

USR-M511 User Manual

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Contents

USR-M511 User Manual	1
Features	3
1. Get Start	4
1.1. Application Diagram.....	4
1.2. Hardware Design	5
1.2.1. Hardware Dimensions	5
1.2.2. LED Indicator	6
1.2.3. DB9 Pin definition.....	6
1.2.4. DB9 Pinboard	6
2. Product Functions	8
2.1. Basic Functions.....	8
2.1.1. Static IP/DHCP	8
2.1.2. Hardware Restore default settings	9
2.1.3. Upgrade Firmware Version	9
2.2. Serial port.....	10
2.2.1. Serial Port Basic Parameter	10
2.2.2. Serial Package Methods	11
2.2.3. Baud Rate Synchronization.....	11
2.3. Modbus protocol transmission.....	11
2.3.1. Modbus Master.....	11
2.3.2. Modbus Slave	12
2.4. Modbus Slave management.....	14
2.4.1. Modbus data monitoring.....	14
2.4.2. Modbus data management	15
2.5. Features	16
2.5.1. Network Identity Packet Function.....	16
3. Parameter Setting.....	17
3.1. Web Server Configuration	17
3.2. AT Command.....	17
3.2.1. Serial AT Command	18
3.2.2. Network AT Command	18
4. Contact Us.....	19
5. Disclaimer.....	19
6. Update History	19

Features

- Support Modbus_RTU_Master, Modbus_RTU_Slave, Modbus_ASCII_Master, Modbus_ASCII_Slave work modes.
- Support Modbus Master Prefetch function.
- Support 8 Modbus Slave automatic query by commands.
- Support Modbus web server management function.
- 10/100Mbps Ethernet interface, support Auto-MDI/MDIX.
- Baud rate support 600bps~230.4K bps; Support None, Odd, Even, Mark, Space.
- Support Static IP/DHCP.
- Support keep-alive.
- Support RS232/RS485/RS422.
- Support hardware Reload.

1. Get Start

Product link:

<http://www.usriot.com/p/industrial-modbus-gateway-modbus-rtuascii-modbus-tcp/>

Industrial Modbus Gateway, Modbus RTU/ASCII to Modbus TCP

USR-M511 is Modbus gateways that query Modbus RTU/ASCII slave and display data in internal webpage. It also supports reply the querying from Modbus TCP Master. USR-M511 provides a flexible method to control and monitor your Modbus RTU/ASCII devices.

- Support RS232/RS485 or RS422
- Ethernet accessory
- Internal webpage to control and monitor
- Auto query Modbus RTU/ASCII Slave device

USR IOT Service
Support: FAE@usriot.com
Order: sales@usriot.com

General Details | Parameter | Inquiry | Download | Comments

Figure 1 Download Page

If you have any question, please submit it back to customer center: <http://h.usriot.com>

1.1. Application Diagram

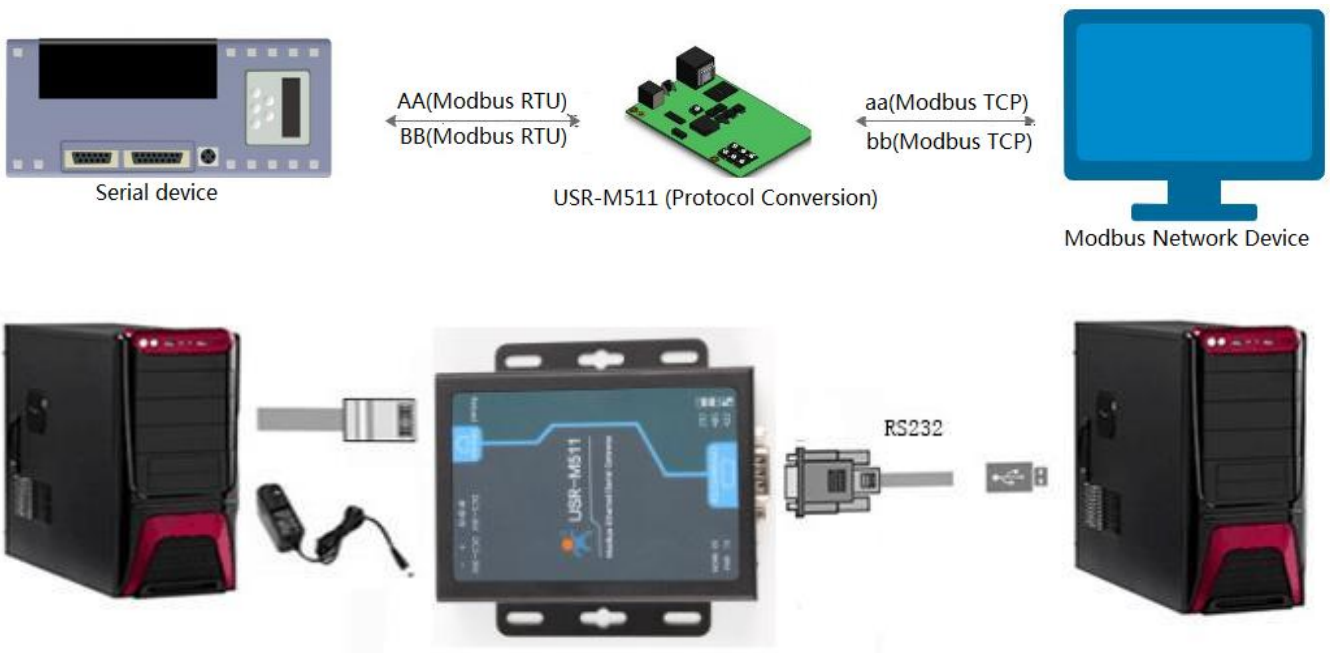


Figure 2 Application diagram

1.2. Hardware Design

1.2.1. Hardware Dimensions

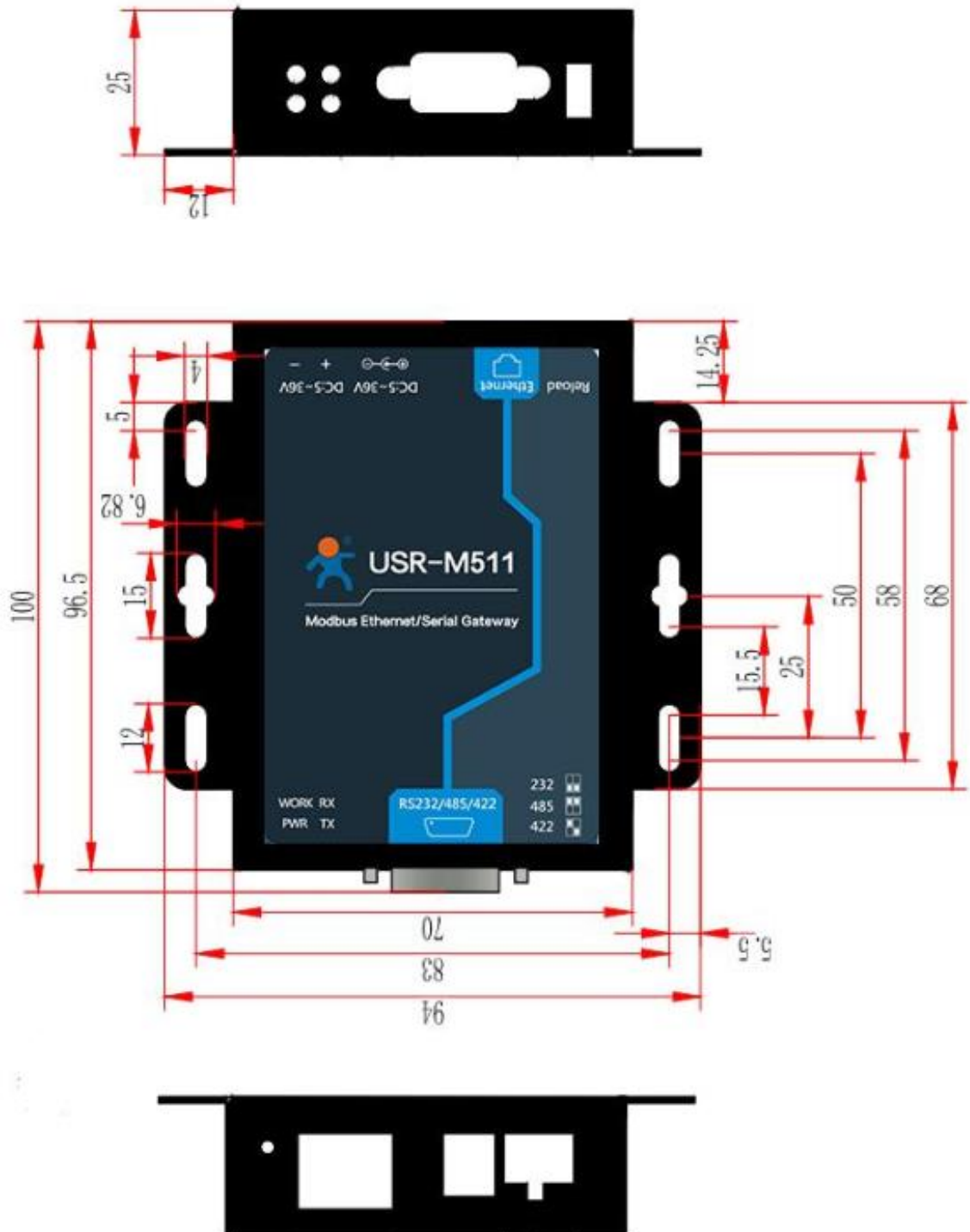


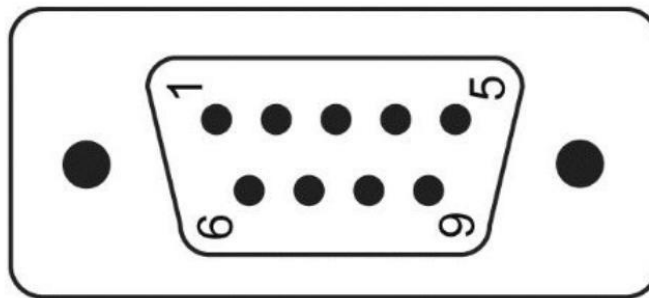
Figure 3 Hardware dimensions

1.2.2. LED Indicator

Indicator	Status
PWR	On: Power on
	Off: Power off
WORK	On: Working
	Off: Not working
TX	On: Sending data to serial
	Off: No data sending to serial
RX	On: Receiving data from serial
	Off: No data receiving from serial

Figure 4 Hardware Indicator

1.2.3. DB9 Pin definition



Pin Number	RS232	RS422	RS485
1			
2	RXD	RX+	
3	TXD	TX-	B-
4			
5	GND		
6			
7	RTS	TX+	A+
8	CTS	RX-	
9			

Figure 5 DB9 Pin definition

1.2.4. DB9 Pinboard

We provide DB9 pinboard for user to use terminal connection.



Type	1	2	3	4	5
RS232		TX	RX		GND
RS485	A+	B-			GND
RS422	T+	T-	R+	R-	GND

Figure 6 DB9 pinboard

2. Product Functions

This chapter introduces the functions of USR-M511 as the following diagram shown, you can get an overall knowledge of it.

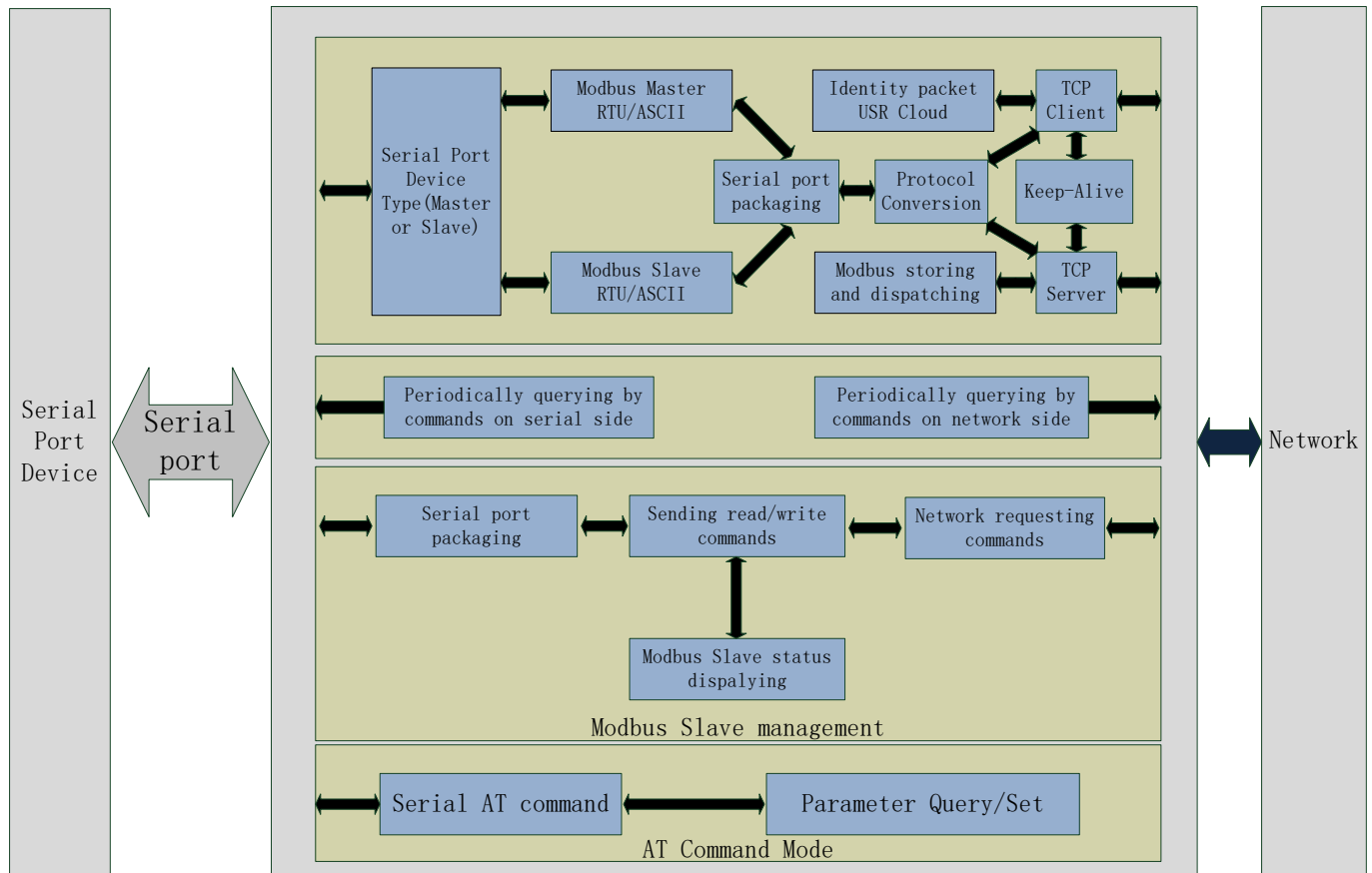


Figure 7 Product Functions diagram

2.1. Basic Functions

2.1.1. Static IP/DHCP

There are two ways for module to get IP address: Static IP and DHCP.

Static IP: Default setting of module is Static IP and default IP is 192.168.0.7. When user set module in Static IP mode, user need set IP, subnet mask and gateway and must pay attention to the relation among IP, subnet mask and gateway.

DHCP: Module in DHCP mode can dynamically get IP, Gateway, and DNS server address from Gateway Host. When user connect directly to PC, module can't be set in DHCP mode. Because common computer does not have the ability to assign IP addresses.

User can change Static IP/DHCP by web server. Setting diagram as follow:

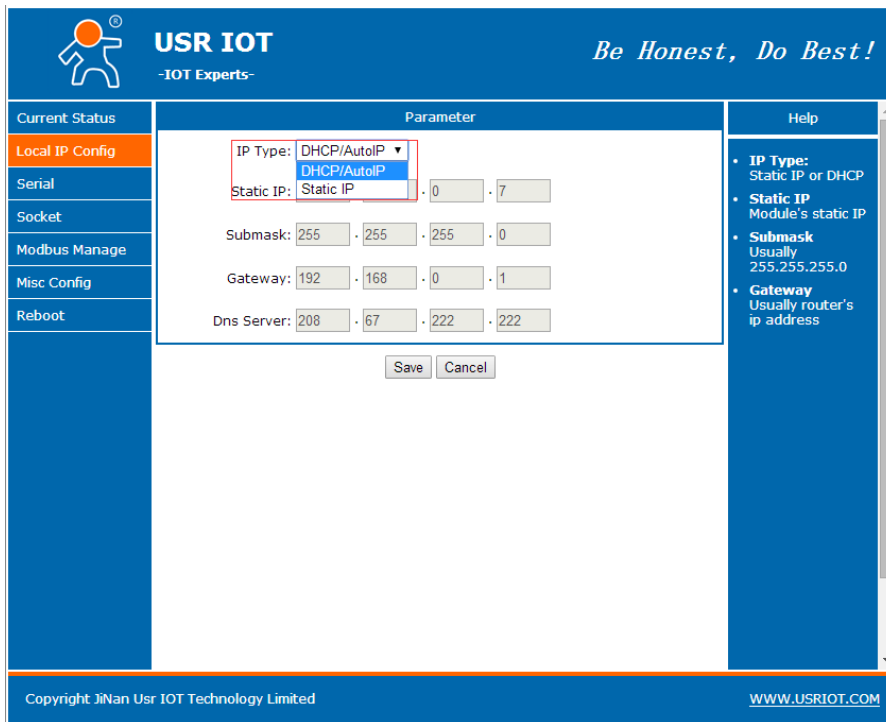


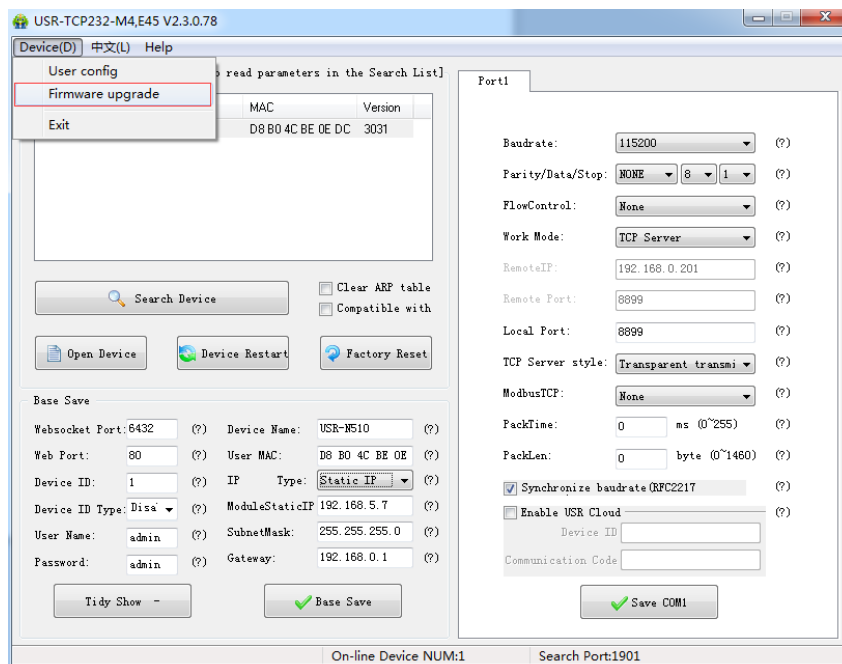
Figure 8 Static IP/DHCP

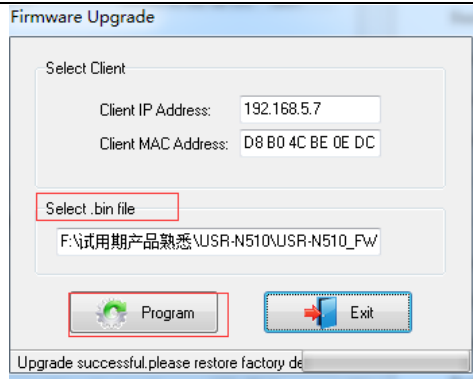
2.1.2. Hardware Restore default settings

User can press Reload over 5s and less than 15s then release to restore default settings.

2.1.3. Upgrade Firmware Version

User can contact to salespersons for needed firmware version and upgrade by setup software through Ethernet port. Setup software download link: <http://www.usriot.com/usr-tcp232-m4k3-setup-software>. User can upgrade as follows:




Figure 9 Upgrade firmware version

2.2. Serial port

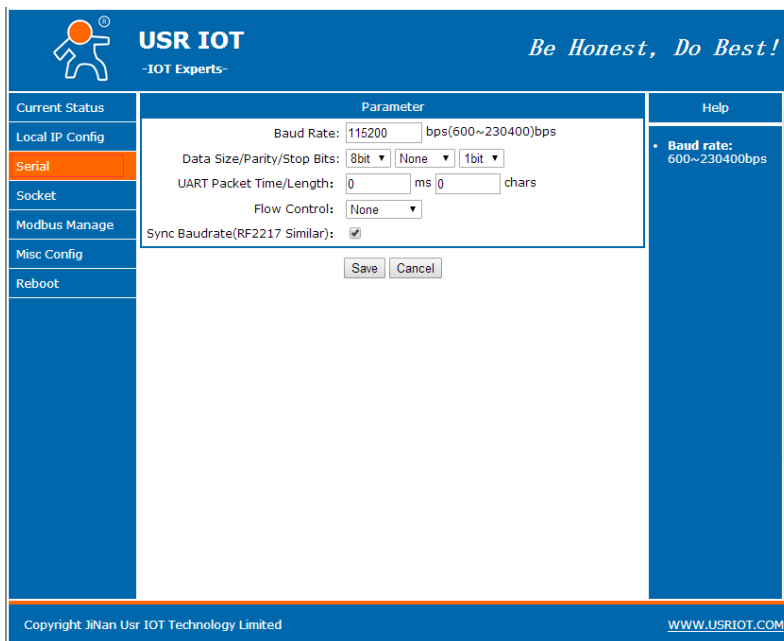
2.2.1. Serial Port Basic Parameter

Serial port basic parameters as follow:

Parameter	Default	Range
Baud rate	115200	600~230400bps
Data bits	8	5~8
Parity	None	None, Odd, Even, Mark, Space
Stop bits	1	1~2
Flow control	None	None: No flow control. HardWare: Hardware flow control(RTS/CTS). Xon/Xoff: Software flow control.

Figure 10 Serial port basic parameter

User can change serial port parameters by web server as follow:


Figure 11 Serial port parameters configuration

2.2.2. Serial Package Methods

For network speed is faster than serial. Module will put serial data in buffer before sending it to network. The data will be sent to Network as Package. There are 2 ways to end the package and send package to network - Time Trigger Mode and Length Trigger Mode.

- Time Trigger Mode: Default package time is 4 bytes sending interval and use can set between 0~65535.
- Length Trigger Mode: Default package length is 1460 and user can set between 0~1460.

2.2.3. Baud Rate Synchronization

When module works with USR devices or software, serial parameter will change dynamically according to network protocol. Customer can modify serial parameter by sending data conformed to specific protocol via network. It is temporary, when restart DTU, the parameters back to original parameters.

2.3. Modbus protocol transmission

Work mode: Modbus_RTU_Master, Modbus_ASCII_Master, Modbus_RTU_Slave, Modbus_ASCII_Slave. Work mode can be defined according to the serial port device of M511 and Modbus protocol. For example, serial port device is Modbus Master and Modbus protocol is ASCII protocol, work mode is Modbus_ASCII_Master.

2.3.1. Modbus Master

Modbus Master mode means serial port device connected to M511 is Modbus Master.

1. M511 work in Modbus Master mode allow at most 32 Modbus Masters connect through RS485/RS422 to achieve RS485/RS422 multiple Masters Polling function. But speed of RS485/RS422 interface will be a little slow because of the limitation of RS485/RS422 baud rate.
2. When M511 work in Modbus Master mode can query information of different Modbus slaves by sending query command with ID of specific Modbus slave. M511 allow at most 8 target server.
3. Modbus work in Modbus Master mode can apply to four applications: One Master to one Slave; one Master to multiple Slaves; multiple Masters to one Slave; multiple Masters to multiple Slaves.

Application diagram as follows:

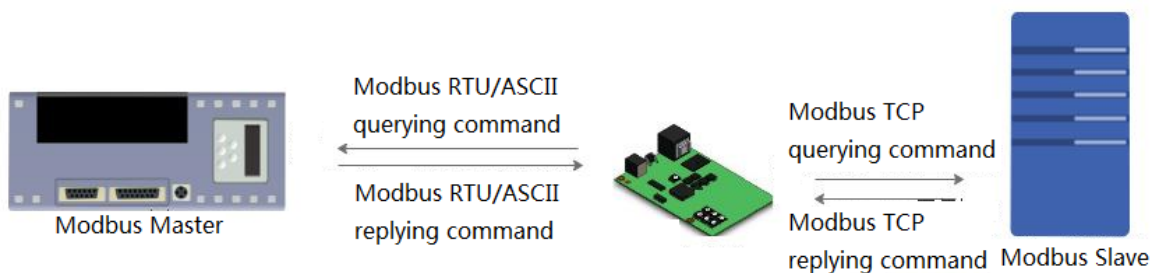


Figure 12 One Master to one Slave

User can change Modbus Master mode parameters by web server as follow:

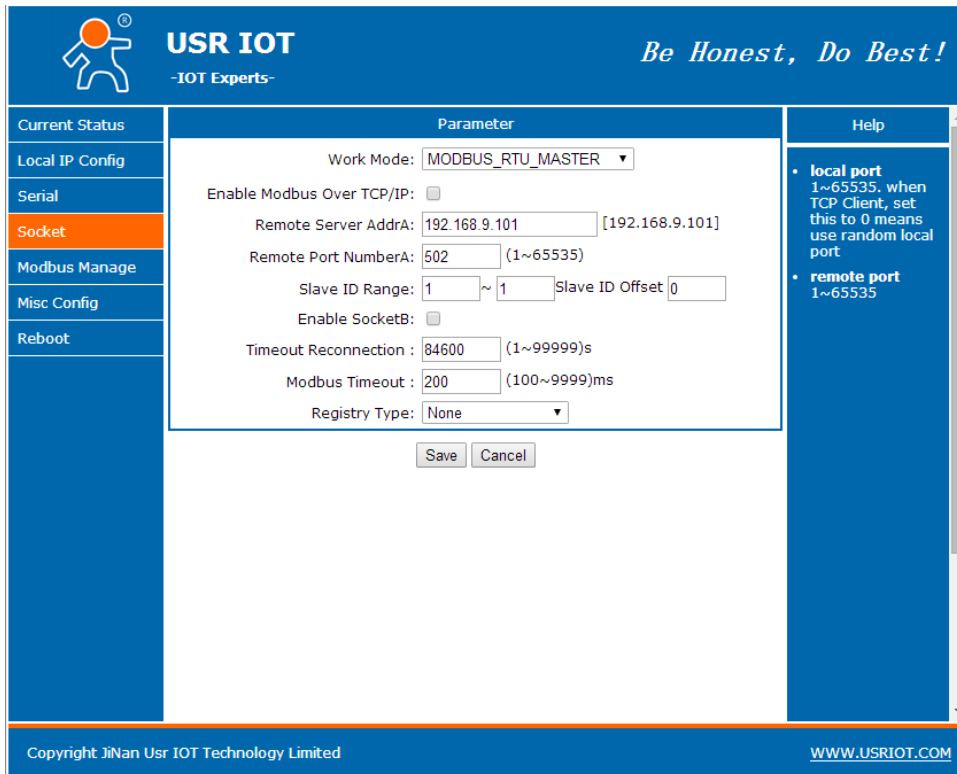


Figure 13 Modbus Master mode configuration

A. Work Mode: Four types work modes.

B. Enable Modbus Over TCP/IP: Open this function, M511 will work in transparent transmission and don't proceed protocol conversion. If network side protocol is Modbus RTU/ASCII, this function must be used. If network side protocol is Modbus TCP, this function can't be opened.

C. Remote Server AddrA: Modbus Slave address, can be domain name.

D. Remote Port NumberA: Default port is 502 and often keep default value.

E. Slave ID Range: All querying command will be sent to this Slave in this range.

F. Slave ID offset: Offset address based on the Slave ID Range. For example, Slave ID Range is 1~1, Slave ID offset is 1, so querying command with ID 2 will be send to this slave.

G. Enable SocketB: Enable socket B to set slave 2 parameters.

H. Timeout Reconnection: No data transmission over this time, M511 will automatically disconnect and reconnect remote Slave.

I. Modbus Timeout: Modbus response time which must be accordant with serial port Modbus Master.

2.3.2. Modbus Slave

Modbus Slave mode means serial port device connected to M511 is Modbus Slave.

1. M511 work in Modbus Slave mode allow at most 32 Modbus Slaves connect through RS485/RS422 to achieve RS485/RS422 multiple Masters Polling function. But speed of RS485/RS422 interface will be a little slow because of the limitation of RS485/RS422 baud rate.

2. M511 work in Modbus Slave mode support 16 Masters querying Slave information.

3. M511 work in Modbus Slave will default open Memory Function to solve the problem that Modbus Masters in network side query Modbus Slaves too slow. When open this function, M511 will automatically update the stored

data from serial port Modbus Slaves and reply stored data to network side Modbus Masters directly.

4. Modbus work in Modbus Slave mode can apply to four applications: One Master to one Slave; one Master to multiple Slaves; multiple Masters to one Slave; multiple Masters to multiple Slaves.

Application diagram as follows:

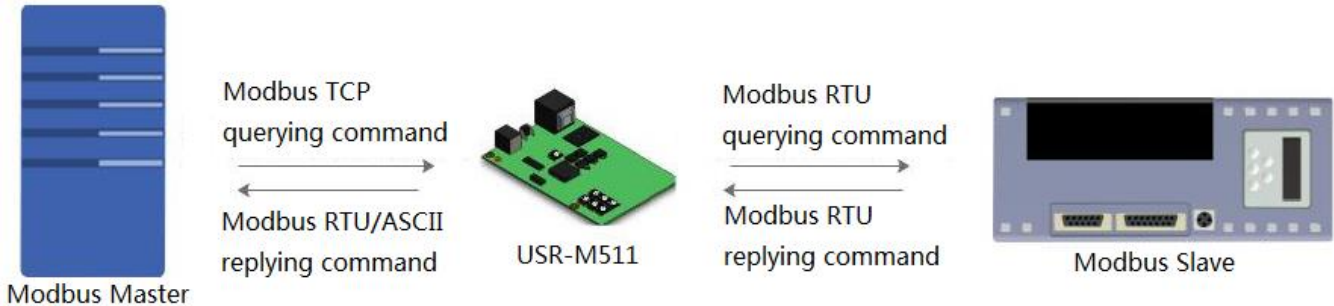


Figure 14 One Master to one Slave

User can change Modbus Slave mode parameters by web server as follow:

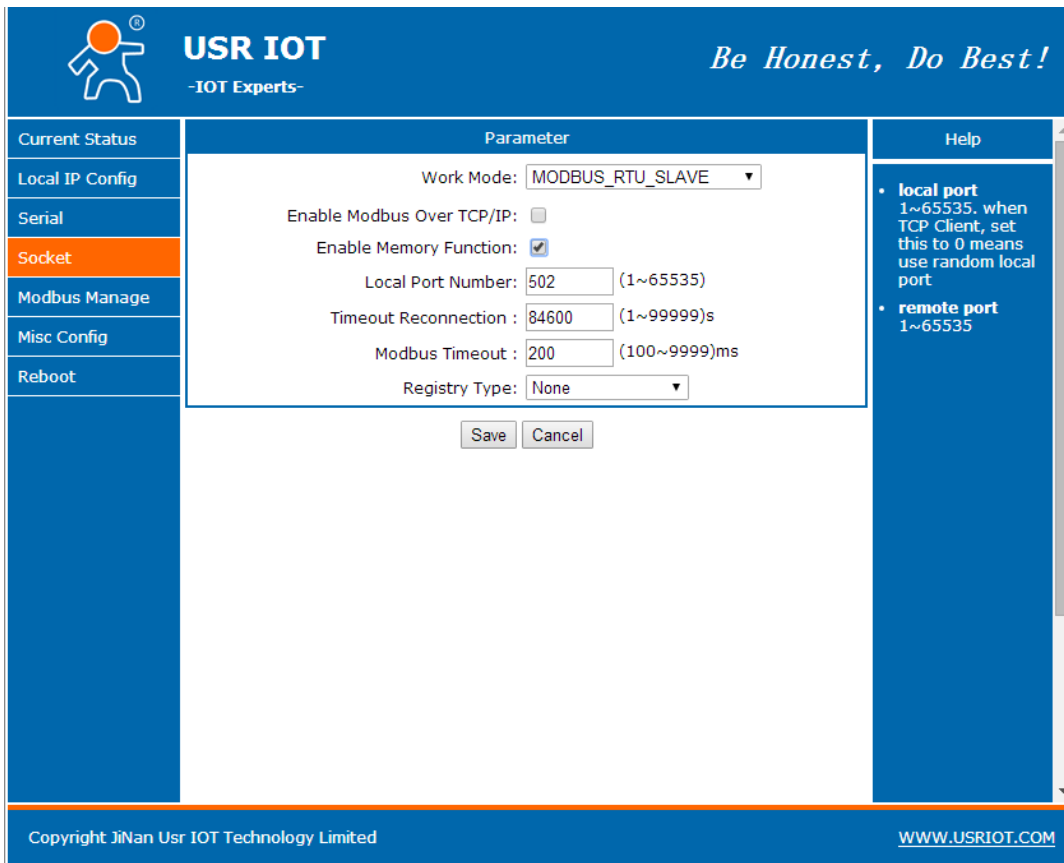


Figure 15 Modbus Slave mode configuration

A. Work mode: Four types work modes.

B. Enable Modbus Over TCP/IP: Open this function, M511 will work in transparent transmission and don't proceed protocol conversion. If network side protocol is Modbus RTU/ASCII, this function must be used. If network side protocol is Modbus TCP, this function can't be opened.

C. Enable Memory Function: When open this function, M511 will automatically update the stored data from serial port Modbus Slaves and reply stored data to network side Modbus Masters directly.

D. Local Port Number: Default is 502 and don't need change.

E.Timeout Reconnection: No data transmission over this time, M511 will automatically disconnect and reconnect remote Slave.

F.Modbus Timeout: Modbus response time which must be accordant with serial port Modbus Master.

2.4. Modbus Slave management

M511 support Modbus management based on Websocket. So user need use browser which can support Websocket as follow:

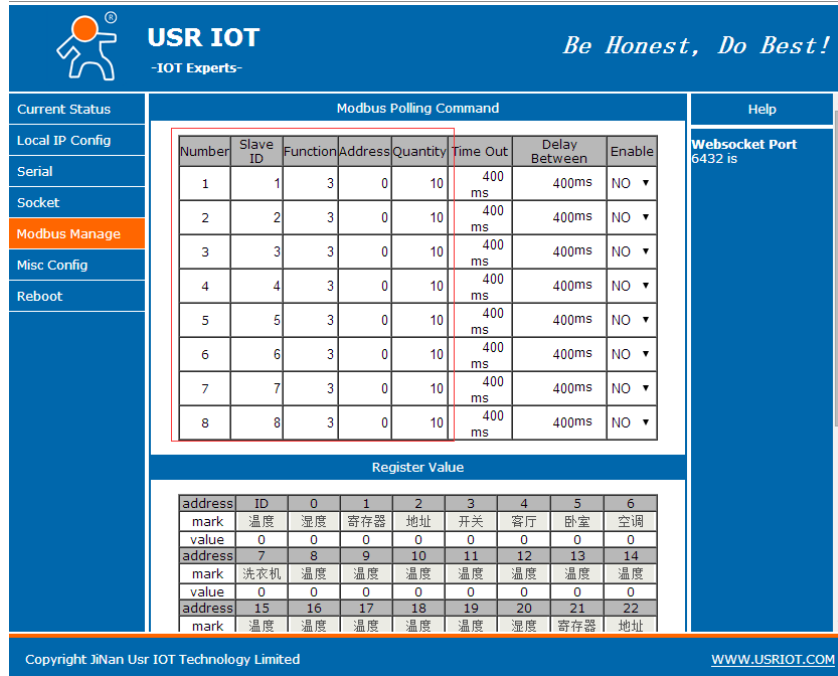
Browser	Version
Chrome	Version 4+
Firefox	Version 4+
Internet Explorer	Version 10+
Opera	Version 10+
Safari	Version 5+

Figure 16 Browser version

2.4.1. Modbus data monitoring

User need disable Modbus Over TCP/IP function to use Modbus data monitoring function.

(1)Open Modbus Manage and configure the Modbus Slave ID/address by web server as follow:



The screenshot shows the USR IOT Modbus data monitoring configuration interface. The main content area is titled "Modbus Polling Command" and contains a table with the following data:

Number	Slave ID	Function	Address	Quantity	Time Out	Delay Between	Enable
1	1	3	0	10	400 ms	400ms	NO
2	2	3	0	10	400 ms	400ms	NO
3	3	3	0	10	400 ms	400ms	NO
4	4	3	0	10	400 ms	400ms	NO
5	5	3	0	10	400 ms	400ms	NO
6	6	3	0	10	400 ms	400ms	NO
7	7	3	0	10	400 ms	400ms	NO
8	8	3	0	10	400 ms	400ms	NO

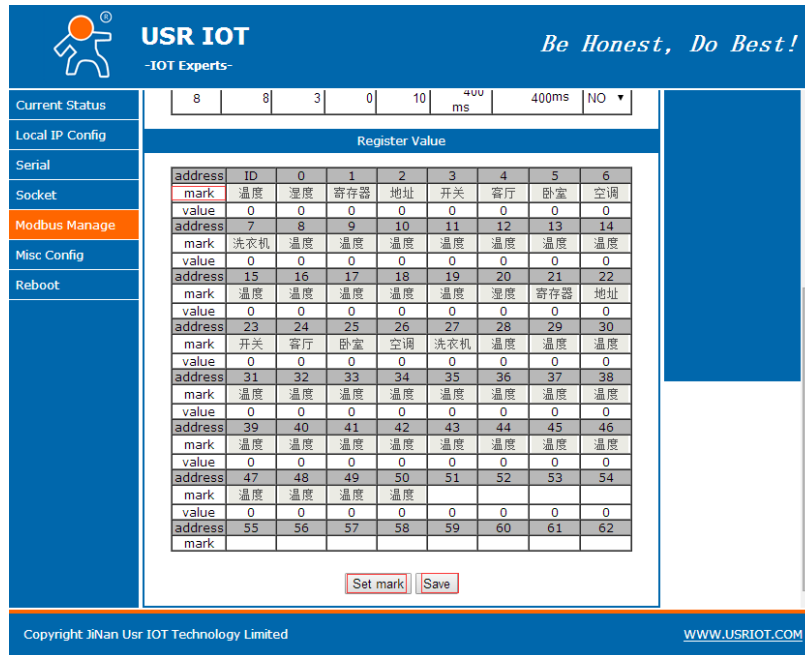
Below the polling command table is the "Register Value" section, which contains a table with the following data:

address	ID	0	1	2	3	4	5	6
mark	温度	湿度	寄存器	地址	开关	客厅	卧室	空调
value	0	0	0	0	0	0	0	0
address	7	8	9	10	11	12	13	14
mark	洗衣机	温度	温度	温度	温度	温度	温度	温度
value	0	0	0	0	0	0	0	0
address	15	16	17	18	19	20	21	22
mark	温度	温度	温度	温度	温度	湿度	寄存器	地址

The interface also includes a sidebar with navigation options: Current Status, Local IP Config, Serial, Socket, Modbus Manage (highlighted), Misc Config, and Reboot. The footer shows "Copyright JiNan Usr IOT Technology Limited" and "WWW.USRIOT.COM".

Figure 17 Modbus data monitoring function configuration

(2)Save and refresh the Modbus Manage, configure Slave mark to monitor conveniently.(mark only support Chinese characters, letter and number).



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Current Status: 8 8 3 0 10 400ms NO

Local IP Config

Serial

Socket

Modbus Manage

Misc Config

Reboot

address	ID	0	1	2	3	4	5	6
mark	温度	湿度	寄存器	地址	开关	客厅	卧室	空调
value	0	0	0	0	0	0	0	0
address	7	8	9	10	11	12	13	14
mark	洗衣机	温度	温度	温度	温度	温度	温度	温度
value	0	0	0	0	0	0	0	0
address	15	16	17	18	19	20	21	22
mark	温度	温度	温度	温度	温度	湿度	寄存器	地址
value	0	0	0	0	0	0	0	0
address	23	24	25	26	27	28	29	30
mark	开关	客厅	卧室	空调	洗衣机	温度	温度	温度
value	0	0	0	0	0	0	0	0
address	31	32	33	34	35	36	37	38
mark	温度	温度	温度	温度	温度	温度	温度	温度
value	0	0	0	0	0	0	0	0
address	39	40	41	42	43	44	45	46
mark	温度	温度	温度	温度	温度	温度	温度	温度
value	0	0	0	0	0	0	0	0
address	47	48	49	50	51	52	53	54
mark	温度	温度	温度	温度				
value	0	0	0	0	0	0	0	0
address	55	56	57	58	59	60	61	62
mark								

Set mark Save

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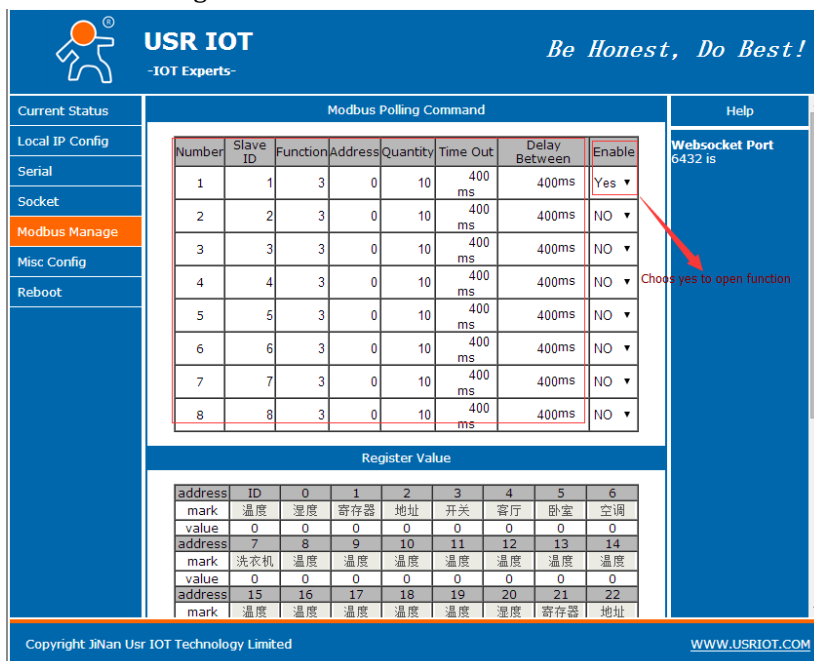
Figure 18 Modbus slave mark configuration

(3) Refresh Modbus Management and query the data. Web server will update data value without refreshing.

2.4.2. Modbus data management

M511 support Modbus data management function to query Slave information through Modbus Management web-page. When user open Modbus data management function, M511 will disable querying commands from Modbus Master to Modbus Slave(close protocol conversion function).

User can configure Modbus data management as follow:



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Current Status

Local IP Config

Serial

Socket

Modbus Manage

Misc Config

Reboot

Number	Slave ID	Function	Address	Quantity	Time Out	Delay Between	Enable
1	1	3	0	10	400ms	400ms	Yes
2	2	3	0	10	400ms	400ms	NO
3	3	3	0	10	400ms	400ms	NO
4	4	3	0	10	400ms	400ms	NO
5	5	3	0	10	400ms	400ms	NO
6	6	3	0	10	400ms	400ms	NO
7	7	3	0	10	400ms	400ms	NO
8	8	3	0	10	400ms	400ms	NO

Websocket Port 6432 is

Choose yes to open function

address	ID	0	1	2	3	4	5	6
mark	温度	湿度	寄存器	地址	开关	客厅	卧室	空调
value	0	0	0	0	0	0	0	0
address	7	8	9	10	11	12	13	14
mark	洗衣机	温度	温度	温度	温度	温度	温度	温度
value	0	0	0	0	0	0	0	0
address	15	16	17	18	19	20	21	22
mark	温度	温度	温度	温度	温度	湿度	寄存器	地址

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Figure 19 Modbus data management configuration

2.5.Features

2.5.1. Network Identity Packet Function

M511 work in Modbus Master mode can send identity packet to Slave. Identity packet can be user editable data or MAC address. Identity packet will be sent when connection is established. Application diagram as follow:

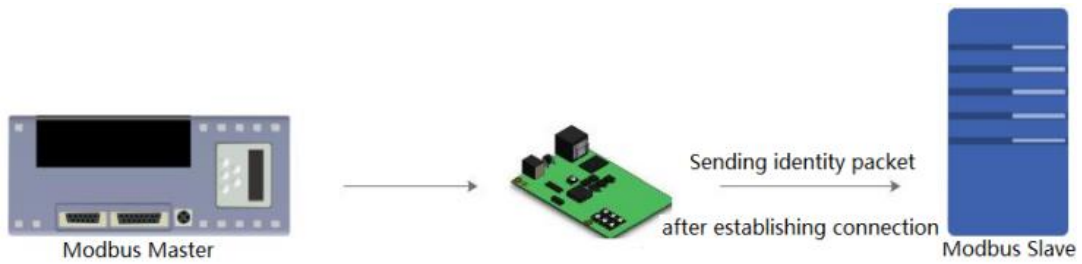


Figure 20 Identity Packet application diagram

3. Parameter Setting

There are two ways to configure USR-M511. They are web server configuration and AT command configuration.

3.1. Web Server Configuration

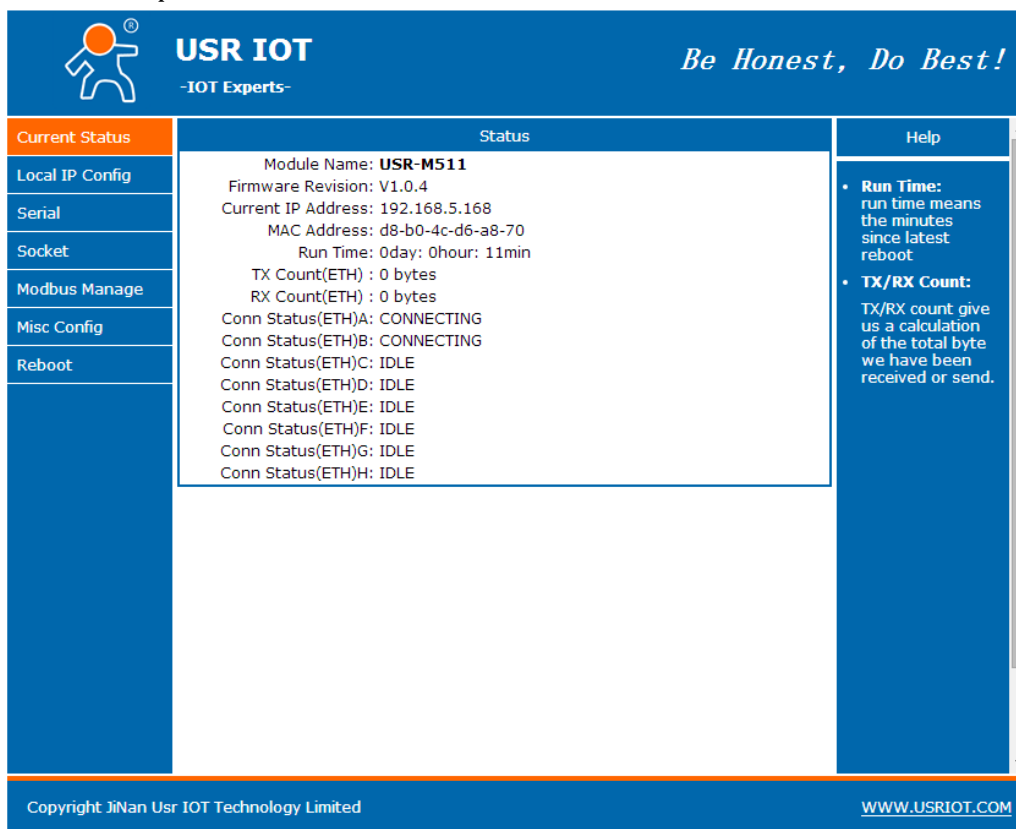
User can connect PC to M511 through LAN port and enter web server to configure.

Web server default parameters as follow:

Parameter	Default settings
Web server IP address	192.168.0.7
User name	admin
Password	admin

Figure 21 Web server default parameters

After firstly connecting PC to M511, user can open browser and enter default IP 192.168.0.7 into address bar, then log in user name and password, user will enter into web server. Web server screenshot as follow:



The screenshot shows the USR IOT web server interface. At the top, there is a blue header with the USR IOT logo and the slogan "Be Honest, Do Best!". Below the header, there is a navigation menu on the left with options: Current Status, Local IP Config, Serial, Socket, Modbus Manage, Misc Config, and Reboot. The main content area is titled "Status" and displays the following information:

```

Module Name: USR-M511
Firmware Revision: V1.0.4
Current IP Address: 192.168.5.168
MAC Address: d8-b0-4c-d6-a8-70
Run Time: 0day: 0hour: 11min
TX Count(ETH) : 0 bytes
RX Count(ETH) : 0 bytes
Conn Status(ETH)A: CONNECTING
Conn Status(ETH)B: CONNECTING
Conn Status(ETH)C: IDLE
Conn Status(ETH)D: IDLE
Conn Status(ETH)E: IDLE
Conn Status(ETH)F: IDLE
Conn Status(ETH)G: IDLE
Conn Status(ETH)H: IDLE
  
```

On the right side, there is a "Help" section with the following text:

- Run Time:** run time means the minutes since latest reboot
- TX/RX Count:** TX/RX count give us a calculation of the total byte we have been received or send.

At the bottom of the page, there is a footer with "Copyright JiNan Usr IOT Technology Limited" on the left and "WWW.USRIOT.COM" on the right.

Figure 22 Web Server

3.2. AT Command

We have specific user manual for AT commands.

3.2.1. Serial AT Command

In transparent mode, user can enter AT command mode, then user can send AT command to module. For entering AT command mode, please refer to this FAQ: <http://www.usriot.com/enter-serial-command-mode/>.

3.2.2. Network AT Command

Network AT command is to send a search keyword by broadcast, then set the parameters in a single broadcast way. Default keyword is **WWW.USR.CN** and default port number is 48899. User can enter Network AT command as follow:

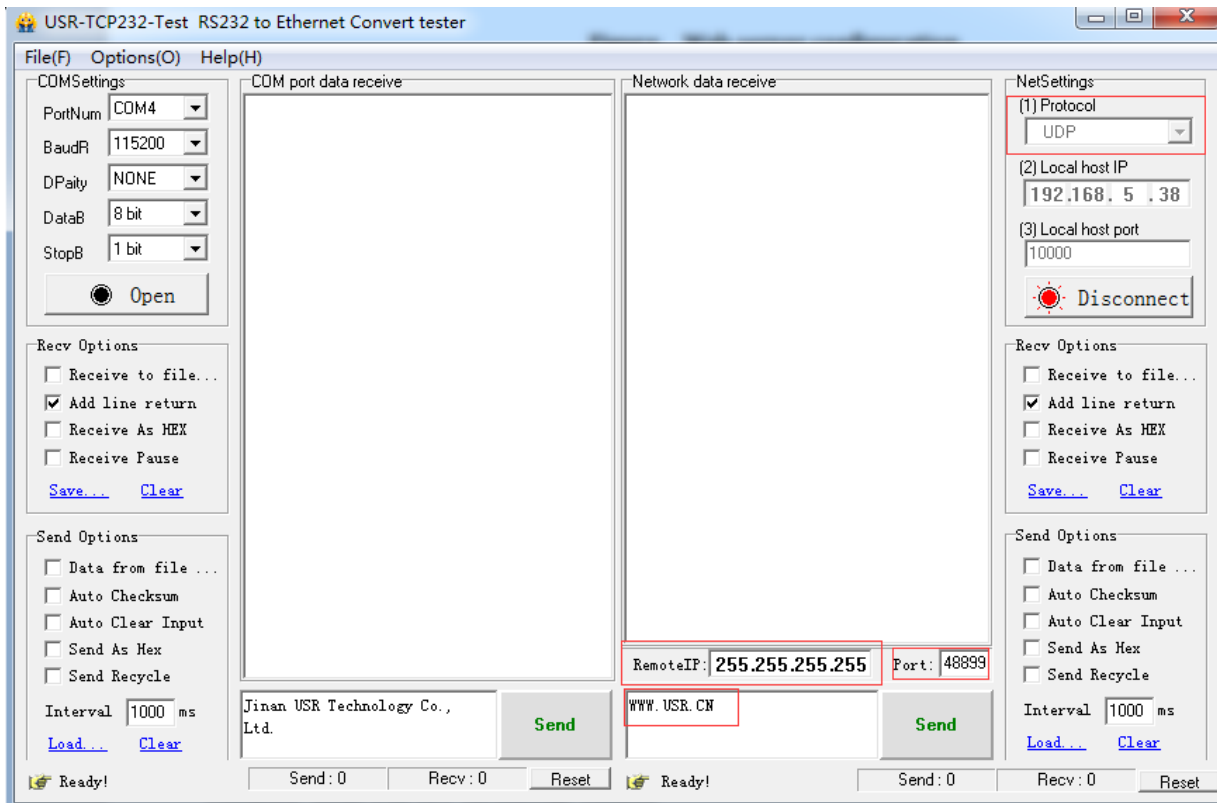


Figure 23 Network AT Command

4. Contact Us

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Email: sales@usr.cn

Tel: 86-531-88826739/86-531-55507297

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6. Update History

2017-09-06 V1.0.4.01 Established.