

# E820-DTU (212-433L)

## User Manual



This manual may be modified based on product upgrade, please refer to the latest version.

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# Content

Features.....	3
1. Quick Start.....	3
1.1 Connection.....	3
1.2 Controlling & collecting.....	5
2. Product Introduction.....	6
2.1 General parameters.....	6
2.2 Size and interface description.....	7
2.3 Reset button description.....	9
2.4 A1, A2 indicator description.....	9
2.5 DIP switch description.....	9
3. Configuration.....	9
3.1 Parameter configuration steps.....	10
3.2 Parameter and button definitions.....	11
4. ModBus.....	11
4.1 Register setting table.....	11
4.2 Command format.....	12
5. Important Statements.....	12
6. About Us.....	<b>错误! 未定义书签。</b>

# Features

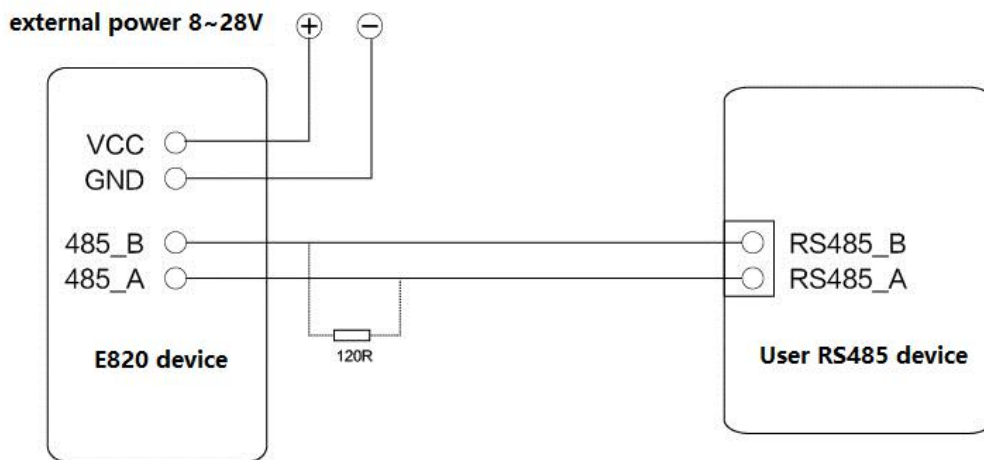
- It supports 2-channel analog quantity input, default current check;
- It supports 2-channel analog quantity output, default current output;
- It supports remote transmission of analog data via 433MHz band;
- It supports analog quantity following, controlling & collecting;
- It supports four operation modes: flowing TX, following RX, controlling & collecting and configuration;
- Controlling & collecting mode adopts Modbus RTU protocol data processing;
- It supports Reset with button, configure device address and reset to factory settings by long-pressing for 5s;
- Built-in watch-dog enables super stability;
- 3 double-color indicators indicating operating modes;
- The power source features good over-current, over-voltage, reverse connection protection functions.

## 1. Quick Start

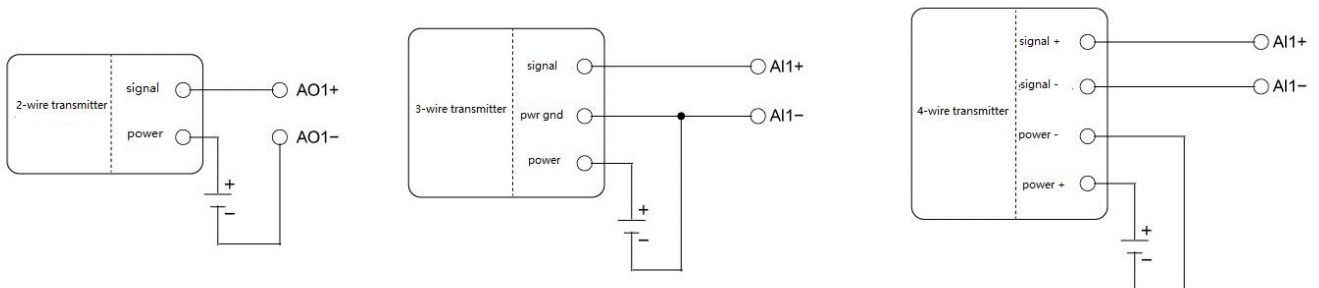
### 1.1 Connection

#### 1.1.1 RS485 connection

**RS485 Connection Chart**

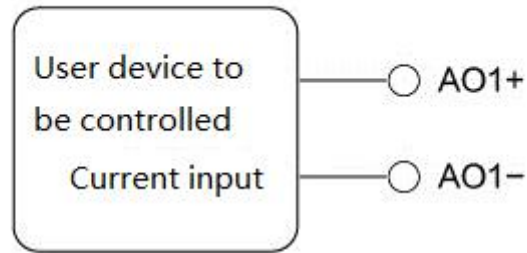


#### 1.1.2 Analog quantity input connection



**Analog Input Connection**

### 1.1.3 Analog quantity output connection



## Analog Output Conenction

### 1.1.4 Following

Preparing two units of E820-DTU (212-433L), unit A and unit B. Make sure parameters of both units are totally same (default parameters). Set operating modes by changing positions of dip switches. Set unit A as following TX mode and unit B as following RX mode. Unit A adopts analog input connection and unit B adopts analog output connection. Then unit A and unit B could realize following function.



Unit A, the transmitter, M1=0, M0=1, repower it on after configuring.



Unit B, the receiver, M1=1, M0=0, repower it on after configuring.

For example, channel 1 of unit A collects 10mA analog quantity, then channel 1 of unit B outputs 10mA analog quantity; if channel 1 of unit A inputs nothing, then channel 1 of unit B outputs nothing. When unit A transmits data for one time, indicators A1 and A2 blink for one time with blue light, when unit B receives data for one time, A1 and A2 blink for one time with green light.



Notes: Under following mode, the analog output interface of unit A does not work, and the analog input interface of unit B does not work.

## 1.2 Controlling & collecting

Prepare one unit of E820-DTU (212-433L) and one unit of E90-DTU, the devices adopt Modbus RTU protocol. Please check the following RF Channel Table and Wireless Response Time Table. Configure the E90-DTU and E820-DTU (212-433L) to same parameters.

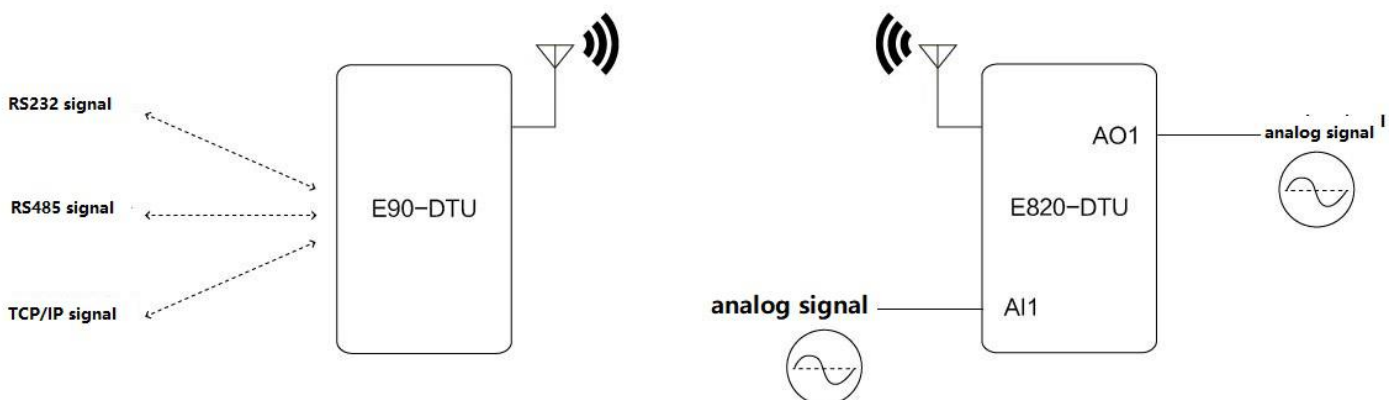
Configure the operating modes of E820-DTU (212-433L) by changing positions of the dip switches.



Controlling & collecting mode, M1+0, M0=0, repower it on after configuring.

Under collecting mode, for example, E90-DTU could read the input value of channel 1 of E820-DTU (212-433L) with command 01 03 00 11 00 01 D4 0F. If the input value is 10mA, the ideal value returned should be 01 03 02 27 10 A2 78. 0x2710H could be altered into 1000D, which represents 10.000mA.

Under controlling mode, for example, E90-DTU could read the output value of channel 1 of E820-DTU (212-433L) with command 01 06 00 41 27 C3 E2.



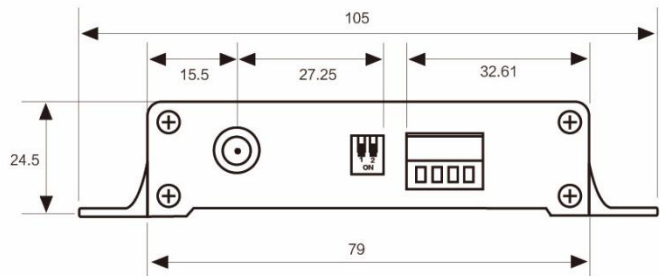
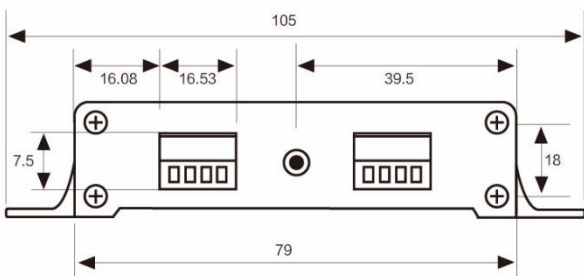
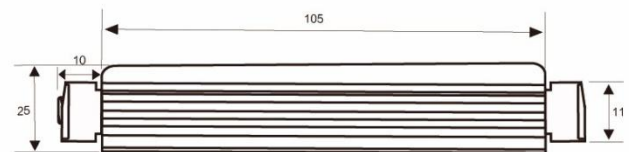
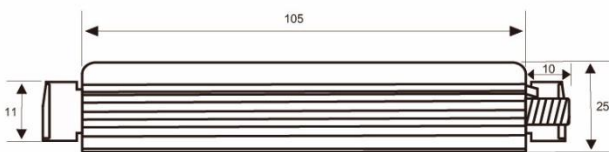
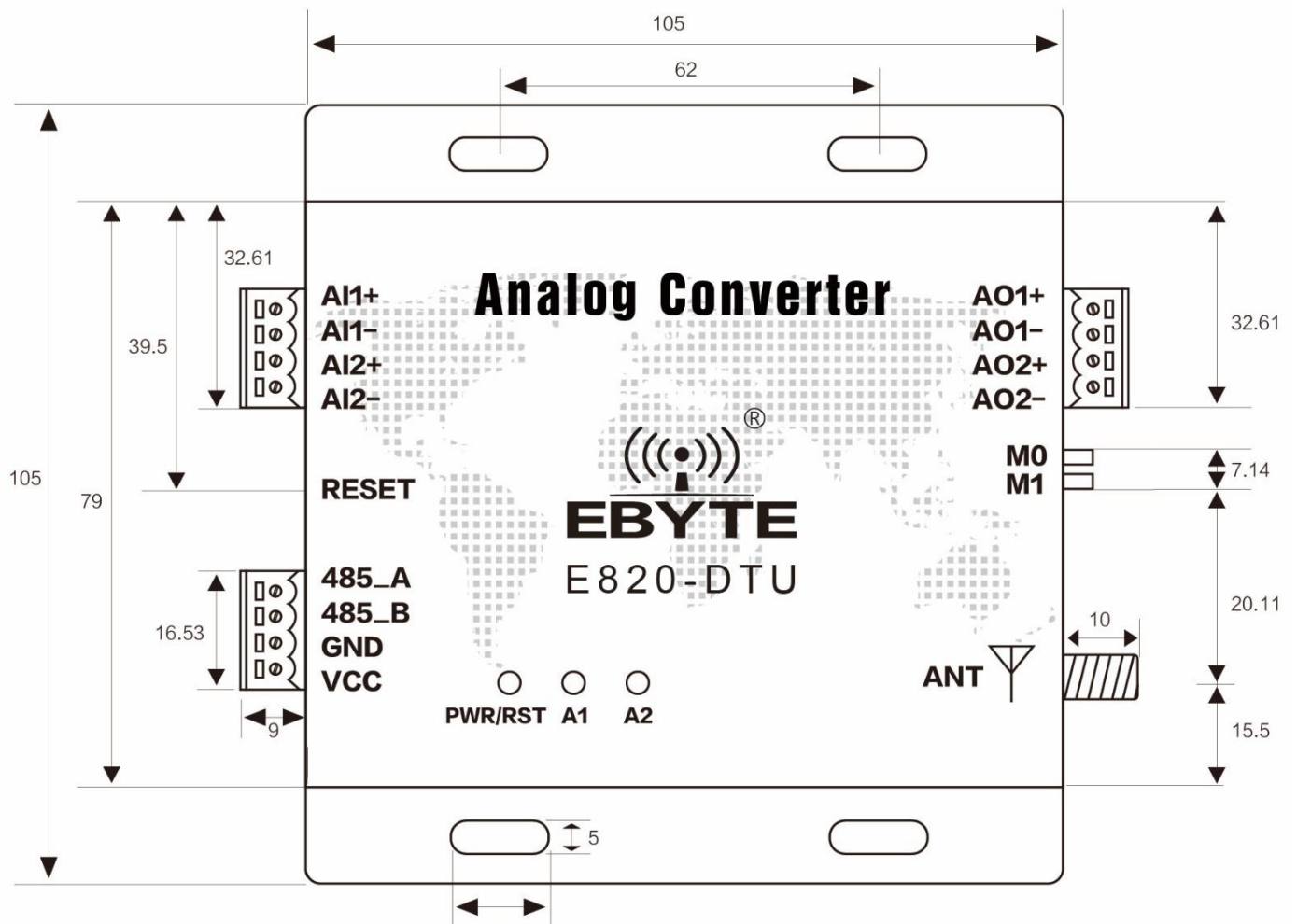
## 2. Product Introduction

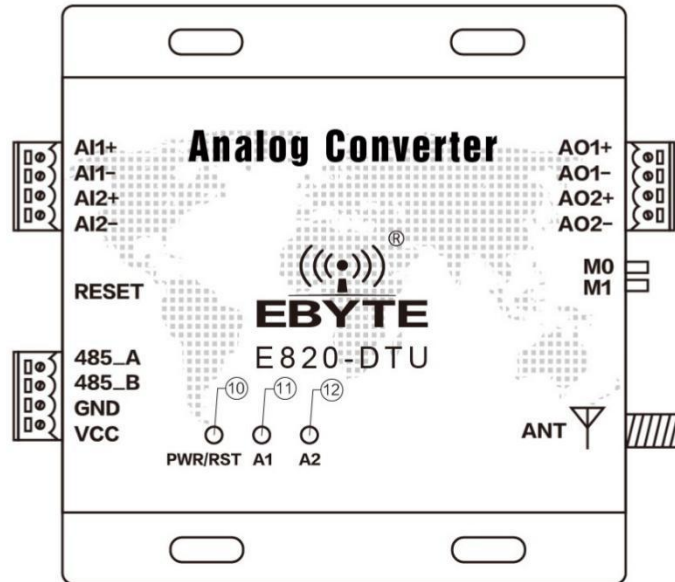
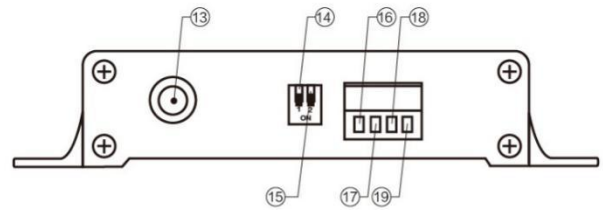
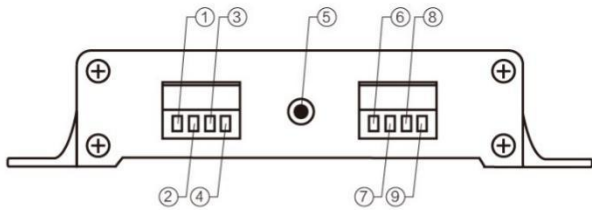
E820-DTU (212-433L) is a remote controlling device supporting analog quantity following, controlling and collecting. Under controlling and collecting mode, it supports Modbus RTU protocol. This product features easy-to use, it can be integrated into user systems so as to realize remote wireless controlling via 433MHz band.

### 2.1 General parameters

	Item	Index
<b>RF parameters</b>	Standard band	433MHz
	TX power	1W
<b>Hardware parameters</b>	Size (H*W*D)	124*105*25
	Weight	9
	Operation temperature	-20℃ ~ +70℃
	Storage temperature	-40℃ ~ +85℃
	Operation humidity	5% ~ 95%
	Storage humidity	1% ~ 95%
	Operation voltage	8V ~ 28V
	Current collecting range	0mA ~ 20mA
	Current output range	0mA ~ 20mA
	Precision	0.2%
	Data interface	RS485: 9600bps
<b>Software parameters</b>	Operation mode	Following TX, following RX, Controlling & Collecting, Configuration
	Configuration command	Modbus RTU

## 2.2 Size and interface description





No	Port and definition	Function	Description
1	AI1+	Analog signal input channel 1 positive	Analog signal input pin, forms input with AI1-
2	AI1-	Analog signal input channel 1 negative	Pair with AI1+
3	AI2+	Analog signal input channel 2 positive	Analog signal input pin, forms input with AI1-
4	AI2-	Analog signal input channel 2 negative	Pair with AI2-
5	RESET	Reset button	Reset device address by long-pressing 5s
6	485_A	RS_485 A	RS_485 A connects with device A connector
7	485_B	RS_485 B	RS_485 B connects with device B connector
8	GND	Wire pressing power input negative	Power GND
9	VCC	Wire pressing power input positive	Power input end, DC 8V~28V, 12V/24V recommended
10	PWR/RST	Power/reset successful indicator	Dual-color indicator, blue represents power, green represents reset successful.
11	A1	RF data TX/RX indicator	Dual-color indicator, blue represents data TX, green represents data RX (channel 1)
12	A2	RF data TX/RX indicator	Dual-color indicator, blue represents data TX, green represents data RX (channel 2)
13	ANT	Antenna connector	433MHz antenna
14	DIP switch	Mode selection	M1M0 (00, 01, 10, 11)
15	AO2-	Analog signal output channel 2 negative	Pair with AO-
16	AO2+	Analog signal output channel 2 positive	Analog signal output pin, forms output with AO2-
17	AO1-	Analog signal output channel 1 negative	Pair with AO+
18	AO1+	Analog signal output channel 1 positive	Analog signal output pin, forms output with AO1-

**Notes:**

Ground: suggest to ground the device case.

RS485: RS485 interface will only be used when configuring parameters under configuration mode.



## 2.3 Reset button description

Long-pressing for 5 seconds, RST indicator blinks for one time once reset successful. (only valid under following RX, controlling & collecting, configuration modes, only reset the device address as 0x01H)

## 2.4 A1, A2 indicator description

Under following or controlling & collecting mode, A1 and A2 are used to indicate the wireless data transmission.

Under following TX mode, when transmitting data, A1 and A2 blink for one time with blue light; under following RX mode, when receiving data, A1 and A2 blink for one time with green light.

Under controlling & collecting mode, when channel 1 has data interaction, A1 blinks for one time with blue light, when channel 2 has data interaction, A2 blinks for one time with blue light.

## 2.5 DIP switch description

Select operation mode by changing DIP switches position (M1 & M0, at lower position means "0"), effect after repowered.

	Mode Type	M1	M0	Definition
Mode 0	Controlling & Collecting	0	0	Wireless controlling & collecting functions
Mode 1	Following TX	0	1	Transmitter, under following mode
Mode 2	Following RX	1	0	Receiver, under following mode
Mode 3	Configuration	1	1	For configuring parameters with upper computer

## 3. Configuration

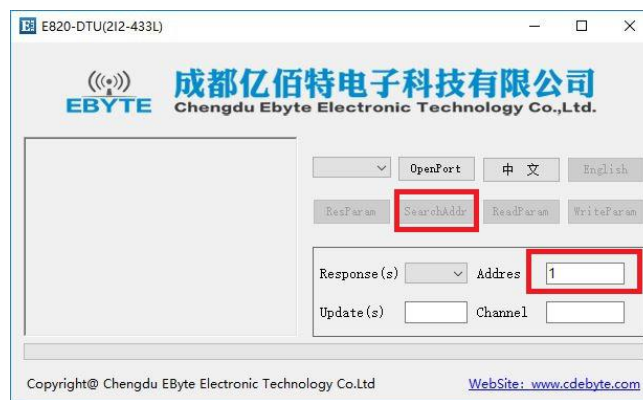


## 3.1 Parameter configuration steps

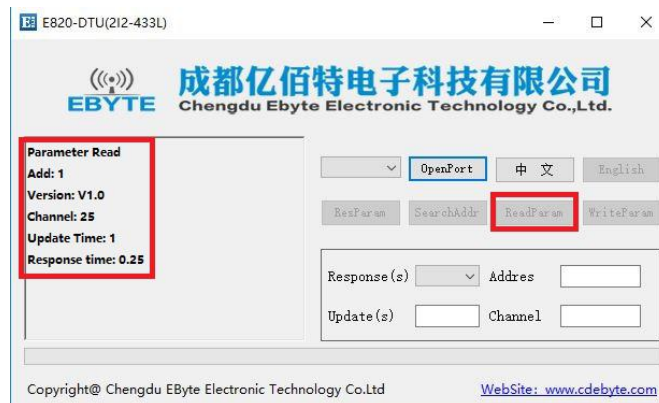
Select and open corresponding com port



Click on "SearchAddr" to search for the current device address, the address will be displayed as "1"; if device address was changed, when operating the device, please click on "SearchAddr" first.



Read parameters



Write in parameters



## 3.2 Parameter and button definitions

### Reset factory settings

Reset all parameters into default settings.

### Response time

Total 6 levels, 1.5s, 0.5s, 0.25s, 0.2s, 0.15s, 0.1s, default as 0.25s. The response time on all communication devices must be same, the longer the response time, the longer the transmission range, and the response time must be equal to or shorter than the update time.

### Update time

Valid only under following mode, the minimum update time is 0.5s and the maximum is 600s, and it can only be multiple relationship with 0.5s, such as 14.5s, 300s & etc., default as 1s. The update time means the interval of data changes of the following RX side. The update w time of all communication devices must be the same.

### Device address

The device address means the address of current device. Minimum is 1, maximum is 247, default as 1.

### RF channel

RF channel means the communication channel of current device. Minimum is 0, maximum is 31, default as 25. The channel of all communication devices must be the same.

## 4. ModBus

### 4.1 Register setting table

#### 4.1.1 ModBus address table

Other register addresses are reserved and unused in this device. The baud rate is fixed as 9600bps, parity bit is fixed as no check.

ModBus register address table				
Address	Byte	variable names	Type	Description
40018(0x0011)	2	AI1 input, real value (mA)	Read only	0 ~ 20000
40019(0x0012)	2	AI2 input, real value (mA)	Read only	
40066(0x0041)	2	AO1 output, real value (mA)	Read/write	0 ~ 20000
40067(0x0042)	2	AO2 output, real value (mA)	Read/write	
40082(0x0051)	2	Device address	Read/write	1 ~ 247
40085(0x0054)	2	RF channel	Read/write	0 ~ 31
40086(0x0055)	2	Response time	Read/write	0 ~ 5

#### 4.1.2 RF channel table

RF channel table		Corresponding channel and module address of E90-DTU	
0	0	0	0x00
1	1	1	0x01
2	2	2	0x02
29	29	29	0x1d
30	30	30	0x1e
31	31	31	0x1f

#### 4.1.3 Response time table

Response time table		Corresponding air data rate of E90-DTU
0	1.5s	300bps
1	0.5s	1200bps
2	0.25s	2400bps
3	0.2s	4800bps
4	0.15s	9600bps
5	0.1s	19200bps

## 4.2 Command format

### 4.2.1 Read a register with “03”

Use command 03 to read the register value, for example, to read channel 1 analog input value (ideally 10mA):

01	03	00 11	00 01	D4 0F
ModBus address of the device	Read command	Start to read register address	Read register length	CRC check bit

Send the above command through E90-DTU to the device, and it returns below value:

01	03	02	27 10	A2 78
ModBus address of the device	Read command	Read returned byte number	Read returned value	CRC check bit

The above 0x2710H can be altered to 10000D, that is 10.000mA (ideal value).

### 4.2.2 Read multiple registers with “03”

Use command 03 to read the register value, for example, to read channel 1 and 2 analog input value (ideally 10mA):

01	03	00 11	00 02	94 0E
ModBus address of the device	Read command	Start to read register address	Read register length	CRC check bit

Send the above command through E90-DTU to the device, and it returns below values:

01	03	04	27 10	4E 20	C5 3A
ModBus address of the device	Read command	Read returned byte number	Read returned value	Read returned value	CRC check bit

The above 0x2710H can be altered to 10000D, that is 10.000mA (ideal value).

The above 0x4E20H can be altered to 20000D, that is 20.000mA (ideal value).

### 4.2.3 Write a register with “06”

Use command 06 to write single register, for example to change the device address to 2:

01	06	00 51	00 02	59 DA
ModBus address of the device	Write command	Write into register 40081	Write 2 into register 40081	CRC check bit

Send the above command through E90-DTU to the device, and it returns below value:

01	06	00 51	00 02	59 DA
ModBus address of the device	Write command	Write into register 40081	Write 2 into register 40081	CRC check bit

If write is successful, the device address will be changed to 2.

### 4.2.4 Default parameters

Device	Address	Channel		Response time
E820-DTU(212-433L)	0x01H	0x19H		0.25s
E90-DTU		Channel	Address	Air data rate
		0x19H	0x19H	2400bps

## 5. Important Statements

EBYTE reserves the right of final interpretation and modification of all the contents in this manual.

As the hardware and software products continuously improving, this manual may subject to change without notice, please refer to the latest version.

Users who use this product need to pay attention to the product dynamics on the official website so that users can get the latest information of this product in time.

## 6. About us

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