

***GW110X series
Modbus Gateway User Manual***

Version 1.0.1, Nov 2015

Shenzhen 3onedata Technology Co., Ltd

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Statement

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Revision History

Version No.	Date	Reason
V1.0.0	2015-07	Creating Documents
V1.0.1	2015-11	Added document content

Notes

In reading this manual, please pay attention to the following symbols,



: Information necessary to explain.



: Special attention.

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Chapter 1 Summarize

1.1 Introduction

GW110X series products are MODBUS gateway device. The series products include GW1101-1D(RS-232), GW1101-1D(RS-485), GW1102-2D(RS-232), GW1102-2D(RS-485), GW1104-4D(RS-232), GW1104-4DI (RS-485), GW1108-8D(RS-232) and GW1108-8DI (RS-485) eight models, which are used as a connection between Modbus TCP and Modbus RTU/ASCII devices. The series products are provided 1/2/4/8 port RS232 (RJ45 connector) or RS485/422 (terminal block) and 1 port 10/100M Ethernet.

Modbus TCP, Modbus RTU and Modbus ASCII protocol are integrated in the series of products, users can easily realize the seamless integration of Modbus Ethernet devices and Modbus serial devices and even multi master and slave hybrid networks. At the same time, the user can be set up by Web or Telnet. The simple design can not only realize the fast application, but also guarantee the application of the entire real environment.

The series of products using EMC protection design. Power has over current, over voltage protection, and can work in rugged environment. The design supports wall mounting installation, easy to use for your projects.

1.2 Product Features

- Support 1/2/4/8 serial port (RJ45 interface or terminal interface)
- Support 1 port 10/100M Ethernet
- 300bps~115200bps baud rate and nonblocking communication
- Support Modbus TCP, Modbus RTU, Modbus ASCII, IP, ARP, DHCP, DNS protocol
- Slave mode support 16 TCP master connections
- Master mode support 32 slave TCP connection requests
- Support RTU Slave, RTU Master, ASCII Slave, ASCII Master four operating modes
- Support Response Timeout / Interval Timeout setting
- Support ID mapping function, to achieve the management of the host ID
- Support Telnet and Web, and other forms of configuration
- Support IP address and MAC address filtering function
- Support gateway, cross route communication
- Support for cascading functions, convenient connection
- IP30 grade protection, metal shell, wall mounted installation
- Working temperature is -40~75°C

Chapter 2 MODBUS Protocol Overview

2.1 Protocol Description

Modbus was originally developed for the PLC module in the application of industrial automation and manufacturing control. It has now become one of the most common open standard protocols. When data communication is needed, the Modbus is the only choice for the end user and the integrator. Although this protocol is not the strongest of the existing protocols, its rare simple design not only to achieve rapid application, but also to ensure the flexibility of all practical industrial environment applications. The communication mode of Modbus can be ASCII, RTU or TCP/IP. GW110X series products are supported by serial (Modbus/RTU or Modbus/ASCII) and Modbus (Modbus/TCP) protocol communication, or Modbus serial devices based on TCP/IP network.

Modbus/RTU and Modbus/ASCII protocol defines how to query 1 or more "slave devices", and write real-time data from RS-232, RS-422, or RS-485 serial data communications. The simple design not only can realize the fast application, but also ensures the flexibility of the application of the entire real industrial environment.

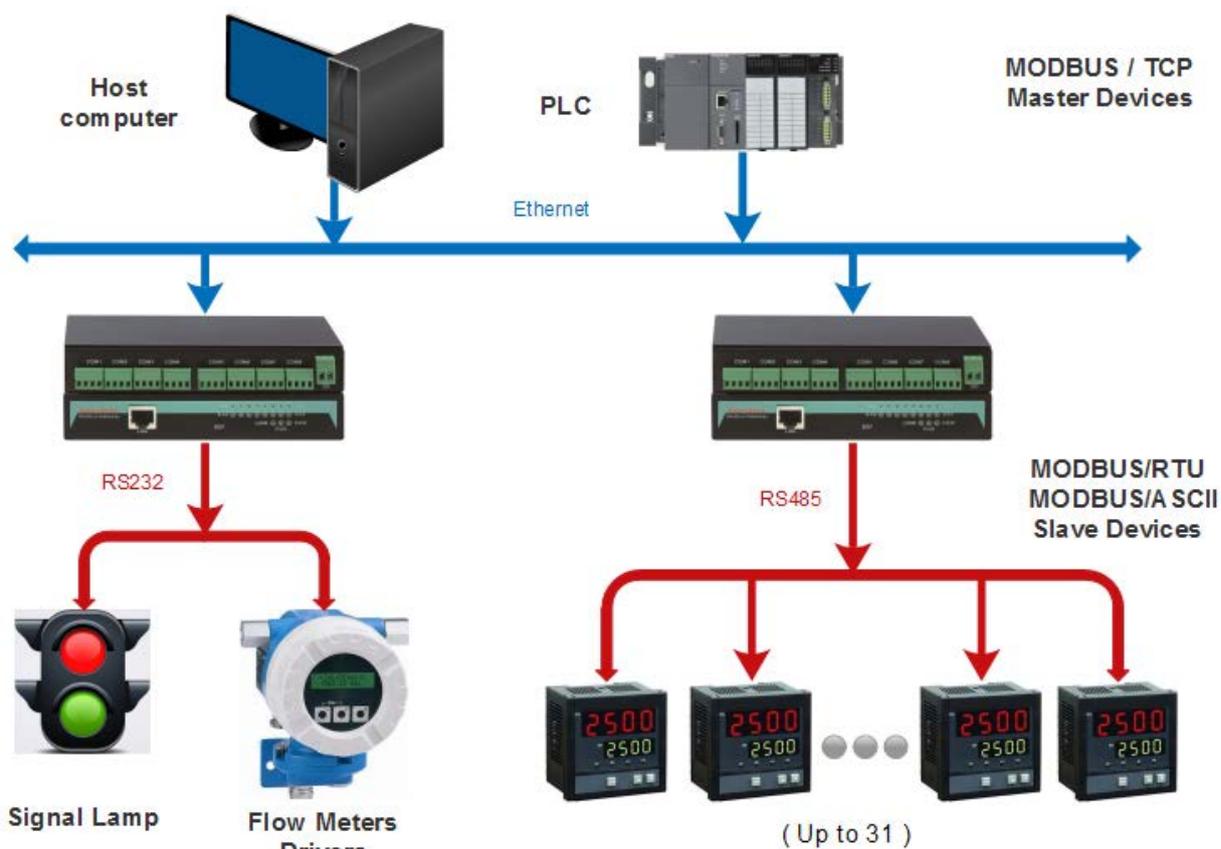
In the Modbus network communication, the protocol defines how each controller knows its device address, the information received, and decides what action to take, and extracts all data or other information contained in the information. If you need to reply, the controller will write the reply message and send out the Modbus protocol.

When the controller uses "master device-slave device" mode to communicate, there is only one device (master device) which can initiate the inquiry command. Other devices (slave device) to reply to the required data to the master device, or the action required to respond to the request. Typical master devices include the main processor and the programming panel. Typical devices include programmable controllers.

The master device may transmit information to the slave device alone or send a broadcast message to all from the slave device. On the other hand, the slave device can respond to the command of the master device alone. The master device broadcast information does not need to reply.

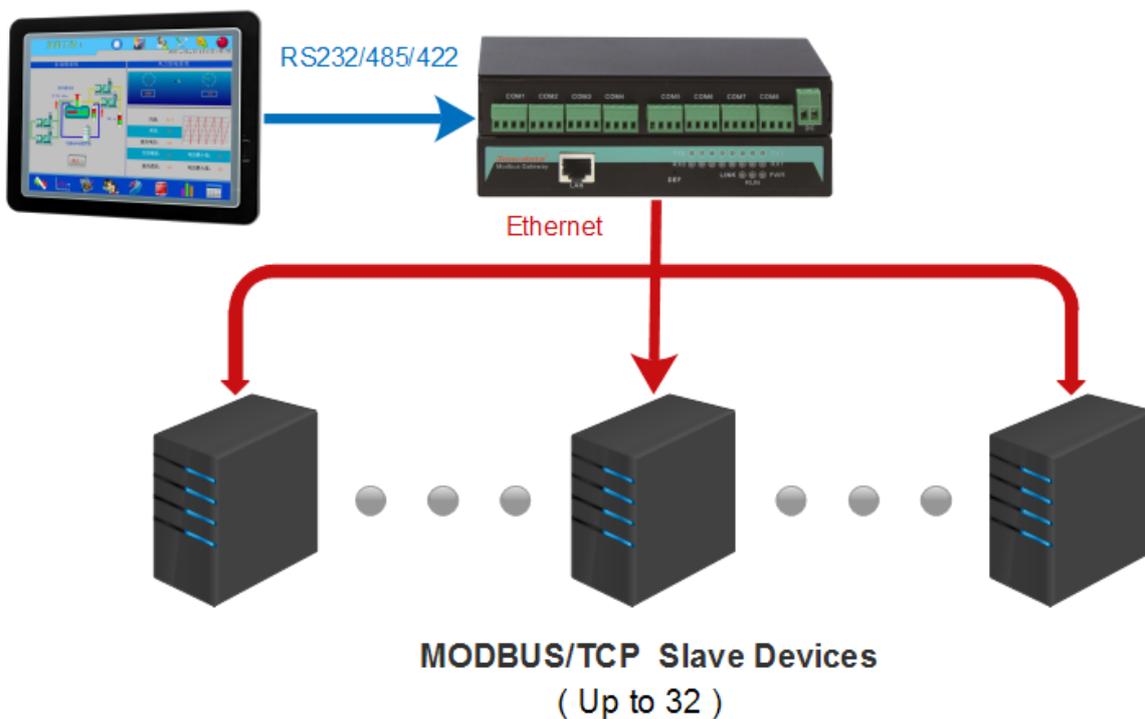
The master device of the Modbus protocol is asked to have a fixed format, which includes a device (or broadcast) address, a function that defines a request for action, encoding, any sending data, and an error inspection area. The reply information from the device is also written in Modbus protocol, which includes the confirmation of the action area, any reply data and the error inspection area. An error occurs when receiving a message, or from an action that is unable to respond to the device, the device will write an error message and send it as a reply message.

The basic system framework is as follows:



(Modbus basic framework Figure 2.1.1)

MODBUS Master



(Modbus basic framework Figure 2.1.2)

2.2 Modbus RTU

Modbus/RTU and Modbus/ASCII protocol defines how to query 1 or more "slave devices", and write real-time data from RS-232, RS-422, or RS-485 serial data communications.

When using RTU mode, the information of every 8 bytes containing two 4bit hexadecimal character. The main advantage of the model is the same baud rate the larger the character density makes the number of the data output is more than the ASCII mode. However, each message must be in continuous transmission.

2.3 Modbus ASCII

When using ASCII mode, the information of every 8 bytes to 2 ASCII characters to send. The main advantage of the ASCII model is that the characters can allow up to 1 second without a mistake.

Comparison between Modbus RTU and Modbus ASCII		
type	RTU	ASCII
Encoding system	8 bit binary	Hexadecimal
	The information in each ASCII character contains 2 hexadecimal characters	The information in each ASCII character contains 1 hexadecimal characters
Each byte	1 start bit	1 start bit
	8 data bits	7/8 data bits
	1 parity bits	
	No parity check	No parity check
	If there is a parity check for 1 stop bits	If there is a parity check for 1 stop bits
	If there is no parity check for 2 stop bits	If there is no parity check for 2 stop bits
Error check	CRC	LRC

2.4 Modbus TCP

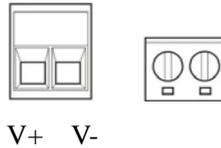
As a new extension of Modbus/TCP, the Modbus/RTU protocol defines how Modbus/RTU information is transmitted via TCP/IP network in the network or through the TCP/IP network. Modbus/TCP is as simple and flexible as before Modbus/RTU. The Modbus/TCP protocol is determined by the Modbus request or response. That is, the Modbus request or the corresponding data to the TCP architecture, the Modbus/TCP protocol has a 6 byte header field.

Modbus/TCP can carry out Modbus information transmission in the TCP/IP protocol. Modbus/TCP is the most suitable for the PLC or I/O module and other simple domain or I/O network connection.

Chapter 3 Hardware Description

3.1 Interface Description

3.1.1 Power Input



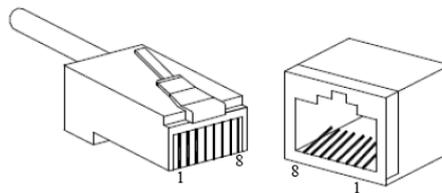
The rear panel of the series product is provided with 2 bits power input terminals for DC power supply and the input range is 9~48VDC.

3.1.2 Communication Interface

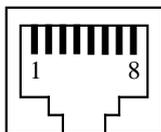
The series products support 1 Ethernet ports and 1/2/4/8 serial ports (RJ45 or terminal interface).

10/100Base-T(X) Ethernet port

The 10/100BaseT(X) ports located on GW110X series front panel. Pin definition of the RJ45 port as shown in the following figure. Connect by UTP or STP. The connect distance is not more than 100m. 100Mbps is used 120Ω of UTP. 10Mbps is used 120Ω of UTP 3, 4, 5.



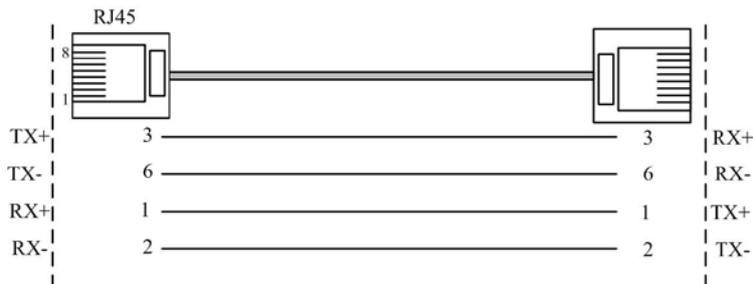
RJ45 port support automatic MDI/MDI-X operation. It connects the PC, Server, Converter and HUB by straight-through cable wiring. Pin 1, 2, 3, 6 Corresponding connection in MDI. 1→3, 2→6, 3→1, 6→2 are used as cross wiring in the MDI-X port of Converter and HUB. 10Base-T is used in MDI/MDI-X, the definition of Pin in the table as below.



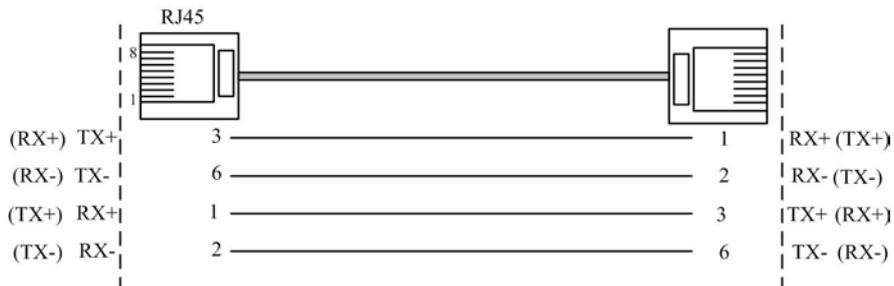
pin	MDI signal	MDI-X signal
1	TX+	RX+
2	TX-	RX-
3	RX+	TX+
6	RX-	TX-
4, 5, 7, 8	—	—

Note: “TX±” transmit data±, “RX±” receive data±, “—”not use

MDI (straight-through cable)



MDI-X (Cross over cable)



MDI/MDI-X auto-adapt function can let user did not think about the type of Ethernet cable when use GW110X series 10/100M Ethernet interface, the series product can connect device through straight-through cable or cross over cable directly.

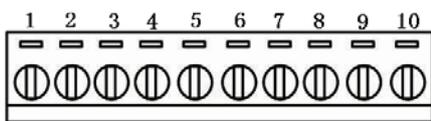
Serial port connection

GW1101 series RS-485/422 port provides 5 bit industrial terminal block. The PIN defines is as follows:



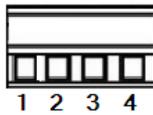
PIN	RS-485 PIN define	RS-422 PIN define
1	D+	T+
2	D-	T-
3	GND	GND
4	--	R+
5	--	R-

GW1102 series RS-485/422 port provides 5 bit industrial terminal block. The PIN defines is as follows:



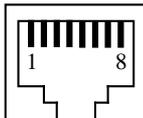
Serial port	PIN	RS-485 PIN define	RS-422 PIN define
COM2	1	--	R-
	2	--	R+
	3	GND	GND
	4	D-	T-
	5	D+	T+
COM1	6	--	R-
	7	--	R+
	8	GND	GND
	9	D-	T-
	10	D+	T+

GW1104/GW1108 series RS-485/422 provides separation distance 3.81mm, 4 bit industrial terminal block. The PIN defines is as follows:



PIN	RS-485 PIN define	RS-422 PIN define
1	D+(A)	T+
2	D-(B)	T-
3	/	R+
4	/	R-

GW110X series RS232 adopts RJ45 connector, the PIN defines is as follows:



PIN	PIN define	Description
1	TXD	Transmit data
2	RXD	Receive data
3	CTS (Optional)	Clear to send
6	RTS (Optional)	Request to send
8	GND	Signal ground

3.1.3 LED Indicator

The LED indicator on the front panel of Modbus gateway series can indicate the running system and the operation status, which makes it easy to find and solve problems, the specific meaning of indicator are shown in the table.

System LED statuses		
LED	Indicator	Description
PWR	ON	Power is connected/Function natural
	OFF	Power is disconnected or function nu-natural
RUN	Flashing	System Running steadily
	OFF	System did not run or running un-steadily
	ON	System Running un-steadily
LINK	ON	Ethernet port connect successfully
	Flashing	Ethernet port has data transmission
	OFF	Ethernet port connect unsuccessfully
RX (1/2/4/8)	OFF	None data receive
	ON/Flashing	In receiving data
TX (1/2/4/8)	OFF	None data transmit
	ON/Flashing	In transmitting data

3.1.4 Factory default

GW1101/GW1102 series provide DIP switch for factory default.



Top panel provide 4 bit DIP switch to set function(ON is effective), 1, 3, 4 is hold, 2 is factory default, if you change the DIP switch statue, please power off and power on.

GW1104/GW1108 series provide reset button for factory default.



DEF: restore the factory settings button, press and hold the DEF button, disconnect the power supply and then give the device to power up, continue for about 5 seconds to restore the factory settings.

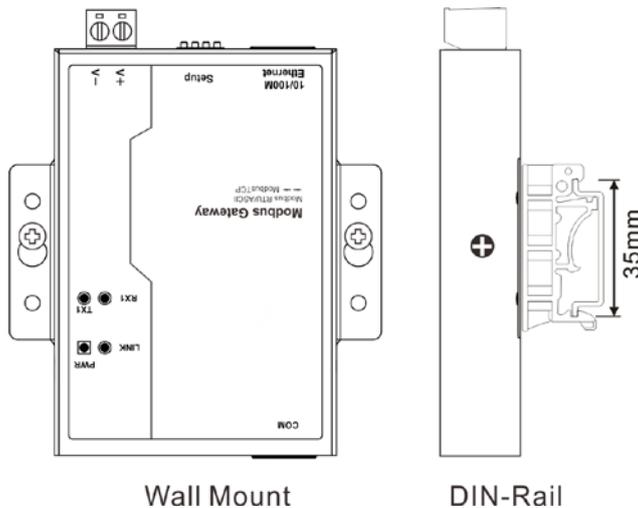
3.1.5 Device installation

Before installation, confirm that the work environment meet the installation require, including the power needs and abundant space.

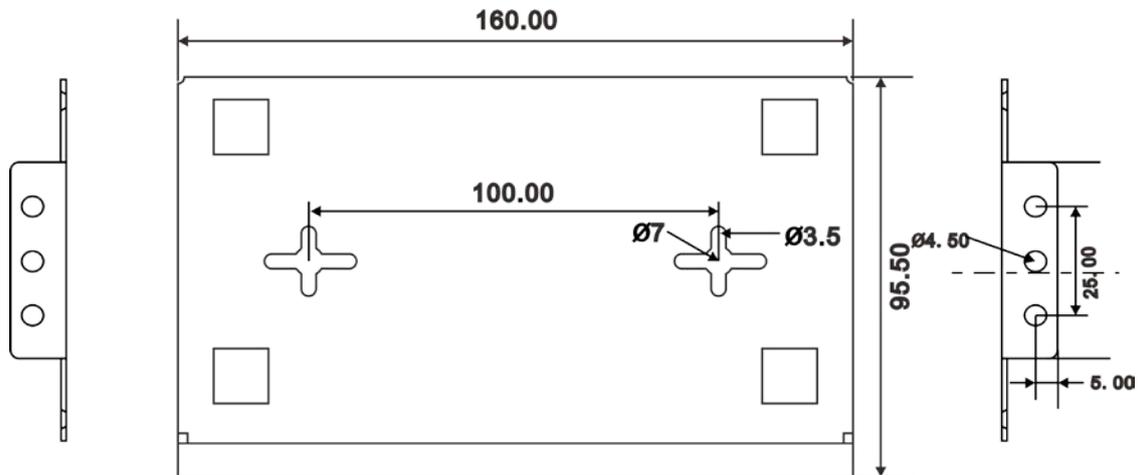
1. Avoid in the sunshine, keep away from the heat fountainhead or the area where in intense EMI.
2. Examine the cables and plugs that installation requirements.
3. Examine whether the cables be seemly or not (less than 100m) according to reasonable scheme.
4. Screws, nuts, tools need to be prepared in advance of your own.
5. Power requirements: 9~48VDC
6. Environments: Working temperature: -40~75°C

Working humidity: 5% ~95%

GW1101/GW1102 series:



GW1104/GW1108 Series:



Wiring Requirements

Cable laying need to meet the following requirements:

1. It is needed to check whether the type, quantity and specification of cable match the requirement before cable laying.
2. It is needed to check the cable is damaged or not, factory records and quality assurance booklet before cable laying.
3. The required cable specification, quantity, direction and laying position need to match construction requirements, and cable length depends on actual position.
4. All the cable cannot have break-down and terminal in the middle.
5. Cables should be straight in the hallways and turning.
6. Cable should be straight in the groove, and cannot beyond the groove in case of holding back the inlet and outlet holes. Cables should be banded and fixed when they are out of the groove.
7. User cable should be separated from the power lines. Cables, power lines and grounding lines cannot be overlapped and mixed when they are in the same groove road. When cable is too long, it cannot hold down other cable, but structure in the middle of alignment rack.
8. Pigtail cannot be tied and swerved as less as possible. Swerving radius cannot be too small (small swerving causes terrible loss of link). Its banding should be moderate, not too tight, and should be separated from other cables.
9. It should have corresponding simple signal at both sides of the cable for maintaining.

3.2 Appearance and Dimension

Appearance:

GW1101-1D (RS-232)-P (9~48VDC)



GW1101-1D (RS-485)-P (9~48VDC)



GW1102-2D (RS-232)-P (9~48VDC)



GW1102-2D (RS-485)-P (9~48VDC)



GW1104-4DI (RS-485)-P (9~48VDC)



GW1104-4D (RS-232) - P (9~48VDC)



GW1108-8DI (RS-485) -P (9~48VDC)

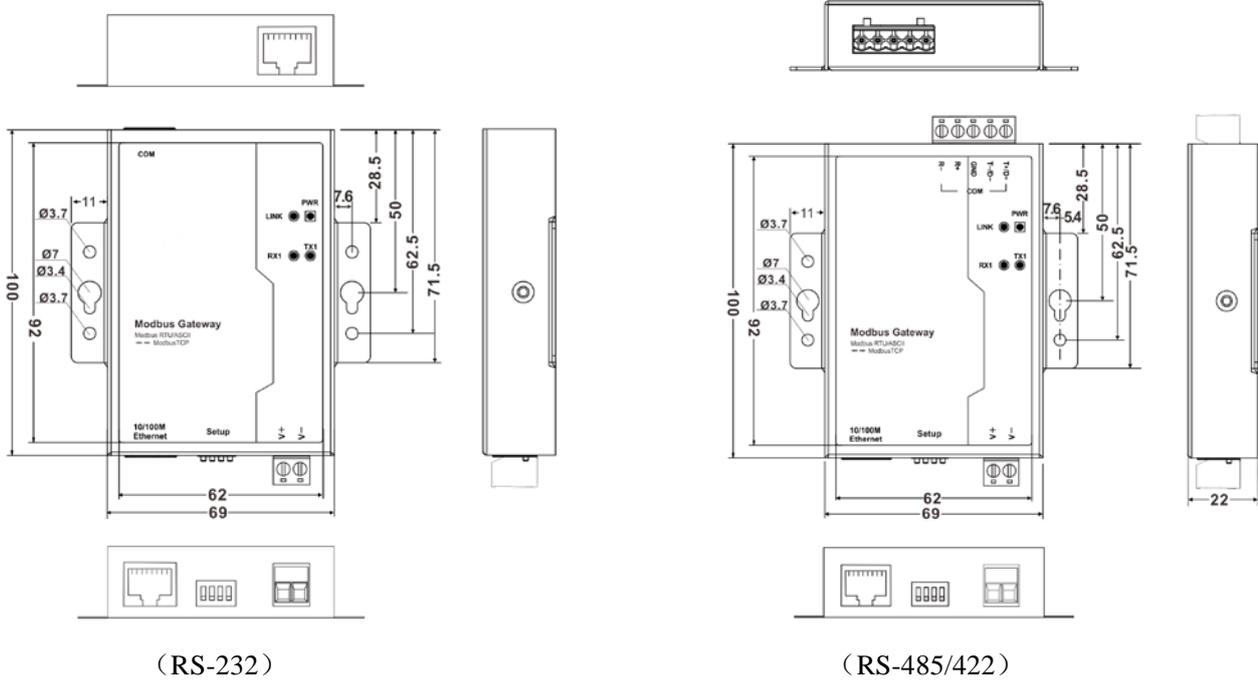


GW1108-8D (RS-232) - P(9~48VDC)

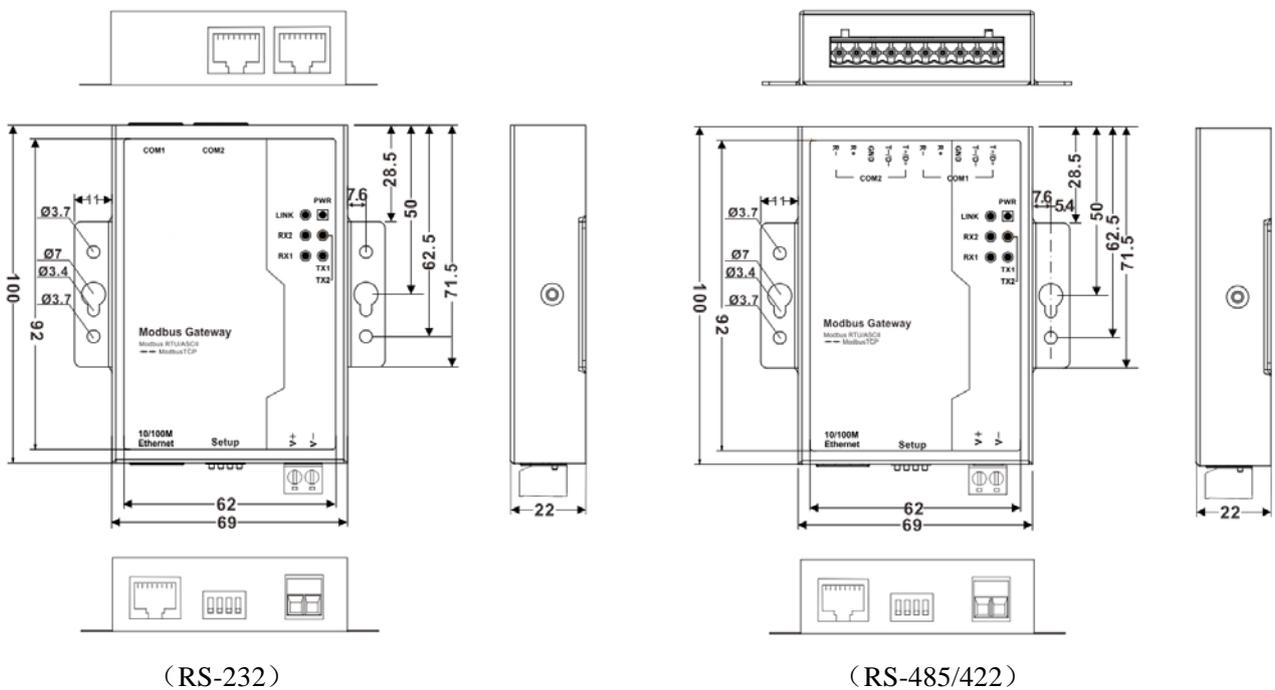


Dimension (Unit: mm)

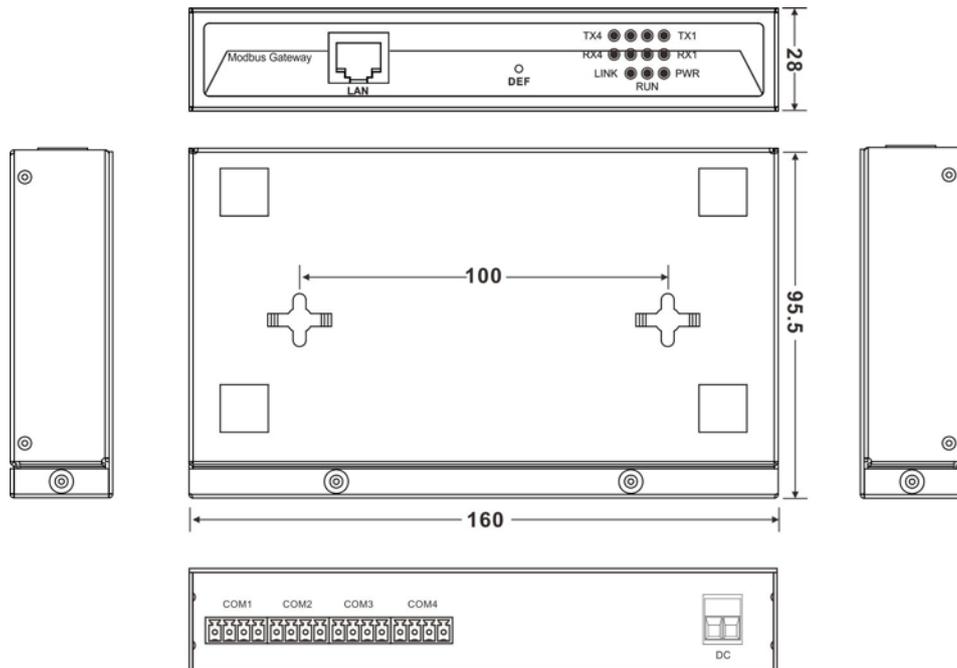
GW1101 series:



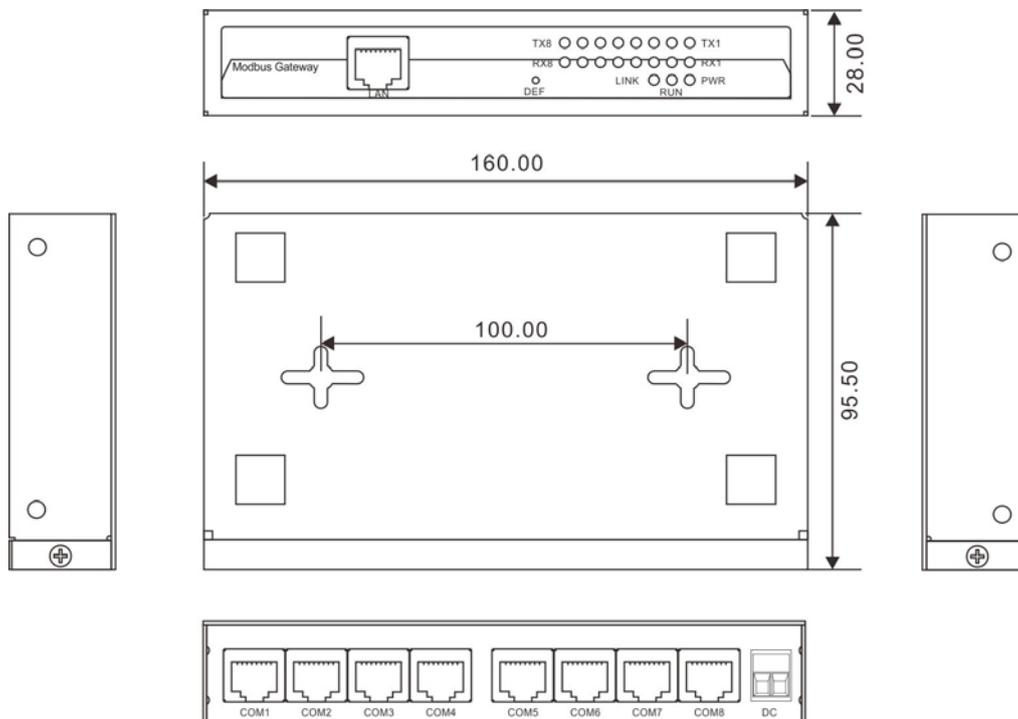
GW1102 series:



GW1104 series product structure size (Length * Width * High) is the same, only the interfaces are not the same:



GW1108 series product structure size (Length * Width * High) is the same, only the interfaces are not the same:



Chapter 4 Packing List

The first time use this product, please check the packaging is intact or not and the attachment is complete or not at first.

Item	Quality
MODBUS Gateway Device	1pcs
User manual	1pcs
CD	1pcs
Warranty card	1pcs
Certificate of quality	1pcs

Chapter 5 Telnet Management Function

The product can access, configuration and management through Telnet, the next will be a brief introduction to the function. For more information, please check “GW110XT series CLI user manual”.

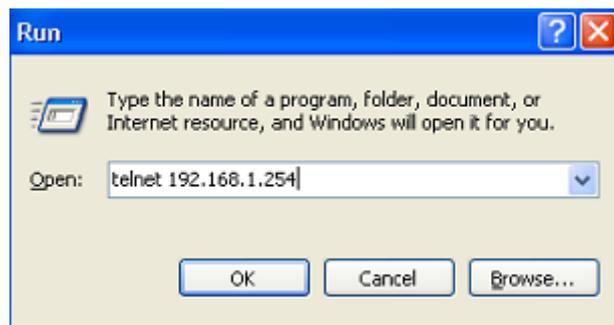
5.1 Configuration through Telnet

Terminal device use telnet connect to GW110X series through PC, the requirements are as follows:

1. The IP address of GW110X series, can get it by search or modify (Use IP command under the system management view);
2. If PC and GW110X in the same local area network, the IP address must in a same network segment, otherwise, PC and GW110X must cross-router.

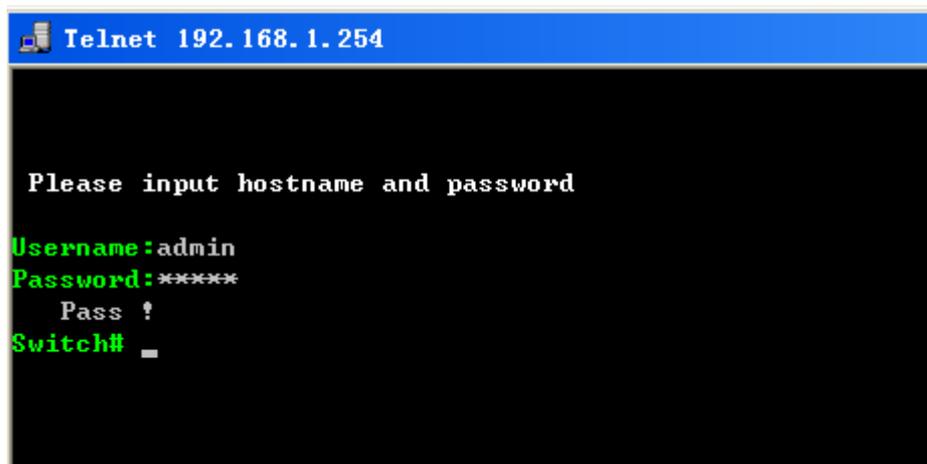
If satisfied these two requirements, can use telnet access to GW110X series, and then configure the GW110X.

- 1) Establish configuration environment, just connect PC's Ethernet port connect to GW110X's Ethernet port through Local area network
- 2) Before access GW110X series through Telnet, need to input “**Telnet** + Space + GW110X's **IP address**” for checking, Figure 5.1.1 as follows:



(Figure 5.1.1)

- 3) Hit “Enter”, checkout successful and till PC show “Please input hostname and password”, ask user to input user name and password, default is admin, figure 5.1.2 as follows:



(Figure 5.1.2)

4) Use command to configure GW110X series and check the running statuses, if need help, please input“?” at any time. Specific configuration command, please reference“GW110X series CLI user manual”.

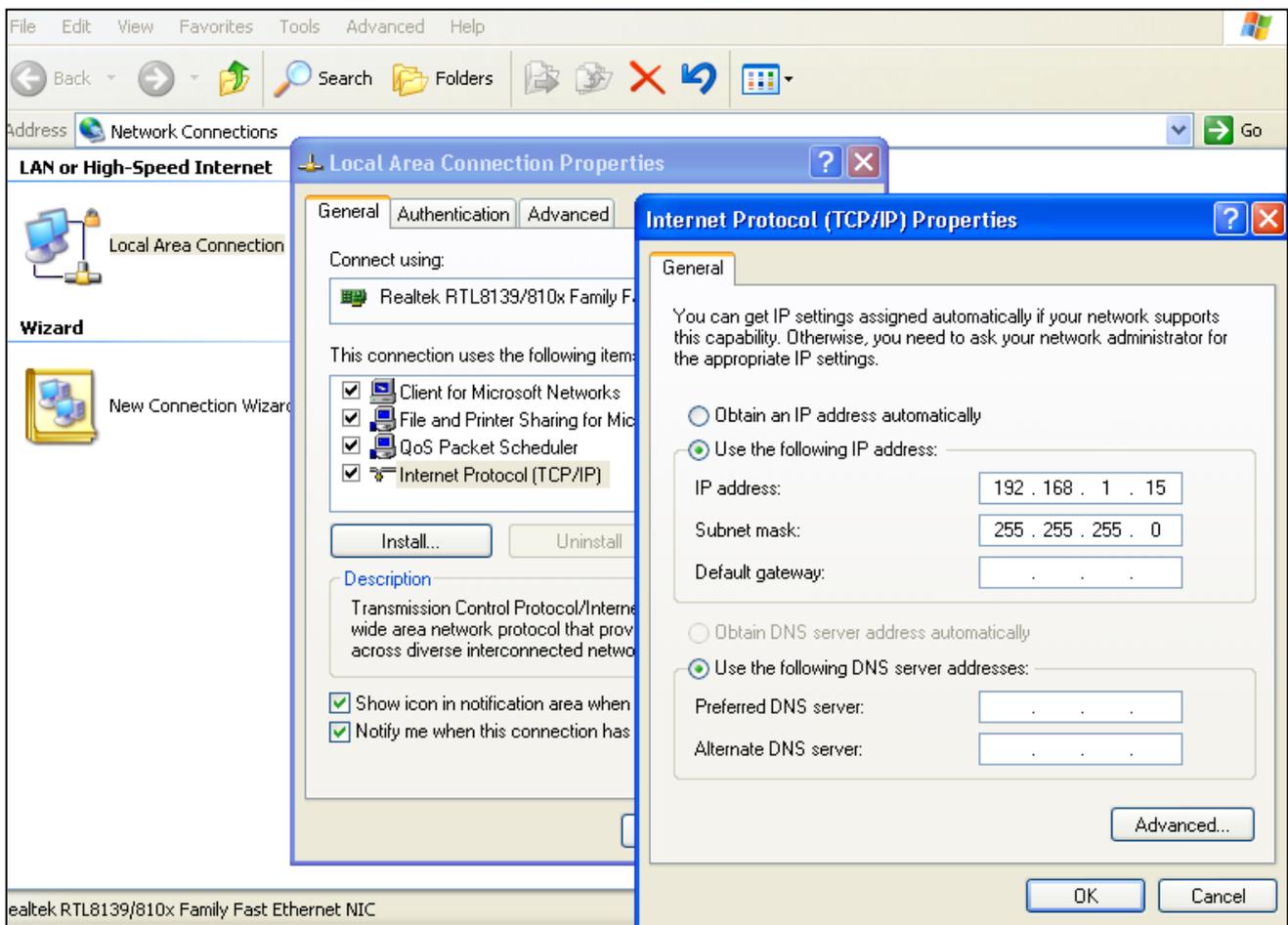
5.2 How to modify the PC's IP address

When access GW110X series through WEB, If PC and GW110X in the same local area network, the IP address must in a same network segment, otherwise, PC and GW110X must cross-router. When modify PC's address, please make sure PC and GW110X series in a same local area network, please reference the operation step as follows:

Control panel->Network connection->Local area connection->Properties->Internet protocol (TCP/IP)

GW110X series default IP address is: 192.168.1.254, configure PC's IP address to: 192.168.1.X (X is a number except 254), after modify the PC's IP address, then we can use the default IP address: 192.168.1.254, then we can access and configure GW110X series through WEB.

Specify Windows system operates as follows:





This configuration example did not use “Advanced” button. If use this advanced configuration function, can let a same network card have some false IP address, then we can access GW110X series and did not modify the original IP address, but windows cannot deal with correctly in IGMP and IEEE 802.1X. Unix system did not have this problem, please note it when you use advanced function

Chapter 6 WEB Management Function

GW110X series have WEB server inside, you can manage and maintenance GW110X series directly perceived through the senses.

6.1 Preparing configuration

1. Requirements of PC

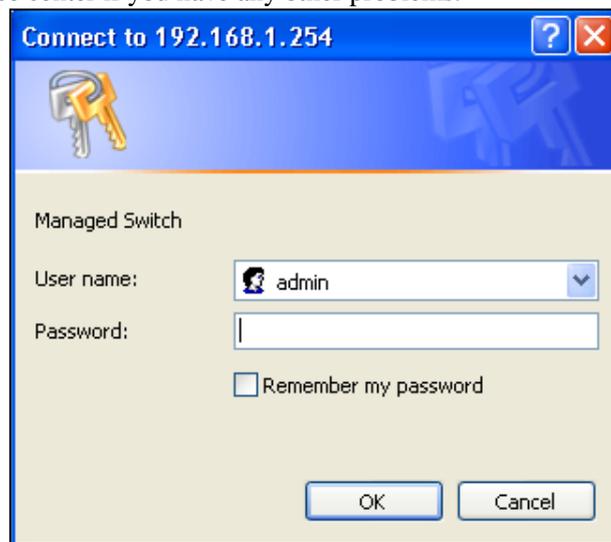
- 1). Install operate system (Like as Windows XP/2000)
- 2). Install network card
- 3). Install Web browser (Microsoft IE6.0 or higher version)
- 4). Install and start TCP/IP protocol

2. Establish correct network configuration

GW110X series default IP address: 192.168.1.254, subnet mask: 255.255.255.0, if configure in local area, please make sure IP address configuration in a same subnet network before access the configuration view (Please reference “Figure 6.5.1” to check IP address configuration method) . If configure remote, PC and GW110X series must reach by cross-router.

How to access Web Server

Open the Browser, input GW110X default IP address in URL, after hit “Enter” , you will see the figure 6.1.1 as follows, point put user input user name and password, default user name and password are “admin” , if input incorrect, Web server has 3 time to input, if all incorrect, Browser will show“ Access denied”. User must refresh the page and input correct user name and password. Please change the user name and password when you log in at first time. Please contact our service center if you have any other problems.



(Figure 6.1.1)

The default user name and password is [admin], it is case sensitive. The default password has administrator permission.

Function menu:

Main Menu	Tabs	Function description
System statues	Overview	Basic Information (Module/Name/ Description/...).
		Network Information (IP/MAC/Gateway/DNS/...).
COM Settings	COM Settings	Configuring serial port parameter: Port setting (COM1/COM2/COM3/...). Basic Settings (Alias/ Baud Rate/ Data Bits/ Stop Bits/ Parity Bits/ Flow Control). Advance Settings (RTS control/DTR control).
	COM Information	Display serial port settings related information.
Modbus Setting	Modbus Parameters	Modbus Setting, Response Timeout and Interval Timeout
	Slave ID	Slave ID Map Table
Network Settings	Network Settings	Automatically obtain IP address. IP address, Subnet Mask, Gateway, DNS Server and IP Report Address setting.
Security setting	Device Security	Web Console, Telnet Console, Device Search, Firmware Upgrade.
	IP Filtering	IP address filtering
	Mac Filtering	MAC address filtering
	User Manage	Modify user name and password
State Monitor	COM State	Serial communication state display
System manage	System Identification	Module, Name, Description, Serial NO. and Contact Information setting.
	System File	Factory Configuration, Update Configuration File from Local PC, Upgrade Firmware from Local PC.
	Logout & Reboot	System Logout and Reboot System.

Web overtime handle

If user did not operate WEB management for a long time, systems will logout (But the entire configuration will be saved)



If user did not operate WEB management for a long time, system wills logout (But the entire configuration will be saved). After overtime, if users want to do any configuration, system will note and come back login dialog box, if users want to operate, need to re-login. The overtime time is 300 seconds.

6.2 System Statuses

Device information

Current Location>>Main Menu>>Basic Settings>>Device Description

Basic Settings			
Name :	ModbusGateway	Hardware Ver :	1.0.0
Module :	8COM	Firmware Ver :	1.0.0 Build 20150618401R
Description :	1LAN	Contact :	
Serial No :	201506180001	Number of LAN :	1

Network Information			
Lan 1			
Gets IP mode :	Static	IP Address :	192.168.5.254
Subnet Mask :	255.255.255.0	Gateway :	192.168.5.1
Gets DNS mode :	Use the following DNS server address	DNS Server :	202.96.134.133
MAC Address :	00-22-6F-03-0B-59		

(Figure 6.2.1)

Item	Meaning
Module	Network identification
Name	Serial number
Description	The description of device's features, like as used key place.
Contact information	The contact information of person when maintenance the device, it can be configured in system information.
MAC address	Hardware address, 48bits(6 bytes,), 16 hexadecimal, it is unique
Hardware version	The current hardware version information, please note the limit of software version to hardware version
Firmware version	The current software's version information, upgrade software version will have more function

6.3 COM Setting

6.3.1 Port Setting

Serial port configuration menu:

Serial port configuration menu	Optional data	Description
working mode	RS-232 full duplex RS-485 half duplex	Serial work mode
Baud rate (bps)	300-115200 (10pcs band rate optional)	Baud rate choice
Parity	None, Even, Odd, Mark, Space	Checkout choice
Data bits (bits)	5,6,7,8	The parameter of serial
Stop bits (bits)	1,2	The last of the data package
Flow Control	NO, RTS/CTS, XON/XOFF, DTR/DTS	
Advance Settings	RTS and DTR control	Default open FIFO function, can set RTS and DTR control

Enter into GW110X series WEB interface, knock [COM settings /COM settings].

Current Location>>Main Menu>>Serial Server>>Port Setting

Port Setting

Port :

COM1

Settings

Alias	<input type="text"/>
BaudRate	<input type="text" value="115200"/>
DataBits	<input type="text" value="8 bits"/>
StopBits	<input type="text" value="1 bits"/>
ParityBits	<input type="text" value="None"/>
Flow Control	<input type="text" value="No"/>
Work Mode	<input type="text" value="RS485"/>

Advance Settings

RTSCtrl	<input type="text" value="Auto"/>
DTRCtrl	<input type="text" value="Auto"/>

Apply to All Port

(Figure 6.3.1)

Configuration option: [Alias] [Baud rate], [Data Bits], [Stop Bits], [Parity], [Flow Control], [Work Mode] and [Advance settings], the explaining is as follows:

[Alias]

Serial port notes

[Baud rate]

It is a parameter to check the communication speed. It shows to transfer how many bits in 1 second.

For example, 300 baud rate means have 300 bits transferred in 1 second.

[Parity]

Parity bits: It is a simple method to checkout fault in serial communication, have 4 types: Even, Odd, Mark, Space

[Data Bits]

It is a parameter to check the actual data bits in communication.

When PC send a Packet, actual data is not 8 bits, the standard is 7 and 8.

[Stop Bits]

The last bit of the single Packet. Typical value is 1 and 2 bit.

[Flow Control]

Flow control is determined by product hardware. For some reason cannot communicate, communication is blocked, can open the flow control to ease. Flow control allows the data receiving device to notify the data sending device when it is unable to receive the data, so that it can be stopped. It includes XON/XOFF, DTR/DSR, and RTS/CTS.

[Work Mode]

Work mode is determined by product hardware. When the product is RS485 serial port, display RS-485. When the product is the RS232 interface, display RS-232.

[FIFO]

Receiving and transmitting data buffer. The product is enabled by default.

[Advance settings]

According to the needs, the user can modify the output state of the DTR and RTS signals at any time.

[Force ON]

DTR or RTS signal is automatically set to the ON state after every time you open the serial port, and it is forbidden to change the user to modify. (When the DTR and RTS flow control mode is turned on, it is invalid.)

[Force OFF]

DTR or RTS signal is automatically set to the OFF state after every time you open the serial port, and it is forbidden to change the user to modify. (When the DTR and RTS flow control mode is turned on, it is invalid.)

6.3.2 COM Information

The main function of serial port information: to view the current communication parameters of each port, including: Port, alias, Baud rate, data bits, stop bits, parity bit, flow control, FIFO and so on. As shown below:

Current Local>>Main Menu>>COM Server>>Port Setting

Port Setting								
Port	Alias	BaudRate	DataBits	StopBits	ParityBits	Flow Control	FIFO	Work Mode
1	123456789123456789123456789123	115200	8	1	None	XON/XOFF	Enable	RS485
2		115200	8	1	None	None	Enable	RS485
3		115200	8	1	None	None	Enable	RS485
4		115200	8	1	None	None	Enable	RS485
5		115200	8	1	None	None	Enable	RS485
6		115200	8	1	None	None	Enable	RS485
7		115200	8	1	None	None	Enable	RS485
8		115200	8	1	None	None	Enable	RS485

(Figure 6.3.2)

6.4 Modbus Setting

6.4.1 Modbus parameter setting

Modbus parameter configuration menu:

Configuration menu	Data option	Description
Initial Delay	0~30000ms	View on the power RUN lights, 0 said no delay, the state is often bright.
Modbus TCP Exception	Default open	
Response Timeout	10-120000ms	Time between request and response
Inter-character Timeout	0ms, 10-500ms	Character interval
Inter-frame Delay	0ms, 10-500ms	Inter frame delay time

Ether into the product Web interface, click the [Modbus settings / Modbus parameter settings. Configuration Web interface as shown below.

Current Local>>Main Menu>>Modbus Setting>>Modbus Parameters

Modbus Setting			
Initial Delay	<input type="text" value="0"/>	(0-30000ms)	
Modbus TCP Exception	<input checked="" type="checkbox"/> Enable		
Response Timeout & Interval Timeout			
Port	Response Timeout(10-120000ms)	Interval Timeout	
		Inter-character Timeout(0ms,10-500ms)	Inter-frame Delay(0ms,10-500ms)
TCP/ProCOM	<input type="text" value="1000"/>		
Port1	<input type="text" value="1000"/>	<input type="text" value="0"/>	<input type="text" value="0"/>
Port2	<input type="text" value="1000"/>	<input type="text" value="0"/>	<input type="text" value="0"/>
Port3	<input type="text" value="1000"/>	<input type="text" value="0"/>	<input type="text" value="0"/>
Port4	<input type="text" value="1000"/>	<input type="text" value="0"/>	<input type="text" value="0"/>
Port5	<input type="text" value="1000"/>	<input type="text" value="0"/>	<input type="text" value="0"/>
Port6	<input type="text" value="1000"/>	<input type="text" value="0"/>	<input type="text" value="0"/>
Port7	<input type="text" value="1000"/>	<input type="text" value="0"/>	<input type="text" value="0"/>
Port8	<input type="text" value="1000"/>	<input type="text" value="0"/>	<input type="text" value="0"/>

(Figure 6.4.1)

Initial delay

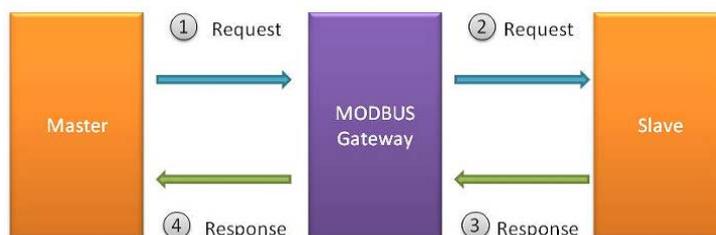
That is, the power of the Modbus gateway equipment, delay time, to start Modbus. This parameter is due to the Modbus from the machine device initialization time is relatively long, in order to avoid before they are not initialized, the request is sent to the frame access, so the gateway set the initialization delay time to decide the time delay of the first request can be sent.

TCP Modbus exception

This parameter is used to display the TCP Modbus exception in the Modbus monitor software, and the is not done at present, regardless of whether the parameter is enabled, the default gateway sends a TCP Modbus exception to the Modbus monitoring software.

Response timeout

Modbus is a master and slave protocol, the master station equipment access the slave station equipment need a time that response timeout, the time is the gateway device response time. This parameter is found in the second and third step in the diagram below. The gateway equipment forwards the request information of the master station to the slave station, and if there is no reply message from the slave station equipment in the response time, the gateway equipment sends out the timeout response information to the master station.

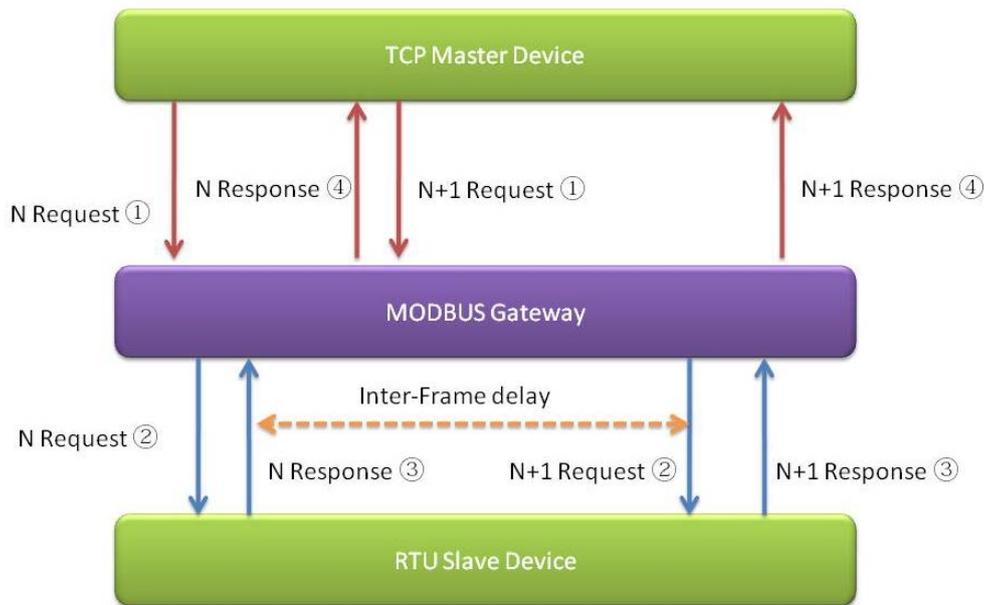


Inter-Character timeout

In a single frame, the time difference between a single character and the next character. When the value is 0, the default is 3.5T time, which is equal to 3.5 characters.

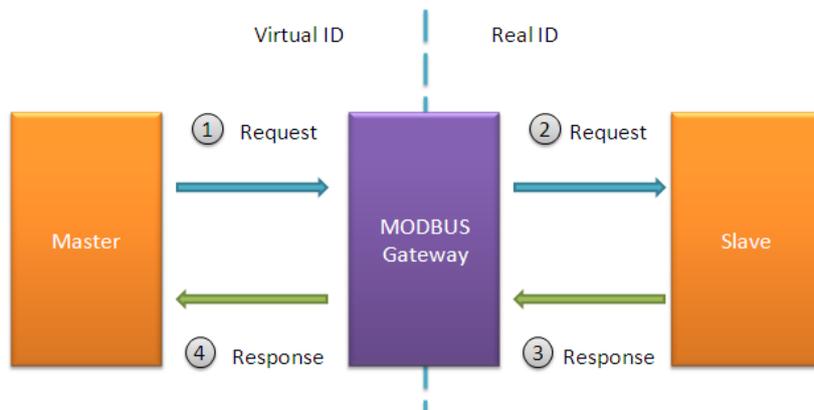
Inter-Frame delay

That is, the current RTU response with the next RTU request between the time intervals, the default is 0ms. This feature is to avoid the RTU request from the station equipment cannot quickly, set the time interval to facilitate the RTU from the station equipment has adequate time to handle the request.



6.4.2 Slave ID

The Modbus protocol provides that all of the slave device must have a unique ID number (1 ~ 247). The ID number is used to identify the address from the slave device to respond to requests from the master device. Modbus equipment ID number is set by the manufacturers, most can be modified, here we call this called "actual" ID (actual ID number).



Virtual ID is used to specify the ID Modbus of each connection gateway. When the Modbus master device accesses the virtual ID, the gateway device converts the virtual ID address into the actual ID address. When the Modbus slave device respond to the master device, the gateway device to convert the actual ID address to the virtual ID address. For the Modbus master, it only needs to access the "virtual" ID. The conversion between the virtual ID and

the actual ID is called ID mapping. Gateway device to achieve the function of ID mapping by setting the ID range and ID offset.

Only the channel type for the slave mode of the channel can be set up, including the Slave ASCII, Slave RTU and Slave TCP.

$$\text{Virtual ID} + \text{ID Offset} = \text{Real ID (Actual ID)}$$

Enter into the Web interface for the product, click [Modbus settings / slave ID]. Configuration Web interface as shown below.

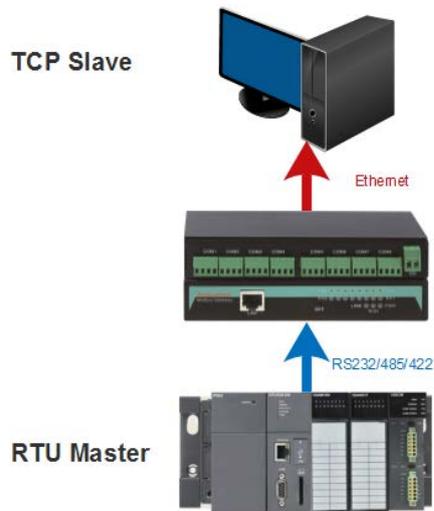


(Figure 6.4.2)

Slave configuration menu	Data option	Description
Channel Type	RTU Master RTU Slave ASCII Master ASCII Slave	Different working modes of the gateway
MODBUS TCP	TCP Slave	
Remote IP address		Slave IP address
TCP port	1~65535	
Slave ID Start	0~247	
Slave ID End	0~247	
Virtual ID	0~247	Different working modes of the gateway
Real ID	0~247	Virtual ID+ ID Offset
Slave ID Offset	-253~253	The numerical value of switching between virtual ID and real ID

1. RTU Master mode

When the users will Modbus RTU master device and Modbus TCP device to achieve communication, the operation mode of the gateway is set to RTU Master.



(Figure 6.4.3)

Enter the WEB configuration interface [slave ID], set the channel NO.1, the working mode is RTU Master. Click "Add", the pop-up window, setting parameters as shown below:

Remote IP address	192.168.1.188
TCP Port	5000
Slave ID Start	6
Slave ID End	9
Slave ID Offset	2
<input type="button" value="Affirm"/> <input type="button" value="Cancel"/>	

(Figure 6.4.4)

Set to complete, click "Affirm", "Submit".

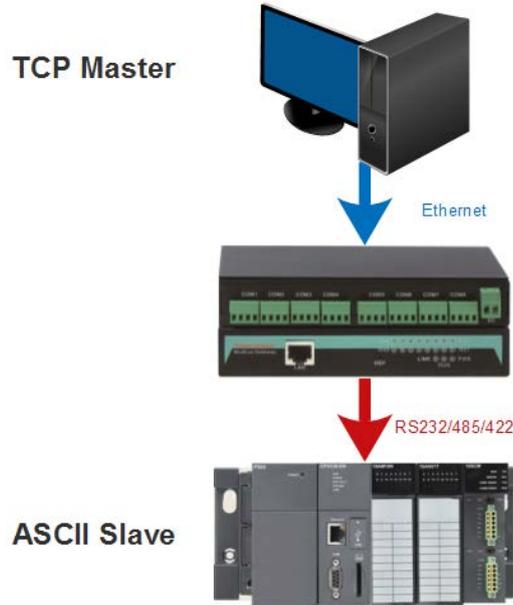
The IP address of the TCP is 192.168.1.188 (the IP address of the local PC), the TCP port number is 5000, the virtual ID is the 9~15. Offset is 2. The display page is shown in channel NO. 1 and 9:

Slave ID Map Table					
Channel No.	Channel Type	Channel Definition	Slave ID Range (Virtual---Real)	Operate	
1	RTU Master	Port1	0 - 0 ~~~ 0 - 0	Delete	Modify
2	RTU Slave	Port2	2 - 2 ~~~ 2 - 2	Delete	Modify
3	RTU Slave	Port3	3 - 3 ~~~ 3 - 3	Delete	Modify
4	RTU Slave	Port4	4 - 4 ~~~ 4 - 4	Delete	Modify
5	RTU Slave	Port5	5 - 5 ~~~ 5 - 5	Delete	Modify
6	RTU Slave	Port6	6 - 6 ~~~ 6 - 6	Delete	Modify
7	RTU Slave	Port7	7 - 7 ~~~ 7 - 7	Delete	Modify
8	RTU Slave	Port8	8 - 8 ~~~ 8 - 8	Delete	Modify
9	Modbus TCP	192.168.1.188:5000	9 - 15 ~~~ 11 - 17	Delete	Modify
<input type="button" value="Add"/>					

(Figure 6.4.4)

2. ASCII Slave mode

When the users will Modbus TCP master device and Modbus ASCII device to achieve communication, the operation mode of the gateway is set to ASCII Slave.



(Figure 6.4.5)

Enter the WEB configuration interface [slave ID], set the channel NO.1, the working mode is ASCII slave. Click "Modify", the pop-up window, setting parameters as shown below:

Remote IP address	<input type="text"/>
TCP Port	<input type="text"/>
Slave ID Start	<input type="text" value="6"/>
Slave ID End	<input type="text" value="9"/>
Slave ID Offset	<input type="text" value="2"/>
<input type="button" value="Affirm"/> <input type="button" value="Cancel"/>	

(Figure 6.4.6)

Set to complete, click "Affirm", "Submit".

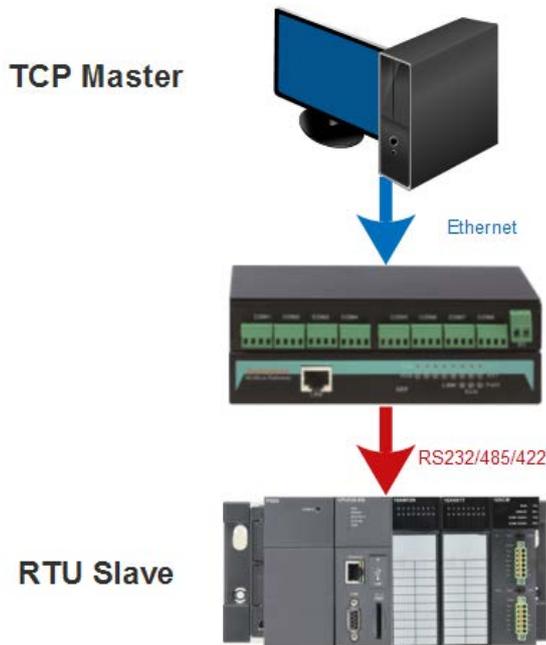
Shown Channel NO.1 as shown in Figure 6.4.7 below, the virtual ID for the 6~9. Offset is 2.

Slave ID Map Table					
Channel No.	Channel Type	Channel Definition	Slave ID Range (Virtual~~~Real)	Operate	
1	ASCII Slave	Port1	6 - 9 ~~~ 8 - 11	Delete	Modify
2	RTU Master	Port2	0 - 0 ~~~ 0 - 0	Delete	Modify
3	RTU Master	Port3	0 - 0 ~~~ 0 - 0	Delete	Modify
4	RTU Master	Port4	0 - 0 ~~~ 0 - 0	Delete	Modify
5	RTU Master	Port5	0 - 0 ~~~ 0 - 0	Delete	Modify
6	RTU Master	Port6	0 - 0 ~~~ 0 - 0	Delete	Modify
7	RTU Master	Port7	0 - 0 ~~~ 0 - 0	Delete	Modify
8	RTU Master	Port8	0 - 0 ~~~ 0 - 0	Delete	Modify
Add					

(Figure 6.4.7)

3. RTU Slave mode

When the users will Modbus TCP master device and Modbus RTU device to achieve communication, the operation mode of the gateway is set to RTU slave.

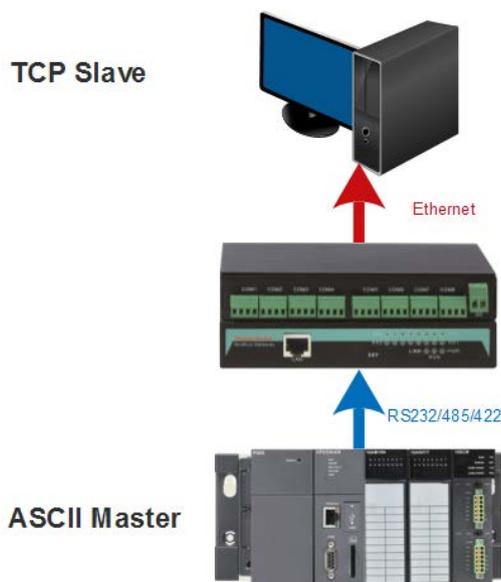


(Figure 6.4.8)

Related settings can refer to the ASCII Slave mode.

4. ASCII Master mode

When the users will Modbus ASCII master device and Modbus TCP device to achieve communication, the operation mode of the gateway is set to ASCII Master.



(Figure 6.4.9)

Related settings can refer to the RTU Master mode.

6.4.3 Customer case

Modbus gateway has been successfully used in many industries, to solve many problems of industrial communications, to meet customer demand for high cost. We have a number of successful customer case, if you do not find the same case, does not represent our MODBUS gateway product is not suitable for you, please contact customer service. We do our best for your service!

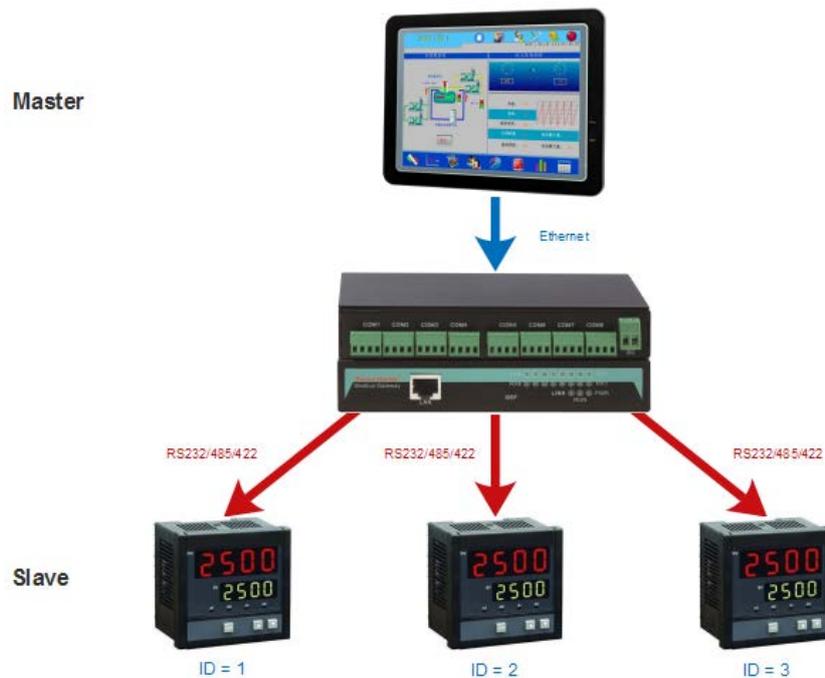
Use TCP Master instead of serial Master, Modify Slave ID:

In this case, the customer's old control system contains multiple subsystems that are based on the serial port. Each subsystem, a serial Master station directly controls the serial Slave device, such as below:



(Figure 6.4.10)

The new system using the Modbus gateway is connected to each of the serial Slave devices, so the Ethernet SCADA can control them. But Slave ID in the network cannot be duplicated, so some devices need to change the ID so that the network can identify them.



(Figure 6.4.11)

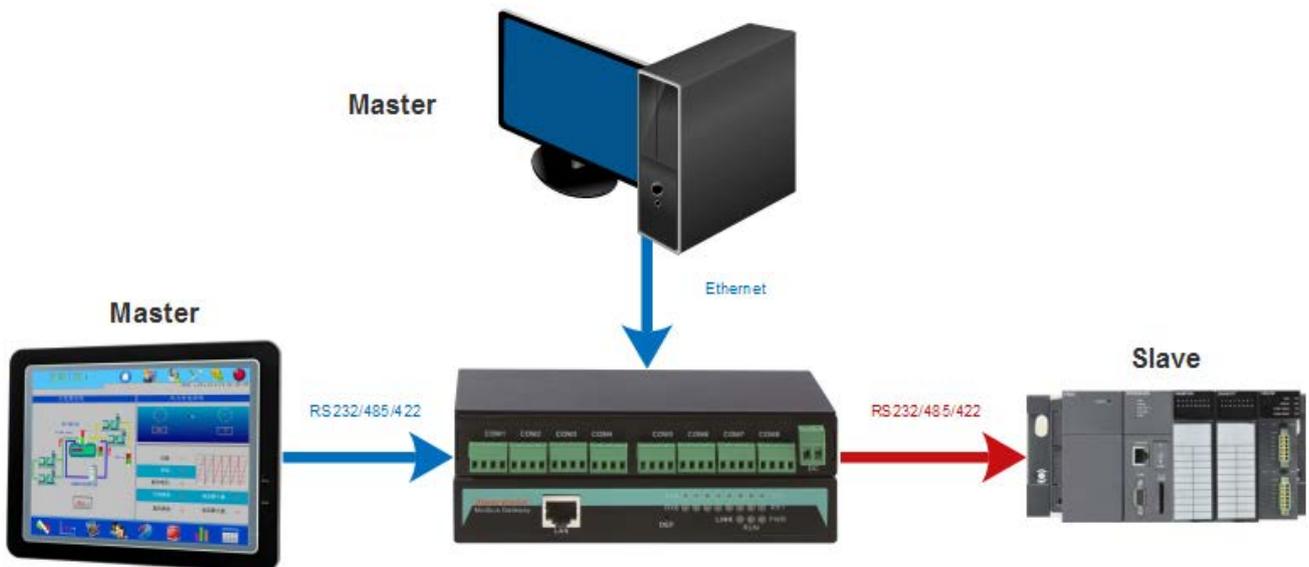
Reserved serial port Master, at the same time to join TCP Master

In this scheme, the serial port Master requires the direct control device, and the waiting time is short, it is unable to be replaced.



(Figure 6.4.12)

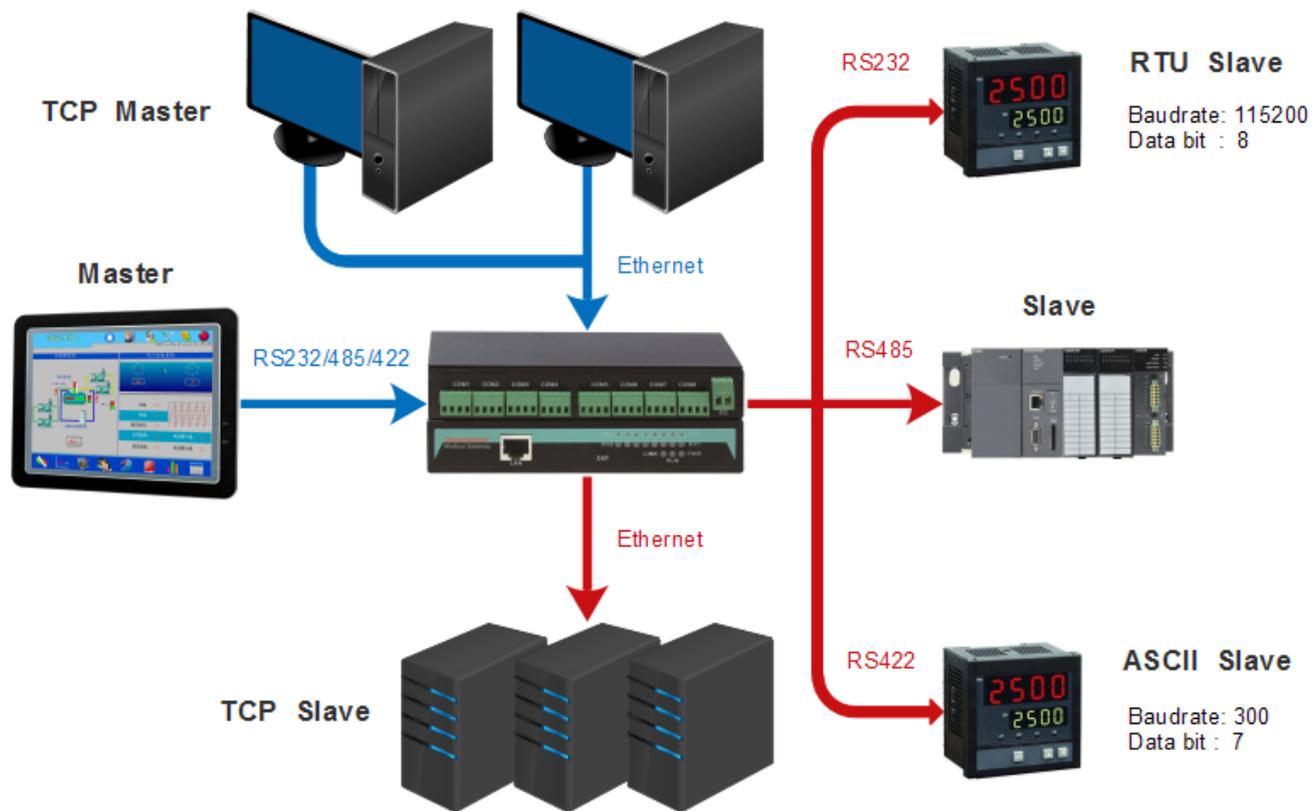
But TCP Master also need access to the monitoring management Slave devices. Two different Master to the same time to access the Slave equipment, how to do? Multi port Modbus gateway is very suitable for this kind of situation, directly embedded in the serial port system, a serial port Slave equipment, another serial port Master, but also access to Ethernet port. The redirection function of the gateway allows the Master TCP to communicate with the Slave device, and the serial port Master still controls the Slave device.



(Figure 6.4.13)

Simultaneous integration Modbus RTU, Modbus ACSII, Modbus TCP

There are numerous and mixed type equipment in the factory, which has the type of mixed type equipment, the instrument, the manufacturing machine and the PLC controller. To integrate these devices into the network, it takes into account a variety of factors, including different communication parameters, different protocols. Modbus gateway equipment has a powerful function, allowing the integration of a variety of different Modbus systems, supporting a variety of communication methods and protocols.



(Figure 6.4.14)

6.5 Network Setting

Device configuration support two modes, DHCP and static IP address, can get the device's IP address via client when the DHCP function is running, if you need NTP that need to connect internet, please enter the available and correct gateway and DNS address.

IP Address

IP address is an address of 32 bits length which is assigned to the device on the internet. The IP address consists of two fields: the network number field (net-id) and the Host ID field (host-id). For can conveniently manage IP address, IP addresses are divided into five categories. As blow:

Network type	Address range	Available IP network range
A	0.0.0.0~126.255.255.255	1.0.0.0~126.0.0.0
B	128.0.0.0~191.255.255.255	128.0.0.0~191.254.0.0
C	192.0.0.0~223.255.255.255	192.0.0.0~223.255.254.0
D	224.0.0.0~239.255.255.255	Non
E	240.0.0.0~246.255.255.255	Non
Others	255.255.255.255	255.255.255.255

A, B, C class address is unicast address; D class address is multicast address; E class address is reserved to prepare for the future for special purposes.

IP address using dotted decimal. Each IP address is represented as four decimal integers separated by decimal points; each integer corresponds to a byte, such as, 10.110.50.101.

Subnet Mask

Mask is corresponding 32 bits number of IP address. Some are 1, the others are 0. These 1 and 0 can be combined arbitrary in principle, but the first continuous bits are 1 when designing subnet mask. IP address can be divided into 2 parts by subnet mask: subnet address and host address. 1 in IP address and subnet corresponds to subnet address, other bits are host address. A type of address corresponding mask is 255.0.0.0; mask of B type address is 255.255.0.0; mask of C type address is 255.255.255.0.

Default Gateway

Default gateway in the host PC is generally called default route. Default route refer to a kind of router that destination address of IP data packet will choose when it don't find other existing route. All data packets of destination address which don't exist in the list of router will choose default route.

DNS Address

DNS (Domain Name Server) is for us to analyze domain to IP address of the Internet. If our equipment needs to access a host, you need to use this server to resolve an IP address.

IP Report

When the device is applied to a dynamic IP address in a network environment, the user must spend considerable time on the IP address management. For example, if the device is set to a server mode (TCP or UDP), then the client must know the IP address of the server. If the DHCP server assigned a new IP address to the device, the host

would need to detect the new IP address of the device.

When the device changes in the dynamic IP address, it is reported that its own IP address, which allows the user to know the new IP address of the device.

Server Address

Need to report to the top of the host IP.

Server Port

When reporting, listening to the port, the default is 4002.

Repeat Time

Report IP interval (seconds), the default is 10.

Current Location>>Main Menu>>Basic Settings>>Network & Reboot

Network Settings

Lan 1

Use the following IP address Automatically obtain IP address

IP Address :

Subnet Mask :

Gateway :

Use the following DNS server address Automatically obtain DNS server address

DNS Server :

IP Report

Server Address :

Server Port : (1-65535)

Repeat Time : (10-65535)

(Figure 6.5.1)

6.6 Security

6.6.1 Device Security

Into the product's Web interface, click [Security / Device security]. Configuration Web interface as shown below.

Current Location>>Main Menu>>Security Settings>>Device Security

Device Security	
Web Console	<input checked="" type="radio"/> Enable <input type="radio"/> Disable
Telnet Console	<input checked="" type="radio"/> Enable <input type="radio"/> Disable
Device Search	<input checked="" type="radio"/> Enable <input type="radio"/> Disable
Firmware Upgrade	<input checked="" type="radio"/> Enable <input type="radio"/> Disable

(Figure 6.6.1)

After disabling the corresponding setting function, the user will not be able to access the system to the system to set up the interface or to achieve the function.

6.6.2 IP Filter

Into the product's Web interface, click [Security / IP filter]. Configuration Web interface as shown below.

Current Location>>Main Menu>>Security Settings>>IP Filtering

IP Filtering				
IP Filtering	<input checked="" type="radio"/> Disable <input type="radio"/> Enable			
Filtering rule	Forbidden ▼ (When it's Forbidden all IP address can access besides below)			
Number	State	Access Permission	IP Address	Subnet Mask
1	Disable ▼	Forbidden ▼	<input type="text"/>	<input type="text"/>
2	Disable ▼	Forbidden ▼	<input type="text"/>	<input type="text"/>
3	Disable ▼	Forbidden ▼	<input type="text"/>	<input type="text"/>
4	Disable ▼	Forbidden ▼	<input type="text"/>	<input type="text"/>
5	Disable ▼	Forbidden ▼	<input type="text"/>	<input type="text"/>
6	Disable ▼	Forbidden ▼	<input type="text"/>	<input type="text"/>
7	Disable ▼	Forbidden ▼	<input type="text"/>	<input type="text"/>
8	Disable ▼	Forbidden ▼	<input type="text"/>	<input type="text"/>
9	Disable ▼	Forbidden ▼	<input type="text"/>	<input type="text"/>
10	Disable ▼	Forbidden ▼	<input type="text"/>	<input type="text"/>
11	Disable ▼	Forbidden ▼	<input type="text"/>	<input type="text"/>
12	Disable ▼	Forbidden ▼	<input type="text"/>	<input type="text"/>
13	Disable ▼	Forbidden ▼	<input type="text"/>	<input type="text"/>
14	Disable ▼	Forbidden ▼	<input type="text"/>	<input type="text"/>
15	Disable ▼	Forbidden ▼	<input type="text"/>	<input type="text"/>
16	Disable ▼	Forbidden ▼	<input type="text"/>	<input type="text"/>

(Figure 6.6.2)

Set item	Description	Factory default
IP Filtering	Disable, Enable	Disable
Filtering rule	Forbidden, Allow	Forbidden
State	Disable, Enable	Disable
Access Permission	Forbidden, Allow	Forbidden
IP Address	IP address dotted decimal format	
Subnet Mask	Subnet Mask dotted decimal format	

Note: the subnet mask is used to determine the IP address range that can be affected by the rule.

Cases: 192.168.1.1/255.255.255.255: the impact of a single IP address (192.168.1.1)

192.168.1.0/255.255.255.0: 192.168.1.1~192.168.1.254

192.168.1.0/255.255.255.192: 192.168.1.1~192.168.1.62

192.168.1.192/255.255.255.192: 192.168.1.193~192.168.1.254

6.6.3 MAC Filter

Into the product's Web interface, click [Security / MAC filter]. Configuration Web interface as shown below.

Current Location>>Main Menu>>Security Settings>>Mac Filtering

Mac Filtering

Mac Filtering			
<input checked="" type="radio"/> Disable <input type="radio"/> Enable			
Filtering rule: Forbidden (When it's Forbidden all MAC address can access besides below)			
Number	State	Access Permission	MAC Address
1	Disable	Forbidden	00-00-00-00-00-00
2	Disable	Forbidden	00-00-00-00-00-00
3	Disable	Forbidden	00-00-00-00-00-00
4	Disable	Forbidden	00-00-00-00-00-00
5	Disable	Forbidden	00-00-00-00-00-00
6	Disable	Forbidden	00-00-00-00-00-00
7	Disable	Forbidden	00-00-00-00-00-00
8	Disable	Forbidden	00-00-00-00-00-00
9	Disable	Forbidden	00-00-00-00-00-00
10	Disable	Forbidden	00-00-00-00-00-00
11	Disable	Forbidden	00-00-00-00-00-00
12	Disable	Forbidden	00-00-00-00-00-00
13	Disable	Forbidden	00-00-00-00-00-00
14	Disable	Forbidden	00-00-00-00-00-00
15	Disable	Forbidden	00-00-00-00-00-00
16	Disable	Forbidden	00-00-00-00-00-00

Submit
Cancel

(Figure 6.6.3)

Set item	Description	Factory default
MAC Filtering	Disable, Enable	Disable
Filtering rule	Forbidden, Allow	Forbidden
State	Disable, Enable	Disable
Access Permission	Forbidden, Allow	Forbidden
MAC Address	MAC address of the destination host	

6.6.4 User Manage

Into the product's Web interface, click [Security / User manage], users can modify the user name and password by this feature. Configuration Web interface as shown below.

Current Location>>Main Menu>>Security Settings>>User Manage

User Manage

Authentication <input type="radio"/> Disable <input checked="" type="radio"/> Enable				
Number	User Name	Password	Permission	Operation
1	admin	●●●●	Administrator ▼	Edit
2			Guest ▼	Edit
3			Guest ▼	Edit

(Figure 6.6.4)

Click "Edit" to make the following window, edit.

User Name	admin
New Password	●●●●
Confirm Password	●●●●
<input type="button" value="Confirm"/> <input type="button" value="Cancel"/>	

(Figure 6.6.5)

Enterprises are often required to monitor the device's administrator and system or network administrator is the two roles, its authority to separate, that is, the former is responsible for monitoring the business management, which is responsible for the management of the system or network. The type Modbus gateway provides the hierarchical management: guest authority and administrator privileges. Guest only views the power of the Modbus gateway state, and only the system administrator can configure the parameters of the Modbus gateway.

Number

The number of users, which represents a group of users, there are three user numbers in the list box.

Permission

Administrator: check and configure authority

Observer: check authority.

User name

The visitor's logo, which allows for no more than 20 bytes of letter combinations

New Password

The visitor uses the password that the user permission is not more than 20 bytes of the letter combination.

Confirm password

Input password once again. Confirm that the password is correct.



Please remember user name and password after you modify them, if forget it, please use DEF button to do factory default, after do that, user name and password will be: admin.

6.7 State Monitor

6.7.1 COM state

Into the product's Web interface, click [state monitor / COM state], can see the serial port work state. WEB interface shown in the following figure 6.7.1.

Current Local>>Main Menu>>State Monitor>>Port Communication

Port Communication										
Port	TX	RX	TX Total	RX Total	CTS	DSR	RI	DCD	DTR	RTS
1	0	0	0	0	Off	Off	Off	Off	Off	On
2	0	0	0	0	Off	Off	Off	Off	Off	On
3	0	0	0	0	Off	Off	Off	Off	Off	On
4	0	0	0	0	Off	Off	Off	Off	Off	On
5	0	0	0	0	Off	Off	Off	Off	Off	On
6	0	0	0	0	Off	Off	Off	Off	Off	On
7	0	0	0	0	Off	Off	Off	Off	Off	On
8	0	0	0	0	Off	Off	Off	Off	Off	On

Clear ALL

(Figure 6.7.1)

TX: The total number of frames that are transmitted to the gateway.

TX + Total: Total bytes of serial transmission.

RX: The total number of frames that are received to the gateway.

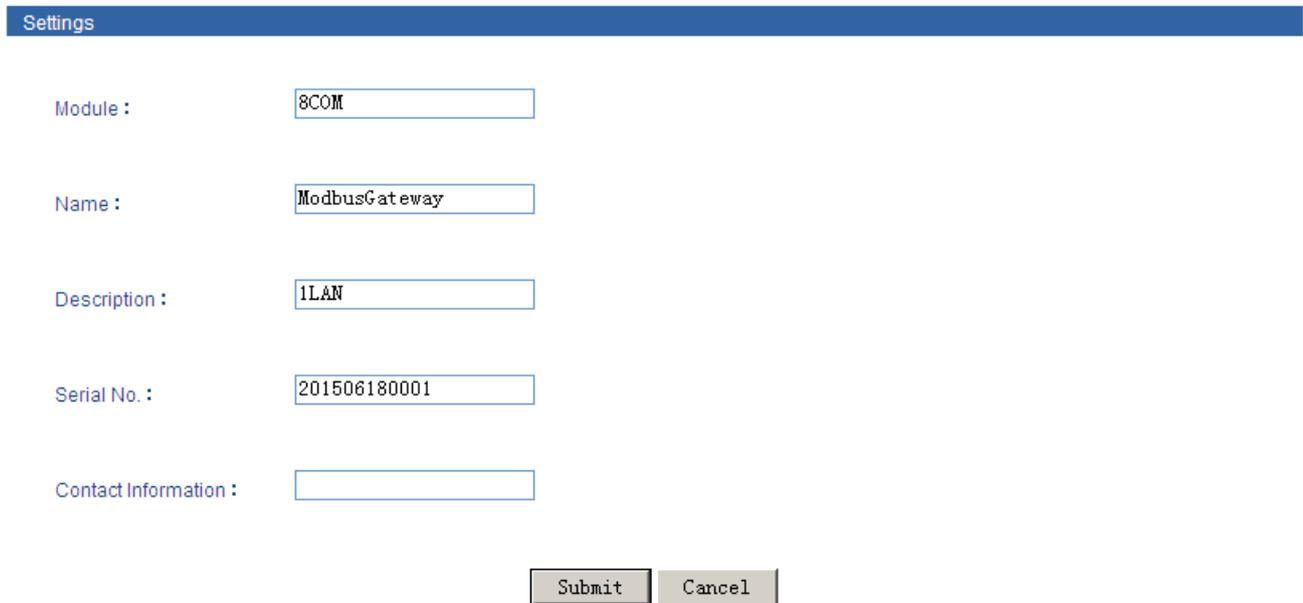
RX + Total: Total bytes of serial received.

6.8 System Manage

6.8.1 System information

The following picture is the initial product of the device information interface, in the picture we can see the Module, Name, Description, Serial NO., Contact information, through this feature can be arbitrarily modify the above options, choose to set up after the restart.

Current Location>>Main Menu>>Basic Settings>>System Identification



Settings

Module :

Name :

Description :

Serial No. :

Contact Information :

(Figure 6.8.1)

Module

No more than 18 bytes, allow Chinese character. English character, digit and “-” “_” but do not allow space.

Name

No more than 18 bytes, allow Chinese character. English character, digit and “-” “_” but do not allow space.

Description

No more than 18 bytes, allow Chinese character. English character, digit and “-” “_” but do not allow space.

Serial No.

No more than 20 bytes, allow Chinese character. English character, digit and “-” “_” but do not allow space

Contact information

No more than 20 bytes, allow Chinese character. English character, digit and “-” “_” “@” “!” “,” “.” but do not allow space

6.8.2 System file

The following picture of the product file management interface, a total of 4 file management functions: Load Factory Default, Download Configuration, Upload Configuration, Upgrade Firmware.

Current Location>>Main Menu>>Basic Setting>>System File Update

Factory Configuration

Load Factory Default :

Update Configuration File from Local PC

Download Configuration :

Upload Configuration :

Upgrade Firmware from Local PC

Upgrade Firmware :

(Figure 6.8.2)

1. Default factory (Please be care of this operation)

Knock<Start> button, after default factory, IP address is 192.168.1.254 and all configurations are the same as default factory. Default configuration will be available after reboot automatic. After recover default configuration, user name and password will be: admin.

2. Download configuration files

Knock<Download>Button, after confirm, system will appear a dialog box and point out to save the configuration file in '.cfg'. It is convenience to recover the configuration in future.

3. Upload configuration files

Knock< Browse> button, choice the correct '.cfg' file and knock <upload>, after confirm, configuration information in '.cfg' file uploaded to device automatic and reboot automatic.

4. Upgrade firmware

Knock <Browse> button, choice the position of the upgrade file. Knock<Upgrade> button. Point out "Forbid power off when upgrade", confirm it and then write flash. Reboot automatic, after upgrade, will refresh page automatic.



1. After default factory, must change the device's IP address, otherwise, if other devices make factory default, will have IP address conflict.
2. Please do not upgrade random. If you want to upgrade, must check the file is correct or not, otherwise, it is easy to damage the software.
3. Upgrade file must be bin type, please do not do any operations when upgrade, it may take upgrade failure. In upgrading, please do not operate the device and forbid know device's WEB page. If upgrade interrupts, please reboot the device and try again.

6.8.3 Logout & Reboot

Into the product's Web interface, click [state manage / Logout & Reboot]. WEB interface shown in the following figure 6.8.3.

Current Location>>Main Menu>>Basic Setting>>Logout



(Figure 6.8.3)

System Logout

Click the <Start> button, the interface would be returned to the login screen, configuration does not have to be changed.

Device Reboot

Click the "Reboot " button is confirmed, the device restarts, 20 seconds, and then click the menu bar returns to the Web network login interface, save the configuration before you restart, or reboot and configuration information not saved will be lost.

Chapter 7 Repair and Service

The company provides a three-year product warranty, from the date of shipment. According to the product specifications, during the warranty period, the company will be free to repair or replace the product if the product has any failure or operation fails. However, these commitments do not cover damage caused by improper use, accident, natural disaster, improper operation or incorrect installation.

To ensure that consumers benefit from our managed series switches, try to get help in the following ways:

Internet service.

Make a call to our technical office.

Return or replace product.

7.1 Internet Service

Please visit <http://www.3onedata.com>

7.2 Make a call to our technical office

You can call our technical support office, the company has professional technical engineers to answer your questions and help you resolve your problems at the first time. Free Service Hotline 400-600-4496

7.3 Repair or Replace

Please to confirm with our technical staff if your product need to repair, replace or return, and then contact our sales man to get a deal with the problem. The above should be in accordance with the company's handler to negotiate for treatment with our technical and salesman to complete the repair, replacement or return.