EBYTE
成都亿佰特电子科技有限公司
Chengdu Ebyte Electronic Technology Co.,Ltd.

Wireless Modem

USER MANUAL

E820-AIO(II-485-20) Product Manual



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1. Module Introduction



1.1 Features

E820-AIO series is an analog signal acquisition series produced by our company. This series adopts RS485 communication network to transmit the analog signals of scattered field data points to the host or control the remote main site by PC through AD conversion. It has a watchdog safety design and will not crash. E820-AIO analog quantity acquisition module has multiple functions such as metering data acquisition, measurement data acquisition, equipment switch status acquisition, etc. It is mainly used as data acquisition, control and display equipment for various measurement and control terminals, and is suitable for automation and information systems in various industries. E820-AIO uses optocouplers and other devices to fully isolate communication from other circuits, and has 3000VDC protection capability.

Serial Number	Features	Features Description
1	Multi-way differential	Supports 4-channel fully differential input sampling.
2	2 working modes	Supports 2 working modes, signed output mode and unsigned output mode.
3	Wide input power range	The power input range is 5-36V , with reverse polarity protection.
4	Adopt ModBus protocol	Adopt ModBus RTU protocol, question-and-answer communication mode, simple, cheap hardware, strong versatility, easy to use
5	High acquisition accuracy	The acquisition accuracy of this product is 0.1%FS
6	Wide operating temperature range	This product can work at -40℃～+85℃ and can adapt to various harsh working environments. It is a true industrial-grade product.
7	Aluminum alloy housing	All-aluminum alloy shell, good EMC performance, compact size, easy installation, good heat dissipation
8	Watchdog	Built-in watchdog and precise time layout ensure high reliability.
For more function introduction, please refer to the relevant application documents		

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1.2 Electrical parameters

Serial Number	Parameter Name	Parameter Value	Notes
1	Module size	108*75*37mm	No crimping interface
2	Average weight	226.2g	No crimping interface
3	Input signal type	0 — 20mA	The analog signal input range must not exceed 23mA, otherwise it may cause damage to the radio.
4	Acquisition channel	4 inputs	4 fully differential inputs
5	Acquisition rate	All channels 10Hz	The acquisition rate of analog signals
6	Interface	RS485 : 1*5*3.81mm	Pressing method
7	Supply voltage	5 ~ 36V DC	Note: Voltage higher than 36V will cause permanent damage to the module
8	Working current	12V/50mA	5V/90mA, 12V/50mA, 24V/30mA, 36V/20mA
9	Communication level	RS485	RS485
10	Mailing address	1-247	1-247 can be set, the default is 1
11	Collection accuracy	0.1%FS	Accuracy of analog signal acquisition
12	Baud rate	Factory default 9600	Baud rate range 2400~ 115200 can be set
13	Operating temperature	-40℃～+85℃	Industrial Grade
14	Isolation protection	3000VDC	Lightning strike, surge protection

1.3 Product Series

Product Model	Interface	Signal Type	Collection Accuracy	Analog Channels	Protection level VDC	Product size
E 820- DTU (I I- 485-4-20) -V2.0	RS485	0-20mA	0.1%FS	4	3000	108*75*37

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1.4 Frequently Asked Questions

Serial Number	Question	Description
1	Device Communication	Use RS485 communication interface and ModBus RTU protocol communication. The register (coil) configuration table is shown in the table below;
3	I don't remember the device parameters.	There is a parameter reset button on the device. Press and hold the button for more than 5 seconds, the RST indicator light will turn on, and L1 and L2 will flash once, and the device will be restored to the default parameters.

1.5 Precautions

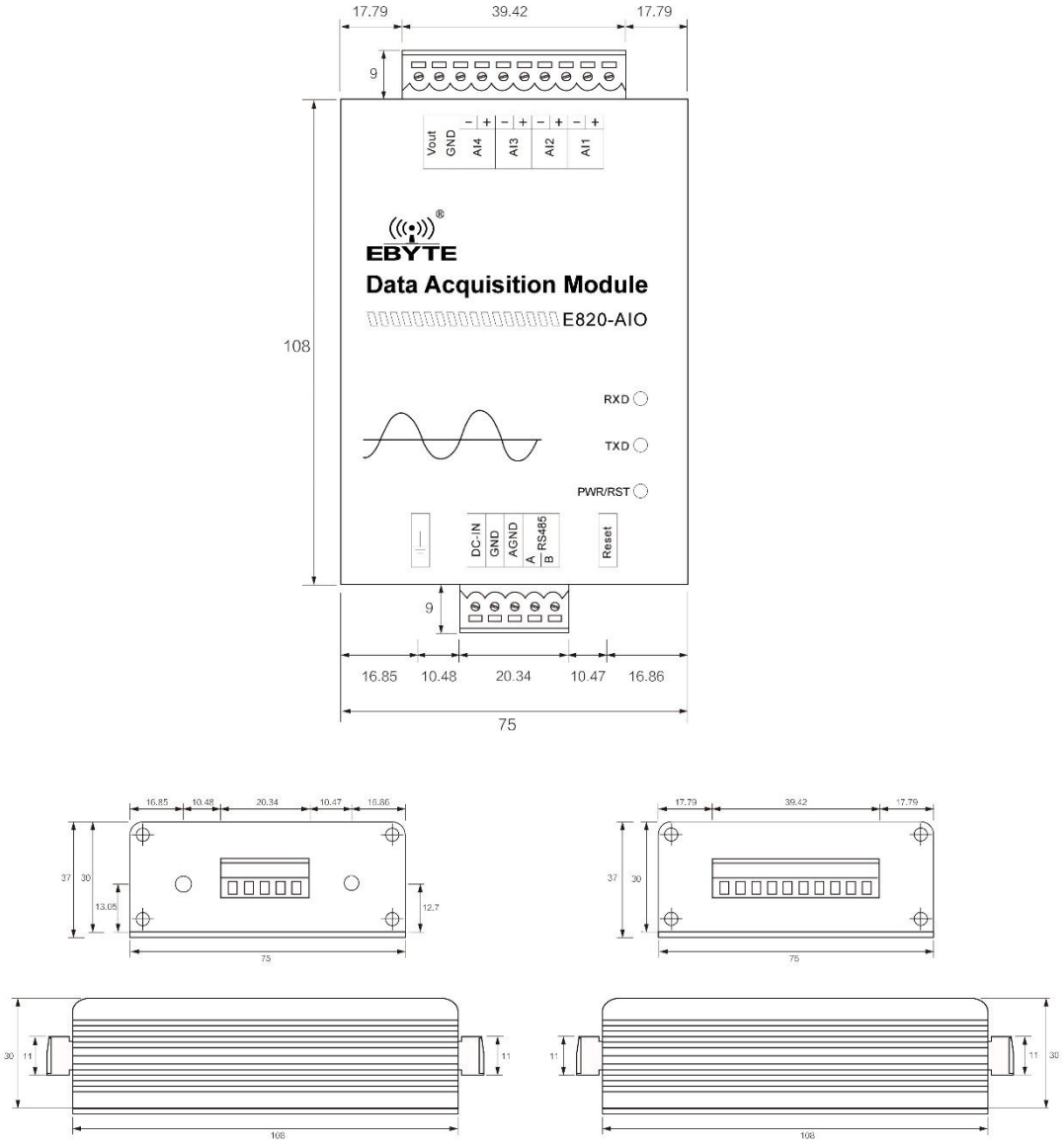
Serial Number	Precautions	Description
1	Communication Connection	When the module communicates with other RS485 devices, attention should be paid to the matching of A and B lines.
2	Input voltage	DC power supply, not AC, DC input voltage should be between 5~36V: Devices below 5V will not work, and devices above 36V will be permanently damaged.
3	Output Power	The positive and negative direction and size of the output power are the same as those of the input power, Max: 2A, see the pin definition for details.
4	Analog input interface	The signal collected by this device is 0-20 mA . Do not input signals exceeding the limit value (23mA) into the device during use, otherwise it may cause damage to the device.
5	Water proof	This radio is not waterproof. Please make sure that the device is not exposed to water, otherwise it will cause permanent damage to the device.

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2. Functional Description

2.1 Pin Definition



Foot Number	Standard Definition	Function	Illustrate
1	DC_IN	Press-wire power input positive terminal	Power input terminal, range: 5-36V, recommended 12V, 24V
2	GND	Press-wire power input negative pole	Power GND

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3	AGND	Common ground for communications	RS485 communication common ground terminal
4	RS 485_ A	RS-485 Interface A	RS-485 interface A is connected to device A interface
5	RS 485_ B	RS-485 interface B	RS-485 interface B is connected to device B interface
6	AI1+	Analog signal input channel 1 positive	Analog signal input pin, forming an input with GND1 pin
7	AI1-	Analog signal input channel 1 negative	Used in pairs with VI1+
8	AI2+	Analog signal input channel 2 positive	Analog signal input pin, forming an input with GND2 pin
9	AI2-	Analog signal input channel 2 negative	Used in pairs with VI2+
10	AI3+	Analog signal input channel 3 positive	Analog signal input pin, forming an input with GND3 pin
11	AI3-	Analog signal input channel 3 negative	Used in pairs with VI3+
12	AI4+	Analog signal input channel 4 positive	Analog signal input pin, forming an input with GND4 pin
13	AI4-	Analog signal input channel 4 negative	Used in pairs with VI4+
14	GND	Power output negative pole	Negative pole of power output, internally connected to pin 2
15	Vout	Power output positive	Power output positive pole, internally connected to pin 1, Max: 2A
16	Reset	Parameter reset button	Long press to reset the device parameters to factory settings. After the reset is successful, the L1 and L2 indicators will flash once.
17	Grounding column	Grounding column	Device connected to the ground

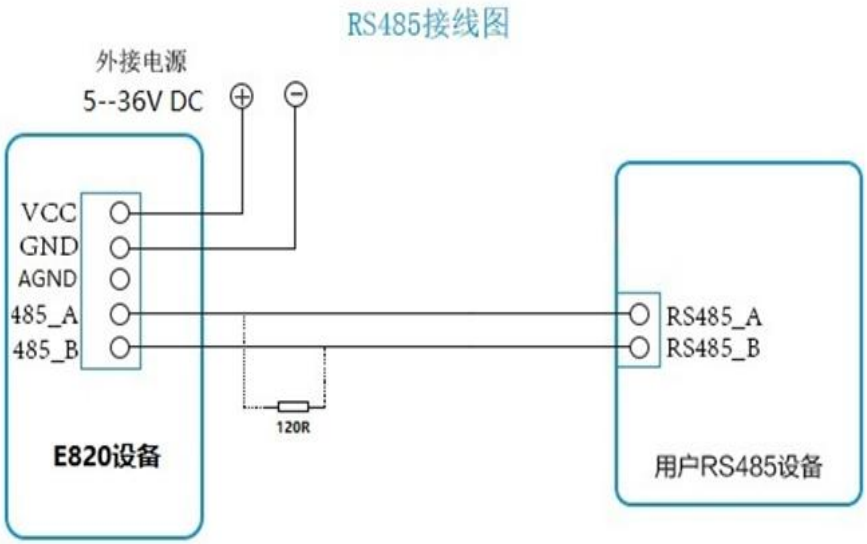
2.2 Connection method

- RS485 connection method

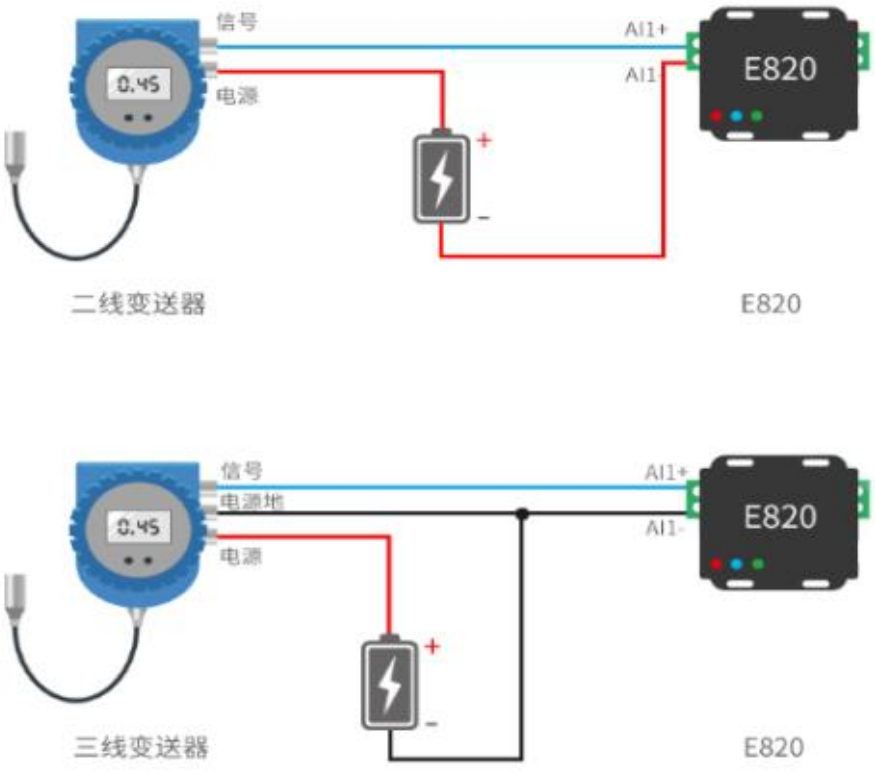
In RS485 communication, you should pay attention to matching A and B first. If you find that the communication is abnormal, try to add matching resistance between the A and B lines of the terminal device.

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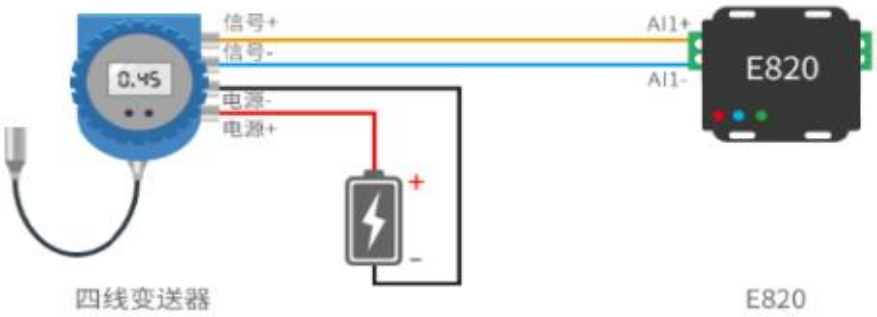


- Collection connection method



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3. Register Configuration Table

3.1 Working Mode

The operating mode is established by ModBus command (default mode 0).

Serial Number	Mode Category	AIx+	AIx-	Register AIx output value
Mode 0	Unsigned mode	5mA	AGND	0x1388
		AGND	5mA	0x1388
Mode 1	Signed Mode	5mA	AGND	0x1388
		AGND	5mA	0xFFEC78

Note: In mode 1, the highest bit (24th bit) of the register (coil) output value is the sign bit.

3.2 ModBus address table

1. Default factory settings

Modbus Address	Baud rate	Parity	Range	model
01	9600	No verification	0 - 20mA	Mode 0

2. Modbus Address Table

(1) Coil reading and writing instructions

Register address table (function code: 0x03H, 0x04H, 0x06H, 0x10H)					
Register Address	Number of registers	Register attributes	Register Type	Register value range	Support function code
300 1 3 (0x00 0C)	1	AI4 input value, unit (uA)	Read-only	0 -20000	0x03 0x04
300 1 4 (0x000D)	1	AI3 input value, unit (uA)	Read-only		
300 1 5	1	AI2 input value, unit (uA)	Read-only		

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(0x000E)					
30016 (0x000F)	1	AI1 input value, unit (uA)	Read-only		
Reserve					
40033 (0x0020)	1	Device Address	Read/Write	1 - 247	0x03 0x06 0x10
40034 (0x0021)	1	Baud rate	Read/Write	0 - 7	
40035 (0x0022)	1	Check digit	Read/Write	0 - 2	
Reserve					
40042 (0x0029)	1	Input range setting	Read/Write	0 - 1	0x03 0x06 0x10
40043 (0x002A)	1	Differential sampling output setting	Read/Write	0 - 1	

3. "03" read single register command

Use command 03 to read register values. For example, the command to read the baud rate value of the module is as follows:

01	03	00 21	00 01	D4 00
Device ModBus address	Read Command	Start reading register address	Read register length	CRC checksum

After sending the above command to the module through the serial port assistant, the module will return the following values:

01	03	02	00 02	39 85
Device ModBus address	Read Command	Read returns the number of bytes	40034 data is 2, that is, the baud rate is 9600, see the baud rate code value table for details	CRC checksum

4. "03" read multiple registers command

Use command 03 to read register values. For example, the command to read from address 40033 to address 40035 is as follows:

01	03	00 20	00 03	04 01
Device ModBus address	Read Command	Start reading register address	Read register length	CRC checksum

After sending the above command to the module through the serial port assistant, the module will return the following values:

01	03	06	00 01	00 02	00 00	BD 75
Device ModBus address	Read Command	Read returns the number of bytes	40033 data is 1, that is, the device address is 1, see the	40034 data is 2, that is, the baud rate is 9600, see	The data of 40035 is 0, no verification	CRC checksum

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			device address code value table for details	the baud rate code value table for details		

5. "06" write register command

Use command 06 to write a single command. For example, to change the baud rate to 19200, the command is as follows:

01	06	00 21	00 03	99 C1
Device ModBus address	Write Command	Write to register 40034	Write a value of 3 to 40034, corresponding to a baud rate of 19200. For details, see the baud rate code table.	CRC checksum

If the modification is successful, the module will return 01 06 00 21 00 0 3 99 C1

3.3 Modbus address code value table

ModBus Register Address Table				
address	byte	Variable Name	type	illustrate
3 0013	2	AI 4 input	Read-only	Unit: 0.001mA
3 0014	2	AI 3 input	Read-only	
3 0015	2	AI 2 input	Read-only	
3 0016	2	AI 1 input	Read-only	
40029	2	Channel 1 reference voltage	Read/Write	Default 2400, maximum 3300, minimum 2000, unit 0.001V
40030	2	Channel 2 reference voltage	Read/Write	
40031	2	Channel 3 reference voltage	Read/Write	
40032	2	Channel 4 reference voltage	Read/Write	
40033	2	ModeBus Address	Read/Write	1-250 (0xff is the monitoring address)
40034	2	Baud rate	Read/Write	See baud rate table
40035	2	Check digit	Read/Write	See the check digit table
40036	2	Lower limit register	Read/Write	0-65535 (the lower limit register must be less than the upper limit register). After setting, the conversion values of channels 1-4 will be forced to be within the upper and lower limits.
40037	2	Upper limit register	Read/Write	
40038	2	Channel 1	Read-only	The original data value

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		conversion value		converted from the analog quantity of channel 1
40039	2	Channel 2 conversion value	Read-only	The original data value converted from the analog quantity of channel 2
40040	2	Channel 3 conversion value	Read-only	The original data value converted from the analog quantity of channel 3
40041	2	Channel 4 conversion value	Read-only	The original data value converted from the analog quantity of channel 4

3.4 Baud rate code value table

Baud rate code table	
0	1200
1	2400
2	4800
3 (default)	9600
4	19200
5	38400
6	57600
7	1152200

3.5 Check digit value table

Check digit code table	
0 (default)	No verification
1	Even parity
2	Odd Parity

3.6 Input range setting

Register Value	Range
0 (default)	0 - 20mA
1	4 - 20 mA

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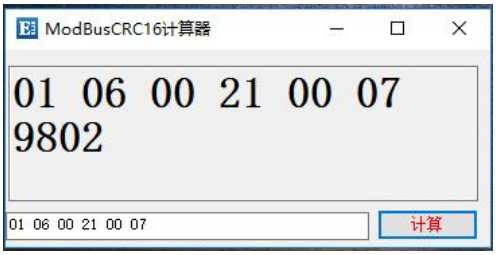
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3.7 Mode Settings

Register Value	model
0 (default)	Mode 0
1	Mode 1

5. Supporting software instructions

5.1 ModBusCRC16 calculator



In order to facilitate the use of serial port tools to debug E820-AIO on the host computer, our company provides a CRC16 calculator, which will automatically add a CRC16 checksum to the input data, but the format should be noted: if it is less than f, 0 should be added in front, such as 01, 06; each number should be followed by a space.

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6. Customized and Cooperation

- If customers need to customize products, please contact us.
- Ebyte has reached in-depth cooperation with many well-known companies.



7. Revisions

Version	Revision Date	Revision Notes	Maintainer
22	2025-05-22	Modified Versions	huaa

8. About Us

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