



**EBYTE**

**成都亿佰特电子科技有限公司**

Chengdu Ebyte Electronic Technology Co.,Ltd.

# Wireless Modem

## 用户使用手册

### Ethernet Switch Quantity I/O controller

#### E830-DIO(ETH-2A)



本说明书可能会随着产品的改进而更新，请以最新版的说明书为准  
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The E830-DIO (ETH-2A) is an Ethernet digital acquisition module, 2-channel digital isolation input, 2-channel digital isolated output(NPN transistor collector open-drain output), use optocoupler and other devices to completely isolate communication from other circuits and the electrostatic protection capability reaches industry leading level. Using standard ModBus RTU communication, E830-DIO(ETH-2A ) communicate through the Ethernet. All kinds of PC configuration software, PLC and DCS can be connected by Ethernet. Users can connect with other devices through private networks or public networks to achieve remote data acquisition and control of equipment. They are widely used in various industrial fields.

## Features

**[wide operating temperature range]:** This product can work in  $-40\text{ }^{\circ}\text{C} \sim +85\text{ }^{\circ}\text{C}$ , adapting to a variety of harsh working environment. It's a real industrial grade products.

**[Power Supply Design]:** Power polarity protection, over-connection protection, increased reliability (8-28V DC).

**[ModBus protocol]:** using ModBus protocol, Q & A mode of communication, simple, cheap, versatile, easy to use.

**[communication design]:** Using Ethernet to realize transparent transmission, it is convenient and simple to set up UDP\TCP communication, and realize digital input reading and output control.

**[All aluminum alloy shell]:** All aluminum alloy shell, good EMC performance, compact size, easy installation, good heat dissipation.

**[Watchdog]:** Built-in watchdog, and precise time layout, Once abnormal occurs, the device will automatically restart.

**[Double-ended input design]:** the output is a two terminal input, which is independent of the positive and negative poles. The connection is convenient, and the input reliability is greatly improved. The real input isolation is achieved.

# 1. Electrical Parameters

No.	Name	Value	Description
1	Size	82 * 84 *25mm	Without screwing interface
2	Average weight	118±2g	Without screwing interface
3	Input channel	2 way double end digital input	6-28V input voltage difference will be valid.
4	Output channel	2 way single end digital output	NPN Transistor collector open-drain outputs.
5	Interface	2 * 4 * 3.81 mm	Screwing way
6	Power supply voltage	8 ~ 28V DC	Note: The voltage cannot be higher than 28V, or module will be destroyed.
7	Working current	40mA@24V	40mA in normal status. 54mA in data transmitting
8	Device address	0-248	0-248 are configurable , default is 1
9	Working temperature	-40°C ~ +85°C	Industrial grade
10	Isolation protection	4000V DC	Lightning strike and surge protection

## 1.1 E830 Series

Model No.	Size	Interface	Signal type	Input channel	Output channel	Protection level V DC
E830-DIO (485-8A)	82*84*25	RS485	Digital	8	8	4000
E830-DIO(ETH-2A)	82*84*25	RJ45	Digital	2	2	4000

## 1.2 FAQ

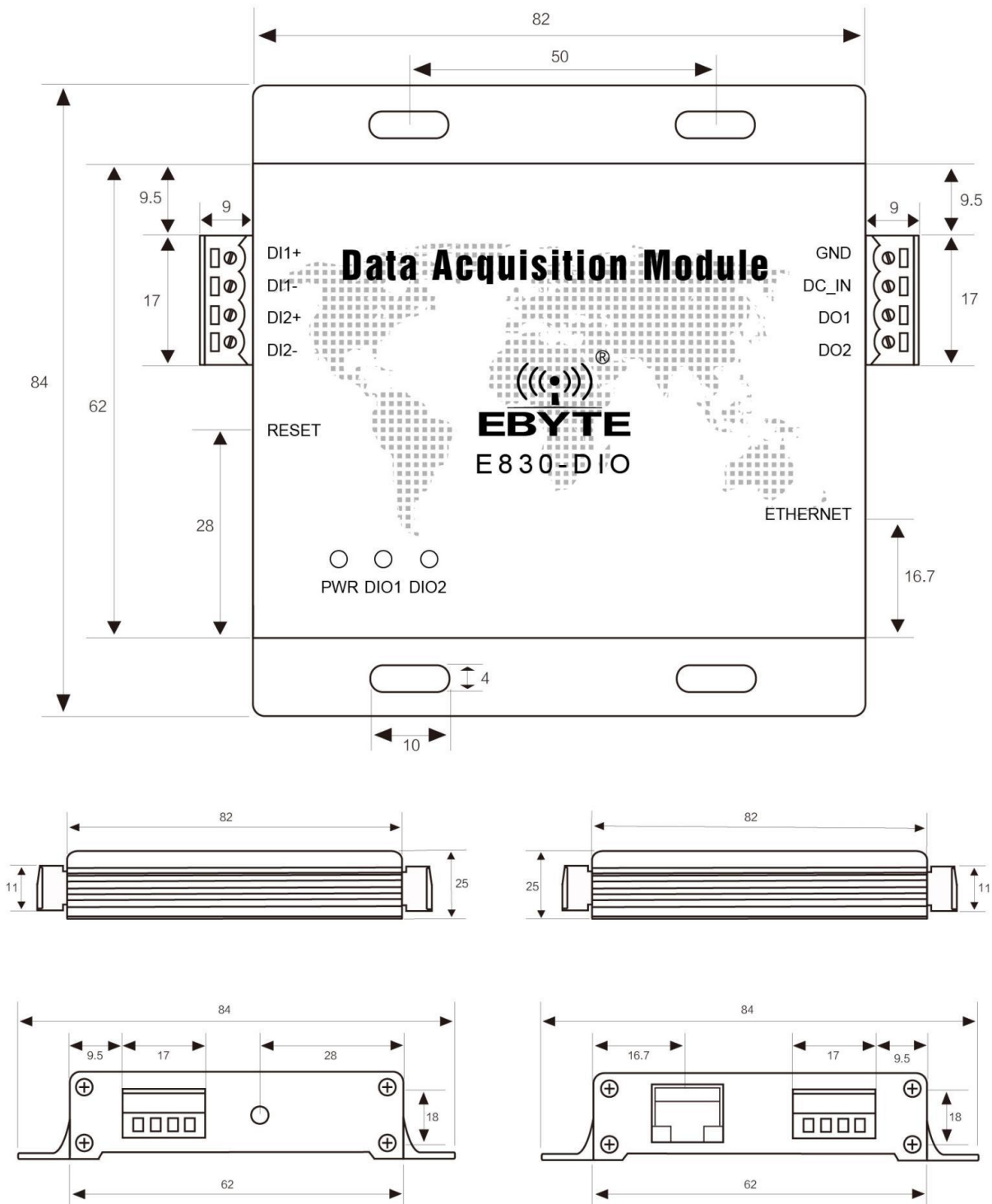
NO.	Question	Description
1	connect to network, but cannot read parameters with Modbus	Reset device reconfiguration.
2	Forget parameters	It can resume the factory settings by pressing the touch button 5S, and then reset it. This recovery is only for Ethernet parameter and MODBUS register.

### 1.3 Notes

No.	Notes	Description
1	Communication connection	If the communication mode is UDP mode, the radio device must be server and cannot be Client.
2	Input voltage	DC, not AC, DC voltage is between 8~28V : Under 8V, device won' t work , beyond 28V, device will be damaged.
3	Input channel	2 channel digital isolated input , DC input voltage difference should be 6~28V.
4	Waterproof	It is not water proof, keep it away from water or permanent damage will be caused.
5	Write register	Registers 4004 and 4005 are reserved registers and cannot be written. After a write-through error, only the reset button can be used to reset the device parameters.

## 2. Functional description

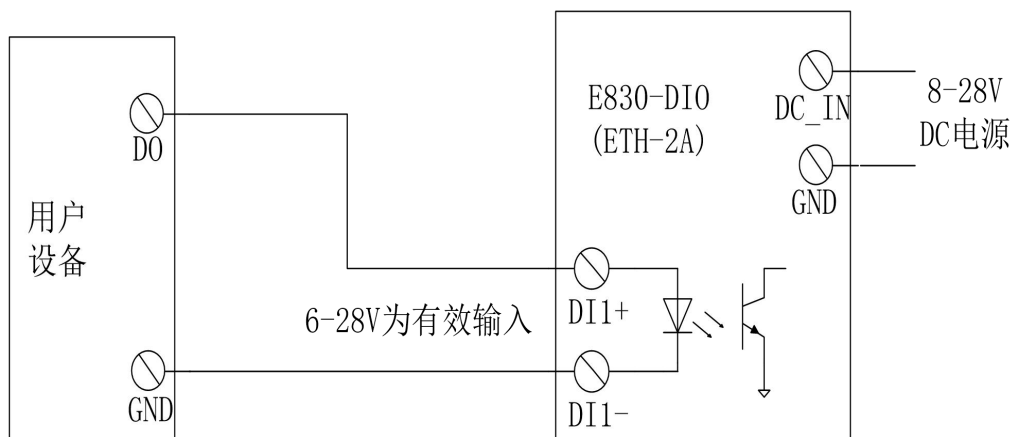
### 2.1 Pin definition



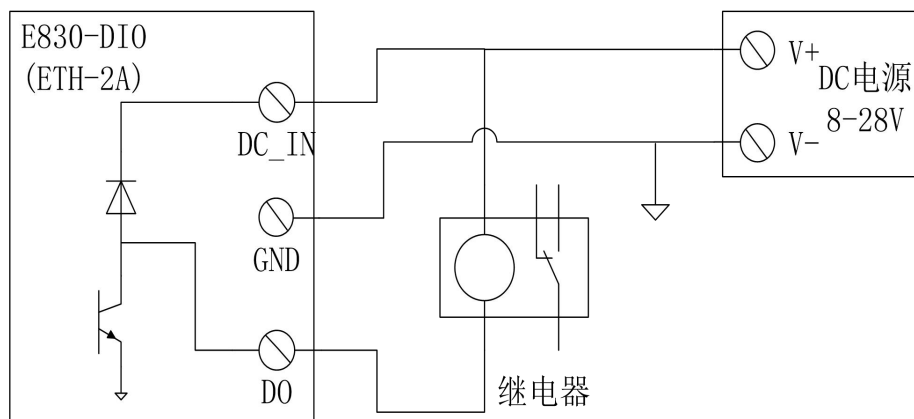
Pin	Function	Description
GND	screwing power input cathode	Ground
DC_IN	screwing power input anode	Power supply : DC8-28V , recommend 12V , 24V
DO1	digital output channel 1	NPN transistor open collector output
DO2	digital output channel 2	NPN transistor open collector output
ETHERNET	RJ45 interface	RJ45 interface with network transformer
DIO2	digital input output channel 2 indicator	It's blue when input has signal, it's green when output has signal. It's light blue when both has signals.
DIO1	digital input output channel 1 indicator	It's blue when input has signal, it's green when output has signal. It's light blue when both has signals.
PWR	Power indication	It shows red light when power working normally.
DI2-	digital input channel 2	Digital acquisition, optocoupler isolation
DI2+	digital input channel 2	Digital acquisition, optocoupler isolation
DI1-	digital input channel 1	Digital acquisition, optocoupler isolation
DI1+	digital input channel 1	Digital acquisition, optocoupler isolation

## 2.2 Connection method

### 2.2.1 Connection method for input channel



## 2.2.2 Connection method for output channel





## 3. Introduction of network basic function

### 3.1 IP address / subnet mask / gateway

1. The IP address is the identity of the module in the LAN. It is unique in the LAN and cannot be duplicated with other devices on the same LAN.

The IP address of the E830-DIO(ETH-2A) is static IP and DHCP.

#### (1) static IP

Static IP need to be set manually by users, the IP, subnet mask, and gateway also need to be written at the same time. Static IP is suitable for scenarios where IP and devices need to be counted and one-to-one correspondence.

Advantages: Access to devices that cannot automatically allocate IP addresses can be searched through the full segment broadcast mode.

Disadvantages: Different IP network segments in different LANs will not allow normal TCP/UDP communication.

#### (2) DHCP

The main function of DHCP is to obtain IP address, Gateway address, DNS server address, and other information from the gateway host dynamics, so as to avoid the tedious steps of setting up the IP address. It's suitable for those scenes that no any requirement for IP and do not force IP to correspond with the module one by one.

Advantages: Access routers and other devices with DHCP Server can communicate directly.

Disadvantages: Access the network without DHCP Serve, such as the direct connection with computer, E830-DIO(ETH-2A) won't work normally.

2. The subnet mask is used to determine the network number and host number of the IP address, showing the number of subnet, determining whether the module is in the subnet. Subnet mask must be set up, what we usually use: 255.255.255.0, The network number is the first 24 digits, the host number is the last 8 digits, and there are 255 subnets. If the module IP is within 255 ranges, the module IP is considered to be in this subnet.

3. Gateway refers to the network number of the module where the current IP address is located. If a device such as a router is connected to an external network, the gateway is the router IP address. If the setting is incorrect, the external network cannot be accessed properly. If you do not connect to the router, you do not need to set up the device.

4. Software configuration

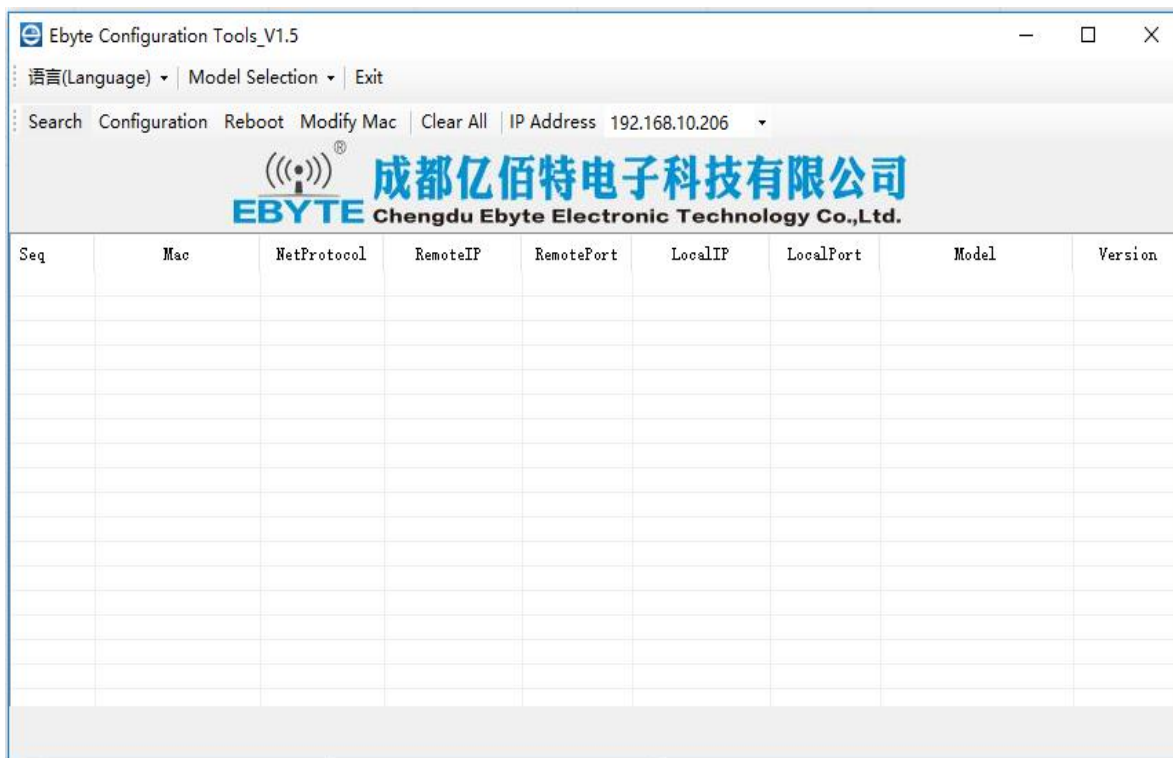


Figure 1 parameter setting software



Figure 2 parameter setting interface

## 3.2 DNS Server Address

The DNS server is mainly used to convert the domain name into a network-recognizable IP address. DNS server address can be set, the domain name can be resolved when the local domain name server is not perfect, Users can also set specific DNS server addresses as required. When the E830-DIO (ETH-2A) needs domain name resolution, it will submit a resolution request to the set DNS server. The usage is more flexible and reliable.

In Static IP mode, the default DNS host address is 61.139.2.69 and the standby DNS server address is 192.168.4.1. In DHCP mode, the DNS server address is automatically acquired. Module supports domain name server address can be set.

## 4. Socket Features

The socket working mode of E830-DIO(ETH-2A) has TCP Client, TCP Server, UDP Server, which can be set up by the host computer software. E830-DIO(ETH-2A) cannot set up as UDP Client. It's because the modbus protocol is a master-slave mode response. The setting interface is as follows:

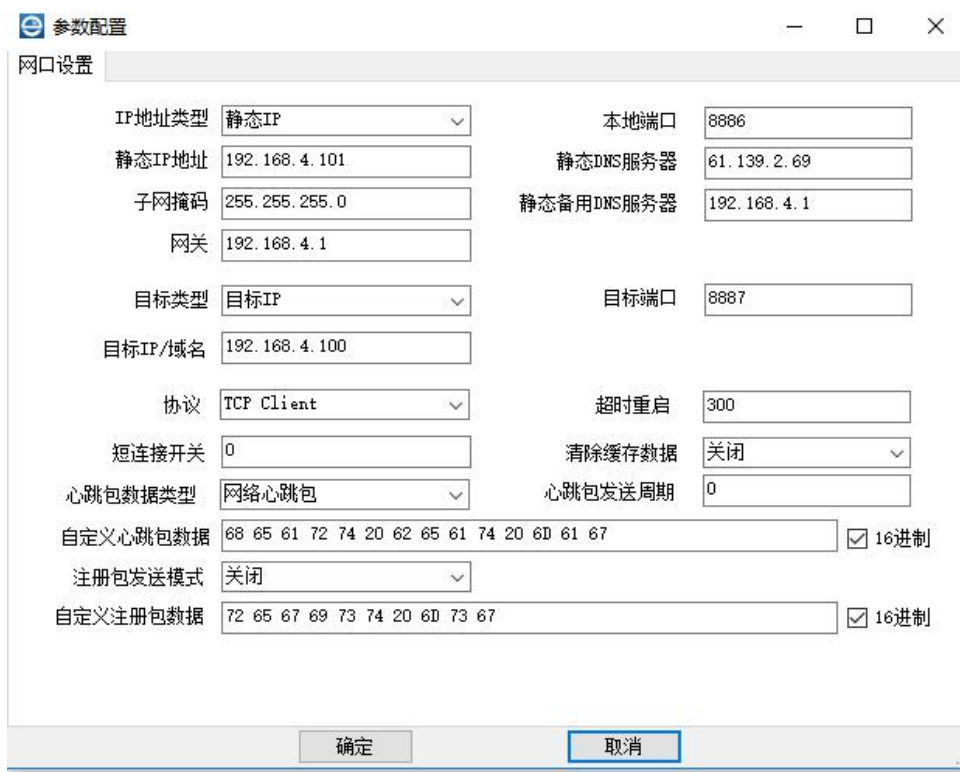
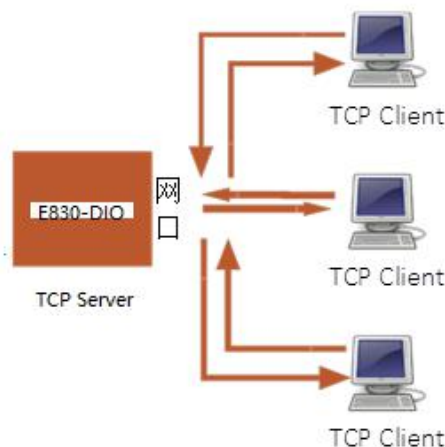


Figure 4-1 Settings interface

### 4.1 TCP Server



(1) TCP server is TCP server. In TCP server mode, E830-DIO (ETH-2A) listens to the local port, receiving and establishing a connection for data communication when a connection request is sent. After establishing the connection, the client sends the request in Modbus protocol, E830-DIO (ETH-2A) receives the response, and returns the corresponding response data to the client.

(2) Usually used for communication with TCP clients in the LAN. Suitable for scenarios where there is no server in the LAN and there are multiple computers or mobile phones requesting data from the server. As with the TCP Client, there are differences between connection and disconnection to ensure reliable data exchange.

(3) When the E830-DIO(ETH-2A) works as a TCP Server, it can accept 6 Client connections at most, the local port number is a fixed value and cannot be set to 0.

## 4.2 TCP Client

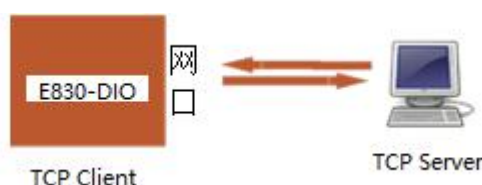


Figure 4-3 TCP Client

(1) TCP Client provides client connections for TCP network services. Initiatively initiates connection requests to the server and establishes connection to realize the interaction between serial data and server data. According to the relevant provisions of the TCP protocol, TCP Client is the difference between connection and disconnection, so as to ensure reliable exchange of data. It is commonly used for data exchange between devices and servers and is the most commonly used networking communication method.

(2) E830-DIO (ETH-2A) attempts to connect to the server in the TCP Client mode and the local port is 0, each time a random port initiates the connection.

(3) This mode supports short connection function.

(4) In the same LAN, if E830-DIO (ETH-2A) is set to static IP, please keep IP and gateway of E830-DIO (ETH-2A) in the same segment, and set the gateway IP correctly, otherwise it will not communicate properly.

### 4.3 UDP Server

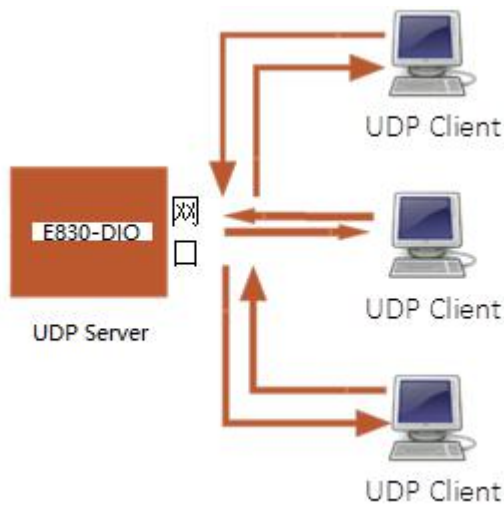


Figure 4-4 UDP Server

(1) UDP Server means that the source IP address is not verified on the basis of normal UDP. After each UDP packet is received, the target IP is changed to data source IP and port number. The IP and port number that was sent to the most recent communication when sending data.

(2) This mode is usually used for data transmission scenarios where multiple network devices need to communicate with the module and do not want to use TCP due to the high speed and frequency.

## 5. Special Function

### 5.1 Short connection

The use of TCP short connections is mainly to save server resources, which is generally applied to multi point to one scenario. The use of short connections ensures that the existing connections are useful connections without additional control means.

The TCP short connection function is applied to the TCP Client mode. After the short connection function is enabled, the message is sent. If no data is received from the serial port or network port within the set time, the connection will be automatically disconnected. The short connection function is closed by default, and the disconnection time can be set after the function is opened. The setting range is 2~255S.

### 5.2 Registration package mechanism

In transparent transmission mode, the user can choose to make the module send a registration package to the server. The registration package is designed to enable the server to identify the data source device or to access the password for the server function.

E830-DIO(ETH-2A) has 4 registration package mechanism:

>Sending MAC when connected: When the connection is established, the module sends the MAC address of the module itself to the device.

>Sending custom data when connected: When the connection is established, the module sends a user-defined data to the device.

>Each data package sending MAC: The data of each frame sent by the module is added with the MAC address of the module.

>Each data package sending custom data: User-defined data will be added before each frame of data sent by the module.

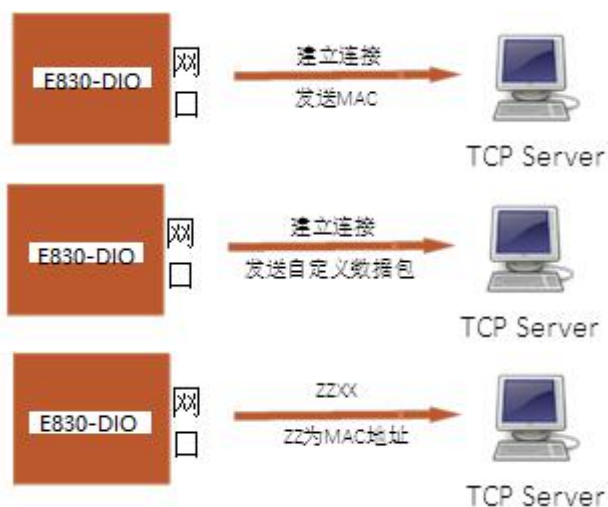




Figure 5-4 Each data package sending custom data

The establishment of connection sending packet is mainly applied to the server that needs to register. Data-carrying registration packets refers to accessing registration packets at the head of data in the sending data, which mainly for protocol transmission. The user-defined data packet defaults to hexadecimal data (ASCII code optional) and the maximum packet length is 40 bytes.

### 5.3 Heartbeat mechanism

In network transparent transmission mode, users can choose to let E830-DIO (ETH-2A) send heartbeat packets. Heartbeat packets can be sent to the web server or sent to the serial device but they cannot be run at the same time.

Network heartbeat package: sending heartbeat packets to the network, heartbeat packet data is sent to the network server to maintain the connection with the network server under the set heartbeat sending cycle, which is only valid in TCP Client mode.

Serial data packet: The module sends heartbeat packet data to the serial port under the set heartbeat sending cycle. Users can do the corresponding processing after the serial port receiving heartbeat data.

In an application where the server sends a fixed query to the device, to reduce traffic flow, the user can choose to send a heartbeat packet (query command) to the serial device instead of sending a query from the server.

The user-defined packet defaults to hexadecimal data (ASCII code optional), and the E830-DIO (ETH-2A) module supports up to 40 bytes of custom heartbeat packet content.

### 5.4 Overtime restart

Overtime restart (no data restart) function is mainly used to ensure long-term stability of E830-DIO (ETH-2A). When the network interface fails to receive data for a long time, or if the network does not receive data for a long time, E830-DIO (ETH-2A) will be restarted after the set time to avoid the impact of abnormal conditions on communication. The normal working time of this function is set to 60~65535S, default is 300s. When the setting time is less than 60S, the default setting is zero, that is, the function is turned off.

### 5.5 TCP Multi-Connection Function

The TCP multi-connection function mainly solves the problem that in the TCP Sever mode, the user has multiple clients to connect E830-DIO (ETH-2A) and send and receive data at the same time. Working as TCP server, E830-DIO (ETH-2A) can create up to 6 connections at the same time. TCP server will send data to multiple (not more than 6) TCP Client on the connection simultaneously. When the number of established connections exceeds 6, the old connection established at the beginning is automatically disconnected, ie, the old connection is kicked.



## 6. Register Configuration Table

### 6.1 ModBus address table

#### 1. Coil output description

Coil output (Function code: 0x01H、0x05H、0x0FH)						
Address	Parameters	Length	Read/Write	Min. value	Max. value	description
00001	DO1	1	Read/Write	0	1	The status of digital output is 1
00002	DO2	1	Read/Write	0	1	The status of digital output is 2

#### 2. Discrete input instructions

Discrete input (Function code: 0x02H)						
Address	Parameters	Length	Read/Write	Min. value	Max. value	description
10001	DI1	1	Read only	0	1	The status of digital output is 1
10002	DI2	1	Read only	0	1	The status of digital output is 2

#### 3. Hold register description

Hold register ( Function code: 0x03H、0x06H )						
Address	Parameters	Length	Read/Write	Min. value	Max. value	description
40001	DI ( 1~8 )	2	Read only	0	0xff	Reading the status of eight digital inputs
40002	DO ( 1~8 )	2	Read/Write	0	0xff	Reading and writing the status of eight digital inputs
40003	Device address	2	Read/Write	0	248	1(default)
40006	Function option	2	Read/Write	0	1	0 ( Output coil control, input discrete input ) 1 ( Input and output register control ) default value
40007	Status control	2	Read/Write	0	1	0 ( Output pulse signal maintains 5s ) 1 ( The output signal has been maintained ) default value
40008	Version information	2	Read only	0	1	Year+month

## 7. Instruction format

### 7.1 “03” read single register command

Using the 03 command to read the register value. For example, the command to read the input port 40001 value of the module is as follows:

01	03	00 00	00 01	84 0A
ModBus address of device	Read command	Start to read register' s address	Read register' s length	CRC check code

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

01	03	02	00 00	B8 44
Modbus address of device	Read command	Read the returning bytes	DI value , see more details in maintain registers	CRC check code

### 7.2 “06”Write a register command

Use the 06 command to write a register value, such as writing a 40002 port output register:

01	06	00 01	00 01	58 75
ModBus address of device	Write command	Write registers' address	Write register's value	CRC check

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

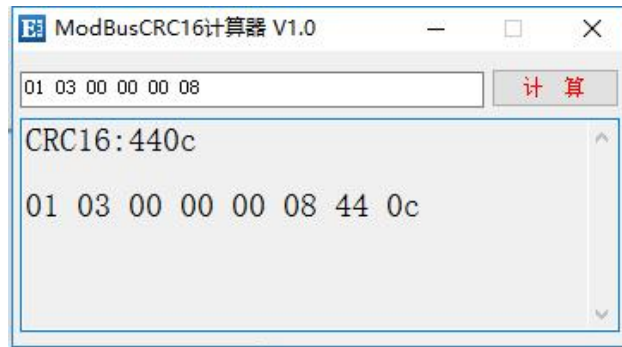
01	06	00 01	00 01	58 75
ModBus address of device	Write command	Write registers' address	Write register's value	CRC check

### 7.3 Factory default

Device address	Function option	Status control	DO output value	Version information
01	00 01	00 01	00 00	17 12

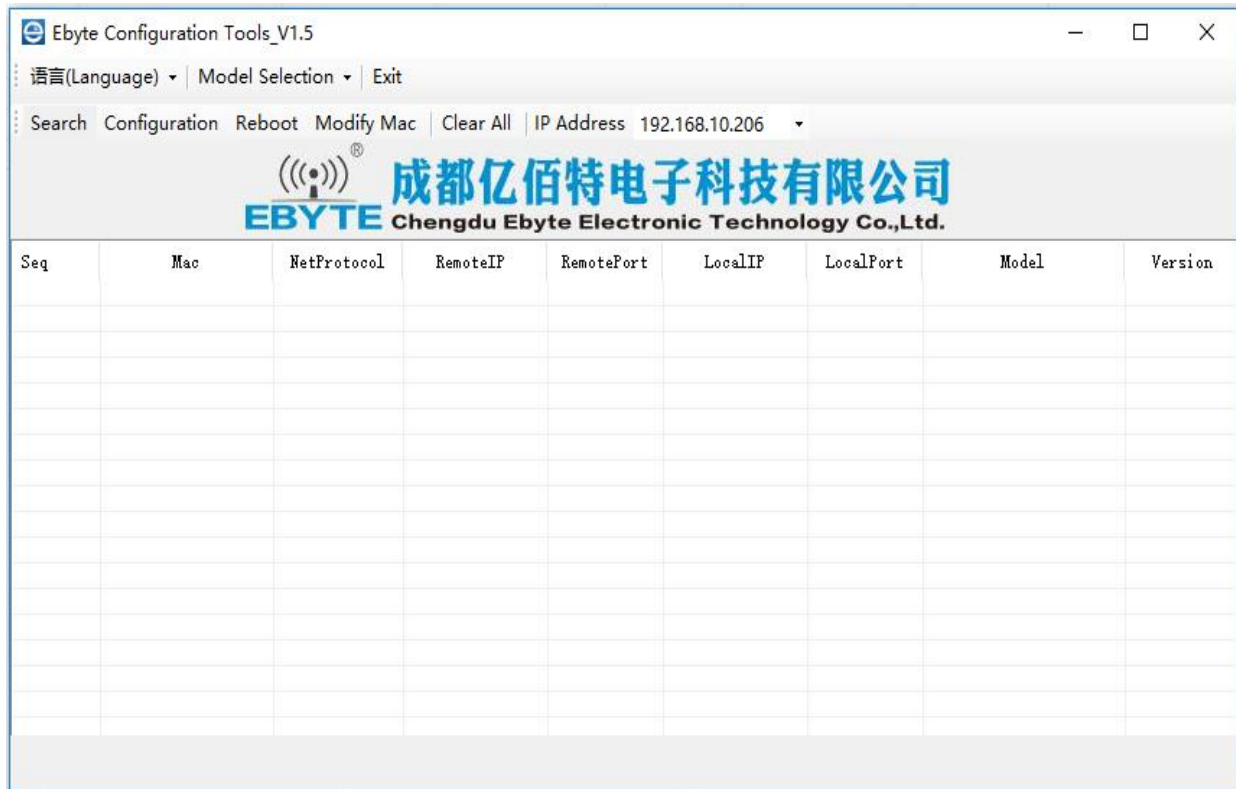
## 8. supporting software instructions

### 8.1 MoBusCRC16 calculator



To facilitate the use of serial port tools to debug E830-DIO (ETH-2A), our company will provide CRC16 calculator, which will automatically add CRC16 check code after input data.

### 8.2 Network Configuration Host Computer



If users forget the device parameters, press the reset button 5S-10S to reset the device configuration parameters. After reset, users need to reconfigure the network parameters and modbus register parameters.

## 9. Important Statement

1. CDEBYTE reserves the right of final interpretation and modification of all the contents of this manual.
2. As the hardware and software products continuously improving, this manual may subject to change without notice, please refer to the latest version.
3. Everyone is responsible for protecting the environment: to reduce the use of paper, we only provide electronic documents of the English manual, if necessary, please go to our official website to download.

## 10. Revision history

Version	Date	Description	Issued by
1.00	2018/04/16	Initial version	huaa

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CDEBYTE after-sales technical support: [support@cdebyte.com](mailto:support@cdebyte.com)

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Tel: +86-28-61399028 ext. 812

Fax: 028-64146160

Web: [www.cdebyte.com/en/](http://www.cdebyte.com/en/)

Address: Innovation Center D347, 4# XI-XIN Road, Chengdu, Sichuan, China