributed IO host series (taking M31-AXAX8080G-L as an example)	2 units

3.2.2. Device Connection

On the computer connection side, LoRa distributed IO host series wiring, use USB to RS485 to connect the device's RS485 interface



LoRa distributed IO host series connected to RS485 schematic diagram

The device needs to be connected to the power cord for power-on testing .

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3.2.3. Parameter configuration

The software parameters use the factory configuration (software Modbus default address: 1) . The Modbus address of the LoRa distributed IO host series connected to the computer is configured to 1, and the other LoRa distributed IO host series is configured to 2 using the dip switch.

Device dial code example :



Serial port control side (hardware address: 0)



Wireless control side (hardware address: 1)

In the configuration tool, turn on the transparent mode .

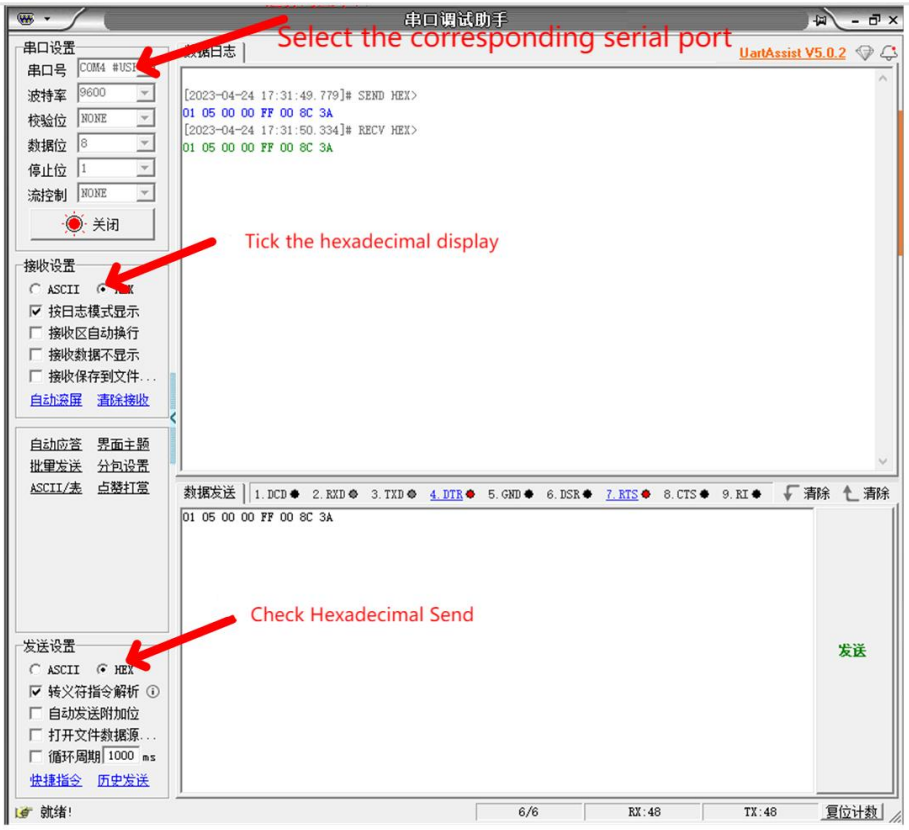
[Note]: This test routine is based on the factory default software parameters. If the software parameters have been modified, please restore the factory parameters before conducting the experiment.

3.2.4. Control Testing

Open the serial port to connect to E95 -DTU, select the corresponding baud rate parameters, select hexadecimal transmission, and cancel automatic line wrap, as shown in the figure.

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Serial port configuration diagram

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Use the serial port to send 01 0F 00 00 00 08 01 FF BE D5 (all coils of the RTU device at address 1 are closed), and the No. 1 relay of the device connected to the serial port is closed. Send 02 0F 00 00 00 08 01 FF FE C0 (all coils of the RTU device at address 2 are closed), and the No. 1 relay of the LoRa control device is closed.

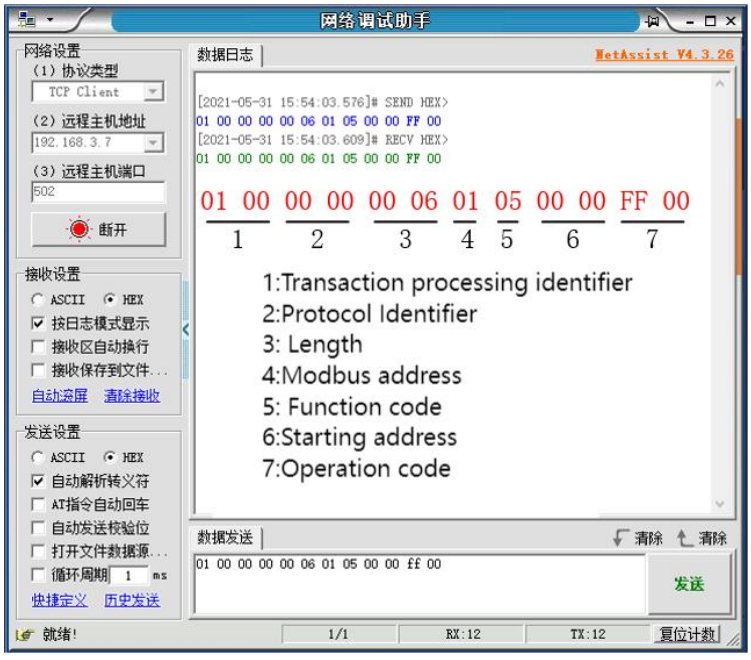


Serial port response diagram

3.3. Network port and serial port control test

3.3.1. Modbus TCP Control

Use the network assistant to control the first DO output of M31-AAAX4440G -L .



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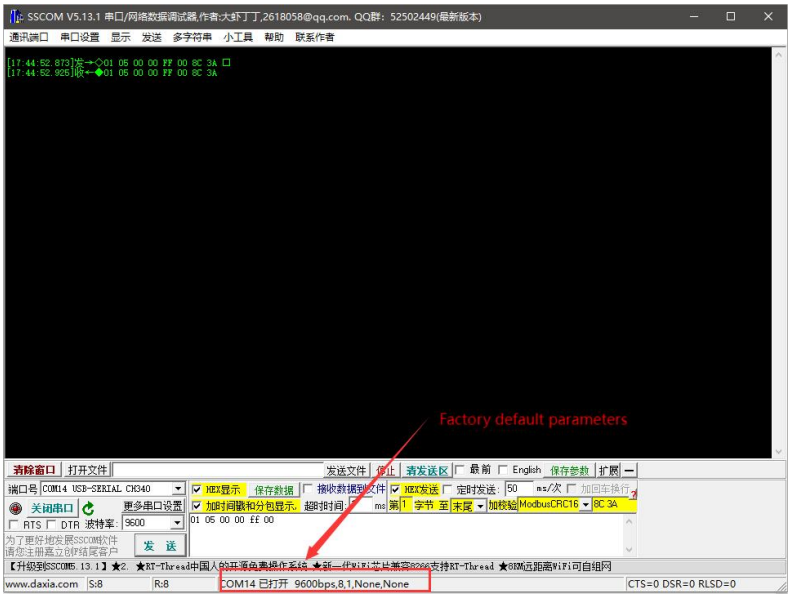
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Other functions can be tested by the following instructions.

Function (function code)	instruction
The first coil is attracted (0x05)	01 00 00 00 00 06 01 05 00 00 FF 00
Control 4-way DO full open instruction (0x0F)	02 00 00 00 00 08 01 0F 00 00 00 04 01 0F
Control 4-way DO all-off instruction (0x0F)	02 00 00 00 00 08 01 0F 00 00 00 04 01 00
Read 4-channel DI status (0x02)	01 00 00 00 00 06 01 02 00 00 00 04
Read 4-channel DO status (0x01)	01 00 00 00 00 06 01 01 00 00 00 04

3.3.2. Modbus RTU control

Use the serial port assistant to control the first DO output of M31-AAAX4440G -L .



Other functions can be tested by the following instructions.

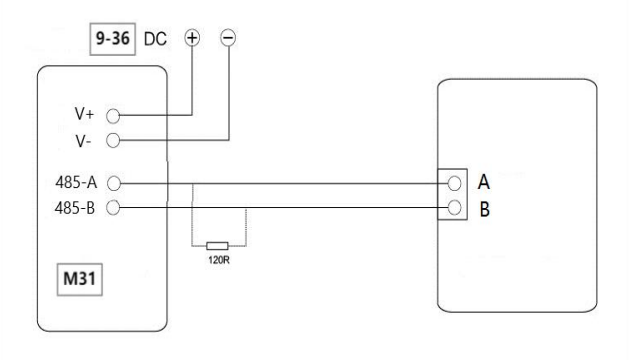
Function (function code)	instruction
The first coil is attracted (0x05)	01 05 00 00 FF 00 8C 3A
Control 4-way DO full open instruction (0x0F)	01 0F 00 00 00 04 01 0F 7E 92
Control 4-way DO all-off instruction (0x0F)	01 0F 00 00 00 04 01 00 3E 96
Read 4-channel DI status (0x02)	01 02 00 00 00 04 79 C9
Read 4-channel DO status (0x01)	01 01 00 00 00 04 3D C9

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3.4. Equipment wiring

3.4.1. RS485 Connection

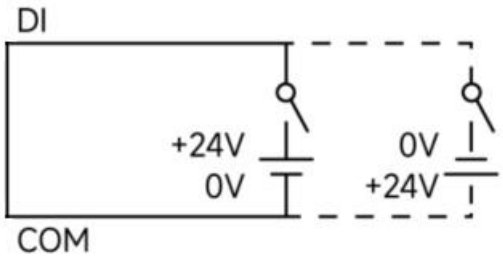


Note: When the 485 bus transmits high-frequency signals, the signal wavelength is shorter than the transmission line. The signal will form a reflected wave at the end of the transmission line, interfering with the original signal. Therefore, a terminal resistor needs to be added at the end of the transmission line to prevent the signal from being reflected after reaching the end of the transmission line. The terminal resistor should be the same as the impedance of the communication cable, and the typical value is 120 ohms. Its function is to match the bus impedance and improve the anti-interference and reliability of data communication.

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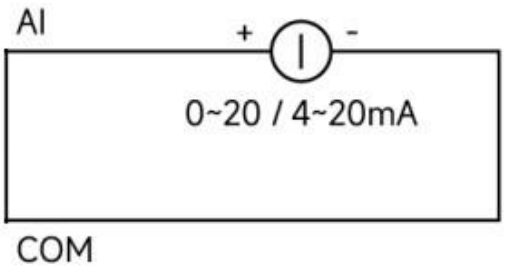
3.4.2. DI Wiring



Note: DI only supports 12V~24V input.

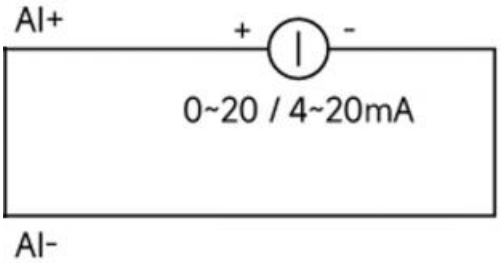
3.4.3. AI Wiring

Single-ended analog current acquisition:

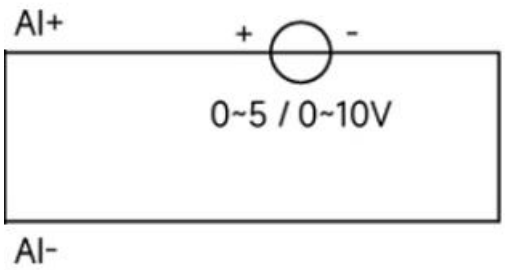


Note: AI is used together with the COM port selected by the adjacent wireframe.

Differential analog current acquisition:



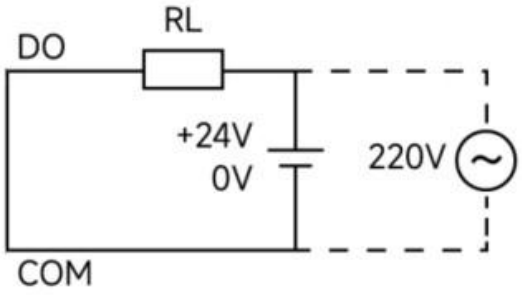
Differential analog voltage acquisition:



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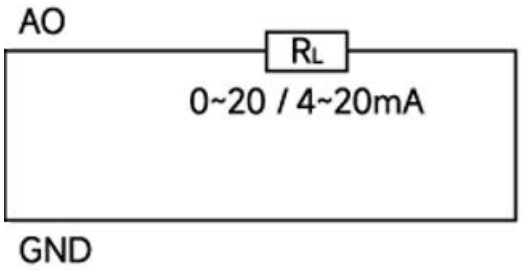
3.4.4. DO wiring



Note: 1. A single relay supports a maximum of 5A.

2. The maximum total current of each group (same COM common terminal) supports 8A.

3.4.5. AO Wiring



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4. Product Features

4.1. IO Expansion

Note: When splicing equipment, do not operate with power on, otherwise it may cause damage to the equipment!

The LoRa distributed IO host series adopts an expandable structure design, in which the IO expansion module can be expanded and used with the LoRa distributed IO host . You only need to dock the IO expansion module with the host slot, and then slide the lock down to firmly connect the host and IO expansion module together.

The specific operations are as follows:

- First, make sure the host is not powered on and the host slider is at UNLK. Then connect the IO expansion module to the host, as shown below:

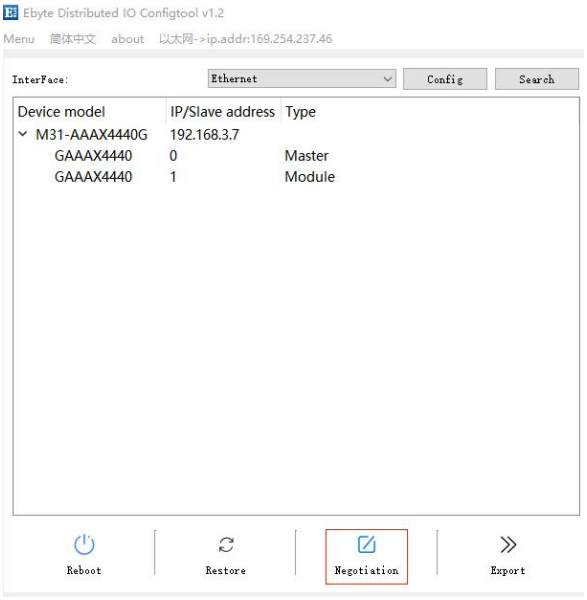


- After the IO expansion module is connected, slide the host to the LOCK position, power on the host, and then insert the network cable. Use the automatic negotiation function through the host computer (or double-click the Reload button on the device within two seconds to automatically negotiate). After the negotiation is successful, the IO expansion module can be operated through the serial port or network port on the host.

Note: When adding a new IO expansion module or removing an already negotiated IO expansion module, the auto-negotiation function must be performed to ensure the sequence and status self-check of the overall device.

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4.2. Airspeed rating

6 airspeed levels: 2.4, 4.8, 9.6, 19.2, 38.4, 62.5k.

Note: The higher the airspeed setting, the faster the transmission rate and the shorter the transmission distance; therefore, if the rate meets the use requirements, it is recommended that the airspeed be as low as possible.

4.3. Modbus transparent transmission mode

enabled through the configuration tool , and Modbus RTU commands with non-local addresses can be transparently transmitted to the networked LoRa devices. It can also be used as a wireless Modbus command transmitter .

4.4. DI Input

4.4.1. Input filtering

When the switch input DI collects signals, it needs to maintain multiple sampling cycles before confirmation. The filter parameter can be set in the range of 1 to 16 (the default is 6 sampling cycles, 6*1kHz).

It can be configured through instructions or host computer.

4.5. DO Output

Output mode of the relay.

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4.6. AI Input

4.6.1. AI Scope

Single-ended analog input AI measures current signal:
The acquisition range is 0 ~ 20mA or 4 ~ 20mA, the accuracy is 3‰, and the resolution is 12 bits. It uses single-ended input, the sampling frequency is 100Hz, and the input impedance is 100Ω.
Set the sampling range of all AI channels. The valid value is 0 to 1 (default 0).
Configuration is 0: indicates 0 ~ 20mA
Configuration is 1: indicates 4~20mA

Differential analog input AI measures current signal:
The acquisition range is 0 ~ 20mA or 4 ~ 20mA or ±20mA, the accuracy is 1‰, the resolution is 16 bits, differential input is adopted, and the sampling frequency is 40Hz.
Set the sampling range of all AI channels. The valid value is 0 to 2 (default 0).
Configuration is 0: indicates 0 ~ 20mA
Configuration is 1: indicates 4~20mA
Configuration 2: indicates ±20mA

Differential analog input AI measures voltage signal:
The acquisition range is 0 ~ 5V or 0 ~ 10V or ±5V or ±10V, the accuracy is 1‰, the resolution is 16 bits, differential input is adopted, and the sampling frequency is 40Hz.
Set the sampling range of all AI channels. The valid value is 3 to 6 (default is 5).
Configuration is 3: represents 0~5V
Configuration 4: indicates ±5V
Configuration is 5: represents 0~10V
Configuration 6: indicates ±10V

【Note】AI configuration instructions

(1) The AI sampling range of each channel can be set. When the AI channel sampling range is configured as 4-20mA sampling, if the current signal is lower than 3.5mA, it is displayed as 0, and if it is higher than 3.5 mA and lower than 4mA, it is displayed as 4. There is no conversion limit for signals greater than 20mA, but it cannot exceed 25mA (exceeding 25mA will cause risk of equipment damage).

(2) The starting address of the AI channel sampling range parameter is 0x0DAC, the register type is a holding register, and the function code is 0x06, 0x10. When writing the AI channel sampling range parameter, if the written parameter value is not within the specified range, it will not take effect, and Modbus will not return an error command.

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4.6.2. AI input engineering quantity integer value, engineering quantity floating point value, process quantity

There are three ways to read the analog signal collected by the device:
Read AI engineering value shaping value and directly convert it to input current or voltage. The starting address of AI engineering value shaping value register is 0x0000, the register type is input register, and the read function code is 0x04. The value returned by this method is one register representing one channel.
Single-ended current: The value read is 0 to 20000. The method for calculating the current size is 0 to 20000 corresponds to 0mA to 20mA.
That is: current = engineering value / 1000 (mA)

Differential current: The value read is -20000~20000. The method for calculating the current size is -20000~20000 corresponds to -20mA~20mA.
That is: current = engineering value / 1000 (mA)

Differential voltage: The value read is -10000~10000. The method for calculating the voltage size is -10000~10000 corresponds to -10V~10V.
That is: voltage = engineering value / 1000 (mV)

（2） Read the AI engineering quantity floating point value, use the IEE754 conversion tool to convert the hexadecimal data into floating point numbers to get the input current or voltage. The starting address of the AI engineering quantity shaping value register is 0x03E8, the register type is input register, and the read function code is 0x04. This method returns two registers to represent 1 channel.

（3） Read AI process quantity. The starting address of AI process quantity register is 0x0BB8, the register type is input register, and the read function code is 0x04. This method returns 1 register to represent 1 channel.
That is: -27648 ~ 27648 represents -10V ~ +10V/-20ma ~ 20ma

Analog input (current 0~20mA)			
Current (0-20mA)	Decimal	hexadecimal	Remark
>23.52	32767	7FFF	Overflow
23.52	32511	7EFF	Over the limit
.	.	.	
>20	27649	6C01	
20	27648	6C00	Rated range
—	—		

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10	13824	3600	
.	.	.	
0	0	0	
<0	0	0	Exceeding the lower limit
.	.	.	
-3.52	-4864	ED00	
<-3.52	-32768	8000	Underflow

Analog input (current - 20-20mA)			
Current (-20-20mA)	Decimal	hexadecimal	Remark
>23.52	32767	7FFF	Overflow
23.52	32511	7EFF	Over the limit
.	.	.	
>20	27649	6C01	
20	27648	6C00	Rated range
.	.	.	
10	13824	3600	
.	.	.	
0	0	0	
.	.	.	
-10	-13824	CA00	
.	.	.	
-20	-27648	9400	
<-20	-27949	93FF	Exceeding the lower

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.	.	.	limit
-23.52	-32511	8101	
<-23.52	-32768	8000	Underflow

Analog input (voltage)						
Voltage (0-5V)	Voltage (0-10V)	Voltage (±5V)	Voltage (±10V)	Decimal	hexadecimal	
>5.06	>10.12	>5.06	>10.12	32767	0x7FFF	Overflow
5.06	10.12	5.06	10.12	27979	0x6D4B	Over the limit
5V+0.1808mv	10V+0.3617mv	5V+0.1808mv	10V+0.3617mv	27649	0x6C01	
5	10	5	10	27648	0x6C00	Rated range
.	.	.	.	.	.	
.	.	.	.	.	.	
2.5	5	2.5	5	13824	0x3600	
.	.	.	.	.	.	
.	.	.	.	.	.	
0	0	0	0	0	0x0000	
/	/	.	.	.	.	
/	/	.	.	.	.	
/	/	-2.5	-5	-13824	0XCA00	
/	/	.	.	.	.	
/	/	.	.	.	.	
/	/	-5	-10	-27648	0x9400	
/	/	-5V -0.1808mv	-10V-0.3617mv	-27649	0x93FF	Exceeding the lower limit
/	/	-5.06	-10.12	-27979	0x92B5	
/	/	-5.06<	-10.12<	-32768	0x8000	Underflow

4.6.3. AI Filter Parameters

You can set the filter parameters of the AI channel. The valid value is 1-16, and the default value is 6.

Filter parameter description:

(1) All AI channels share a filter parameter. The higher the parameter value, the more stable the output value and the slower the response.

(2) AI channel filter parameter address is 0x0DA2, register type is holding register, function code 0x06, 0x10.

(3) When writing AI filter parameters, if the written parameter value is not within the range of 1 to 16, the closest value will be automatically taken and written. For example, if the written filter parameter is 0, the device will take 1 as the filter parameter, and Modbus will not return an error command.

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4.7. AO Output

4.7.1. AO Range

Analog current output, range 0~20mA or 4~20mA, accuracy 3‰, resolution 16 bits, input impedance 500Ω.

Set the output range of a single AO channel. Valid values are 1 and 0 (default 0).

Configuration is 0: indicates 0 ~ 20mA

Configuration is 1: indicates 4~20mA

【Note】AO configuration instructions

(1) The AO output range of each channel can be set.

(2) The starting address of the AO channel output range parameter is 0x0DAC, the register type is a holding register, and the function code is 0x06, 0x10. When writing the AI channel sampling range parameter, if the written parameter value is not within the range of 0 to 1, the closest value will be automatically written. For example, if the sampling range parameter is written as 2, the device will take 1 as the sampling range parameter, and Modbus will not return an error command.

4.7.2. AO output engineering quantity shaping value, engineering quantity floating point value, process quantity register

There are three ways to read the current signal collected by the device:

(1) Read and control the AO engineering quantity shaping value, and directly convert it to the output current. The starting address of the AO engineering quantity shaping value register is 0x0000, the register type is a holding register, the read function code is 0x03, and the write function code is 0x06, 0x10. The value returned by this method is that one register represents one channel, and the value is 0 to 20000. The method for calculating the current size is that 0 to 20000 corresponds to 0 to 20mA. That is:

Current = Engineering value / 1000 (mA)

（2） Read and control the floating-point value of AO engineering quantity, and use the IEE754 conversion tool to convert the hexadecimal data into floating-point numbers to get the current. The starting address of the AO engineering quantity floating-point register is 0x03E8, the register type is a holding register, the read function code is 0x03, and the write function code is 0x06, 0x10. This method returns two registers to represent 1 channel.

（3） Read and control the process value shaping value. The starting address of the A O engineering value register is 0x01F4, the register type is a holding register, the read function code is 0x03, and the write function code is 0x06, 0x10. This method returns 1 register to represent 1 channel.

That is: 0~27648 represents 0ma~20ma

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4.8. Online monitoring

The device can monitor whether the device is abnormal through relevant registers:

Register Function	Register address (hexadecimal)	Register address (decimal)	Register area	Number	Data range/remarks	Related function codes
Device abnormal code	0X7587	4-30088	Zone 4	1	Check the abnormal code of the current device. If it is 0, it means there is no abnormality. If it is 1, it means that the slave does not respond. If it is 2, it means that the expansion module sequence is wrong (this error will directly cause the device to not work properly).	R: 0x03
Extension module exception label	0X7588	4-30089	Zone 4	2	Check which expansion module has not responded. There are two 32-bit registers in total, representing the expansion modules in order. If the bit on the corresponding serial number is 1, it means that this expansion module is abnormal.	R: 0x03

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4.9. Module Information

4.9.1. Basic parameters

(1) Modbus address: The default device address is 1, and the address can be modified. The address range is 1-255 (the maximum setting value of the software address is 240, and the value will not take effect if it exceeds the limit) .
(2) Serial port baud rate: 2400, 4800, 9600, 19200, 38400, 57600, 115200, 230400bps, 8 options are available.
(3) Serial port parity bit: NONE, ODD, EVEN optional.
(4) Channel: Default 23, (0-83 software configurable)
(5) Transparent transmission mode: closed by default.
(6) Airspeed: 2400, 4800 , 9600, 19200, 38400, 62500 bps 6 options
(7) DI filter parameters: The filter parameters can be set in the range of 1 to 16 (default 6 sampling cycles, 6*1kHz)
(8) AI filter parameters: You can set the filter parameters of the AI channel. The valid value is 1-16, and the default value is 6.

4.9.2. Network parameters

Unless otherwise specified: The following network-related parameters default to IPV4-related parameters.

(1) Working mode: Switch the working mode of the module. Server: The device is equivalent to a server, waiting for the user's client to connect, with a maximum number of connections of 4. Client: The device actively connects to the target IP and port set by the user.
(2) DHCP: Set the way the device obtains IP: static or dynamic.
(3) Gateway Address: Gateway.
(4) Subnet mask: address mask, readable and writable.
(5) Local IP: Device IP address, readable and writable.
(6) Local port : The port number of the device, which can be read and written.
(7) Target IP: When the device works in client mode, the target IP or domain name that the device connects to.
(8) Target port: When the device works in client mode, the target port to which the device is connected.
(9) DNS server: When the device is in client mode, resolve the server domain name.
(10) Network Modbus protocol: Modbus TCP and Modbus RTU protocols can be selected on the network port.

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4.10. MODBUS parameter configuration

4.10.1.DI register list

DI status register:

name	Access location	Register address (hexadecimal)	Register address (decimal)	Register area	Related function codes	Default state
DI1	Host	0x0000	1-0001	Zone 1	R: 0x02	0
DI2	Host	0x0001	1-0002	Zone 1	R: 0x02	0
DI3	Host	0x0002	1-0003	Zone 1	R: 0x02	0
DI4	Host	0x0003	1-0004	Zone 1	R: 0x02	0
DI5	IO expansion module	0x0004	1-0005	Zone 1	R: 0x02	0
.....	IO expansion module	.....	.....	Zone 1	R: 0x02	0

DI filter register:

name	Register address (hexadecimal)	Register address (decimal)	Register Type	Data range/description	Related function codes	Default state
DI channel filter parameters	0x0DA3	4-3492	Holding Registers	All DI channel filter parameters, Valid values: 1-16	R: 0x03 W: 0x06, 0x10	6

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4.10.2.DO Register List

DI status register:

name	Access location	Register Address (Hexadecimal)	Register Address (decimal)	Register area	Related function codes	Default state
DO1	Host	0x0000	0-0001	Zone 0	R: 0x01 W: 0x05, 0x0F	0
DO2	Host	0x0001	0-0002	Zone 0	R: 0x01 W: 0x05, 0x0F	0
DO3	Host	0x0002	0-0003	Zone 0	R: 0x01 W: 0x05, 0x0F	0
DO4	Host	0x0003	0-0004	Zone 0	R: 0x01 W: 0x05, 0x0F	0
DO5	IO expansion module	0x0004	0-0005	Zone 0	R: 0x01 W: 0x05, 0x0F	0
.....	IO expansion module	.....	.....	Zone 0	R: 0x01 W: 0x05, 0x0F	0

4.10.3.AI Register List

AI engineering quantity shaping value register:

name	Access location	Register address (hexadecimal)	Register address (decimal)	Register area	Data range/description (For difference, please refer to AI input section)	Related function codes	Default state
AI1	Host	0x0000	3-0001	Zone 3	Engineering quantity 0-20000 represents 0-20ma 2-byte integer, unit (uA)	R: 0x04	0
AI2	Host	0x0001	3-0002	Zone 3	Engineering quantity 0-20000 represents 0-20ma 2-byte integer, unit (uA)	R: 0x04	0
AI3	Host	0x0002	3-0003	Zone 3	Engineering quantity 0-20000 represents 0-20ma 2-byte integer, unit (uA)	R: 0x04	0
AI4	Host	0x0003	3-0004	Zone 3	Engineering quantity 0-20000 represents	R: 0x04	0

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					0-20ma 2-byte integer, unit (uA)		
AI5	IO expansion module	0x0004	3-0005	Zone 3	Engineering quantity 0-20000 represents 0-20ma 2-byte integer, unit (uA)	R: 0x04	0
.....	IO expansion module	.....	.....	Zone 3	Engineering quantity 0-20000 represents 0-20ma 2-byte integer, unit (uA)	R: 0x04	0

AI floating point value register:

name	Access location	Register address (hexadecimal)	Register address (decimal)	Register area	Data range/description	Related function codes	Default state
AI1	Host	0x03E8	3-1001	Zone 3	Analog signal floating point value, 4-byte floating point number, unit (mA)	R: 0x04	0
AI2	Host	0x03EA	3-1003	Zone 3	Analog signal floating point value, 4-byte floating point number, unit (mA)	R: 0x04	0
AI3	Host	0x03EC	3-1005	Zone 3	Analog signal floating point value, 4-byte floating point number, unit (mA)	R: 0x04	0
AI4	Host	0x03EE	3-1007	Zone 3	Analog signal floating point value, 4-byte floating point number, unit (mA)	R: 0x04	0
AI5	IO expansion module	0x03F0	3-1009	Zone 3	Analog signal floating point value, 4-byte floating point number, unit (mA)	R: 0x04	0
.....	IO expansion module	.....	.....	Zone 3	Analog signal floating point value, 4-byte floating point number, unit (mA)	R: 0x04	0

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AI process quantity register:

name	Access location	Register address (hexadecimal)	Register address (decimal)	Register area	Data range/description	Related function codes	Default state
AI1	Host	0x0BB8	3-3001	Zone 3	Analog signal integer value, 2 bytes	R: 0x04	0
AI2	Host	0x0BB9	3-3002	Zone 3	Analog signal integer value, 2 bytes	R: 0x04	0
AI3	Host	0x0BBA	3-3003	Zone 3	Analog signal integer value, 2 bytes	R: 0x04	0
AI4	Host	0x0BBB	3-3004	Zone 3	Analog signal integer value, 2 bytes	R: 0x04	0
AI5	IO expansion module	0x0BBC	3-3005	Zone 3	Analog signal integer value, 2 bytes	R: 0x04	0
.....	IO expansion module	.....	.....	Zone 3	Analog signal integer value, 2 bytes	R: 0x04	0

AI filter register:

name	Register address (hexadecimal)	Register address (decimal)	Register area	Data range/description	Related function codes	Default state
AI channel filter parameters	0x0DA2	4-3491	Zone 4	All AI channel filter parameters, Valid values: 1-16	R: 0x03 W: 0x06, 0x10	6

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AI sampling range register:

name	Access location	Register address (hexadecimal)	Register address (decimal)	Register area	Data range/description	Related function codes	Default state
AI1 sampling range	Host	0x0DAC	4-3501	Zone 4	See AI Input section for details.	R: 0x03 W: 0x06, 0x10	0
AI2 sampling range	Host	0x0DAD	4-3502	Zone 4	See AI Input section for details.	R: 0x03 W: 0x06, 0x10	0
AI3 Sampling Range	Host	0x0DAE	4-3503	Zone 4	See AI Input section for details.	R: 0x03 W: 0x06, 0x10	0
AI4 sampling range	Host	0x0DAF	4-3504	Zone 4	See AI Input section for details.	R: 0x03 W: 0x06, 0x10	0
AI5 sampling range	IO expansion module	0x0DB0	4-3505	Zone 4	See AI Input section for details.	R: 0x03 W: 0x06, 0x10	0
.....	IO expansion module	.....	.....	Zone 4	See AI Input section for details.	R: 0x03 W: 0x06, 0x10	0

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4.10.4. AO Register List

AO engineering quantity shaping value register:

name	Access location	Register address (hexadecimal)	Register address (decimal)	Register area	Data range/description	Related function codes	Default state
AO1	Host	0x0000	4-0001	Zone 4	Engineering quantity 0-20000 represents 0-20ma 2-byte integer, unit (uA)	R: 0x03 W: 0x06, 0x10	0
AO2	Host	0x0001	4-0002	Zone 4	Engineering quantity 0-20000 represents 0-20ma 2-byte integer, unit (uA)	R: 0x03 W: 0x06, 0x10	0
AO3	Host	0x0002	4-0003	Zone 4	Engineering quantity 0-20000 represents 0-20ma 2-byte integer, unit (uA)	R: 0x03 W: 0x06, 0x10	0
AO4	Host	0x0003	4-0004	Zone 4	Engineering quantity 0-20000 represents 0-20ma 2-byte integer, unit (uA)	R: 0x03 W: 0x06, 0x10	0
AO5	IO expansion module	0x0004	4-0005	Zone 4	Engineering quantity 0-20000 represents 0-20ma 2-byte integer, unit (uA)	R: 0x03 W: 0x06, 0x10	0
.....	IO expansion module	.....	.....	Zone 4	Engineering quantity 0-20000 represents 0-20ma 2-byte integer, unit (uA)	R: 0x03 W: 0x06, 0x10	0

AO floating point value register:

name	Access location	Register address (hexadecimal)	Register address (decimal)	Register area	Data range/description	Related function codes	Default state
AO1	Host	0x03E8	4-1001	Zone 4	Analog signal floating point value, 4-byte floating point number, unit (mA)	R: 0x03 W: 0x06, 0x10	0
AO2	Host	0x03EA	4-1003	Zone 4	Analog signal floating point value, 4-byte floating point number, unit (mA)	R: 0x03 W: 0x06, 0x10	0

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AO3	Host	0x03EC	4-1005	Zone 4	Analog signal floating point value, 4-byte floating point number, unit (mA)	R: 0x03 W: 0x06, 0x10	0
AO4	Host	0x03EE	4-1007	Zone 4	Analog signal floating point value, 4-byte floating point number, unit (mA)	R: 0x03 W: 0x06, 0x10	0
AO5	IO expansion module	0x03F0	4-1009	Zone 4	Analog signal floating point value, 4-byte floating point number, unit (mA)	R: 0x03 W: 0x06, 0x10	0
.....	IO expansion module	.....	.....	Zone 4	Analog signal floating point value, 4-byte floating point number, unit (mA)	R: 0x03 W: 0x06, 0x10	0

AO process quantity register:

name	Access location	Register address (hexadecimal)	Register address (decimal)	Register area	Data range/description	Related function codes	Default state
AO1	Host	0x01F4	3-0501	Zone 4	Analog signal integer value, 2 bytes	R: 0x03 W: 0x06, 0x10	0
AO2	Host	0x01F5	3-0502	Zone 4	Analog signal integer value, 2 bytes	R: 0x03 W: 0x06, 0x10	0
AO3	Host	0x01F6	3-0503	Zone 4	Analog signal integer value, 2 bytes	R: 0x03 W: 0x06, 0x10	0
AO4	Host	0x01F7	3-0504	Zone 4	Analog signal integer value, 2 bytes	R: 0x03 W: 0x06, 0x10	0
AO5	IO expansion module	0x01F8	3-0505	Zone 4	Analog signal integer value, 2 bytes	R: 0x03 W: 0x06, 0x10	0
.....	IO expansion module	.....	.....	Zone 4	Analog signal integer value, 2 bytes	R: 0x03 W: 0x06, 0x10	0

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AO output range register:

name	Access location	Register address (hexadecimal)	Register address (decimal)	Register area	Data range/description	Related function codes	Default state
AO1 output range	Host	0x1194	4-4501	Zone 4	Valid values are 0 and 1. 0 means 0-20mA, 1 means 4-20mA	R: 0x03 W: 0x06, 0x10	0
AO2 output range	Host	0x1195	4-4502	Zone 4	Valid values are 0 and 1. 0 means 0-20mA, 1 means 4-20mA	R: 0x03 W: 0x06, 0x10	0
AO3 output range	Host	0x1196	4-4503	Zone 4	Valid values are 0 and 1. 0 means 0-20mA, 1 means 4-20mA	R: 0x03 W: 0x06, 0x10	0
AO4 output range	Host	0x1197	4-4504	Zone 4	Valid values are 0 and 1. 0 means 0-20mA, 1 means 4-20mA	R: 0x03 W: 0x06, 0x10	0
AO5 output range	IO expansion module	0x1198	4-4505	Zone 4	Valid values are 0 and 1. 0 means 0-20mA, 1 means 4-20mA	R: 0x03 W: 0x06, 0x10	0
.....	IO expansion module	.....	.....	Zone 4	Valid values are 0 and 1. 0 means 0-20mA, 1 means 4-20mA	R: 0x03 W: 0x06, 0x10	0

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4.10.5.Module related registers

Register Function	Register address (hexadecimal)	Register address (decimal)	Register area	Number	Data range/remarks	Related function codes
Serial port baud rate code	0X7530	4-30001	Zone 4	1	1:2400 2:4800 3:9600 4:19200 5:38400 6:57600 7:115200 8:230400	R: 0x03 W: 0x06, 0x10
Serial port check digit	0X7531	4-30002	Zone 4	1	0:NONE 1: ODD 2: EVEN	R: 0x03 W: 0x06, 0x10
Network working mode	0X7532	4-30003	Zone 4	1	0: TCPS 1: TCPC 2: UDPS 3: UDPC	R: 0x03 W: 0x06, 0x10
DHCP	0X7533	4-30004	Zone 4	1	0: Off, 1: On	R: 0x03 W: 0x06, 0x10
Device MAC address	0X7534	4-30005	Zone 4	3		R: 0x03
Local IP address	0X7537	4-30008	Zone 4	2		R: 0x03 W: 0x06, 0x10
Subnet Mask	0X7539	4-30010	Zone 4	2		R: 0x03 W: 0x06, 0x10
Gateway Address	0X753B	4-30012	Zone 4	2		R: 0x03 W: 0x06, 0x10
DNS server address	0X753D	4-30014	Zone 4	2		R: 0x03 W: 0x06, 0x10
Local port	0X7541	4-30018	Zone 4	1	0-65535	R: 0x03 W: 0x06, 0x10
Target IP/Domain Name	0X7542	4-30019	Zone 4	64	Maximum 128-byte string. Domain name is also represented by a string.	R: 0x03 W: 0x06, 0x10
Target server port	0X7582	4-30083	Zone 4	1	1-65535	R: 0x03 W: 0x06, 0x10
Network Modbus protocol	0X7583	4-30084	Zone 4	1	When the network data is TCP data, this item needs to be set to 1. When the network data is RTU data,	R: 0x03 W: 0x06, 0x10

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					this item needs to be set to 0.	
Address Negotiation Write Register Protection	0X7584	4-30085	Zone 4	1	This write protection register needs to be turned on before sending the address negotiation command Write 1: represents opening the write protection register	R: 0x03 W: 0x06, 0x10
Address Negotiation Register	0X7585	4-30086	Zone 4	1	Write 1: represents the start of address negotiation	R: 0x03 W: 0x06, 0x10
Current negotiation status register	0X7586	4-30087	Zone 4	1	Check whether the current negotiation is completed. 0: Indicates that the negotiation has not yet been completed 1: Negotiation completed	R: 0x03
Device abnormal code	0X7587	4-30088	Zone 4	1	Check the abnormal code of the current device. If it is 0, it means there is no abnormality. If it is 1, it means that the slave does not respond. If it is 2, it means that the expansion module sequence is wrong (this error will directly cause the device to not work properly).	R: 0x03
Extension module exception label	0X7588	4-30089	Zone 4	2	Check which expansion module has not responded. There are two 32-bit registers in total, representing the expansion modules in order. If the bit on the corresponding serial number is 1, it means that this expansion module is abnormal.	R: 0x03

Note: According to the usage requirements, some software (such as KingView) need to add 1 to convert hexadecimal to decimal before operating the register (the decimal in the table has been added 1).

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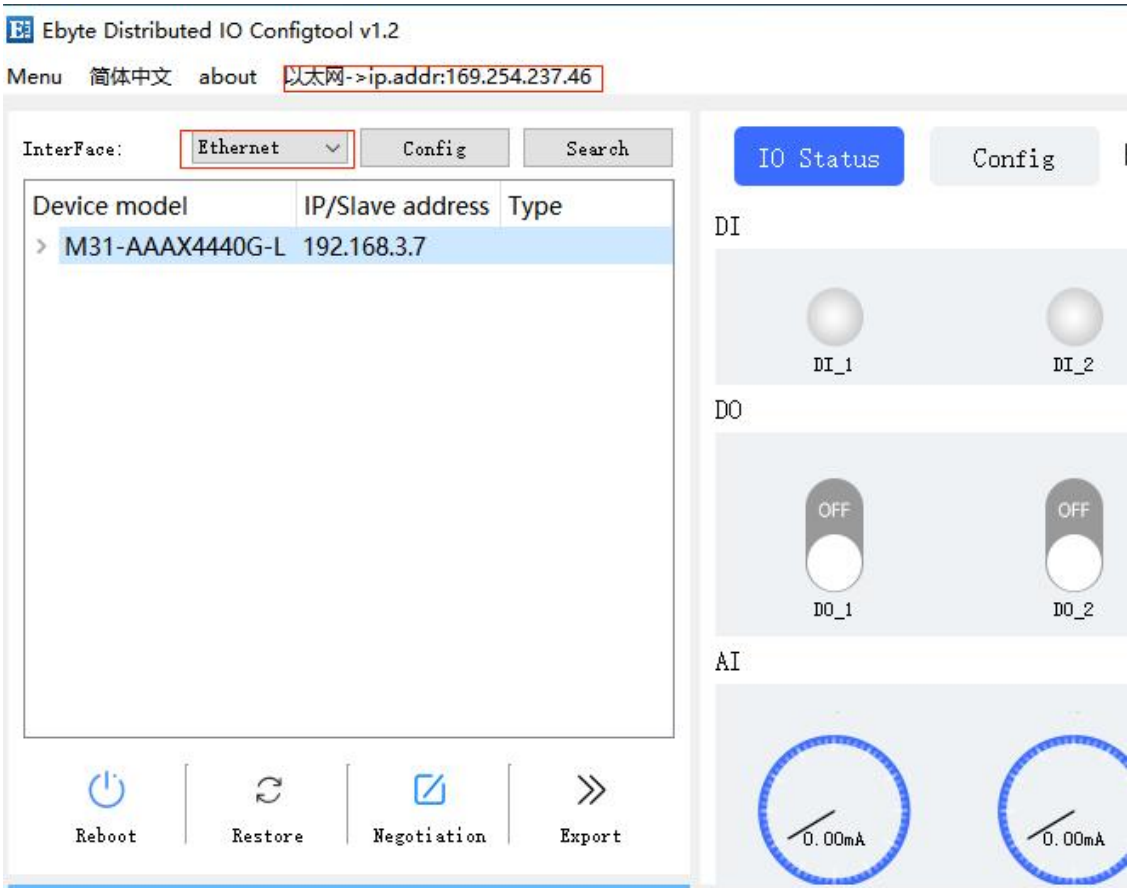
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5. Configuration Tools

5.1. Connectivity and Control

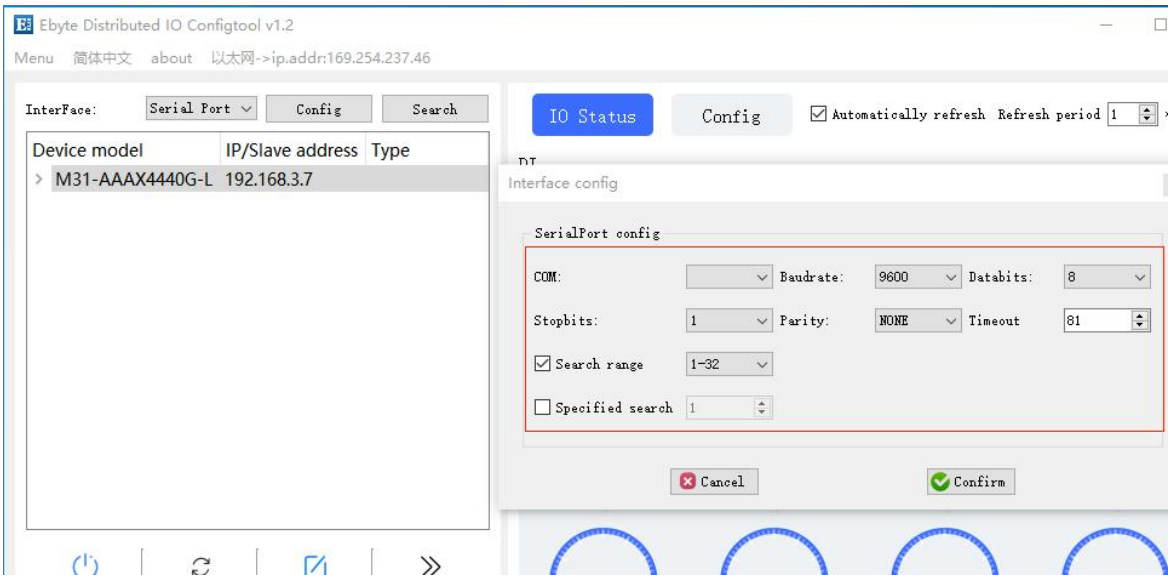
Step 1: Configuration tool connection device

（1）You can configure the device by selecting the interface (serial port/network port). If you select the network port, you must first select the network card and then search for the device.

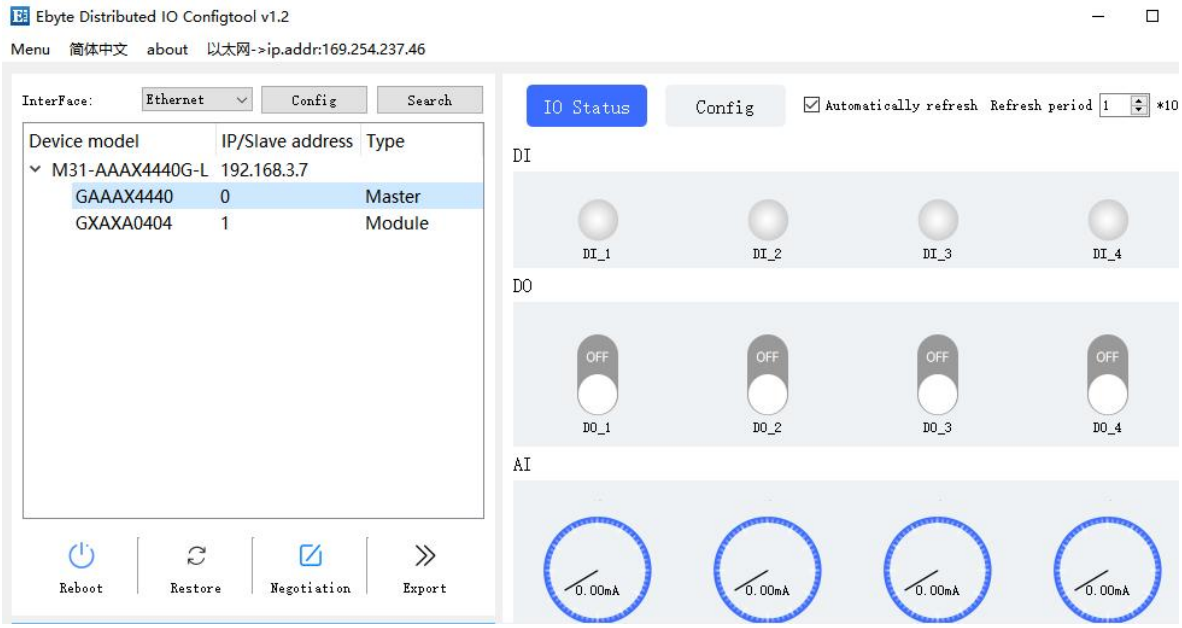


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(2) If you select a serial port, you must select the corresponding serial port number, as well as the same baud rate, data bits, stop bits, parity bit, and address segment search range as the device, and then perform the search.



Step 2: Select the corresponding device and operate the corresponding IO.



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5.2. Parameter configuration

Step 1: For connecting devices, refer to " Connection and Control"

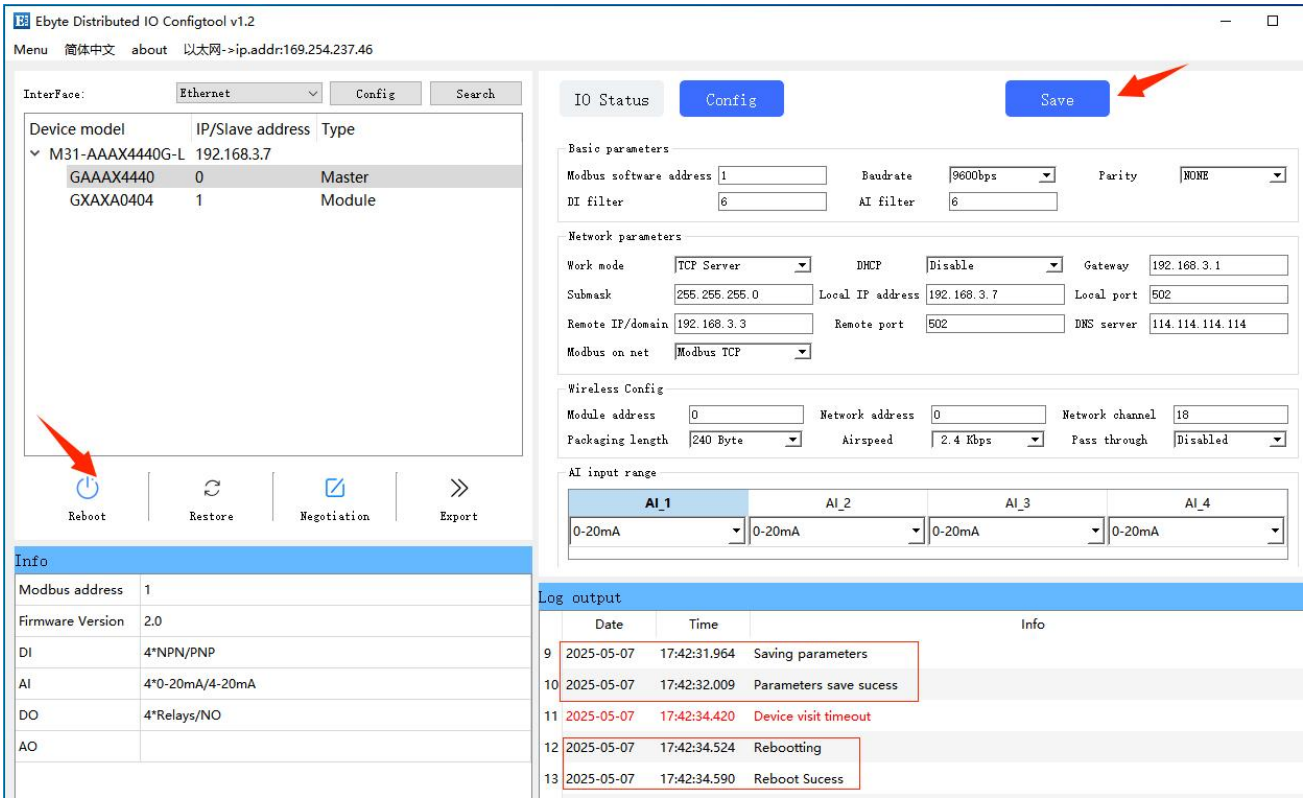
Step 2: You can configure the wireless parameters, basic parameters, and network parameters of the device.



Step 3: After configuring the parameters, click Save Parameters. When you see the prompt message that the parameters are saved successfully in the log output, click Restart Device. After the device restarts, the modified parameters take effect.

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6. Precautions

(1) Do not connect or assemble modules while the device is powered on, as this may damage the equipment.
(2) When adding a new I/O expansion module or removing an existing one, the auto-negotiation function must be performed to ensure proper sequence and status self-check of the entire system. For negotiation procedures, refer to the I/O Expansion section.
(3) The M31-xxxxxxxxG-L model is recommended to be used with the E95-DTU(400SL30) data radio.
(4) The M31-xxxxxxxxG-L9 model is recommended to be used with the E95-DTU(900SL30-485) data radio.
(5) The M31-xxxxxxxxG-L and M31-xxxxxxxxG-L9 models operate on different frequency bands; ensure proper distinction during selection and use.

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Revision History

Version	Revision Date	Revision Notes	Maintainer
1.0	2025.5.7	Initial release	LT
1.1	2025.7.31	New model added	LT

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