THiNGET

INDUSTRIAL ETHERNET MODULE
## TBOX
Manual

XINJE ELEC. CO., LTD

CONTECTS

1、INTRODUCTION

1. Brief introduction

Modbus protocol is industrial protocol which has become open style, supported by many manufactures and used widely. Modbus protocol has become the first choice by manufactures who intend to use data communication protocol. Modbus/RTU protocol defines the serial protocol on how to real time read or write one or many values by the main station. Although Modbus is not the most powerful protocol, but it is simple enough and flexible, it can be used at any industrial field. Modbus/TCP protocol is the expansion of Modbus/RTU protocol. It defines Modbus/RTU protocol how to transfer and apply in TCP/IP network. Modbus/TCP is the same flexible as Modbus/RTU protocol.

Modbus protocol TBOX can support Modbus/RTU serial port device to connect with the Ethernet, in this way to support Modbus/TCP protocol. In graph, we listed the application format of Modbus；
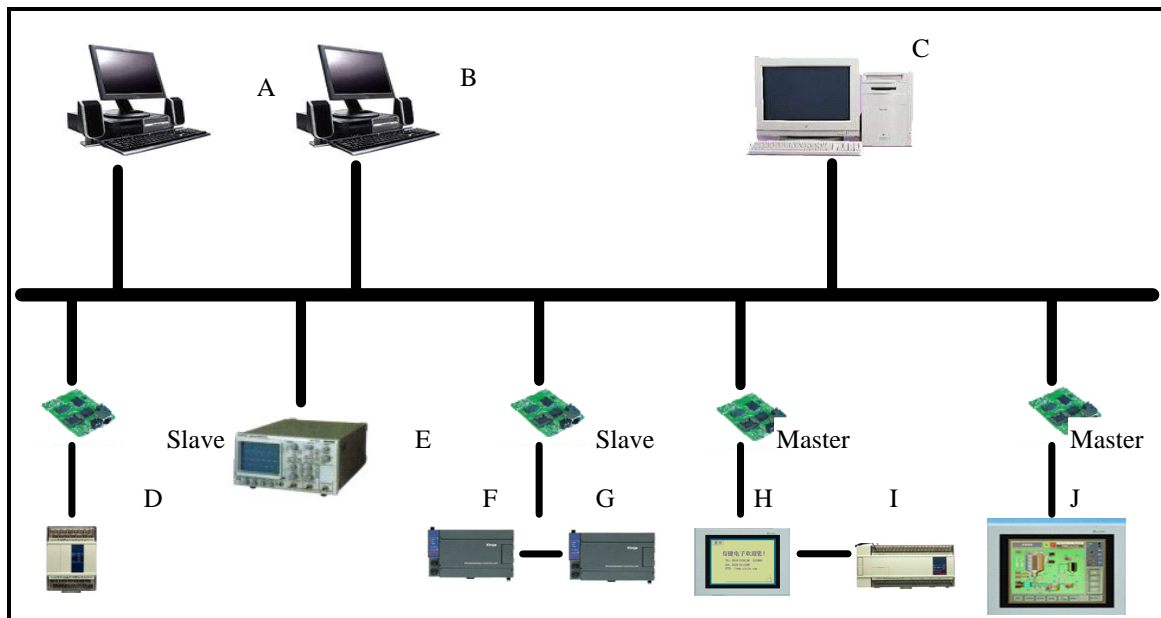
In the above graph, we can see 4 types of modbus working format, Modbus/RTU device could be divided into two types:

Modbus slave stations：usually used in industrial field device, can keep on working. Such as flow-meter、temperature control device、humidity control etc. The slave stations always negatively waiting for the master station to require them report data or accept new data from the master station.

Modbus master stations：they are usually some work stations or PC，run "human machine interface" edit tool to monitor、regulate、maintain the slave stations

The master stations always initiatively send the information, require the slave stations to response.

● Communication between Modbus/TCP master station and Modbus/TCP slave station

Device A，B，C，E　are the newest devices which support Modbus/TCP protocol. The 4 devices can all be master stations or slave stations. A，B can both treat E as slave station, real time get the information. Meanwhile, C can be master station, require E to offer the data. Also，E can also treat A and B as the slave station. The traditional Modbus/RTU alternate require format needs the slave station to offer data only after required, no matter how serious warning occurs at that time. The new Modbus/TCP protocol solved the preceding problem, which brings the traditional Modbus protocol new life. TBOX can convert the traditional Modbus protocol to be Modbus/TCP protocol.

● Communication between Modbus/TCP master and Modbus/RTU serial slavers
Devices D，F，G are traditional Modbus/RTU slave stations. D adopts dot to dot RS232 communication format. In this format, there could be a master station to communicate with them. But TBOX changes D to be Modbus/TCP slave stations. All devices which support Modbus/TCP like A，B，C，E can at the same time share information of D. Because the traditional Modbus/RTU protocol require the device to be master or slave, so D can be only the slave device.

Device F, G are different with D. They share one same RS485 bus, in order to make them slave of Modbus/RTU.
However, after using the TBOX，A,B,E,F can share the information of F,G.

● Communication between serial Modbus/RTUmaster and Modbus/TCP slaves
Devices H，J are traditional Modbus/RTU master stations. However, TBOX convert H，J as Modbus/TCP master station. All the Modbus/TCP devices in the network become Modbus/RTU slaves of H, J. Something to note, the traditional Modbus/RTU requires H，J to be only masters. So Modbus/TCP master can not see H，J as Modbus/TCP slaves.
Besides, H as Modbus/RTU master, can also connect Modbus/RTU slave device I via RS485.

● Modbus/RTU master and Modbus/RTU slave
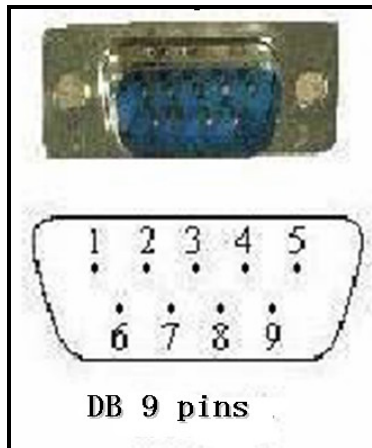Finally, master H，J can also read information Modbus/RTU slave D，F，G, just like they are connected on RS-485 bus.
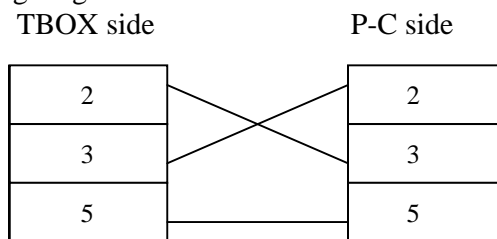
2、COM AND DISPLAY

2-1 *SERIAL COM*
COM RS232 and RS485 (terminal A & B)
RS232 has 9 pins，as the following picture show：

2	TX
3	RX
5	GND

COM232 wiring diagram：

TBOX side   P-C side

TBOX side	P-C side
2	2
3	3
5	5

You have two methods to connect our Tbox with the PLC:
Method 1: You can connect the Tbox with the cable (PC-XC-CAB) I sent you!!!
Method 1: You can connect Terminal "A" on Tbox with terminal "A" on PLC, connect Terminal "B" on Tbox with terminal "B" on PLC

2-2 *NET COM*

RJ45 Standard

Ethernet RJ45 definition:

No.	Line color	Signal meaning	Direction
S1	Orange white	TXD+	Output
S2	Orange	TXD-	Output
S3	Green white	RXD+	Input
S4	Blue	-	-
S5	Blue white	-	-
S6	Green	RXD-	Input
S7	Brown white	-	-
S8	Brown	-	-

Please connect this port with HUB. Make the cable according to your requirement

2-3 *POWER SUPPLY*

Input power supply：Terminal board 24V DC (24V+、GND)

2-4 *PUSH BOTTOM*

ON

1	2	3	4

OFF

Bottom NO.	State and Function
1	OFF = MATER；ON = SLAVE
2	OFF = Timing sign in；ON = Timing sign in closed

3	OFF = Settled IP (192.168.0.111); ON = IP settled according to others
4	OFF = Distribute IP by DHCP；ON = DHCP Closed

Please configure the buttons to fulfill your requirement

2-5 *LED DISPLAY*

LED	Indication	Function
PWR	Power Supply	Lighting = power on
LINK	Ethernet link	Lighting = connected normally
ACT	Ethernet Data reception	Flashing = receiving data
COM	Serial COM indication	Flashing = connected
IP	IP detection	Lighting = IP conflict
ERROR	Fault diagnosis	Lighting = received data from serial COM checkouts CRC wrongly. (Close when the next serial data turns normally)

3、 PARAMETER SETTING

Please set the parameter following the following instructions

3-1 *IP DISTRIBUTION*

All the equipments used in the TCP/IP net should have exclusive IP address, the same as TBOX.
TBOX has three origins of IP address:
A- Settled IP;
B-IP distributing by DHCP;
C-IP specified by user （not A/B).
PRI：A > B > C.

A: Settled IP
 Unknown TBOX IP address, we can choose settled IP setting.
 IP Address：192.168.0.111
 Subnet mask：255.255.255.0
 Default gateway：192.168.0.1
 Default DNS：192.168.0.1

B: IP distributing by DHCP
 Distributing by DHCP is as distributing by PC.
 Necessary：DHCP server in the net
 Suggest：It is not recommended to use.

C : IP specified by user （not A\B）
 IP address, Subnet mask, Default gateway, Default DNS
 （normally thought as Default gateway）

3-2 *TBOX PARAMETERS*

1）Modbus slaver No. list on the TBOX serial COM side
 Under the MATER mode, we can stop transcending the commands, which send from the
 master to slave equipments.
 Under the SLAVE mode, we can list the serial Modbus slave equipments.
2）Position of Modbus slave equipments in the net
 (Salver equipment No.：IP) （ MASTER mode peculiar）
 NOTE：to TBOX which works under MASTER mode and the following modbus device, the
sent command will be disposed with the following order:
 For example, directly abandon in "the connected modbus slave device ID table"
 Check the user set （ slave device's ID：IP） table，if exist, then send directly to the
 correspond station
 If not fit, then TBOX broadcasting this station's position. In the condition of fits, TBOX will
response the connected modbus device, after receiving the response, send the command to this
station.
3）TBOX SLAVE mode shield table：

correspond with the above C：when not received broadcasting enquiry station ID, TBOX is under slave mode, when the enquiry station ID is within"modbus slave device station table" but not in"SLAVE mode shield table", reply the asker, which has this station's modbus slave device!

4）Choice of net protocol（MATER mode peculiar）

In the mode of MATER, TBOX can choose net protocol when communicating.

UDP：High efficiency and high speed

TCP：the sent or response data has good stability.（as it contains confirmation device）, but it occupies more resource.

5）Net Setting：IP address, Subnet mask, Default gateway.

6）Serial COM setting：baud rate, data bit, parity bit, stop bit, send delay (SLAVE mode peculiar).

here, TBOX corresponds its following"modbus slave device",which equals"modbus master device", after receiving the following slave device's response, send the next message immediately. The following slave device may not available to tell the difference of command and response, which leads to lose this command bag.7）TBOX long-distance signing in function

(For the maintenance of long-distance equipments)

The IP address and COM of long-distance server 1 & 2 are normally suggested the default settings.

When long-distance signing in, the ID and password are set by the user. Exclusive ID and password couple is necessary, or it will cause conflicts in the list of server.)

NOTE: Normally opening the long-distance sign in bottom can save net width and TBOX sources.

Please read it carefully, connect it correctly and configure it according to your requirement, you needn't compile any program via XC-PLC software, just connect and configure!!!