

USR-M100 Industrial Edge I/O Gateway

Modular Remote Terminal Unit(RTU)

User Manual V1.0.0



Build a Smarter IoT world, Your Trustworthy Partner



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1. Introduction

1.1. Overview

The USR-M100 is an intelligent IoT I/O gateway with comprehensive functions like on-board I/O support and RS-485/232/Ethernet interface, is an advanced modular RTU product with a unique hardware and software design, making it an ideal solution for a variety of industrial data acquisition applications.

The USR-M100 has a unique mechanical design that reduces the amount of time required for installation and removal, simplifying deployment and maintenance. In addition, the USR-M100 supports Modbus RTU Master protocol for retrieving field site serial data from serial meters and also supports OT/IT protocol conversion.

With the ability to convert between multiple protocols, USR-M100 can convert the collected I/O and serial data to protocols suitable for different upper-level software. For example, cloud service via MQTT, SCADA via Modbus TCP, web server via HTTP, and more. This two-in-one design reduces system complexity, the amount of space required in the network topology, and overall installation time. You can also connect your legacy devices to Ethernet, thereby increasing the lifetime of the devices since you can continue using the devices' original protocols.

1.2. Features

- High-performance CPU processing ability, using 32-bit Arm Cortex-M7 core CPU, up to 400MHz frequency
- Provides remote serial access over the Internet for industrial serial devices
- 10/100Mbps Ethernet port and support Auto MDI/MDIX
- Built-in 15KV ESD serial port protection
- Supports a wide industrial operating temperature,-40°C~85°C
- Baud rate: 0.6~230.4 Kbps, and any baud rate setting, support None, Odd, Even, Mark, Space Parity bit
- Flexible serial port data framing packing, which can satisfy user's various demands for data packets segmentation
- Versatile operation modes: TCP Server, TCP Client, UDP, HTTP client, Websocket server
- Support virtual COM USR-VCOM(windows)
- Modbus Ethernet-to-Serial support (Modbus/TCP, Modbus/RTU) for seamless integration of serial Modbus devices
- Provides rich configuration access, including: Windows configuration tool, and Web Browser
- Firmware upgrading via Web Browser and Windows configuration tool
- High security via certificate verification SSL/TLS encryption for serial data transmission, HTTPS, TCPS, MQTTS
- Support modbus RTU master, edge computing, modbus gateway, MQTT gateway
- Support SNMP V1/V2c
- Support on board I/O for analog input(2 AI), digital input(2 DI), digital output(SSR relay,2 DO), expandable with I/O modules
- Support 2 RS485 serial port, the first one can also be RS232
- Cloud support: MQTT via AWS IOT, Microsoft Azure, Thingsboard, Alibaba Cloud, EMQX, Tuya, Cumulocity IoT and so on



2. Get started

Since the USR-M100 is connected through a TCP/IP network, you may need to know some basic facts about networking in order to connect the server correctly. Specifications and dimensions are not provided in this manual. Please refer to datasheet for more information.

2.1. Installation

You can choose whether to plug in the other peripheral ports at this point or do it later depending on the actual location of the device or level of comfort for performing such operation.

2.1.1. DIN-Rail mounting

The USR-M100 has a unique mechanical design that reduces the amount of time required for installation and removal. In fact, screwdrivers and other tools are not required for any part of the hardware installation, including mounting the device on a DIN-rail, as well as connecting the wiring for both communication and I/O signal acquisition. Furthermore, no tools are required to remove the USR-M100 from a DIN-rail. Removing all of the modules from a DIN-rail is also easy using the latch and release tab.

Position the rear panel of the device directly in front of the DIN-Rail, making sure that the top of the clip hooks over the top of the DIN-Rail, as shown in Fig.1. Push up the the release tab towards the bottom of the DIN-Rail until the the mounting clip snaps into place.



Fig. 1 DIN-Rail mounting and wall mounting

- If you want to remove the device from DIN-Rail. Pull down the release tab with your finger and then remove the module from the DIN-Rail.
- NOTE: Disconnect all connections, including Ethernet, serial, and power cables, from the device before removing the device from the DIN rail.



2.1.2. Wall mounting

The wall mounting option provides better shock and vibration resistance than the DIN-Rail vertical mount.

- Locate the installation site and place the device against the wall. Use the wall mount plates as a guide to mark the locations of the screw holes.
- ♦ Drill two holes over the 4 marked locations on the wall. Insert the wall sinks into the walls.
- ♦ Insert the screws(M3 size) into the wall sinks then tighten the screw to enhance stability, see the following Fig.1.

2.2. Serial port

The USR-M100 supports 2 serial ports, 1 RS232/485 and 1 RS485, and adopts Spring-type terminal. The serial port pin assignments are shown in Fig.2. When connecting up Modbus devices via an RS485 network they should be daisy chained together, and a dual twisted pair cable are recommended. The connections should be kept the same throughout the network: positive to positive, and negative to negative. These may sometimes be labeled up as A and B. The maximum length of the serial network cannot exceed 1200m regardless of boosters and repeaters.





PRODUCT DETAILS



2.3. I/O interfaces

USR-M100 is equipped with two 11-pin Terminal blocks that are used for I/O interfaces. The pin assignments of terminal block are



shown in table 1. The PIN assignments are also marked on the device's nameplate, in order to avoid confusion.

Terminal block1	Definition
DO1 NC	Relay Output 1 normal close
DO1 COM	Relay Output 1 Common
DO1 NO	Relay Output 1 Normal open
DO2 NC	Relay Output 2 normal close
DO2 COM	Relay Output 2 Common
DO2 NO	Relay Output 2 normal open
ТХ	COM 1 RS232 TX
RX	COM 1 RS232 RX
G	COM 1 Ground
А	COM 1 RS485 A
В	COM 1 RS485 B

Table 1Terminal pin assignments

Terminal block2	Definition
A	COM 2 RS485 A
В	COM 2 RS485 B
G	COM 2 Ground
DI1	DC Digital Input 1
СОМ	Digital Input 1 Common
DI2	DC Digital Input 2
СОМ	Digital Input 2 Common
Al1	Analog Input 1
СОМ	Analog Input 1 Common
Al2	Analog Input 2
СОМ	Analog Input 2 Common



2.3.1. I/O specifications

		Inputs
	DI channels	2
	Input Type	Dry/Wet contact
	Wet contact	On: 9 to 36 VDC
Digital inputs		Off: 0 to 2 VDC
Digital inputs	Dry contact	On: close
		Off: open
	Range	9-36V DC
	Input filter time	Software configurable,10~65535ms
	Quantity	2
Analog inputs	Туре	Differential input
	Resolution	16 bit
	Range	4~20mA current
	Accuracy	1% FSR
		Outputs
	Quantity	2
	Туре	Form C SSR Relay
	AC Contact Current	10A / 277V AC at resistive load, NO
Digital outputs	Rating	5A / 250V AC at resistive load, NC
	DC Contact Current	10A / 28V DC at resistive load
	Rating	
	Operating time	10 ms max.
	Release time	5ms max.
	Mechanical Endurance	1000000 operations

Table 2 I/O specification

2.3.2. I/O wiring

The left picture in Fig.3 shows an example of digital input (DI) dry contact in which the digital input channel is controlled by a switch that is wired to the COM pin of the DI port. An external DC power(9~36V) is supplied this external circuit via the wiring of DI pin and the switch. The position of switch and power supply can be interchanged.

The right picture in Fig.3 shows an example of digital input (DI) wet contact in which the digital input channel.





Input Type	ON State LED ON Readback as 1	OFF State LED OFF Readback as 0	
	Relay ON	Relay Off	
Relay Contact	+ COM - Toole DIx	+ COM - Tool DIx	
R	Voltage > 9V	Voltage < 2V	
TTL/CMOS Logic	Logic Power Logic Level Low	Logic Power Logic Level High Logic Level High Logic Level High	
	Open Collector On	Open Collector Off	
NPN Output			
	Open Collector On	Open Collector Off	
PNP Output			

Fig. 3 Dry/Wet contact wiring

Fig. 4 DI wire connection



Fig. 5 DO wire connection



NOTE:

-All DI channels should be configured to dry contact or wet contact in the same time

-wire range:28~16 AWG(0.2~0.1 mm²), strip length 10mm

2.3.3. Modbus address mapping table

The internal register map of USR-M100 field controller node is the data map of digital input and output and analog input module.



Data points	Slave ID	Start address	Register	Function	Attribute	Data type	Default status
			address	code			
DO 1	100	0000	00001	0x1,0x5,0xF	Write/read	Uint8	NC
DO 2	100	0001	00002	0x1,0x5,0xF	Write/read	Uint8	NC
DI 1	100	0000	10001	0x2	read	Uint8	0
DI 2	100	0001	10002	0x2	read	Uint8	0
Al 1	100	0000	30001	0x4	read	float32(ABCD)	0
AI 2	100	0001	30003	0x4	read	float32(ABCD)	0

Table 3 IO modbus address

2.4. Power supply

The USR-M100 I/O gateway provides 2-pin power supply input terminal. The power supply support anti-reverse protection. Power supply range: 9 ~ 36VDC.

2.5. Ethernet RJ45 interface

The 10Base-T/100Base-TX adaptive Ethernet RJ45 interface supports automatic MDI/MDIX connection, refer to Fig.7 below for the pin distribution of the RJ45 interface.

Link LED: green color. Lights(steady on) when the module is connected to a network.

Activity LED: orange color. Blinks when network data is transmitted through the port.



87654321

Fig. 7 RJ45 with light

Table 4Ethernet pin assignments

Pin number	Signal name
1	Send data+(TD+)
2	Send data-(TD-)
3	Receive data+(RD+)
6	Receive data-(RD-)
4,5,7,8	Unused

2.6. LED indicators

The USR-M100 smart RTU provides LED indicators to monitor the device working status with a comprehensive simplified troubleshooting, the LED indicator behaviors are defined below.



LED name	status	description
POW	Steady on	Power supply is normal
	Off	No power supply or abnormal power supply
WORK	Blinking	Power is on and the device is ready. System is booted up
		and running
NET	Blinking	Ethernet WAN connection
	Steady on	4G LTE network connection
	off	No network
DATA	Blinking	Serial port is transmitting data
DO1	Steady on	Light on, the channel output is activated
DO2	Steady on	Light on, the channel output is activated
DI1	Steady on	Light on, the channel is activated by input signal
DI2	Steady on	Light on, the channel is activated by input signal

Table 5LED indicators

2.7. Factory default settings

The USR-M100 remote IO module comes with the following default settings.

Table 6 Default parameters		
Parameter	Default Values	
User Name	admin	
Password	admin	
Device IP address	192.168.0.7	
Subnet Mask	255.255.255.0	
Gateway IP	192.168.0.1	
COM port	115200,None,8,1	
COM operation mode	TCP server,23	
MQTT	Disable	
Edge computing	Disable	

2.8. Quick test

USR-M100 has a built-in Web server, which provides a convenient way to access and configure the remote IO module. Users can use Edge, Firefox or Google browser to access it. This chapter is a quick introduction to the USR-M100 smart IO gateway. It is recommended that users read this chapter and follow the instructions once for the system, and you will have a basic understanding of the product. For specific function details and instructions, please refer to the subsequent chapters.

2.8.1. Download the software

Download the setting software from PUSR's website:

https://www.pusr.com/support/downloads/H7-version-set-up-software.html

https://www.pusr.com/support/downloads/usr-tcp232-test-V13.html

You may find it in the download section under your product page. Run the software when the installation has been completed as shown in Fig.8 and Fig.9.



It is strongly recommended for the users to set the Network Parameters through configuration tool first. Other device-specific

configurations can later be carried out via user-friendly Web-Interface.

AUSR-MXX V1.0.1			-	
Device 中文				
DeviceIP Device	Name MAC	Ver Web		
Basic Set				
IP Type:	static IP	~		
ModuleStaticIP:		7		
SubnetMask:		7		
Gateway:		7		
	Save			
	Search			
	Le nonest, bo best			

Fig. 8 Windows configuration tool

	COM port data receive		Network data receive		NetSettings
PortNum COM1 -					(1) Protocol
up 115200 v					TCP Server
					(2) Local host IP
Paity NONE					172.16.14.15
ataB 8 bit 💌					(2) Local heat part
tonB 1 bit 💌					8234
- 1					10001
🖲 Open					🔵 🕒 Listenin
cv Options					Recy Options
Receive to file					Receive to file
Add line return					Add line return
Receive As HEX					Receive As HEX
Receive Pause					T Receive Pause
ave Clear					Save Clear
nd Options	10 M				Send Options
Data from file					🔲 🔲 Data from file
Auto Checksum					🔲 Auto Checksum
Auto Clear Input					🗌 🗍 Auto Clear Inpu
					🗌 🔲 Send As Hex
Send As Hex			1		Send Recycle
Send As Hex Send Recycle			1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		The second se
Send As Hex Send Recycle nterval 1000 ms	Jinan USR Technology Co.,	Creed	http://en.usr.cn	C 1	Interval 1000 ms

Fig. 9 Test assistant

2.8.2. Hardware connection

For fast networking of USR-M100 smart RTU, you need to prepare a PC, a router, a network cable, a serial cable, and a DC12V/1A power supply. The hardware connection is shown in Fig.10. To establish a TCP / IP network all devices must be connected to the same network either locally or via gateway connections.





Fig. 10 Hardware connection

- Connect the power line with the USR-M100 power input. If the power is properly supplied, the "PWR" LED will show a solid red color. After the system is ready, the "WORK" LED will blink.
- Connect one end of the Ethernet cable to the M100's 10/100M Ethernet port and the other end of the cable to the same Ethernet network(same router or switch).
- Connect a serial data cable(USB to RS232 or RS485) between the USR-M100 and PC. Screwless push-in type connection for simple and easy connection.



Fig. 11 Push in type connector

2.8.3. Network configuration (Step1)

The Broadcast Search function is used to locate all USR-M100 gateways that are connected to the same LAN as your computer. Since the Broadcast Search function searches by MAC address and not IP address, all M100 connected to the LAN will be located, regardless of whether or not they are part of the same subnet as the host.

Click Search to search for USR-M100 gateways. When your unit appears in the search results, you can click device to select it and



change the IP type to DHCH, save your change. Wait for 5s and search it again.

GUSR-MXX V1.0.1				
Device 中文				
DeviceIP De	viceName	MAC	Ver	Web
192.168.0.7 U	R-M100	04 AD 20 38 A	V1.0.09	U.
			1	
Basic Set				_
IP Type:	DHCP//	luto IP		2
ModuleStati	IP: 192.168	1.0.7		
SubnetMask	255.255	i.255.0		
Gateway:	192.168	1.0.1		
		Save 🔶	_	3
				•
	S	earch		
	-			
	📌 u	SR IOT		
	Be	honest, Do best		

Fig. 12 IP network setting

When accessing the M100 gateway through the Web, the IP address of the M100 gateway and the PC must be in the same network segment. After changing the IP address of the M100 gateway, you can access the Web page of the M100 gateway through browser and perform related configuration operations on it. The user name and initial password are both "admin". After entering the user name and password, click "OK" and the server will authenticate. After success, you will enter the main page of the Web server, as shown in Fig.13.

Communication Expert of Indust	al loT			Be Honest Do Best! 中文 English
) Chatura	Status			ŕ
> Matwork	System			
> Port	Model Name	USR-M100		
> Gateway	Firmware Version	V1.0.15		
> Cloud Service	Туре	H7		
> System	Run Time	Oday: Ohour: 1min		
	OS	RT-Thread		
	MAC Address	D4-AD-20-38-A4-58	8	
	IMEI	860059054780122		
	SN	0040342206080026	8382	
	Current Network Card Type	EtherNET		
	System Time	2023-01-13 14:53:1	3	
	Ethernet			
	Local IP Address	172.16.14.73		
	Preferred DNS Server	192.168.0.1		
	Alternate DNS Server	223.5.5.5		
	Cellular Network			
	ICCID	1.2		
	LTE IP Address	-		
	Preferred DNS Server			
	Alternate DNS Server			
		Jinan USR IOT Technology Limited.	http://www.pusr.com	

Fig. 13 The main interface of the Web server

The IP address of the PC must be modified to ensure that it is in the same local area network as the IP of the M100 gateway if you want to connect M100 to PC directly via a net cable. The default IP address of M100 IO gateway is: 192.168.0.7. Set the PC's IP address as: 192.168.0.X (X is any valid value from 2 to 253 except 7). The specific Windows system operation page is shown in Fig.14. you can access the Web page of the USR-M100 gateway through browser as mentioned above.



nternet 协议版本 4 (TCP/IPv4) Properties		
General			
You can get IP settings assign this capability. Otherwise, you for the appropriate IP settings	ed automatically if your network supports need to ask your network administrator		
O Obtain an IP address aut	omatically		
• Use the following IP addr	ess:		
IP address:	192 . 168 . 0 . 100		
S <u>u</u> bnet mask:	255 . 255 . 255 . 0		
Default gateway:	192.168.0.1		
Obtain DNS server addre	ss automatically		
• Use the following DNS set	rver addresses:		
Preferred DNS server:	192.168.0.1		
Alternate DNS server:	114 . 114 . 114 . 114		
Validate settings upon e	xit Ad <u>v</u> anced		
	OK Cancel		

Fig. 14 IP setting of PC

2.8.4. Data transmission test (Step2 and 3)

You can select an operation mode in socket setting page, but for now we use default parameters to test, i.e TCP server. Now USR-TCP232-Test works as TCP client, you need configure the server IP and port, that is 172.16.14.73:23 of USR-M100 gateway, the IP address of PC is 172.16.14.15.

In the serial port setting module, you can configure communication parameters for the serial ports RS485, as shown in the figure below. When configuring a serial network you need to set the following within each device-Baud rate,Parity,Stop bits,Data bits and keep serial port parameters consistent in the same network. We now configure the COM Settings to operate as required for the M100 devices. Go to the Uart1 Settings tab for confirming values of parameters.

Fig.15 shows an example of parameters setting to test transparent transmission.

USR IOT Communication Expert of Inductrial Io	и	Be Honest Do Best 1 47 (1996) ELECTO 22-Test RS232 to Ethernet Convert tester FEIer(F) Ontions(O) Helin(H)	– 🗆 X
		COMSettings COM port data receive Network data receive	NetSettings
> Status	UART TO NET	Doubling COM3 ▼ http://en.usr.en [Receive from 172.16.14.73 : 23]:	(1) Protocol
> Network	Data transmission sparameter configuration	Jinan USR Technology Co., Ltd.	TCP Client 💌
✓ Port		Fault intervention Just and State an	(2) Server IP
Uart1	SETTING	DPaly NUN The use on Jinan Usa leenalogy Co., Itd.	172.16.14.73
Uart2	Pvrt Socket	Data8 8 bit 💌	(2) Server Port
Websocket		StopB 1 bit 💌	23
> Gateway	Baudinate 115200 (800-210400)/pps	A 21	
> Cloud Service	No. 14	Close	Disconnect
> System	URING 0 TO	Recv Options	Recy Options
	Party None v	Receive to file	T Receive to file
	Stop bits 1 v	₩ Add line return	Add line return
	Fire red NOVE	Receive As HEX	TReceive As HEX
		T Receive Pause	🔽 Receive Pause
	UART Faciant Length 0 (0-1460 bytes	Save Clear	Save Clear
	U44T Packet Time 0 (0-255)ms		
	Sync Baudinate/FC2217) (N	Send Options	Send Options
		Data from file	Data from file
	crate can rearroad	Auto Checksum	Auto Checksun
	SaveDeaty	Auto Clear Input	Auto Llear Input
		LocalNost 172.16.14.15 Por	t 8683 Sand Baguala
		Tinan ISB Technology Co.	T . 1 1000
		Interval 1000 ms Ltd. Send Send	end Interval 1000 ms
		Load Clear	Load Clear
	Jinan USR 10T Technology Limited. http://www.pusr.com	🕼 Ready! Send: 120 Recv: 64 <u>Reset</u> 🕼 Ready! Send	1:64 Recv:120 Reset





2.9. Reload factory settings button

Press the "Reload" button (inside a small hole) on the back panel for 3-15 seconds and then release or follow the procedure in Section 3.1.9, to restore the USR-M100 gateway to the factory default settings.

2.10. Technical support and assistance

Please visit the USR IoT website: <u>https://www.pusr.com</u> where you can find the latest information about the product.

Contact your distributor, sales representative, or PUSR's support center:

http://h.usriot.com/index.php?c=frontTicket&m=sign for technical support if you need additional assistance. Please have the following

information ready before you submit a ticket:

- Product model
- Description of your peripheral attachments
- Description of your software (firmware version, application,function description,etc.)
- A complete description of the issue and steps to reproduce



3. Configuration and parameter details

3.1. Web interface

The USR-M100's user-friendly web configuration tool was designed specifically to make configuration and reconfiguration easy; no reconfiguration effort is required for the unchanged modules.

Every USR-M100 Industrial IO gateway is equipped with a built-in web server in the firmware. Therefore, the device can be accessed by using a web browser for configuring by entering the device's IP address in the URL field of your web browser. An authentication will be required and you will have to enter the username (Default value is "admin") and password (Default value is "admin") for accessing the web interface as shown in Fig. 16. This approach (web interface) for configuring your device is the most user-friendly. Please go to its corresponding section for a detailed explanation.

主臣

Fig. 16 Authentication Required for Accessing Web Interface

3.1.1. Status

After entering the correct user name and password and the authentication is successful, you will enter the main page of the Web, as shown in Fig.13.

USR IOT Communication Expert of Industrial IoT			Be Honest Do Best 中文 Englid
> Status	Status		
> Network	System		
> Port	Model Name	USR-M100	
> Gateway	Firmware Version	V1.0.15	
> Cloud Service	Туре	Н7	
> System	Run Time	Oday: Ohour: 5min	
	os	RT-Thread	
	MAC Address	D4-AD-20-38-A4-58	
	IMEI	860059054780122	
	SN	00403422060800268382	
	Current Network Card Type	EtherNET	
	System Time	2023-01-13 14:56:53	
	Ethernet		
	Local IP Address	172.16.14.73	
	Preferred DNS Server	192.168.0.1	
	Alternate DNS Server	223.5.5.5	
	Cellular Network		
	ICCID		
	LTE IP Address		
	Preferred DNS Server		
	Alternate DNS Server		



Fig. 17 Overview

The function of the device status part is to display some specific information of the current device, including system, network, serial port, mqtt gateway and Edge computing status.

Parameter Item	Description
Model name	The name of the gateway, which can be customized by the user on the "Miscellaneous settings" page.
Firmware version	The current software version of the gateway.
Туре	The current hardware version of the gateway.
Running time	Total time after the device start work. It will starts from 0 after reboot.
OS	Operating system.
MAC address	The MAC address of the gateway.
Current network type	Which interface to access the internet, default WAN interface, that is ethernet port.
Current IP address	The IP address of the gateway.
Port status	The working status of checked serial port. Select the serial port currently to be displayed
	Conn Status A(ETH): connection status of socket A.
	IDLE:Initialization status
	LISTEN:When the module works as TCP Server, it is listening for connection access
	CONNECTING:Works as TCP client, the module is establishing a connection to the TCP Server
	CONNECTED:Works as TCP server, the TCP connection to TCP server of the module has been
	established
	CONNECTED (n) :Number of TCP clients connected to the module
	ERROR:The module is abnormally disconnected
	Tx Count A(ETH): To count how many bytes be send to internet.
	Rx Count A(ETH): To count how many bytes received from internet.
MQTT	Whether MQTT is enable
Connection status	Shows the connection status to the MQTT broker.
	CONNECTING:the Smart I/O Controller is connecting to the MQTT broker
	CONNECTED:the Smart I/O Controller is connected to an MQTT broker
	ERROR: The module is abnormally disconnected due to invalid MQTT protocol version, invalid client ID,
	unavailable broker, invalid client credentials or unknown reasons
Edge computing	Whether Edge computing is enable
Connection status	Connection status of Edge computing.
	CONNECTING:the module is establishing a socket or mqtt connection
	CONNECTED:the socket or mqtt connection has been established
	ERROR:The module is abnormally disconnected

Table 7Overview status list

3.1.2. IP settings

You must assign a valid IP address to the USR-M100 before it will work in your network environment. The IP address must be unique within the network. If the device is connected to the Internet and should connect to other servers over the Internet to get some



services such as Network Time Protocol (NTP) server, you will need to configure the DNS server in order to be able to resolve the host

name of the NTP server. The detailed description of the configuration parameters on this interface is shown in table 8.

USR IOT Communication Expert of Industrial IoT		Be Honest Do Best! †r⊄∣English
VER LOT Communication Expert of Inductival Lot Verview Network IP Config P Config	III DHCP/AudalP Auto ~ 1 172.16.14.73 2 25.255.0 1 172.16.14.1 1 114.114.114.114 2 8.8.8	Be Honest Do Best ! #ty Inglob

Fig. 18 Network web page

Table 8Network configuration list

Parameter Item	Description
IP obtaining type	Click the drop-down menu to select the IP Address Setting mode: Static or DHCP. If you choose DHCP,
	the rest of the options will be greyed out or disabled.
DNS type	Click the drop-down menu to select the DNS mode: auto or manual. If you choose auto, the DNS options
	will be greyed out or disabled.
IP address	IP address is a 32-bit address assigned to devices connected to the Internet. The IP address consists of
	two fields: the network number field (Net-id) and host number field (host-id). In order to facilitate the
	management of IP addresses, IP addresses are divided into five categories: Class A, B, and C addresses
	are unicast addresses, Class D addresses are multicast addresses, Class E addresses are reserved
	addresses for future special purposes. The IP addresses currently in large numbers belong to three types
	of addresses: A, B, and C.
Subnet mask	The mask is a 32-bit number corresponding to an IP address. Some of these numbers are 1, and the
	others are 0. The mask can divide the IP address into two parts: the subnet address and the host address.
	The part of the IP address corresponding to the 1 bit in the mask is the subnet address, and the other bits
	are the host address. The mask for class A addresses is 255.0.0.0, the mask for class B addresses is
	255.255.0.0, the mask for class C addresses is 255.255.255.0.
Gateway	The default gateway in the host is usually called the default route. The default route (Default route) is the
	route chosen by the router when no other route exists for the destination address in the IP packet. All
	packets whose destination is not in the router's routing table will use the default route.
DNS	The IP address of the DNS server. DNS Server part is where you can specify the IP Address of your
	Preferred DNS (Domain Name Server) and Alternate DNS. When the device uses a static IP address, the
	user is required to fill in this item, 8.8.8.8(Google) will be a good choice. If a specific DNS server is not



used, the default gateway IP address is generally sufficient.

The configuration will save to flash memory after clicking Save button. All configurations take effect after a system reboot.

3.1.3. Serial port settings

The serial port module includes: serial port parameter configuration, network parameter configuration. The main function of the gateway is to carry out two-way transparent transmission of standard serial bus data (RS-232, RS-485) and standard Ethernet data supporting TCP/IP protocol to solve common serial equipment Networking problems on the Internet. The Port configuration page can configure the parameters of the serial port and socket, as shown in Fig.19. Details on work mode connectivity protocols and its settings of USR-M100 gateway are given in Chapter 4 Operation modes, this section will only focus on the part of parameter description. The description of the configuration parameters on this interface is shown in table 9 and table 10.

Communication Expert of Industr	ial IoT			Be Honest Do Best! 中文 English
Communication Expert of Industr Status Overview Network IP Config Port Uart1 Uart2 Websocket	We lot UART TO NEF Data transmission parameter conf SETTING Port Socket Baud rate	Iguration	(600-230400)tps	⊄t⊄ English
> Gateway	Data oits Parity	8	bit	
Cloud Service System	Parity Stop bits Flow ctrl UART Packet Length UART Packet Time Sync Baudrate(RFC2217) Enable Uart Heartbeat	None ~ 1 ~ NONE ~ 0 0 0 0	(0–1460)bytes (0–255)ms Savro&Apply	

Fig. 19 Serial port configuration web page

Table 9Serial settings list

Parameter Item	Description
Baud rate	This sets the port's data transfer speed. Choices are from 600—230400. Set this to match the baud rate
	setting of the connected device. Default is 115200.
Data bits	This sets the number of bits used to transmit one character of data. Choices are: 7 and 8. Set this to
	match the data bit setting of the connected device. Default is 8 (which is the default for the majority of
	serial devices).
Parity bits	This bit checks the integrity of the transmitted data. Choices are: None, Odd, Even, Space, Mark. Set this
	to match the parity setting of the connected device. Default is None (which is the default for the majority
	of serial devices).
Stop bits	This indicates that a character has been transmitted. Set this to match the stop bit setting of the
	connected device. Choices are: 1 and 2. Default is 1 (which is the default for the majority of serial devices).
Flow control	This allows you to choose how the data flow will be controlled. Choices are: None(No Flow Control), or
	Xon/Xoff (Software Flow Control). Set this to match the flow control setting of the connected device.
	Default is None. If Xon/Xoff is selected, the Xon and Xoff characters are 0x11 for Xon and 0x13 for Xoff.
	Note that these are hexadecimal numbers of ASCII characters (i.e., $0x11 = '1'$ and $0x13 = '3'$).



Packing timeClick the option to sent pack immediately by interval.Packing lengthClick the option to sent pack immediately by size.

The configuration will save to flash memory after clicking Save button. All configurations take effect after a system reboot.

USR IOT Communication Expert of Industrial IoT	Be Honest Do Best ! #r≿[forglish
 Communication Depart of Industrial IoT Status Verview Network IP Config Port SetTING Uart1 Uart2 Websocket Working Mode Gateway 	4 x f Frydiah ifiguration TCP Client v None v 192 168 221
Cloud Service identities System Cloud Service Local/Remote Port Number Reconnection period PRINT Modbus Poll Enable Net Heartbeat	192.168.0.201 0 23 0 (0-9999)s OFF ~ Response Timeout 200 (10-9999)ms
Registration Packet Type SSL protocol SOCKET B Operating Mode	None Location Once connecting Clusable Clusable Connecting Clusable Clus

Fig. 20 Socket configuration web page

Table 10Operation modes settings list

Parameter Item	Description		
Working mode	USR-M100 gateway supports 5 different operation Modes which are TCP Server, TCP Client, and		
	UDP,HTTP client and websocket. The operation Mode describes the role of the device and the		
	connection between the device and other remote devices in the network which would like to		
	communicate with serial device on M100's COM port.		
Maximum socket no.(TCP	This option specifies the maximum number of remote devices/clients (with maximum of 16 clients) that		
server only)	can be connected to the serial device on this COM port.		
Local port	This option specifies the port number that the TCP/UDP server should listen to. It is also used by the		
	remote TCP/UDP client to connect to the TCP/UDP server. The default local port is 23. You can enter		
	different port numbers in this option.		
Remoter server addr.	Please specify the IP address of the TCP/UDP server program on the remote host in this field. This should		
	match the IP settings of the TCP/UDP server program.		
Remote port	Please specify the port number of the TCP/UDP server program on the remote host in this field. Once		
	again, this should match the IP setting of the TCP/UDP server program.		
Timeout	The default is disable. If you want to keep connection continually, you can disable it. Data idle Time is the		
reconnection(TCP/UDP	time period for which the device waits for data. If the USR-M100 gateway does not receive data during		
client)	established idle time(timeout), the USR-M100 gateway will disconnect temporarily. When the data comes		
	in, it will reconnect automatically. Users do not need to reconnect.		
Modbus polling	This option is selected when multiple modbus maters from Ethernet are polling the same serial port.		
	Each serial port supports up to 16 simultaneous TCP connections allowing hosts to simultaneously		
	transmit/receive data to/from the same serial port, USR-M100 gateway processes the data in the order		



	arrived. The M100 gateway determines the end of the serial acknowledgement through a response
	timeout.
Response timeout	If the Modbus device does not receive a response within the time specified here, the communication
	times out. Valid settings are from 10 – 9999ms.
Modbus TCP exception	This option is used to enable modbus exception checking. If selected, error messages (TCP exception
(modbusTCP enabled)	codes) are generated if a problem (such as a message timeout) should occur during Modbus operations.
SSL protocol	Choose TLS/SSL data encryption protocol version
Socket B	Socket B supports 2 different operation Modes which are TCP Client, and UDP client, this socket is closed
	by default.

The configuration will save to flash memory after clicking Save button. All configurations take effect after a system reboot.

3.1.4. Websocket server

This function is that the gateway acts as a WebSocket server, and transparently transmits the data received by the serial to the webpage in hexadecimal. The WebSocket server can also send data to the serial device at any time. It can also print log information. Pleas refer to system setting.

< > C 88 A Not secure 172.16.14.73		⊳ 🕲 💲 ≞		
USR IOT Communication Expert of Industrial IoT	172.16.14.73 says connet successi	Be Honest Do Best! 中文 English		
VSR 107 Communication Report of Industrial IoC Verview Network IP Config P Config Network Uart1 Uart2 Websocket Sateway Cloud Service System	Incle Incle This page use websocket to establish a channel of shell command and log outputing between webpage and device Websocket connection:0 Secrive hex.data is and ascilidata send ascilidata	Be Honest Do Best ! ⊕⊋ [inglish		
	Jinan USR IOT Technology Limited. http://www.pusr.com			
	Fig. 21 Mahaaalat aanaar			

Fig. 21 Websocket server

3.1.5. MQTT gateway

If you enable MQTT Broker as your northbound connection, the M100 gateway will be configured as MQTT Client. In Client mode, you can setup MQTT broker basic settings, general topic settings, TLS secure transmission, last will message, and advanced settings.



USR IOT Communication Export of Industrial IoT		Be Honest Do I #1
V Status MQTT Gateway		
Overview MQTT Gateway function suppr V Network supports port mapping function	orts SSL, clean session and QOS, supports connecting to the third-party MQIT server. It supports up to 16 publish topics and 16 subscribe topics, m, which can bind each topic to a different serial port.	
IP Config ~ Port Basic configuration Pu	Nish Subscribe	
Uart1 Uart2 Enable MQT	7 Enable ~	
Websocket MQTT Version	n MQTT-3.1.1 ~	
Client II MQTT Gateway Server Address (II	b 123456 b brokar amax ia	
Edge Computing IO Fuction Local/Remote Port NC	A. (0-65535) 1883 (1-65535)	
Cloud Service Keepalvie Interva System	60 (0-6553)s	
Reconnection Interva	l 1 (1-65535)s	
Clean up sessio		
User Credential Enable last wi		
SSL protocc	A Disable V None V	
	Save&Apply	
	Jinan USR IOT Technology Limited. http://www.pusr.com	



Table 11	MQTT basic setting
----------	--------------------

Parameter Item	Description		
Enable MQTT	Turns MQTT gateway on or off.		
MQTT Version	Select the mqtt protocol version. V3.1 and V3.1.1 are supported.		
Client ID	The client ID defined the identifier of the USR-M100 Gateway.		
	The IDs of the various MQTT clients have to be unique for the respective MQTT Broker. If two MQTT		
	clients are using an identical ID, the connections of theses clients to the MQTT Broker are		
	disconnected. For an individual client, there is no way to find out whether a specific client ID is already		
	used by another client or not.		
Server address	IP address or hostname of an MQTT broker.		
Remote Port	Port number of the MQTT broker.		
Keep alive interval	The Keep Alive is a time interval measured in seconds. It is the maximum time interval that the broker		
	permits between when a client finishes sending one MQTT packet and starts to send the next.		
Re-connection time	Automatic reconnection when there are not data flow in the MQTT session in the setting time. If the		
	time is set 0, this function does not take effect.		
Re-connection interval	Automatic reconnection interval after a fail network connection.		
Clean session	Valid only for Qos1 and Qos2. When the clean session is checked, the client does not want a persistent		
	session. If the client disconnects for any reason, all information and messages that are queued from a		
	previous persistent session are lost.		
	When the clean session is unchecked, the broker creates a persistent session for the client. All		
	information and messages are preserved until the next time that the client requests a clean session.		
User name	Username for authentication to the MQTT broker.		
Password	Password for authentication to the MQTT broker.		
Last will	The last will message is part of the Last Will and Testament (LWT) feature of MQTT. The will message		
	notifies other clients when a client disconnects ungracefully.		



SSL/TLS

If you use a TLS connection, click the SSL/TLS tab, select Enable SSL/TLS, and then set

the Protocol parameter to TLSv1.2

USR IOT Communication Expert of Industrial IoT	В	e Honest Do Best! 中文 English
 Status Overview Network IP Config Port Uart1 Uart2 Websocket 	MQTT Gateway MQTT Gateway function supports SL, clean session and QOS, supports connecting to the third-party MQTT servect supports up to 16 publish topics and 16 subscribe topics, supports port mapping function, which can bind each topic to a different serial port. Basic configuration Publish Subscribe Custom mode Disable © Publish topic1 ©	
Cateway MQTT Gateway Edge Computing ID Fuction Cloud Service System	Transmission Mode Transparent transmission Topic String Publishing Binding port Pet 1. QOS QOS Retained message . IO Control/Query .	

Fig. 23 Topic to publish

Table 12 Publish message setting

Parameter Item	Description
Transmission mode	Transparent transmission, just as its name implies, the gateway does not process any data, forward the
	data directly.
	Topic distribution, in this mode users should define a topic name when configuring the topic. After
	receiving serial port data, the device pushes it to the associated topics based on the topic name. Topic
	name and payload are separated by comma. For example, topic name, {"message": "Hello from
	USR-M100 gateway"} as serial data. Different topics are allowed to have the same topic name. In this
	way, data is pushed to all topics with the same topic name.
	Custom mode, add topic, Qos(0,1,2), retain(ON,OFF) message before payload. After receiving the serial
	data, USR-M100 publishes the payload of the corresponding topic to cloud according to rules. This
	method can be used to publish any topic at any time. For example, awsiot/test,0,0N,{"message": "Hello
	from USR-M100 gateway"} as serial data.
TOPIC string	An MQTT topic is a UTF-8 string that the broker uses to filter messages for each connected client. To
	receive messages, the client must subscribe to the topic. A topic can have one or more topic levels.
	Each topic level is separated by a slash (Topic Level Separator).
Binding Port	The MQTT topic is bound to the serial port number of the device. Any data from the COM Port1 of the
	gateway will send to all the TOPIC it bindings to.
Qos	QoS 0: at most once. In this case, the client publishes a message to the broker only once.
	QoS 1: at least once. In this case, when a client publishes a message to the broker, the client expects
	the broker to acknowledge whether or not a client has received the message. If the publisher does not
	receive acknowledgement from the broker within a preset time interval, it will republish the message



	again and again until acknowledgment is received.
	QoS 2: exactly once. The MQTT protocol uses the confirmation of confirmations to ensure that a
	message is delivered exactly once.
Retained message	By setting the Retain flag the MQTT Broker is instructed to save the most recent data value for the
	topic. Data values without Retain flag are only transferred from the MQTT Broker to those MQTT
	Subscribers that are registered at the broker and have subscribed to the appropriate topic in the
	moment when sending the data to the broker.
IO control/Query	Used to reply for IO status to server

Communication Expert of Industrial IoT		3e Honest Do Best! 中文 English
USE IOT Communication Report of Industrial IoT Overview Network IP Config P Config Vart1 Uart1 Uart2 Websocket Gateway Edge Computing IO Fuction Cloud Service System	MQTT Gateway Multication supports SSL, clean session and QOS, supports connecting to the hird-party MQTT servecit supports up to 16 publish topics and 16 subscribe topics, supports port mapping function, which can bind each topic to a different serial port. Race configuration Publich Subscribe topic1	te Honest Do Best! dr≾[English
	Jinan USR IOT Technology Limited. http://www.pusr.com	



Table 13Subscribe message setting

Parameter Item	Description
Transmission mode	The data printed to the serial port can be set whether to carry the Topic
Topic string	Same to Table 12
Binding port	Same to Table 12
QoS	Same to Table 12
IO control/Query	Used to Query IO status from server

3.1.6. Edge computing

The M100 gateway supports southbound fieldbus protocols of Modbus RTU protocols. It also supports northbound MQTT/ Cloud protocols of MQTT Broker, TCP/UDP/HTTP in socket, AWS IOT, and Alibaba Cloud IoT Platform. The M100 gateway fulfills a different role on each of its sides. Each role is determined by your devices' settings. Therefore, set the role of each of your devices correctly.



epert of Industrial IoT	
atus	Edge Computing Gateway
Overview	suger sumptions generating and a consultance and an experimental sed attractions support. Modifier 2011 to Medius 2019 and other associational
✓ Network	including source acquisition, source comparing, edge reporting and other raincatoris, supports modulas knot to source active source source and other general industrial protocol conversion.
IP Config	
∽ Port	SETTING
Uart1	Edge Computing Data Acquisition Data Query and Report Linkage control
Uart2	
Websocket	Enable Edge Computing Enable
∽ Gateway	Save Next
MQTT Gateway	
Edge Computing	
IO Fuction	
> Cloud Service	
> System	
	linan IISR IOT Technology Limited http://www.wusr.com



Communication Expert of Industrial IoT	Be Honest Do Be 中文
✓ Status	
Overview	Edge Computing Gateway
✓ Network	Including edge acquisition, edge computing, edge reporting and other functions, supports Modbus RTU to Json, Modbus RTU to Modbus RTU and other general industrial
IP Config	protoco conversor.
✓ Port	SETTING
Uart1	File Computing Data Acquidition Data Query and Report Linkane control
Uart2	cage company end of a particular and cases and company end of a company end of a company end of a company end of
Websocket	Select edge computing profile Choose file Export.
✓ Gateway	lat: 126 nodes
MQTT Gateway	
Edge Computing	No. Nameli Point Sourceli Slave addril Operations No. Nameli Register addressii Data typeli Operations
IO Fuction	1 device01 Port1 1 Edit Delete 1 node0101 40001 uln116 Edit Delete
> Cloud Service	
> System	z nodel ruz wooz um ro Edit Delete
	TAGE STATE
	Add modes
	Come Day
	dans well
	Jinan USR IOT Technology Limited. http://www.pusr.com

Fig. 26 Modbus slaves and datapoints configuration

Table 14Modbus RTU poll configuration

Parameter Item	Description
Device name	The Modbus slave device identifier, which is unique for the current gateway. The device name must be
	less than 30 characters in length, and can contain letters, digits, underscores (_).
COM Port	Which serial port the modbus slave device connected to. Select an option from the drop-down list.
Slave address	Slave ID. Each slave in a network is assigned a unique identifier ranging from 1 to 255. When the
	master requests data from a slave, the first byte it sends is the Slave ID. When set to 0, the slave will
	respond to requests addressed to any ID.
Polling interval	The interval at which data is collected. Modbus is a communications protocol with half-duplex
	transmission. Gateways send requests to collect data from devices. Therefore, you must specify the
	data collection interval. The unit is millisecond.



	f 60 milliseconds is required to collect the data of each property, the total time required to collect the					
	data of all properties is calculated as follows:					
	Total required time = Time required to collect the data of each property (60 ms) × Number of					
	properties for the slave device.					
Modbus address mapping	This function is usually combined with register mapping to realize a single modbus command query in					
	data query.					
Merger collection	This function is used when the register address of many data points are sequential					

Table 15Data point(node) configuration

Parameter Item	Description
Data point name	Identifier of the data point, which must be unique for the gateway. The name must be 1 to 30
	characters in length and can contain letters, digits, and underscores (_).
Modbus function code	The Modbus RTU master supports the following Modbus functions: 1 Read Coils, 2 Read Discrete
	Inputs,3 Read Multiple Holding Registers, 4 Read Input Registers.
Register address	The address of the register from which data will be read.
Data type	Defines how read data will be stored. See <u>table 22</u> .
Response timeout	If the Modbus device does not receive a response within the time specified here, the communication
	times out. Valid settings are from 10 – 65535ms.
Data report	The trigger of reporting data. Valid values:
	On Change: The report is triggered if the collected data changes. You can use a tolerance to only log
	the data point if the value changes more than X amount.
	Interval: Collect the variable data at the poll interval and report the data at the specified report interval.
	Timer: Collect the variable data at the poll interval and report the data at the regular time.
Register address mapping	This function is usually combined with modbus address mapping to realize a single modbus command
	query in data query.
Formula	Modbus register store only whole numbers. For this reason a scale factor often needs to be applied.
	For example a modbus register with a temperature value may read as 723 and a multiplier of 0.1 need
	to be applied to get the correct value of 72.3 in the SCADA system,the formula is %s*0.1. If the data
	type is a Float then the multiplier is not needed. This computation supports +, -, * and / operators.



Sommunication Expert of Industrial IoT		Be Honest Do Best 中文 Eng
✓ Status	tling Data Acquisition Data Query and Report Linkage control	
Overview	ad the second	
V Network		
IP Config	Channel select MQTT ~ 🥥	
✓ Port Data Quer	y/Set	
Uart1	Data Output Excelle	
Uart2	Data Query Elleune *	
Websocket	Data Set Disable ~	
✓ Gateway	Query or Set type ModbusRTU ~	
MQTT Gateway	Query or Set Topic //DownloadTopic	
Edge Computing		
IO Fuction	QUS QUSU ~	
> Cloud Service	Respond Topic /RespondTopic	
> System	QOS Q050 ~	
Data Repo	it of nodes	
	Reporting method Disable ~	
Report Ag	eement	
	Save Next	

Fig. 27 Transport channel and formatting

Table 16	Data Query and report
----------	-----------------------

Parameter Item	Description			
Communication channel	Select the channel in the socket type. You can choose TCP/UDP or HTTP in socket A of each series			
	port(socket1 or socket2), or MQTT you have added.			
Data query	Whether data query from remote server or cloud is enable.			
Data set	Whether data setting command from remote server or cloud is enable.			
Query or set type	You can choose Modbus RTU, Modbus TCP or JSON. Users can send the right format query command			
	from remote modbus master or MQTT publisher to the M100 gateway. The data is retrieved from the			
	device's cache of corresponding modbus instructions.			
Query or set Topic	Topic that used to query or set data from MQTT publisher.			
Response Topic	Topic that reply to the query or set data from MQTT publisher.			
Data report	The trigger of reporting data. Valid values:			
	On Change: The report is triggered if the collected data changes. You can use a tolerance to only log			
	the data point if the value changes more than X amount.			
	Interval: Collect the variable data at the poll interval and report the data at the specified report interval.			
	Timer: Collect the variable data at the poll interval and report the data at the regular time.			
Report Topic	Topic that used to report data to MQTT broker.			
Failure padding	Exception handling. Any data point did not get the response in response timeout will be filled with this			
	string as key value into the template.			
Quotation mark	Numeric values are quoted. It does not affect a string.			
Json template	The payload format. Users can custom which data points should report to the server.			

3.1.7. IO settings

USR-M100 gateway can support a number of Digital Input (DI), Digital Output (DO-Relays), Analog Input (AI) ports. There are a few combinations of I/O extension board in develop. Because the I/O status of M100 is mainly displayed via Modbus protocol, the user has



to configure the Modbus settings if the user wants to use the Modbus protocol. Fig.29 shows the parameter that must be set for the

Modbus protocol that is the Modbus Slave ID.

Communication Expert of Industri	hat	Be Honest Do Best 中文 Englis
✓ Status	10 Function	
Overview	IO Device Function Config and Status	
✓ Network		
IP Config	Configuration	
∽ Port	IO Control IO Function	
Uart1		
Uart2	DO Status	
Websocket	P01 P03	
✓ Gateway		
MQTT Gateway		
Edge Computing		
IO Fuction	Di Status	
> Cloud Service		
> System		
	AI Status	
	AII(UA) AI2(UA)	
	0 0	
	Save&Apply	
	Jinan USR IOT Technology Limited. http://www.pusr.com	

Fig. 28 IO control

ら USR IOT Communication Expert of Industrial IoT						Be Honest D)。 中
✓ Status	IO Control IO Function						
Overview							
✓ Network	Slave Address	100	(1~)	:55)			
IP Config	Register	Register Type	Register Address	Function Code	2		
∽ Port		DO	00001~00002	0x01,0x05,0x0	F		
Uart1		DI	10001~10002	0x02			
Uart2		AI	30001-30004	0x04			
Websocket							
∽ Gateway	Timing Function						
MQTT Gateway	Timer1 Enable	Disable	× (Start	NTP or Time Synchr	noization first)		
Edge Computing							
IO Fuction	Timer2 Enable	Disable	∽ (Start	NTP or Time Synchr	onization first)		
> Cloud Service	Timer3 Enable	Disable	∽ (Start	NTP or Time Synchr	onization first)		
> System	Timer4 Enable	Disable	∽ (Start	NTP or Time Synchr	onization first)		
	Timer5 Enable	Disable	× (Start	NTP or Time Super-	nnization first)		
	Timer6 Enable	Disable	✓ (Start	NTP or Time Synchr	onization first)		
	DO Function						
	Restart Hold	Disable	~				
	DO Action Config	Execute IO	Execute Action		Execute Time		
		DO1	No Action	~	1		
					(1~65535s)		

Fig. 29 IO function

Table 17 IO function

Parameter Item	Description
Slave address	This field allows the user to configure the Modbus identification (ID), The Modbus slave ID is set to the
	default value of 100. It can be the integer number from 1 to 247.
Register	The I/O status will be displayed at the starting address given in this field.
	E.g. The DI status will be mapped to the address set here. The default starting address is 1 which will
	be mapped to DI channel number 0. The successive DI channels will have the incremental Modbus
	address based on this starting address, i.e. DI1 will have the Modbus address of 2.
Timer1-6	Currently, two actions are supported: device restart and DO control



Restart Hold	Whether the DO output status remains after the restart			
DO action configuration	No action,default value.			
	Hold: keep the triggering status in the specified time, and back to the previous status, single trigger			
	Flip: keep the triggering status in the specified time and then flip, periodic trigger			
DI filter time	This field is the interval that the system will check for the DI status. The default value is 10 milliseconds			
	(ms).			

3.1.8. Cloud service

Please refer to "USR-M100 Quick Start Guide with AWS IoT" for detail.

Please refer to "USR-M100 Quick Start Guide with PUSR cloud" for detail.

3.1.9. System setup

System setting

This system setting tab includes several system level settings, such as device name, websocket, system log, user name and password. Most of these settings are optional.

S USR IOT Communication Expert of Industrial IoT			Be Honest Do Best! ¤x English
✓ Status	SETTING		
Overview	System Setting		
✓ Network			
IP Config	Hostname	USR-M100	
✓ Port	Websocket Port	6432 (1~65535)	
Uart1	Websocket Direction	LOG	
Uart2			
Websocket	Webserver Port	80 (0~65535)	
✓ Gateway	User Name	admin	
MQTT Gateway	Pass Word		
Edge Computing	Uart Cache	OFF	
IO Fuction			
✓ Cloud Service	Restarting Without Data	0 (0/60-65535)s	
USR Cloud	SNMP	ON 🗸 🙆	
Alibaba Cloud	Telnet	OFF v 🔞	
AWS IoT	NTP	OFF	
∽ System			
System Setting	Time Synchronization	2023/01/13 15:38:06 Sync	
Management	485 Anti-Collision	OFF 🛛 🗸	
Feedback			
	Log Export	Export	
		Заусалдрау	

Fig. 30 System settings

Table 18System settings list

Parameter Item	Description
Host name	The name of the device, up to 32 characters,can't be null
Websocket port	Websocket server listen port NO. Range 1-65535
Websocket direction	Click the drop-down menu to select websocket mapping direction: UART or Log.
Webserver port	Web server listen port NO. Range 1-65535
User name	The user name of web console and can be modified. up to 16 characters,can't be NULL
Password	The password of web console and can be modified. up to 16 characters, can't be NULL
UART cache	Click the option to enable serial buffer. By default, USR-M100 will empty its serial buffer when a new TCP
	connection is established. This means that the TCP application will not receive buffered serial data during
	a TCP link breakage. To keep the serial data when there is no TCP connection and send out the buffered



	serial data immediately after a TCP connection is established, you can disable this option.
Restarting without data	This function is used for the gateway without any data transmission or reception for a long time, and the
	gateway automatically restarts. If the restart time is set between 0 and 59 seconds, this function does not
	take effect. Only when the time is set to be greater than or equal to 60 seconds, the restart function of
	the device without data will take effect.

The configuration will save to flash memory after clicking Save button. All configurations take effect after a system reboot.

> management

In management page users can perform some system operations on the M100 gateway, including restarting, restoring factory configuration, and upgrading. It is recommended that users use it with caution. Improper operation may damage the gateway.

Communication Expert of Industri	alo <u>r</u>	e Honest Do Best! 中文 English
✓ Status	Management	
Overview	Management	
 V Network 	Firmware upgrade/Reset/Restart	
IP Config	Firmware upgrade	
∽ Port		
Uart1	Firmware file: Select timware tite Select the file Flashing the timware	
Uart2	Reset	
Websocket	Reset 🔯 Restore factory defaults	
✓ Gateway		
MQTT Gateway	Restart	
Edge Computing		
IO Fuction	Nestart 🗃 Kestart	
 Cloud Service 		
USR Cloud		
Alibaba Cloud		
AWS IoT		
∽ System		
System Setting		
Management		
Feedback		
	Jinan USR IOT Technology Limited. http://www.pusr.com	

Fig. 31 Module management

A. Restart

This function is used to restart the gateway by software. Before the gateway is completely restarted, the device does not work and cannot forward any data packets. This restart is different from the hardware reset of power-on restart, but the gateway system software is reset, just like the "warm restart" of the windows operating system. Once a new setting is changed, you can use the Save function to accept the changes. You will need to reset the device to save the settings to flash memory. Click on "restart" Button, the page pops up a prompt box, click "OK".

B. Restore factory defaults

This function is used to restore the gateway to the factory settings and automatically restart the gateway at the same time. Before the gateway restarts successfully, the device does not work and cannot forward any data packets. This function is to restore the factory default configuration value once the user sets the wrong parameter and causes the gateway to work abnormally. Click the "Restore factory defaults" button, and a prompt box will pop up on the page. Click "OK".

C. Firmware upgrade

USR IoT continually upgrades its firmware to add new features and optimize performance. Please contact the sales to obtain the latest version of the firmware. Before upgrading the firmware, please make sure that the device has a reliable power source that will not be powered off or restarted during the firmware upgrading process(please be patient as this whole process might take up to 1 -2 minutes).

Copy the new firmware file to your local computer. Note that the firmware file is a binary file with ".bin" extension. Before updating



the firmware, make sure that your host's Network domain is as same as the gateway.

Next, click "Select the file" button as shown in Figure to find and choose the new firmware file. Then, click "Flashing the firmware" button to start the firmware upgrade process. After the progress bar in the page is read, the software upgrade is completed. Please wait until the uploading process is finished (the amount of time varies depending on the equipment used). Finally, the device will then proceed to restart itself. In most cases, you might require to re-configure your device.

3.2. Configuration software

3.2.1. Discovering your gateway

After you start configuration software, if the USR-M100 gateway is already connected to the same gateway as your PC, the device can be accessed via broadcast packets. Users can search all the USR-M100 gateways on the network and show them on the Deivce List Area of the utility. Please select the right Ethernet adapter(Device menu) if you did not see any gateway.

B USR-MXX V1.0.1	_	
Device 中文		
User config MAC Ver Web		
Clear temporary IP D4 AD 20 38 A V1.0.09		
Select network card 🔸 🗹 ASIX AX88179 USB 3.0 to Gigabit Ethernet Adapter		
Exit		
Jasic Set		
IP Type: DHCP/Auto IP V		
ModuleStaticIP:		
Subnet/Mask:		
Gateway		
V9W//91		
Save		
Save Search		
Save Search		

Fig. 32 Searching

3.2.2. Network setting

Sometime the USR-M100 gateway might not be in the same subnet as your PC, therefore, you will have to use this utility to locate it in your environment. To configure each device, first click to select the desired device (default IP:192.168.0.7) in the list of configuration utility, and then change the IP address to avoid any IP address conflict with other hosts on your LAN, save your change.



-Ionest, D	o Best !		User Manual
🖶 USR-MXX '	v1.0.1		- 🗆 X
Device 中文	ζ		
DeviceIP	DeviceName MAC	Ver Web	
72.10.14/5			
Basic Set	DHCP/Auto IP		
Module SubnetM Gatewa	StaticIP: Mask: y:		
	Search		
	Be honest, Do best		

Fig. 33 Changing network settings

3.2.3. Reboot the device

This function is available to allow you to reset the gateway. The function disconnects both the ethernet and serial connections. The function also allows the gateway to save new configuration settings to flash memory. To reset the device:

1. Right-click a desired device to display the settings menu.

2. Select Reboot.

Press the Reboot button and the system will give a reset response.

USR-MXX	V1.0.1				<u> </u>
nice d					
The The	文				
DeviceIP	DeviceName	MAC	Ver	Web	
2.16.14.73	USR-M100	NA AD 20 20 A	1/1 0 09		
		Reboot			
		External web conf	fig		
		Restore Factory			
		Upgrade			
1.0.4					
sic Set					
ic Set IP Type	e: DHCP	/Auto IP	~		
sic Set IP Type Modul	e: DHCP, eStaticIP:	/Auto IP	~		
sic Set IP Type Modul Subset	e: DHCP eStaticIP:	/Auto IP	~		
sic Set IP Type Modul Subnet	e: DHCP eStaticIP: tMask:	/Auto IP	~		
sic Set IP Type Modul Subnet Gatewa	e: DHCP eStaticIP: tMask: ay:	/Auto IP	~		
sic Set IP Type Modul Subnet Gatewa	e: DHCP eStaticIP: tMask: ay:	(Auto IP Save	~		
sic Set IP Type Modul Subnet Gatewa	e: DHCP: eStaticIP: tMask: ay:	(Auto IP Save			
sic Set IP Type Modul Subnet Gatewa	e: DHCP: eStaticIP: tMask: ay:	/Auto IP Save			
sic Set IP Type Modul Subnet Gatewa	e: DHCP eStaticIP: tMask: ay:	<mark>/Auto IP</mark> Save Search	~		
sic Set IP Type Modul Subnet Gatewa	e: DHCP eStaticIP: tMask: ay:	(Auto IP Save Search	~		
sic Set IP Type Modul Subnet Gatewa	e: DHCP eStaticIP: tMask: ay: 	Save Search			
sic Set IP Type Modul Subnet Gatewa	e: DHCP estaticIP: tMask: ay:	(Auto IP Save Search JSR IOT e honest, Do best			

Fig. 34 Reboot the device

3.2.4. Restore to factory default settings

The configuration utility provides the function to restore the gateway to factory default settings. If you really want to restore the gateway to factory default settings, please click restore factory button to continue. As shown in Fig.34.



3.2.5. Open web server

Users can visit the web server of the gateway conveniently with configuration tool. Select the device you want to visit and right click,then click External web config, you will open the web server with default browser such as Google Chrome. As shown in Fig.34.

4. Operation modes

The USR-M100 gateway provides various operations: TCP Server/ Client mode, UDP mode, HTTP mode and Websocket mode. The main difference between the TCP and UDP protocols is that TCP guarantees delivery of data by requiring the recipient to send an acknowledgement to the sender. UDP does not require this type of verification, making it possible to offer speedier delivery. UDP also allows unicast or multicast of data to only one IP or groups of IP addresses. Detailed descriptions of each operation are provided in following sections. After choosing the proper operation mode in this chapter, refer to Chapter 3 for detailed configuration parameter definitions.

4.1. TCP Server

4.1.1. Properties

In TCP server mode, the TCP connection is initiated from the host to the USR-M100 gateway. This operation mode supports a maximum of 16 simultaneous connections for each serial port on the gateway from a single or multiple hosts. After the connection is established between the gateway and the remote host computer (remote TCP client), data can be transmitted in both directions. The serial port on the device will forward requests from all remote connected hosts (Ethernet) to the serial device immediately and reply to all remote connected hosts once it receives data from the serial device.

The default operation mode of USR-M100 is the TCP Server mode. Fig.35 shows an example of configuration setting for TCP Server working mode under the Uart1 socket tab. You can configure other serial ports in the same way.

SR IOT Communication Expert of Industrial IoT	Be Hones	it Do Best ! 中文 English
Status UART TO NET		
Port	r configuration	
Uart1 SETTING		
Uart2 Port Socket		
SOCKET A		
Cloud Service System Working M	ode TCP Server V None V	
Maximum Sockets suppor	ted 8 v Exceeding Maximum KICK v	
Local Port Num	ber 23 (1-65535)	
PR	INT OFF ~	
Modbus	Poll Response Timeout 200 (10-9999)ms	
SOCKET B		
Operating M	bde None v	
	Sare&Apply	
	Jinan USR IOT Technology Limited. http://www.pusr.com	

Fig. 35 TCP server work mode

Please follow the following steps to configure connection settings of the work mode for Uart1 port.

- 1. Click on the "Uart1" tab on the menu frame on the left side of Web UI to go to Uart1 page as shown in Fig.35.
- 2. For Serial Settings on the Port configuration page, please go to Section 3.1.3.

3. Click on the Socket tab in this page, select TCP Server in the working mode options. The local ports of different serial ports must be different. After receiving network data, the device determines which serial port the data is sent to based on the local port. For example, the default port number of the first serial port (Uart1) is 23, the default port number of the second serial port (Uart2) is 26,


and so on.

4. After finishing configuring the working Mode, please scroll down to the bottom of the page and click on "Save & Apply" button to save all the changes that you have made. All configurations take effect after a system reboot.

Fig.36 shows an example of test in this mode. By selecting the TCP Server work mode, a TCP client program on a remote host computer should be prepared to connect to USR-M100. Server IP is IP address of USR-M100, server port is local port of USR-M100. In this case, IP address of USR-M100 is 172.16.14.73.

mmunication Expert of Industrial IoT			Be Honest Do Bi 中文
Status Network Port Uart1 Uart2 Websocket	UART TO NET Data transmission parameter configuration SETTING Port Socket		
Gateway Cloud Service System	Baud rate 115200 Data bits 0 Parity None Stop bits 1 Flow ctrf NONE UART Packet Length 0 UART Packet Time 0 Sync Baudrate(RFC2217) ON Enable Uart Heartbeat	(00-230400)bps bit (0-1460)bytex (0-255)ms	
	Jinan USR IOT Technol	sgy Limited. http://www.pusr.com	
WSR-TCP232-Test RS232 tt File(E) Options(Q) Help(H COMSettings PortNum CDM3 ▼ BaudR 115200 ▼ DPaity NDNE ▼ DataB 8 bit ▼ StopB 1 bit ▼	e Ethernet Convert tester COM port data receive http://en.usr.on http://en.usr.on http://en.usr.on	Network data receive Jinan USR Technology Co., Ltd. Jinan USR Technology Co., Ltd. Jinan USR Technology Co., Ltd.	- C X
 	Ethernet Convert tester COM port data receive http://en.usr.on http://en.usr.on http://en.usr.on	Network data receive Jinan USR Technology Co., Ltd. Jinan USR Technology Co., Ltd. Jinan USR Technology Co., Ltd.	- C X NetSettings (1) Protocol TCP Client (2) Server IP 172.16.14.73 (2) Server Port [23] (2) Server Port [24] (2) Server Port [25] (2) Server Port [26] (2) Server Port [27] (2) Server Port

Fig. 36 Host initiating TCP connection



4.1.2. Multihost setting

Communication Expert of Indust	B of	e Honest Do Best! 中文 English
Status Network Port Uart1 Uart2	UART TO NET Data transmission parameter configuration SETTING	
Websocket Cloud Service	SOCKET A	
> System	Working Mode TCP Server None Maximum Sockets supported 8 Exceeding Maximum KICK Local Port Number 23 11-65535)	
	PRINT OFF ~ Modbus Poll _ Response Timeout 200 (10-9999)ms SOCKET B	
	Operating Mode None ·	
	Jinan USR IOT Technology Limited. http://www.pusr.com	

Fig. 37 Maximum socket connection

Maximum connection is usually used when the user needs to receive data from different hosts simultaneously. The factory default allows 8 connection at a time. This option specifies the maximum number of remote devices/clients (with maximum of 16 clients) that can be connected to the serial device on this COM port. And users can define the behavior when the connection established exceed the maximum.

Kick: when the connection exceeds the maximum number, actively kick out the oldest connection(first in first kick out). Keep: when the connection exceeds the maximum number, keep the old connection and reject new connections.

4.2. TCP Client

4.2.1. Properties

When the working mode of this device is TCP Client, the remote device must work in TCP Server mode, and its IP address and port number must be configured, which can be configured in the corresponding options of the network connection. The local port number can be ignored and no configuration is required. USR-M100 supports SSL (TLS v1.0 or v1.2) data encryption in this operating mode. Fig.38 shows an example of configuration setting for TCP Client working mode under the Uart1 socket page. You can configure other serial ports in the same way. There are additional connection settings that can be configured as shown in Fig.38.



UART TO NET Data transmission parameter configuration SETTING Port Socket SOCKET A	
Data transmission parameter configuration SETTING Port Socket SOCKET A	
SETTING Port Socket SOCKET A	
Port Socket	
Port Socket SocKET A	
SOCKET A	
SUCKETA	
Working Mode TCP Client V None V	
Remote Server Addr 172.16.14.15	
Local/Remote Port Number 0 23 (1~65535)	
Reconnection period 0 (0-99999)s	
PRINT OFF ~	
Modbus Poll CResponse Timeout 200 (10~9999)ms	
Enable Net Heartbeat	
Registration Packet Type None Vocation Once connecting	
SSL protocol Disable V None	
SOCKET B	
Operating Mode None v	
Save&Apply	
	Working Model TCP Client Remote Server Addr 172.16.14.15 Local/Remote Port Number 2.2.(1-65535) Reconnection period 0.0-99999/s PRINT OFF Modous Poll Response Timeout 200_(10-9999)ms Enable Net Heartbeat . Registration Packet Type None SSL protocol Datable None . Correcting Mode None CareAdpept

Fig. 38 TCP client work mode

Please follow the following steps to configure connection settings of the work mode for Uart1 port.

1. Click on the "Uart1" tab on the menu frame on the left side of Web UI to go to Uart1 page as shown in Fig.38.

2. For Serial Settings on the Port configuration page, please go to <u>Section 3.1.3</u>.

3. Click on the Socket tab in this page, select TCP Client in the working mode options. Please specify the Destination IP address and port number of the TCP server program on the remote host. This should match the IP settings of the TCP server program. The default local port number is 0, M100 will assign a random TCP Port.

4. After finishing configuring the working Mode, please scroll down to the bottom of the page and click on "Save & Apply" button to save all the changes that you have made. All configurations take effect after a system reboot.

Fig.39 shows an example of test in this mode. By selecting the TCP Client operation mode, a TCP server program on a remote host computer should be prepared to accept a connection request from the device. In this case,Host IP address is 172.16.14.15.

COMSettings	COM port data receive	Network data receive	NetSettings
PortNum COM3 BaudR 115200 Deaity NONE Deaity NONE DataB 8 bit StopB 1 bit Close Receive to file Add line return Receive As HEX Receive Pause Save Clear Send Options	http://en.usr.on http://en.usr.on http://en.usr.on http://en.usr.on	[Receive from 172.16.14.73 : 1086] : Jinan USR Technology Co., Ltd. Jinan USR Technology Co., Ltd. Jinan USR Technology Co., Ltd.	(1) Protocol TCP Server (2) Local host IP 172.16.14.15 (3) Local host port 23
Data from file Auto Checksum Auto Clear Input Send As Hex Send Recycle Interval 1000 ms Load Clear	Jinan USR Technology Co., Ltd. Send	Peers: 172.16.14.73:1086 V http://en.usr.on Send	Data from file Auto Checksum Auto Clear Input Send As Hex Send Recycle Interval 1000 ms



Fig. 39 M100 initiating TCP connection

4.2.2. SSL/TLS

If SSL certificate authentication is enabled on the remote server, user need to configure SSL encryption parameters on M100. User can select TLS1.0 or TLS1.2 version protocol. User can select None certificate Authentication, server certificate authentication and bidirectional certificate authentication.

Communication Expert of Industrial IoT		Be Honest Do Best! 中文 English
> Status	nfiguration	^
> Network SETTING		í – – – – – – – – – – – – – – – – – – –
✓ Port		· · · · ·
Uart1 Port Socket		-
Uart2		8
Websocket SOCKET A		
> Gateway Working Mode	TCP Client v None v	
> Cloud Service Remote Server Addr	172.16.14.15	
> System		
Local/Remote Port Number	0 23 (1~65535)	
Reconnection period	0 (0-99999)s	
PRINT	OFF ~	
Modbus Poll	Response Timeout 200 (10-9999)ms	
Enable Net Heartbeat		
Registration Packet Type	None Cocation Once connecting	
SSL protocol	TLS1.2 Verify all V	
Upload Server CA	Server Root CA. Upload	
Upload Client CA	Client CA Choose file Upload	
Upload Client Private Key	Client Private Key Choose file Upload	
SOCKET B		E
Operation Mode	Jinan USR IOT Technology Limited. http://www.pusr.com	, and the second s

Fig. 40 SSL/TLS encryption

4.2.3. Transient connection

This connection, called transitory due to its short-lived nature. If the serial port or network port receives none data within the setting time, the connection will be automatically disconnected. The gateway used to send serial device data back to a control room or a cloud application need to open a remote connection before they can transfer the serial data. When the transmission is completed, the gateway should immediately close the connection. Without support for flexible connection control, you would need to spend extra time handling connections at the central site or cloud application.

TCP transient connection is used primarily to save server resources. Fig.41 shows an example of configuration setting for transient connection in TCP Client working mode under the socket page.

Communication Expert of Industrial IoT		Be Honest Do Best! 中文 English
Status Data transmission paramete Network SETTING	configuration	^
Websocket SOCKET A		
> Gateway Working Mo	de TCP Client - Short Connection	
Cloud Service Remote Server Ac	dr 172.16.14.15	
System Local/Remote Port Num	er 0 23 (1-65535)	
Reconnection per	od 0 (0-99999)s	
Duration of short connect	om 3 (3~255)s	
PRI	VT OFF ~	
Modbus F	DII Response Timeout 200 (10~9999)ms	
Enable Net Heartb	at 🗌	
Registration Packet Ty	None Vocation Once connecting	
SSL proto	ol Disable V None V	
SOCKET B		
Operating Mc	de None ~	
	Surved.Apply	Ţ
	Jinan USR IOT Technology Limited. http://www.pusr.com	



Fig. 41 Transient connection

4.3. UDP Server

4.3.1. Properties

User Datagram Protocol (UDP) is a faster and more efficient transport protocol than TCP but it is a connectionless transport protocol, it does not guarantee the delivery of network datagram. In UDP mode, you can unicast or multicast data from the serial device to one or multiple host computers, and the serial device can also receive data from one or multiple host computers. Please beware that even though UDP provides better efficiency in terms of response time and resource usage, it does not guarantee data delivery. It is recommended to utilize UDP only with cyclic polling protocols where each request is repeated and independent, such as Modbus Protocol.

When the working mode of the device is UDP server, the remote device must also work in UDP mode. You only need to specify the Local Port that USR-M100 should listen to. In UDP server mode, serial port data is always sent to the last peer UDP device(IP and port) that communicates with the USR-M100, and the USR-M100 can record the IP and port number only after the peer UDP device sends data to the USR-M100 first.

Fig.42 shows an example of configuration setting for UDP Server mode under the Uart1 socket page. You can configure other serial ports in the same way.

USR IOT		Be Hones
> Status	UART TO NET	
> Network	Data transmission parameter configuration	
✓ Port		
Uart1	SETTING	
Uart2	Port	
Websocket		
> Gateway	SOCKET A	
> Cloud Service		
> System	Working Mode UDP Server V None V	
	Remote Server Addr 172.16.14.15	
	Local/Remote Port Number 9000 23 (1~65535)	
	PRINT OFF ~	
	Enable Net Heartbeat	
	SOCKET B	
	Operating Mode None ~	
	Save&Apply	
	Jinan USR IOT Technology Limited. http://www.pusr.com	

Fig. 42 UDP server work mode

Please follow the following steps to configure connection settings of the operation mode for Uart1 port.

- 1. Click on the "Uart1" tab on the menu frame on the left side of Web UI to go to Uart1 page as shown in Fig.42.
- 2. For Serial Settings on the Port configuration page, please go to <u>Section 3.1.3</u>.
- 3. Click on the Socket tab in this page, select UDP Server in the working mode options.

4. Local Port specifies the local port number for UDP server mode on M100 which it will be listening to and it can be any number between 1 and 65535. The local ports of different serial ports must be different. After receiving network data, the device determines which serial port the data is sent to based on the local port.

5. After finishing configuring the working Mode, please scroll down to the bottom of the page and click on "Save & Apply" button to save all the changes that you have made. All configurations take effect after a system reboot.

Serial port data is firstly sent to the preset destination IP/domain name and Destination port. After receiving a UDP packet, the system



updates the destination IP address and port number, and sends the data back to the latest IP address and port number. In this case, IP

address of USR-M100 is 172.16.14.73, host IP address is 172.16.14.15.

COMSettings	COM port data receive		Network data receive		NetSettings
PortNum COM3 BaudR 115200 DPaity NONE DataB 8 bit StopB 1 bit Close	http://en.usr.on http://en.usr.on http://en.usr.on		C Receive from 172.16.14.73 Jinan USR Technology Co., Lt. Jinan USR Technology Co., Lt Jinan USR Technology Co., Lt	: 9000] : d. d. d.	(1) Protocol UDP (2) Local host IP (172, 16, 14, 15 (3) Local host port 23
Receive to file Add line return Receive As HEX Receive Pause Save Clear Send Options Data from file Auto Checksum					Recv Options Receive to file Add line return Receive As HEX Receive Pause Save Clear Send Options Data from file Auto Checksum
Auto Clear Input Send As Hex Send Recycle	Tinen ISB Technology Co.	-	RemoteIP: 172.16.14.73	Port: 9000	Auto Clear Input Send As Hex Send Recycle
Interval 1000 ms	Ltd.	Send	http.//en.usr.on	Send	Interval 1000 ms

Fig. 43 UDP transmission test

4.4. UDP Client

4.4.1. Properties

When the working mode of the device is UDP client, the remote device must also work in UDP mode. M100 supports remote IP address and port verification. After verification is enabled(OFF), the M100 only communicates with the destination port of the destination IP address. If the data is not from this channel, the M100 will discard the data. If verification is disabled(ON), M100 does not filter the data of the destination IP address and destination port. Fig.44 shows an example of configuration setting for UDP Client mode under the Uart1 socket page. You can configure other serial ports in the same way.

	中文 English
> Status	
Network Data transision exampler configuration	
V Port	
Uart1 SETTING	
Uart2 Port Socket	
Websocket	
Sateway SOCKET A	
System Working Mode UDP Client None	
Remote Server Addr 172.16.14.15	
Local/Remote Port Number 9000 23 (1~65535)	
UDP Not Check Remote PORT OFF	
PRINT OFF ~	
Enable Net Heartbeat	
Registration Packet Type None Content Once connecting	
SOCKET B	
Operating Mode None ~	
Conflicts	
Saweenopy	
Jinan USR IOT Technology Limited. http://www.pusr.com	

Fig. 44 UDP client work mode



Please follow the following steps to configure connection settings of the UDP client mode for Uart1 port.

- 1. Click on the "Uart1" tab on the menu frame on the left side of Web UI to go to Uart1 page as shown in Fig.44.
- 2. For Serial Settings on the Port configuration page, please go to Section 3.1.3.
- 3. Click on the Socket tab in this page, select UDP Client in the working mode options.

4. Please specify the Destination IP address and port number of the UDP program on the remote host. Local Port specifies the local port number which socket A will be listening to and it can be any number between 1 and 65535. The local ports of different serial ports must be different. After receiving network data, the device determines which serial port the data is sent to based on the local port. Note that typically the port number that is larger than 1024 is recommended to avoid conflicting with the well-known port numbers. You should match this setting with the remote UDP program. Note that this number is usually called destination port in the remote UDP program.

5. After finishing configuring the working Mode, please scroll down to the bottom of the page and click on "Save & Apply" button to save all the changes that you have made. All configurations take effect after a system reboot.

Fig.45 shows an example of test in this mode. In this case, IP address of USR-M100 is 172.16.14.73, host IP address is 172.16.14.15.



Fig. 45 UDP client test

4.4.2. UDP multicast

UDP also allows multicasting of data to groups of IP addresses. A multicast is a packet sent by one host to multiple hosts. In multicast mode, each host that belongs to a specific multicast group will receive multicast packets for that group. For a host to be configured as a multicast receiver over the Internet, the must inform the routers on its LAN. The Internet Group Management Protocol (IGMP) is used to communicate group membership information between hosts and routers on a LAN. The USR-M100 Series supports IGMP version 2.



Communication Expert of Industr	al loT	
> Status > Network Port Uart1 Uart2 Websocket	UART TO NET Data transmission parameter configuration SETTING Port Socket	on
> Gateway > Cloud Service > System	SOCKET A Working Mode UDP Remote Server Addr 238.1 Local/Remote Port Number 5000	Client V Multicast V 1.1.1 20108 (1-65535)
	PRINT OFF Enable Net Heartbeat Registration Packet Type None SOCKET B	e V Location Once connecting V
	Operating Mode None	e v



Communication Expert of Industrial IoT		Be Honest Do Bes 中文 E
> Status	UART TO ETH	
> Network	Data transmission parameter configuration	
✓ Port		
Port1	SETTING	
Port2	Port	
LOG		
> Gateway	SOCKET A	
> Cloud Service		
> System	Working Mode UDP Client V Multicast V	
	Remote Server Addr 239.1.1.1	
	Local/Remote Port Number 20108 9000 (1-65535)	
	PRINT OFF	
	Enable Net Heartbeat	
	Registration Packet Type None v Location Once connecting v	
	SOCKET B	
	Operating Mode None ~	
	Smattank	
	Concerdant	
	Jinan USR IOT Technology Limited. http://www.pusr.com	

Fig. 47 USR-M100 #2 UDP multicast setting

Fig.48 shows an example of test in this mode with two M100s.



•	Uart Assistant	× 🗆 - 🖉		Uart Assistant	×
CDM Configs Channel COM10 #L - Badrate 11500 - Paritybits NONE - Databits 8 - Stophits 1 - Flowetri NONE - Flowetri NONE - Close Recv Options C ASCI C HEX I Log Display Mode Auto Linefeed Hide Received Data Save Recv to File AutoScroll Clear - Send Options C ASCI C HEX Lise Escene Charg()	Datalog [2022-07-19 10:44:33.675]# RECV ASCII> MSXO device 1 UDP multicast [2022-07-19 10:44:39 777]# SEND ASCII> MSXO device 2 UDP multicast	UartAssint V5.0.2 🗇 🗘	COM Configs Channel COM3 #US - Baudrate 115200 - Parkybits NONE - Databits 8 - Stopbits 1 - Flowcth NONE - Flowcth NONE - Close Recv Options C ASCII C HEX - Hide Received Data - Save Recv to File AutoScroll Clear - Send Options C ASCII C HEX - Lise Escone Charso	Datalog [2022-07-19 10:44:33.597]# SEND ASCII> MEXO device 1 UDF multicast [2022-07-19 10:44:39.831]# RECV ASCII> MEXO device 2 UDF multicast	UartAssint V5.0.2 🗇 🗘
Auto Append Bytes Send from File Cycle 1000 ms Shortcut Kistory	Data Send 1. DCD • 2. RXD • 3. TXD • 4. DTR • 5. GRD NSX0 device 2 UDP multicast	● 6. DSR ● ↓ Clear ↓ Clear	Auto Append Bytes Send from File Cycle 1000 ms Shortcut Kistory	Data Send 1. DCD ● 2. RXD ● 3. TXD ● <u>4. DTR</u> ● 5.	GRD ♦ 6. DSR ♥ ↓ Clear ▲ Clear ▲ Clear ▲ Clear
🕼 Ready!	1/1 RX-28	TX:27 Reset	🕼 Ready!	1/1 RX:27	TX:28 Reset

Fig. 48 UDP multicast transmission test

4.5. HTTP Client

4.5.1. Properties

When the operation mode of this device is Httpd Client, users need to specify the remote httpd server's address, port, method and other parameters. The device will submit the serially received data to the httpd server in the form of GET or POST. At the same time, the data sent by the httpd server can be transparently transmitted to the serial port.

Fig.49 shows an example of configuration setting for HTTP Client working mode under the Uart1 socket page. You can configure other serial ports in the same way.

Ser LOST Communication Expert of Industrial IoT		Be Honest Do Best! 中文 English
Status Data transmission parameter co	mfouration	Â
> Network		
✓ Port SETTING		
Uart1 Port Socket		
Uart2		21
Websocket SOCKET A		
> Gateway		
Cloud Service Working Mode	Httpd Client V None V	
> System Httpd method	GET ~ Remove Httpd Header 🗹	
Httpd URL(<101byte)	/1.php?	
Httpd Header(<181byte)	User_Agent: Mozilla/4.0	
Local/Remote Port Number	test usr.cn	
Remote Server Addr	0 80 (1~65535)	
Server Response Time	10 (3-255)s	
PRINT	OFF ~	
SSL protocol	Disable v None v	
SOCKET B		
Operating Mode	None v	-
	Save&Apply	
	linan USR IOT Technology Limited. http://www.pusr.com	

Fig. 49 HTTP client mode

Please follow the following steps to configure connection settings of the work mode for Uart1 port.

- 1. Click on the "Uart1" tab on the menu frame on the left side of Web UI to go to Uart1 page as shown in Fig.49.
- 2. For Serial Settings on the Port configuration page, please go to Section 3.1.3.
- 3. Click on the Socket tab in this page, select Httpd Client in the working mode options.
- 4. The HTTPD method needs to fill in the correct URL path, and select the GET or POST method as needed.



5. Fill in the HTTPD request header as needed.

6. Fill in the HTTPD address, that is, the address of the HTTP server, which can be an IP address or a domain name (the ability to connect to foreign countries is required).

7. Fill in the HTTPD port number. The default local port number is 0, M100 will assign a random TCP Port.

8. After finishing configuring the working Mode, please scroll down to the bottom of the page and click on "Save & Apply" button to save all the changes that you have made. All configurations take effect after a system reboot.

4.5.2. HTTPS

If SSL certificate authentication is enabled on the remote server, user need to configure SSL encryption parameters on M100. User can select TLS1.0 or TLS1.2 version protocol. User can select None certificate Authentication, server certificate authentication and bidirectional certificate authentication.



Fig. 50 SSL/TLS encryption

4.6. Websocket server

When the operation mode of this device is WebSocket server, the user needs to specify the main parameters such as listening port, forwarding direction. This function is that the gateway acts as a WebSocket server, and transparently transmits the data received by the serial to the WebSocket client in hexadecimal format. The WebSocket server can also forward data to the serial device at any time. This operation mode supports a maximum of 16 simultaneous connections for any serial port on the gateway from a single or multiple hosts.

- 1. Click on the "system setting" tab on the menu frame on the left side of Web UI to go to system setting page as shown in Fig.51.
- 2. Fill in the WebSocket server listening port number, default 6432.
- 3. Select UART1 in websocket direction.
- 4. For Serial Settings on the Port configuration page, please go to Section 3.1.3.



Communication Expert of Industrial IoT						Be Honest Do Best 中文 English
> Status	SETTING					
> Network	System Setting					
> Port						
> Gateway	Model Name	USR-M100				
> Cloud Service	Websocket Port	6432	(1~65535)			
✓ System						
System Setting	Websocket Direction	UART1 ~				
Management	Webserver Port	80	(0~65535)			
Feedback	User Name	admin				
	Pass Word		8			
	Uart Cache	OFF ~				
	Restarting Without Data	0	(0/60~65535)s			
	SNMP	OFF ~	0			
	Telnet	OFF ~	0			
	NTP	ON ~	0			
	NTP Server Address	cn.pool.ntp.org				
	NTP Timezone Setting	UTC+8 ~				
	485 Anti-Collision	OFF ~	0			
	Log Export	Export				
	л	nan USR IOT Technology Li	mited. http://ww	/w.pusr.com		

Fig. 51 Websocket server setting

5. Click on the websocket to serial tab, browser will connect to the websocket server of M100 automatically.

Communication Expert of Industrial IoT	172.16.14.73 says connect success!	Be Honest Do Best! 中文 English
> Status	LOG	-
> Network	this name use websorket to establish a channel of shell command and lon outputtion between webnane and device	
✓ Port		
Uart1		
Uart2	kecelve nex oata	
Websocket		
> Gateway		
> Cloud Service	<i>h</i>	
✓ System		
System Setting		
Management		
Feedback	send ascii data clear	
	Jinan USR IOT Technology Limited. http://www.pusr.com	

Fig. 52 Browser as websocket client to connect M100

Fig.53 shows an example of test in this mode.







5. Virtual COM port

Traditional SCADA and data collection systems rely on serial ports (RS-232/485) to collect data from various kinds of instruments. Virtual COM ports on host computer allows remote access of serial devices over TCP/IP network that works like local native COM ports. Since USR-M100 gateway enable network operation of instruments equipped with an RS-232/485 communication port, your SCADA and data collection system will be able to access all instruments connected to a standard TCP/IP network, regardless of whether the instruments are used locally or at a remote site.

To enable Virtual COM on host computer, you will require a VCOM software to emulate the COM port. For Windows operating system, a software utility called VCOM is supported by PUSR to be used for this purpose.

This function is useful with devices such POS terminals, Bar Code Readers, Serial printers, etc. since it allows you to use software that was written for pure serial communication applications.

Download the software from PUSR's website:

https://www.pusr.com/support/downloads/VCOM_Setup_exe.html

Execute the VCOM program, click quick-install to install program files in the default directory, or select an alternative location. The Installing window reports the progress of the installation.





Fig. 54 Install wizard 1



Fig. 55 Install wizard 2

Once the installation of the package is finished a start screen displays. Click start to conclude the process and launch the VCOM software.





Fig. 56 VCOM overview

5.1. TCP Server Application with Virtual COM

Virtual COM on host computer allows remote access of serial devices over TCP/IP networks through Serial/IP Virtual COM ports that work like local native COM ports. This section will provide the procedure to enable Virtual COM (VCOM) on Windows based PC. Please follow the steps described here to configure your Virtual COM application.

1. If the gateway is running in TCP Server Mode (recommended), the VCOM utility on the host computer should be configured as the TCP client connecting to the gateway. The characteristic of this mode is that the IP address of the host can be changed (usually automatically assigned by the router), and the IP address of the gateway must be fixed.

欱	USR IOT Communication Expert of Industrial IoT		Be Honest Do Best! 中文 English
	 > Status > Network ✓ Port Uart1 Uart2 Websocket 	UART TO NET Data transmission parameter configuration SETTING Port Socket	
	> Gateway > Cloud Service > System	SOCKET A Working Mode TCP Server None Maximum Sockets supported 8 Exceeding Maximum Local Port Number 23 (1-65535) PRINT OFF Modbus Poll Response Timeout [289 (10-5999)ms	
		SOCKET B Operating Mode None Sare&Apply	
		Jinan USR IOT Technology Limited. http://www.pusr.com	
		Fig. 57 TCP server mode in USR-M100	



Ŝ USR-VCOM	⊕ © - □ ×
(+) New	Please select new connection type
ſ ² Ŧ	New TCP Server-Vircom Connection By creating this connection you will be able to receive the COM port data of multiple remote computers (clients) on this PC over TCP/IP protocol
You haven't created any connections yet.	New TCP Client-Vircom Connection By creating this connection you will be able to share the COM port data on local computer among other remote computers (servers) over TCP/IP protocol
	New UDP-Vircom Connection By creating this connection you will be able to send the COM port data to other remote computers with the same type of connection over UDP protocol
	New Cloud Device-Vircom Connection By creating this connection you will be able to share the COM port data on local computer with cloud device over MQTT



2. Select one COM port as the Virtual COM port before proceeding as shown in Fig.59. Note that if a COM port number is used by other application or your operating system, you can not select it.

💦 USR-VCOM			۲	0	-		×
① New		New TCP Client-Vircom Connection	n				
0	Connection name :	Client COM11					
You haven't created any connections yet.	Select Senai Port :	COM10 COM10 COM12 COM12 COM13 COM14 COM15	7 <mark>simila</mark> r)				
	Remote Host Name :	COM16 COM17 V					
		20	ncel		0) New	
	ł					Attent	



3. After selecting the virtual COM ports, please enter the IP Address of the gateway with the specified Port Number. The Port Number here is the Local Listening Port for the gateway which is specified in the Local Port field of Fig.60. In this case, IP address of USR-M100 is 172.16.14.12.



💦 USR-VCOM		•	0	-		×
⊕ New		New TCP Client-Vircom Connection				
ſ_	Connection name : Select Serial Port :	Client COM11 COM11 COM11 Strict baudrate emulation				
You haven't created any connections yet.	Remote Host Name : Remote Host Port :	Synchronize baudrate(N+C2217 similar) 172.16.14.12 23				
		🛞 Cancel		Ø	New	

Fig. 60 Virtual COM port mapping

4. Click new to add the Virtual COM11. Click client COM11 on the left side of VCOM panel to check the status. If status become connected, the process is completed.

	- u ×	📩 Device Manager	_	×
		<u>File Action View Help</u>		
(1) New	Info of TCP Client connection : Client CCM11			
Clent COM11 ● COM11 dosed bytes:0 ■ Client 17:16.14.12 23 Connected bytes:0 Clent COM12 ■ Client 172.16.14.12 26 Connected bytes:0 Clent COM13 ■ Client 172.16.14.12 29 Connected bytes:0 Clent COM14 ■ Client 172.16.14.12 32 Connected bytes:0	COM port information Port name : COM11 Port status : dosed Port parameters : Bytes received : 0 Opened by : Network information Type : TCP Clent P : 172.16.14.12 Port : 23 State : Connected Bytes received : 0	▼ USR-Garluchao > ▲ Auto inputs and outputs > ▲ Batteries > ▲ Biometric devices > ▲ Biometric devices > ● Biometric devices > ● Computer > ■ Disk drives > ■ Disk drives > ■ Display adapters > ↓ Imaging devices > ↓ Imaging devices > ■ Muman Interface Devices > ↓ Imaging devices > ■ Monitors > ● Portable Devices > ● Portable Devices > ■ Monitors > ● Portable Devices > ■ Portable Devices		~

Fig. 61 Virtual COM11 status

5.2. TCP Client Application with Virtual COM

1. If the gateway is running in TCP Client Mode, the VCOM utility on the host computer should be configured as the TCP server waiting for a gateway to connect to the host computer. The feature of this mode is that the IP address of the computer cannot be changed, but the IP address of the gateway can be changed (which can be automatically assigned by the router).



Communication Expert of Industrial IoT	
> Status UART TO NET	
Network Data transmission parameter Port	r configuration
Uart1 SETTING	
Vart2 Port Socket	
S Gateway SOCKET A	
> System Working M	de TCP Client V None V
Remote Server A	ddr 172,16,14,15
Reconnection pe	cd 0 (0-9999)s
PR	NT OFF v
Modbus	Voll CResponse Timeout 200 (10–9999)ms
Enable Net Heart Registration Packet T	ppe None v Location Once connecting v
SSL prote	col Disable V None V
SOCKET B	
Operating M	de None ~
	Save&Apply

Fig. 62 TCP client mode in USR-M100

R-VCOM	⊕ © - □ ×
⊕ New	Please select new connection type
Client COM11 ◆ COM11 ■ Client 172.16.14.12 23 Connected bytes:0	New TCP Server-Vircom Connection By creating this connection you will be able to receive the COM port data of multiple remote computers (clients) on this PC over TCP/IP protocol
	New TCP Client-Vircom Connection By creating this connection you will be able to share the COM port data on local computer among other remote computers (servers) over TCP/IP protocol
	New UDP-Vircom Connection By creating this connection you will be able to send the COM port data to other remote computers with the same type of connection over UDP protocol
	New Cloud Device-Vircom Connection By creating this connection you will be able to share the COM port data on local computer with cloud device over MQTT

Fig. 63 New Virtual COM connection

2. Select one COM port as the Virtual COM port before proceeding as shown in Fig.64. Note that if a COM port number is used by other application or your operating system, you can not select it.

3. After selecting the virtual COM ports, please enter the specified Port Number. This Port Number is the Destination Port of the gateway.



💦 USR-VCOM		⊕ 《	• -		×
+ New		New TCP Server-Vircom Connection			
Client COM11 ● COM11 ■ Client 172.16.14.12 23 Connected bytes:0	Connection name : Select Serial Port : TCP port :	Server COM12 COM12 Strict baudrate emulation Synchronize baudrate(RFC2217 similar) Keep-alive			
	_	S Câncel		New	

Fig. 64 Virtual COM port mapping

4. Click new to add the Virtual COM12. Click client COM12 on the left side of VCOM panel to check the status. If status become connected, the process is completed.

	🖶 🗇 🗕 🗆 🗙	A Device Manager	122	×
~~ ····		Eile Action View Help		
+ New	Info of TCP Server connection : Server COM12			
Client COH11 ● COH11 ■ Client 72.16.14.12 23 Connected bytes:0 Server COM12 ● COM12 ■ Server 20108 Connected(1) bytes:0	COM port information Port name : COM12 Port status : dosed Port parameters : Bytes received : 0 Opened by : Network information Type : TCP Server Port : 20108 Status : Connected(1) Bytes received : 0	V USR-Gadruchae > Audio inputs and outputs > Batteries > Biometric devices > Computer > Computer > Disk drives > Disk drives > Disk drives > Bioplay adapters > Firmware > Keyboards > Keyboards > Monitors > Post (CDM & LPT) # ELTIMA Virtual Serial Port (CCM11) # ELTIMA Virtual Serial Port (CCM12)		^
	🖾 Data Montor 🛛 🖻 Delete 🔷 ResetCount			~

Fig. 65 Virtual COM12 status

5.3. Enable RFC2217 through Virtual COM

Enabling this function allows users to use customized RFC2217 commands on the network to dynamically modify the serial port's baud rate, data bits, stop bits, and parity bits. This function is only allowed when the working mode is TCP Server and TCP Client. Note that this protocol is used to change the serial port parameters of USR-M100. In this case, IP address of USR-M100 is 172.16.14.34.



R IOT munication Expert of Industrial IoT				Be Honest D
Status				
Network	TONET			
V Port	ransmission parameter con	nfiguration		
Uart1 SETT	NG			
Uart2	Socket			
Websocket				
Gateway	Baud rate	115200	(600~230400)bps	
Cloud Service	Data bits	8	∽ bit	
System	Dentra			
	Parity	None	~	
	Stop bits	1	~	
	Flow ctrl	NONE	~	
	UART Packet Length	0	(0~1460)bytes	
	UART Packet Time	0	(0~255)ms	
	Sync Baudrate(RFC2217)	ON	~	
	Enable Uart Heartbeat			
			Save&Apply	



R USR-VCOM		⊕
① New		New TCP Client-Vircom Connection
Client COM11 COM11 closed bytes:0 Client 172.16.14.12 23 Connected bytes:0		Connection name : Client COM1 Select Serial Port : COM1 v
Complex Complex Complex Consected bytes:0 Client COM13 Client COM13		Strict baudrate emulation Synchronize baudrate(RFC2217 similar) Remote Host Name : 172.16.14.34
COM13 closed bytes:0 Client 172.16.14.12 29 Connected bytes:0 Client 172.16.14.12 29 Connected bytes:0		Remote Host Port : 23
 COM14 closed bytes:0 Client 172.16.14.12 32 Connected bytes:0 		
		🛞 Cancel 🧼 🔗 New
	Fig. 67	enable RFC2217 in VCOM

When we change serial parameters in Virtual COM port 1, we can see these parameters have took effect in serial port of USR-M100.



· ·	Uart Assistant	4 - 🗆 ×		Uart Assistant	₩ - □ ×
COM Configs Channel COM1 #EL V Baudrate 9600 V Paritybits EVEN V Databits 8 V Stopbits 1 V Flowctri NONE V Close Recv Options © ASCII C HEX V Log Display Mode Auto Linefeed Hide Received Data Save Recv to File <u>AutoSoroll Clear</u> Send Options © ASCII C HEX Use Escape Chars(f)	Outrowscient Data log [2022-07-08 17:57:10.669]# Decice has been inserted [2022-07-08 17:57:10.675]# SEND ASCII> http://www.omsoft.onll [2022-07-08 17:57:10.682]# SEND ASCII> http://www.omsoft.onll [2022-07-08 17:57:10.682]# SEND ASCII> http://www.omsoft.onll [2022-07-08 17:57:10.685]# SEND ASCII> http://www.omsoft.onll [2022-07-08 17:57:20.046]# RECV ASCII> http://www.omsoft.onll [2022-07-08 17:57:20.910]# RECV ASCII> http://www.omsoft.on22 [2022-07-08 17:57:20.910]# RECV ASCII>	UartAssist V5.0.2 @ \$	COM Configs Channel COM10 HL V Baudrate 9600 V Partybits EVEN V Databits 8 V Stopbits 1 V Flowctri NONE V © Close Recv Options © ASCII C HEX V Log Display Mode Auto Linefeed Hide Received Data © Save Recv to File AutoScroll Clear Save Recv to File Cose Clear C HEX Cose	Data log [2022-07-08 17:57:11.076]# RECV ASCII> http://www.emsoft.cnllhttp://www.emsoft.cnll [2022-07-08 17:57:13.031]# RECV ASCII> http://www.emsoft.cnll [2022-07-08 17:57:16.963]# RECV ASCII> http://www.emsoft.cnll [2022-07-08 17:57:10.903]# SEND ASCII> http://www.emsoft.cnll [2022-07-08 17:57:19.903]# SEND ASCII> http://www.emsoft.cnl2 [2022-07-08 17:57:20.903]# SEND ASCII> http://www.emsoft.cnl2 [2022-07-08 17:57:20.903]# SEND ASCII> http://www.emsoft.cnl2 [2022-07-08 17:57:20.903]# SEND ASCII>	
Auto Append Bytes Send from File Cycle 1000 ms <u>Shortout History</u>	Data Send 1.DCD	DSR 🗸 🗸 Clear 🛧 Clear Send	Auto Append Bytes Send from File Cycle 1000 ms <u>Shortcut</u> <u>History</u>	Data Send 1. DCD ◆ 2. RXD ◆ 3. TXD ◆ 4. DTR ◆ 5. GND ◆ http://www.cmsoft.cn22	6. DSR • F Clear L Clear
🕼 Ready!	2/4 RX:44	TX:88 Reset	🞯 Ready!	3/2 RX:88	TX:44 Reset

Fig. 68 Synchronizing serial port parameters

5.3.1. PUSR customized RFC2217 protocol

Table 19Com Port Control commands

Name	Header	Baud rate	Serial parameter definition	Sum check
Length(bytes)	3	3	1	1
		Big endian,	Data bits/stop bits/parity	Check sum of 4 bytes of
Description Fixed	Fixed	e.g.	bits setting.	baud rate and serial
	T IXEU	600 (00 02	AS shown in the table 20	parameter definition, retain
		58)	below	the least significant byte
115200,N,8,1	55 AA 55	01 C2 00	03	С6
9600, N,8,1	55 AA 55	00 25 80	03	A8

Table 20Serial parameter definition

Bit Position	Function	Value	Description
1:0	Data bits	10	7 Data bits
		11	8 Data bits
2	Stop bits	0	1 Stop bits
		1	2 Stop bits
3	Parity bit enable	0	disable the parity bit
		1	Enable the parity bit
5:4	Parity bit type	00	ODD
		01	EVEN
		10	Mark
		11	Space
7:6	undefinition	00	Please write 0



6. Modbus TCP/RTU gateway

Modbus is one of the most popular automation protocols in the world, supporting traditional RS-232/485 devices and recently developed Ethernet devices. Many industrial devices, such as PLCs, DCSs, HMIs, instruments, and meters, use Modbus as their communication standard. In industrial applications, the most common protocol conversion is Modbus RTU to Modbus TCP conversion, and it is usually required when legacy devices such as meters, mostly using Modbus RTU, need to be integrated with SCADA systems, mostly using Modbus TCP.

Most modern PLCs and host computers support Modbus TCP over Ethernet. In order to access discrete Modbus RTU devices for data collection and control, they can rely on the M100 Modbus gateway.

6.1. Ethernet masters with serial slaves

When the host computer or PLC is Modbus TCP Master, the Modbus TCP function must be enabled, the remote device must work in Modbus RTU Slave mode. The M100(TCP Server mode) supports Modbus TCP with up to 16 simultaneous connections. The serial interface supports both RS-232 and RS-485, selectable through software. Each serial port can be connected to one RS-232 serial device, or to 32 RS-485 serial devices. When connected with more than one RS485 devices, please refer to section 7.5 for bus collision detection.





The device supports multiple hosts to query data from the slave in Q&A mode. Please select modbus polling function as shown in Fig.70. When USR-M100 gateway does not receive a response from the serial port after a response timeout, the device replies with an acknowledgement and then processes the next host request.

When you need to use long frame data frequently or have high data transmission requirements, please adjust the baud rate and lengthen the sending interval appropriately to prevent the slow serial port from causing messy codes or packet loss.



Communication Expert of Industrial IoT		Be Honest Do Bes 中文 En
 > Status > Network > Port Uart1 Uart2 Websocket 	UART TO NET Data transmission parameter configuration SETTING Port Socket	
> Gateway > Cloud Service > System	SOCKETA Working Mode TCP Server V ModbusTCP V Maximum Sockets supported 16 V Exceeding Maximum KEEP V Local Port Number 502 (1~65535)	
	PRINT OFF ✓ Modbus Poll ⊘ Response Timeout 200_](10-9999)ms Modbus TCP Exception □ SOCKET B	_
	Operating Mode None v	



Open the Modbus Poll and Modbus Slave software, go to "Connect" -> "Connect", and the connection parameters are configured as

follows, in this case, IP address of USR-M100 is 172.16.14.12.

협월 Modbus Poll - [Mbpoll1]		X Modbus Slave - [Mbslave1]		- 🗆 🗙
File Edit Connection Setup Functions Display View Wind	ow Help	🗕 🗗 🛪 📴 File Edit Connection Setup Display	y View Window Help	- 8 ×
🗅 📽 🖬 🎒 🗙 🛅 🗏 🎒 🕮 05 06 15 16 17 22 23	TC 🖻 🦹 📢	D 📽 🖬 🕾 🛅 🗏 🚊 📍 😢		
Tx = 0. Err = 0. ID = 1: F = 03: SR = 1000ms No connection 0 1 0 2 0 3 0 4 0 3 0 4 0 3 0 4 0 3 0 3 0 4 0 3 0 8 0 1 Strop Bard Prodestor Mode Nature Prodestor Mode Nature Sever Pat Stor	K K <t< th=""><th>D = 1 : F = 03 No connection Anas Anas O C Anas O C C C C C C C C C C C C</th><th>Connection Setup X See Pot Cannel See Share Connection USS Seal Pot CASC USS Seal Pot CASC USS Seal Pot CASC USS Seal Pot CASC Deva bate Pote Contol None Petry Or State delay TCP/P Server Pote Server P</th><th></th></t<>	D = 1 : F = 03 No connection Anas Anas O C Anas O C C C C C C C C C C C C	Connection Setup X See Pot Cannel See Share Connection USS Seal Pot CASC USS Seal Pot CASC USS Seal Pot CASC USS Seal Pot CASC Deva bate Pote Contol None Petry Or State delay TCP/P Server Pote Server P	
For Help, press F1.	[172.16.14.13]: 502	For Help, press F1.	[172.16.14.15]: 502	.0

Fig. 71 Modbus emulator settings(Ethernet master and serial slave)

6.2. Serial master with Ethernet slave

Many HMI (Human Machine Interface) systems use a serial interface to connect to a discrete DCS (Data Control System). However, many DCSs are now Ethernet-based and operate as a Modbus TCP server device. The M100 Modbus gateway can link a serial-based HMI to distributed DCSs over an Ethernet network.

When the host computer or HMI is Modbus RTU Master, if the remote device work in Modbus TCP Slave mode, the ModbusTCP function must be enabled. The M100(TCP Client mode) supports only one Modbus TCP slave.







Communication Expert of Industrial IoT		Be Honest Do Best ! 中文 English
	UART TO NET	
> Status	Data transmission parameter configuration	
> Network		
✓ Port	SETTING	
Uart1	Port Socket	
Uart2		
Websocket	SOCKET A	
> Gateway	Working Mode TCP Client V ModbusTCP V	
> System	Remote Server Addr 172.16.14.15	
	Local/Remote Port Number 9000 502 (1–65535)	
	Reconnection period 0 (0~99999)s	
	PRINT OFF ~	
	Modbus Poll 🗌 Response Timeout 200 (10~9999)ms	
	Modbus TCP Exception	
	Enable Net Heartbeat	
	Depistentian Parket Tone New York Strategy Concernation	
	Coation Once connecting	
	SSL protocol Disable V None	
	SOCKET B	
	Operating Mode None ~	
	Save&Apply	

Fig. 73 Modbus TCP slave settings

O configured as

Ibus Poll - [Mbpoll]] Edit Connection Setup Function Edit Connection Setup Function Edit Connection Setup Function Edit Connection Alian 00000 0 0 0 0 0 0 0 0 0 0 0	ns Diploy View Window Help 5 16 15 16 17 22 23 TC 23 7 2 29 DOMS Connection Setup Connection Setup Send Servings USB Send Pett (DM3) 15500 Bad B Datables Hore Paty 1 Step Paty 1 Step Paty 1 Step Paty 2 Server Pir Addes on Kode Name 172161412 Server Pir Addes Once Times of 522 3000 mal	X Cancel Mode PRTU OASCII Resconse Timou- 1000 (mol) Dalay Between Pols 500 (mol) Cancel Pr4 (Pr6	X Image: Start - Mblsherel] File Site Connection Stup Diversity Do 1: F = G3 Image: Start - Mblsherel] No connection Image: Start - Mblsherel] 0 Image: Start - Mblsherel] <	splay View Window Help Connection Setup Connection Setup Connection Setup Connection Setup Connection Setup Connection Setup Connection Secial Setup USB Senial Peri(CDM3) USB Senial Peri(CDM3) For Connection Port Connection TS Connection Port State Port State Port State Port State State Port State Port State State State State State Port State Sta

- 8 ×



6.3. Serial master with serial slaves

When the HMI is Modbus RTU Master, all M100 must enable or disable ModbusTCP function at the same time, the remote device must work in Modbus RTU Slave mode. The M100 supports up to 16 simultaneous TCP connections.



Fig. 75 Serial master with multiple serial slaves

If there are more than one serial masters in RS485 network, users should select modbus poll function and configure response timeout in Fig.76. please refer to section 7.5 for bus collision detection.

Communication Expert of Industrial IoT	Be Honest Do Best ! 中文 English
Status UART TO NET Network Data transmission parameter configuration V Port Data transmission parameter configuration Uart1 SETTING Uart2 Port Websocket Socket	
SockEr A SockE	
SOCKET 8 Operating Mode None Save&Apply Save&Apply Uses JISP IOL To be leaded at the Mark Apply	
Jinan USK 101 Technology Limited. http://www.pusr.com	

Fig. 76 Modbus RTU master settings



Communication Expert of Industrial IoT		Be Honest Do B 中文
	UART TO NET	
> Status	Data transmission parameter configuration	
> Network		
∽ Port	SETTING	
Uart1	Port Socket	
Uart2		
Websocket	SOCKET A	
> Gateway	Working Mode TCP Client v Medbus TCP v	
> Cloud Service		
> System	Remote Server Addr 172.16.14.15	
	Local/Remote Port Number 0 502 (1-65535)	
	Reconnection period 0 (0~99999)s	
	PRINT OFF ~	
	Modbus Poll Response Timeout 200 (10~9999)ms	
	Modbus TCP Exception	
	Enable Net Heartbeat	
	Registration Packet Type None V Location Once connecting	
	SSL protocol Disable v None	
	SOCKET B	
	Operating Mode None ~	
	Save&Apply	



📽 Modbus Poll - [Mbpoll1]	- 🗆 🗙 Modbus Slave - [Mbslave	1]	- 🗆 ×
🕅 File Edit Connection Setup Functions Display View Window Help	5" 🛪 📴 File Edit Connection	Setup Display View Window Help	- 8 ×
🗅 🗃 🗃 🛪 🛅 🗏 🚊 💷 05 06 15 16 17 22 23 TC 🗵 🤶 😵		ġ ? % ?	
O @ @ @ % @ @ fill 0 65 06 15 15 17 22 23 17 0 61 75 17 22 23 17 0 71 72 17 061 75 17 07 17 07 17 07 17 07 17 07 07 07 07 07 07 07 07 07 07 07 07 07	D D <th>Q Y None Q Send Hat OK Q Send Settings OK Q Settings Point 1 Stop De IPA Settings I Settings IPA Settings I Settings IPA Settings I Settings IPA Settings I Settings IPA IPA I Settings IPA IPA I Settings IPA IPA I Setti</th> <th></th>	Q Y None Q Send Hat OK Q Send Settings OK Q Settings Point 1 Stop De IPA Settings I Settings IPA Settings I Settings IPA Settings I Settings IPA Settings I Settings IPA IPA I Settings IPA IPA I Settings IPA IPA I Setti	
For Help, press F1. Port 3: 1152	-8-N-1	[172.16.14.15]]: 502

Fig. 78 Modbus emulator settings(serial master and serial slave)

6.4. Serial master via virtual COM with serial slaves

When the host computer is Modbus RTU master, if we use VCOM, the Modbus TCP function must be disabled, the remote device must work in Modbus RTU Slave mode.



⊕ New	Please select new connection type
	New TCP Server-Vircom Connection By creating this connection you will be able to receive the COM port data of multiple remote computers (clients) on this PC over TCP/IP protocol
	New TCP Client-Vircom Connection By creating this connection you will be able to share the COM port data on local computer among other remote computers (servers) over TCP/IP protocol
	New UDP-Vircom Connection By creating this connection you will be able to send the COM port data to other remote computers with the same type of connection over UDP protocol
	New Cloud Device-Vircom Connection By creating this connection you will be able to share the COM port data on local computer with cloud device over MQTT

Fig. 79 New virtual COM port mapping

nterna de la comunicación de la		@ (\$	- 🗆 ×
⊕ New	New TC	P Server-Vircom Connection	
€ New	New TC Connection name : Select Serial Port : TCP port :	P Server-Vircom Connection Server COM16 COM16 Strict baudrate emulation Synchronize baudrate(RFC2217 simil Keep-alive 20108	lar)
		🛞 Cancel	⊘ New

Fig. 80 Mapping a virtual COM port



R USR-VCOM	🖨 🔍 🗕 🗆 🗙
① New	Info of TCP Server connection : Server COM16
Server COM16 COM16 Server 20108	COM port information Port name : COM16 Port status : closed Port parameters : Bytes received : 0 Opened by : Network information Type : TCP Server Port : 20108 Status : Listen Bytes received : 0 EXI Data Montor

Fig. 81 Virtual COM port mapping details

Communication Expert of Industrial IoT		Be Honest Do Bes 中文 Eng
X. Chature	UART TO NET	
> Network	Data transmission parameter configuration	
' Port	SETTING	
Uart1	Poid Socket	
Uart2		
Websocket	SOCKET A	
Gateway	Working Mode TCP Client V None V	
System	Remote Server Addr 172 16 14 15	
	Local/Remote Port Number 0 20108 (1–65535)	
	Reconnection period 0 (0~99999)s	
	PRINT OFF	
	Modbus Poll 🗌 Response Timeout (200 (10~9999)ms	
	Enable Net Heartbeat	
	Registration Packet Type None V Location Once connecting V	
	SSL protocol Disable V None V	
	SOCKET R	
	JUCKLEU	
	Operating Mode None ~	
	Save8Apply	

Fig. 82 Serial device settings

Modbus Poll - (Mppoll1) Image: fail Connection Stup Function Image: fail Connection Image: fail Connection No connection Atlass 00000 Image: fail Connection 0 Image: fail Conne	Interest Dipplay View Window Help P 05 66 15 16 17 22 23 TC E P R SR = 1000ms Connection Setup Connection Setup Connection Setup Setal Setup Cancel ELTIMA Vinual Setup Cancel I115200 Bad P RU (OASCI) Bota bet Reconst Timord I000 minit Delay Seture Folg I5 too BE Advanced	→ →	ℓ View Window Help Connection Setup X Correction OK Setal Setings OK Setal Setings Cancel USB Setal Pert (COMTO) V 115200 Bad @ RTU OASCI Roads bats Poor Control Topo Error [Tis Grade Intro	- 0 X
	Corport Correct Treasul Correct T		TCPAP Serve Port T22.16.14.15 ▼ TA23ee © IPv4 Isprose UnitID IPv6	
For Help, press F1.	Port 3: 115200-8-N-1	For Help, press F1.	Port 10: 115200-8-N-1	



Fig. 83 Modbus emulator settings(serial master and serial slave)

6.5. Modbus poll with serial heartbeat packet

When the M100 is Modbus RTU Master, the serial device work in Modbus RTU Slave mode, the ModbusTCP function must be disabled. M100 works in TCP server mode, it supports up to 16 TCP connections.

Communication Expert of Indust	Be Glot	Honest Do Best! 中文 English
Status Network Vert Uart1 Uart2 Websocket Gateway Clowd Sensing	UART TO NET Data transmission parameter configuration SETTING Port Socket SOCKET A	
> System	Working Mode TCP Server None Maximum Sockets supported 16 Exceeding Maximum Local Port Number 23 (1-65535) PRINT OFF Modbus Poll Response Timeout (200) (10-9999)ms	
	SOCKET B Operating Mode None C Sarro&Appt	

Fig. 84 Modbus RTU master Settings

Communication Expert of Industrial I	Το			Be Honest Do Best! 中文 English
> Status	UART TO NET			Ŷ
> Network	Data transmission parameter conf	iguration		
∽ Port	SETTING			
Uart1	Port Socket			
Uart2 Websocket				
> Gateway	Baud rate	115200 (600~230400)bps		
> Cloud Service	Data bits	8 v bit		
> System	Parity	None ~		
	Stop bits	1		
	Flow ctrl	NONE ~		
	UART Packet Length	0 (0~1460)bytes		
	UART Packet Time	0 (0~255)ms		
	Sync Baudrate(RFC2217)	ON ~		
	Enable Uart Heartbeat			
	Uart Heartbeat Type	User define ~		
	Uart Heartbeat Packet	0103000000AC5CD		
		HEX 🗹 ASCII 🗆		
	Beat Time	1 (1~65535)s		
		Save&A	spily	
	л	nan USR IOT Technology Limited. http://w	ww.pusr.com	v

Fig. 85 Serial heartbeat packet as modbus command



USR-TCP232-Test RS232 to Ethernet Convert tester × File(E) Options(O) Help(H) COM port data receive -COMSettings Network data receive NetSettings PortNum COM10 -(1) Protocol [Receive from 172, 16, 14, 12 : 23] 01 03 14 00 00 00 00 00 00 00 00 00 0E TCP Clien -115200 -BaudR 00 00 00 00 00 00 00 00 00 00 97 8F (2) Server IP 01 03 14 00 00 00 00 00 00 00 00 00 0E NONE • DPaitu 172.16.14.12 00 00 00 00 00 00 00 00 00 00 97 8F 8 bit • DataB 01 03 14 00 00 00 00 00 00 00 00 00 0E (2) Server Port 1 bit • 00 00 00 00 00 00 00 00 00 00 97 8F StopB 01 03 14 00 00 00 00 00 00 00 00 00 0E 00 00 00 00 00 00 00 00 00 00 97 88 Open 🕨 Disconnect 01 03 14 00 00 00 00 00 00 00 00 00 0E 00 00 00 00 00 00 00 00 00 00 97 8F Recv Options Recv Options 01 03 14 00 00 00 00 00 00 00 00 00 0E Receive to file. Receive to file. 00 00 00 00 00 00 00 00 00 00 97 88 🔽 Add line return 01 03 14 00 00 00 00 00 00 00 00 00 0E 🔽 Add line return 00 00 00 00 00 00 00 00 00 00 97 88 ✓ Receive As HEX ✓ Receive As HEX 01 03 14 00 00 00 00 00 00 00 00 00 0E Receive Pause Receive Pause 00 00 00 00 00 00 00 00 00 00 97 88 Save. Clear 01 03 14 00 00 00 00 00 00 00 00 00 0E Save... Clear 00 00 00 00 00 00 00 00 00 00 97 88 01 03 14 00 00 00 00 00 00 00 00 00 0E Send Options Send Options 00 00 00 00 00 00 00 00 00 00 97 88 🔲 Data from file ... □ Data from file 01 03 14 00 00 00 00 00 00 00 00 00 0E 🗖 Auto Checksum Auto Checksum 00 00 00 00 00 00 00 00 00 00 00 97 8F 01 03 14 00 00 00 00 00 00 00 00 00 0E Auto Clear Input Auto Clear Input 🕅 Send As Hex 🔲 Send As Hex Port 4723 LocalHost 172.16.14.15 🔲 Send Recycle Send Recycle Jinan USR Technology Co., http://en.usr.cn Interval 1000 ms Interval 1000 ms Send Send Ltd Load. . . Clear Load ... Clear Send: 0 Recy : 208 Send: 0 Recv : 575 Reset 💣 Ready! F Ready! Reset

Fig. 86 Modbus response transparently transmission

7. Advanced features

Г

7.1. Packing mechanism

Serial to Network Packet Delimiter: Packet delimiter is a way of packing data in the serial communication. It is designed to keep packets intact. USR-M100 provides two types of delimiter: Time Delimiter, Maximum Bytes Delimiter. Note that the following delimiters (time, length) when they are selected are programmed in the OR logic. Meaning that if any of the two conditions were met, the device would transmit the serial data in its buffer over the network.

USR IOT Communication Expert of Industrial IoT		Be Honest Do Best! 中文 English
	r configuration	
Websocket Socket Sateway Bauc Cloud Service Dat System Stop	ate 115200 (600-230400)bps bits 8 • hit •	_
For UART Packet Lo UART Packet Sour Baudraw/DF	NONE ath 0 (0-1460)bytes ime 0 (0-255)ms 120 out *	
Syn Coulombia, e C	eat Surrol6Apply	
	Jinan USR IOT Technology Limited. http://www.pusr.com	

Fig. 87 Data packing mechanism

Packet time: USR-M100 will transmit the serial data in its buffer when the specified time interval has reached and no more serial data comes in. The default value is calculated automatically based on the baud rate. If the automatic value results in chopped data, the timeout could be increased manually by specifying a larger value in the text box above. Note that the maximum interval is 255 milliseconds. This option is disabled by default.

User Manual



The optimal "Interval timeout" depends on the application, but it must be at least larger than one-character interval within the specified baud rate. For example, assuming that the serial port is set to 1200 bps, 8 data bits, 1 stop bit, and no parity. In this case, the total number of bits needed to send a character is 10 bits (included 1 start bit), and the time required to transfer one character is (10 (bits)/1200 (bits/s))*1000 (ms/s) = 8.3 ms. Therefore, you should set the "Interval timeout" to be larger than 8.3 ms. Rounding 8.3 ms to the next integer would give you 9 ms. Which can be set as your interval timeout.

Packet length: USR-M100 will transmit the serial data in its buffer when the specified length in the unit of bytes has reached. If you would like USR-M100 to queue the data until it reaches a specific length, the data length can be configured for 1 to 1460 bytes. If the data length (in bytes) matches the configured value, the data will be forced out. Set to 0 if you do not need to limit the length.

7.2. Heartbeat packet

Network heartbeat packet: The M100 gateway sends a heartbeat packet regularly to notify the server that it is active and maintains a normal network connection with the server. This function is only allowed when the working mode is UDP and TCP Client.

Serial heartbeat packet: The M100 gateway notifies the serial device it is active via packet, and this packet can also be used to actively capture sensor data.

Heartbeat packet only works in no data traffic in the setting direction. There are no data coming from serial port or internet in heartbeat interval.

Communication Expert of Industrial IoT		Be Honest Do Best! 中文 English
Status		^
Data transmission parameter con Network	figuration	
✓ Port SETTING		
Uart1		·
Uart2		
Websocket Baud rate	115200 (600~230400)bps	
> Gateway Data bits	8 v bit	
Cloud Service		
> System Party	None	
Stop bits	1 *	
Flow ctrl	NONE	
UART Packet Length	0 (0~1460)bytes	
UART Packet Time	0 (0~255)ms	
Sync Baudrate(RFC2217)	ON ~	
Enable Uart Heartbeat	8	
Uart Heartbeat Type	User define 🗸	
Uart Heartbeat Packet	WWW.UBF.CD	
	HEX 🗆 ASCII 🗹	
Beat Time	30 (1-65535)s	
	Save&Apply	
n.	inan USR IOT Technology Limited. http://www.pusr.com	×

Fig. 88 Serial heartbeat packets



USR IOT Communication Expert of Industrial IoT		Bé Honest Do Best 中文 Engl
> Status	Port Socket	
> Network	SOCKET &	
✓ Port	JULKER	
Uart1	Working Mode TCP Client V None V	
Uart2	Remote Server Addr 172.16.14.15	
Websocket	Local/Remote Port Number 9000 23 (1~65535)	
> Gateway	Reconnection period 0 (0~99999)s	
> Cloud Service	PRINT OFF	
z system		
	Robubus Fori Response Limeout Zuu (10~3939)ms	
	Enable Net Heartbeat 🔽	
	Net Heartbeat Type User define	
	Net Heartbeat Packet www.usr.cn	
	HEX 🗆 ASCII 🗹	
	Beat Time 30 (1~65535)s	
	Registration Packet Type None Location Once connecting	
	SSL protocol Disable V None V	
	SOCKET B	
	Operating Mode None ~	
	Save&Apply	

Fig. 89 Network heartbeat packets

7.3. Registration packet

This function is only allowed when the working mode is UDP and TCP Client. The content of the registration packet can be up to 40 bytes long. Users can choose to display this content in hexadecimal format or ASCII format.

Once connected: The registration packet is only sent once when the network connection is established;

Prefix of DATA: The registration packet is filled in front of the serial port data every time the serial port sends data to the network;

Communication Expert of Industrial InT		Be Honest Do Best! 中文 English
Status VAR Network Vart Uart	RT TO NET transmission parameter configuration TING Socket	
Uari2 Websocket SOC	KET A Working Mode TCP Client V None V	-
> System	Remote Server Addr. 172.16.14.15 .occal/Remote Port Number 9000 2.3 (1~65535)	
	Reconnection period 0 (0-9999)s PRINT OFF ~ Modbus Poll Response Timeout (200 (10-9999)ms	
	Enable Net Heartbeat	
	SSL protocol Berka IICCID SSL protocol Berka IICCID None	_
	Operating Mode None Jinan USR 101 Technology Limited. http://www.pusr.com	

Fig. 90 Registration packet type



USR IOT Communication Expert of Industrial IoT		Be Honest Do Best 中文 Eng
Charles	UART TO NET	
Status	Data transmission parameter configuration	
Port	077701/0	
Uart1	SETTING	
Uart2	Port Socket	
Websocket		
Gateway	SOCKET A	
Cloud Service	Working Mode TCP Client V None V	
System	Remote Server Addr 172.16.14.15	
	Local/Benote Port Number 9000 23 (1, 65535)	
	Reconnection period 0 (0-99999)s	
	PRINT OFF ~	
	Modbus Poll 🗌 Response Timeout 200 (10-9999)ms	
	Enable Net Heartbeat	
	Registration Packet Type User Defined V Location Once connecting V	
	Once connecting Prefer of Data	
	User defined Packet www.usr.cn Both are supported	
	SCI protocol Diaskia w Mass	
	age Monoros Disania e Houla	
	SOCKET B	
	Operating Mode None ~	

Fig. 91 Registration packet method

7.4. Socket B

Socket B supports TCP Client and UDP Client. Socket B and Socket A share the registration packet and heartbeat packet. When Socket B initiates a connection, it uses a random local port number to connect to the target server.

25	USR IOT Communication Expert of Industr	в	e Honest Do Best! 中文 English
	 > Status > Network ✓ Port Uart1 Uart2 Websocket > Gateway > Cloud Service > System 	UART TO NET Data transmission parameter configuration SETTING Port Socket Socket Socket Socket F A Working Mode TCP Server V None V Maximum Sockets supported 8 V Exceeding Maximum KICK V Local Port Number 23 (1-6533) PRINT OFF V Modbus Poll C Response Timeout 200 (10-9999)ms	
		Operating Mode Remote Server Addr Remote Port No. 20105 (1-65535) Saws&Apply	
		Jinan USK IOI Technology Limited. http://www.pusr.com	



7.5. Rs485 bus detection

If RS485 bus is in the receiving state, M100 can not output data to serial port to achieve the 485 bus anti-conflict function. Idle time: the interval time when M100 is allowed to send data to RS485 bus after the receiver is idle. The value ranges from 0 to 65535 (ms). Default value: 10. This parameter is mandatory.



USR IOT Communication Expert of Industrial IoT					Be Honest Do Bes 中文 Eng
	System Setting				
> Status					
> Network	Model Name	USR-M100			
> Port	Websocket Port	6432	(1~65535)		
> Gateway	Websocket Direction	UART1 .			
> Cloud Service		on and			
✓ System	Webserver Port	80	(0~65535)		
System Setting	User Name	admin			
Management	Pass Word		2		
Feedback	Uart Cache	OFF			
	Restarting Without Data	0	(0/60~65535)s		
	SNMP	OFF	· @		
	Teinet	OFF	. @		
	NTP	ON	. @		
	NIP Server Address	cn.pool.ntp.org			
	NTP Timezone Setting	UTC+8	•		
	485 Anti-Collision	ON	0		
	485-Idle Time	10	(0~2500)ms		
	Log Export	Export			
		non USP IOT Tochnelsen	Save	&Apply	



7.6. Serial Printer setting

USR-M100 gateways transform any serial device into an Ethernet-capable device that can be used in a network. These gateways allow serial devices such as a printer, control mechanisms or control systems to be used in a network without relying on the serial port of a computer for connectivity. This way, any serial device can be connected to the network and the internet and accessed from anywhere. Sharing a printer among coworkers in the same physical office can be implemented with a gateway that does not need to offer security or authorization capabilities.

The M100 gateway, features a Serial Printer option which functions in similar fashion to the Serial Printer option in the (COM) Ports dialog box. This option allows the associated TCP port to be identified as a serial printer connection. The connection does not consume a user license, is restricted to output only, and filters out the end-of-document marker correctly. In this case, IP address of USR-M100 is 172.16.14.12.

USRIOT		Be Honest Do B
Communication Expert of Industrial Iol		40
> Status		
> Network	UART TO NET	
∽ Port	Data transmission parameter configuration	
Uart1	SETTING	
Uart2	Dart Codes	
Websocket	Port Socket	
> Gateway	SOCKET A	
> Cloud Service		
> System	Working Mode TCP Server Vone V	
	Maximum Sockets supported 8 v Exceeding Maximum KICK v	
	Local Port Number 9100 (1-65535)	
	PRINT	
	Modbus Poll Cresponse Timeout 200 (10~9999)ms	
	SOCKET B	
	Operating Mode None	
	Save&Apply	





Brother DCP-7180DN Printer (扫描)				Welcome to the Add Standard TCP/IP Printer Port Wizard
t to the following port(s). Documents will print to the first free cked port.	Printer Ports		×	This wizard helps you add a port for a network printer.
rt Description Printer	 Available port types: 			Before continuing be sure that:
COM9: Serial Port	Local Port			1. The device is turned on.
ILE: Print to File	Standard TCP/IP Port		de de la	Ine network is connected and configured.
VSD-5 WSD Port MiWiFi-R3-srv (HP DeskJet	260			
VSD-a WSD Port Brother DCP-7180DN Print	er			
SD-9 WSD Port Brother DCP-7180DN [3c2a	if4e2			
/SD-b WSD Port Brother DCP-B7535DW ser	es P			
-172 Standard ICP/IP Port Brother DCP-/180DN Print	er (V New Port Type	New Port Cancel		
Add Port (1) Delete Port Configure	Port	2		
ble bidirectional support				To continue, click Next.
ble printer pooling				lo continue, click Next.

Fig. 95 Serial printer setting wizard 1

Add Standard TCP/IP Printer Port Wiza	rd	
Add port For which device do you want to ac	dd a port?	
Enter the Printer Name or IP ad	ldress, and a port name for the desired device.	
Printe <mark>r</mark> Name or IP <u>A</u> ddress:	172.16.14.12	
Port Name:	172.16.14.12	
	< <u>B</u> ack <u>N</u> ext > Can	cel

Fig. 96 Serial printer setting wizard 1



The device co	uld not be identified.				Ń
The device is not	found on the networl	k. Be sure that	:		
. The device is t	turned on.				
. The network i	s connected.				
. The device is	properly configured.				
. The address on the previous page is correct.					
f you think the a	ddress is not correct,	click Back to re	eturn to the prev	ious page. Then c	orrect the
f you think the a uddress and perfo levice type belov Device Type	ddress is not correct, orm another search or v.	click Back to re n the network.	eturn to the prev If you are sure t	ious page. Then c he address is corre	orrect the ect, select the
f you think the a address and perfo levice type belov Device Type — ⓒ <u>S</u> tandard	ddress is not correct, orm another search or v. Generic Network C	click Back to ro n the network. ard	eturn to the prev If you are sure t	ious page. Then c he address is corre	orrect the ect, select the
f you think the a address and perfo levice type below Device Type — (• <u>S</u> tandard (• <u>C</u> ustom	ddress is not correct, orm another search or v. Generic Network C S <u>e</u> ttings	click Back to re n the network. ard	eturn to the prev If you are sure t	ious page. Then c he address is corre	orrect the ect, select the

Add Standard TCP/IP Printer Port	Wizard Completing to Printer Port You have selected a	the Add Standard TCP/IP Wizard
	SNMP: Protocol: Device: Port Name: Adapter Type:	No RAW, Port 9100 172.16.14.12 172.16.14.12 Generic Network Card
	To complete this wiz	ard, click Finish.



7.7. NTP

If M100 is connected to the internet or to a local NTP server, the Date/time can be set automatically by enable NTP function. If this option is chosen, the default value "cn.ntp.org.cn" should be shown in the NTP server field. User can select a proper Time Zone from the dropdown box. If the M100 device is connected to the Internet and should get NTP server over the Internet, you will need to



configure the DNS server in order to be able to resolve the host name of the NTP server.

Communication Expert of Industr	ial IoT		Be Honest Do Best! 中文 English
> Status	System Setting		^
> Network			
> Port	Model Name	USR-M100	
> Gateway	Websocket Port	6432 (1~65535)	
> Cloud Service	Websocket Direction	UART1 ~	
∽ System	Webserver Port	80 (0~65535)	
System Setting	User Name	admin	
Management			
Feedback	Pass Word		
	Uart Cache	OFF v	
	Restarting Without Data	0 (0/60~65535)s	
	SNMP	OFF v	
	Telnet	OFF v	
	NTP	ON 🗸 🔘	
	NTP Server Address	en pool ntp org	
	NTP Timezone Setting	UTC+8 ~	
	485 Anti-Collision	OFF v	
	Log Export	Export	
		Save&Apply	
	Iti	Jinan USR IOT Technology Limited. http://www.pusr.com	v

Fig. 99 NTP settings

7.8. SNMP

The Simple Network Management Protocol (SNMP) is used by network management software to monitor devices in a network,

to retrieve network status information of the devices, and to configure network parameters of the devices.

To make the device's information available for public viewing/editing, you can enable the SNMP function by checking the Enable box. The supported SNMP Version:v1/v2c.The default SNMP Community Strings (or passphrases) is "admin".

Communication Expert of Industrial IoT		Be Honest Do Best! 中文 English
> Status		^
> Network Model Name	USR-M100	
> Port Websocket Port	6432 (1~65535)	
> Gateway		
Cloud Service Websocker Direction	UART	
System Setting	80 (0~65535)	
Vser Name User Name	admin	
Feedback Pass Word		
Uart Cache	OFF	
Bostation Without Data	0 (0/60, 65525)	
Restarting without bata	u (U)00(0)00(0)00(0)00(0)00(0)00(0)00(0)0	
SNMP	ON 🗸	
Telnet	OFF 🗸 🗸	
NTP	ON - @	
NTP Server Address	cn.pool ntp.org	
NTD Timesone Setting	1770-9	
An integole second		
485 Anti-Collision	OFF 🗸 🗸	
Log Export	Export	
	Save&Apply	
it.	nan USR IOT Technology Limited. http://www.pusr.com	v

Fig. 100 Enable SNMP agent

Table 21 PUSR OID list

ltem	OID
IP address	.1.3.6.1.2.1.4.20.1.1.172.16.14.12
Subnet mask	.1.3.6.1.2.1.4.20.1.3.172.16.14.12
Gateway	.1.3.6.1.2.1.4.21.1.1.172.16.14.12


Firmware version	.1.3.6.1.2.1.12.1.0
Hardware version	.1.3.6.1.2.1.12.2.0
RAM usage	.1.3.6.1.2.1.12.3.0
CPU usage	.1.3.6.1.2.1.12.4.0
Preferred DNS	.1.3.6.1.2.1.12.5.0
Alternate DNS	.1.3.6.1.2.1.12.6.0



Fig. 101 SNMP test

8. MQTT gateway

Although the MQTT protocol has been around for nearly three decades, the design of the protocol makes it ideal for IIoT (Industrial Internet of Things) applications, the latest trend in automation engineering. This is particularly true for applications that stress "active notification," in which devices provide data only when needed, as opposed to "passive notification," in which devices are polled at regular intervals. MQTT's broker/client design eliminates the need for all devices in the system to be online at the same time. The clients (i.e., "devices" or "things") communicate directly with the broker, which plays the role of middleman to pass messages back and forth between clients.

8.1. Basic settings

When configuring the Broker information, Client ID, Host, and Port are already filled in by default. You can also modify it by yourself based on the actual Broker information. We will use Free Public MQTT Server provided by EMQX Cloud as the MQTT server address for quick testing. You can configure KeepAlive, Clean Session, Auto Reconnect, MQTT Version, etc.



Communication Expert of Industrial IoT		Be Honest Do Best! 中文 English
> Status MQTT Gateway		Â
Network MQTT Gateway function s supports port mapping fu	pports SSL, clean session and QOS, supports connecting to the third-party MQIT serverit supports up to 16 publish topics and 16 subscribe topics, ction, which can bind each topic to a different serial port.	
✓ Gateway MQTT Gateway Basic configuration	Publish Subscribe	-
Edge Computing IO Fuction Enable I	QTT Enable ~	
Cloud Service MQTT V	sion MQTT-3.1.1 ~	
> System Cli	nt ID 123456	
Server Addre	s (IP) broker.emqx.io	
Local/Remote Por	NO. 0 (0~65535) 1883 (1~65535)	
Keepalvie In	erval 60 (0~65535)s	
Reconnecting time Without	Data 0 (0-65535)s	
Reconnection In	erval 1 (1~65535)s	
Clean up so	sion 🗌	
User Crede	tials	
Enable la	t will	
SSL pro	ocol Disable v None v	
	Save&Apply	
	Jinan USR IOT Technology Limited. http://www.pusr.com	



If your broker has enabled user authentication, you can fill in the information of Username and Password in the configuration item.

SR IOT Communication Expert of Industrial IoT		Be Honest Do Best! 中文 English
Status Status Network	sh Subscribe	^
> Port Enable MQTT	Enable ~	
MQTT Version	MQTT-3.1.1 ~	
Edge Computing Client ID	123456	
IO Fuction Server Address (IP)	broker.emqx.io	
> Cloud Service Local/Remote Port NO.	0 (0~65535) 1883 (1~65535)	
> System Keepalvie Interval	60 (0~65535)s	
Reconnecting time Without Data	0 (0.,.65535)+	
Becomparing into Window Data	4 (1. 0000)	
Reconnection interval		
Clean up session		
User Credentials		
Username	admin	
Password	admin	
Enable last will		
SSL protocol	Disable V None V	
	Save&Apply	
Le contra de la cont	inan USR IOT Technology Limited. http://www.pusr.com	v

Fig. 103 User credential

When you need to enable SSL/TLS authentication, you need to set the SSL/TLS configuration item. The two versions, TLS 1.0 and TLS 1.2 are provided. If SSL/TLS is selected, certificate configuration can be performed. If it is a one-way connection, you only need to select your CA File. If it is a two-way authentication, you also need to select to configure Client Certificate File and Client key file. Click the choose file button on the far right to select the certificates you have generated.

- Uploads a Certificate Authority (CA) file. A Certificate Authority (CA) is an entity that issues digital certificates. A digital certificate certifies the ownership of a public key by the named subject of the certificate.
- Uploads a client certificate (cert) file. A certificate file is a type of digital certificate that is used by client systems to make authenticated requests to a remote server.
- ♦ Uploads a private key file.



Communication Expert of Industrial	loĩ		Be Honest Do Best! 中文 English
> Status	Basic configuration Publis	sh Subscribe	-
> Network > Port	Enable MQTT	Enable	
✓ Gateway	MQTT Version	MQTT-3.1.1 ~	
MQTT Gateway	Client ID	123456	
Edge Computing	Server Address (IP)	brokar emqx io	
> Cloud Service	Local/Remote Port NO.	0 (0~65535) 1883 (1~65535)	
> System	Keepalvie Interval	60 (0-65535)s	
	Reconnecting time Without Data	0 (0~65535)s	
	Reconnection Interval	1 (1-65535)s	
	Clean up session		
	User Credentials		
	Enable last will		
	SSL protocol	TLS1.2 Verify All	
	Upload Server CA	Server Root CA Choose file Upload	
	Upload Client CA	Client CA Choose file Upload	
	Upload Client Private Key	Client Private Key Choose file Upload	
		Save&Aceby	
			•
	(J)	Jinan USR IOT Technology Limited. http://www.pusr.com	

Fig. 104 SSL/TLS connection

You can configure the Will Message. The values of Last-Will-QoS and Last-Will-Retain are filled with 0 and False by default. When you enter the values of Last-Will-Topic and Last-Will-Payload, you can complete the configuration of Will Message.

忿	USR IOT Communication Expert of Industr	ial IoT		Be Honest Do Best! 中文 English
	> Status	Basic configuration Publis	sh Subscribe	^
	> Network	Enable MOTT	Fnable	
	> Port			
,	∽ Gateway	MQ11 Version	MQTT-3.1.1	
	MQTT Gateway	Client ID	123456	
	Edge Computing	Server Address (IP)	192.168.0.201	
	IO Fuction	Local/Remote Port NO.	0 (0~65535) 1883 (1~65535)	
	> Cloud Service	Keepalvie Interval	60 (0~65535)s	
	> System			
		Reconnecting time without Data	0 (0~02020)s	
		Reconnection Interval	1 (1-65535)s	
		Clean up session		
		User Credentials		
		Enable last will		
		Topic of will	/will	
		Will Message	offline	
		005	0050	
		Retained		
		SSL protocol	Disable v None v	
			Save&Apply	v
		ار .	man OSK fOT technology Limited. http://www.pusi.com	

Fig. 105 Last will message

After finishing configuring the basic settings, please scroll down to the bottom of the page and click on "Save & Apply" button to save all the changes that you have made. All configurations take effect after a system reboot. In this case we only finish the follow parameters setting.



Communication Expert of Industria	lati	Be Honest Do Best! 中文 English
> Status	MQTT Gateway	^
> Network > Port	MQTT Gateway function supports SSL clean session and QOS, supports connecting to the third-party MQTT servedt supports up to 16 publish topics and 16 subscribe topics, supports port mapping function, which can bind each topic to a different serial port.	
✓ Gateway MQTT Gateway	Basic configuration Publish Subscribe	
Edge Computing	Enable MQTT Enable ~	
IO Fuction	MQTT Version MQTT-3.1.1 ~	
> System	Client ID 123456	
	Server Address (IP) broker emotio	
	Local/Remote Port NO. 0 (0-65535) 1883 (1-65535)	
	Keepalvke Interval 60 (0-65535)s	
	Reconnecting time Without Data 0 (0-65535)s	
	Reconnection Interval 1 (1~65535)s	
	Clean up session	
	User Credentials	
	Enable last villi	
	SSL protocol Disable v None v	
	Save&Apply	
	Jinan USR IOT Technology Limited. http://www.pusr.com	

Fig. 106 EMQX broker connection

To view the status of the device, choose Status>Overview, the device is in the CONNECTED state, the connection to IoT Hub is successful, and publishing and subscribing operations can be performed.

Communication Expert of Industrial IoT			Be Honest Do Best! 中文 English
	Alternate DNS Server		^
✓ Status	Signal Value	0	
Overview	Signal Intensity	all	
> Network	Network Type	NONE	
> Port	Connection Status	Disconnected	
✓ Gateway			
MQTT Gateway	Port		
Edge Computing	Status of Port	Port1	-
IO Fuction	Conn Status A/FTH)	LISTEN	
> Cloud Service	TV Count A(ETH)	0 huter	
> System		0 bytes	
	RA Count A(ETH)	U Dytes	
	Conn Status B(ETH)	IDLE	
	TX Count B(ETH)	0 bytes	-
	RX Count B(ETH)	0 bytes	
	MQTT Gateway		
	Enable MQTT	ENABLE	
	Conn Status MQTT	CONNECTED	
-			
	Edge Computing		
	Enable Edge Computing	DISABLE	
			v
	Jinan USR IOT Tech	nology Limited. http://www.pusr.com	

Fig. 107 MQTT connection status

8.2. Publishing a message

8.2.1. MQTT.fx tool introduction

MQTT.fx is a mainstream MQTT desktop client. Compatible with Windows, macOS, and Linux, it can quickly verify whether it is possible to connect to IoT Hub and publish or subscribe to messages. MQTT.fx in this article refers to version 1.7.1 without special instructions.

The main page is shown in the figure below. The top part is the MQTT Broker connection address bar and its connection configuration. The following function Tabs include Publish column, Subscribe column, Scripts column, Broker Status column, Log column for log information control.



WQTT.fx - 1.7.1			<u>201</u> 0		×
File Extras Help					
EMQX	Connect Disconnect				•
Publish Subscribe Scripts Broker Status	Log				
>> /testTopic/1	♥ Publish	QoS0 QoS1 QoS2	Retaine	d(

Fig. 108 MQTT.fx main page

First, the MQTT client and Broker need to establish a connection to communicate. Click the configuration icon on the right side of the input box in the connection address bar to enter the specific connection configuration. Select the Profile Type as MQTT Broker. Fill in broker.emqx.io for Broker Address and 1883 for Broker Port, as shown in the figure below:

мс	2TT.fx - 1.7.1		224	
File	Extras Help			
	EMQX	Connect Disconnect		
Put	Edit Connection Profiles			×
	AWSIOT	Profile Name EMQX		
	M2M Eclipse New Profile	Profile Type MQTT Broker 💌	MQT	
	Thingsboard cloudmqtt	MQTT Broker Profile Settings		
	mqtt onenet connect	Broker Address broker.emox.io		
		Broker Port 1883		
		Client ID 8045a78e6f4b49c59160b6c52ec95444 Generate		
		Connection Timeout 30 Keep Alive Interval 60 Clean Session - Auto Reconnect Max Intlight 10 MQTT Version Clear Publish History Clear Subscription History		
	+-@	Revert	ОК Аррі	k.

Fig. 109 Connection Profiles

Click OK to confirm the configuration, return to the main interface, and click Connect. It can be seen that the indicator on the right side turns to green, indicating that the current connection is successful, as shown in the following figure:



0 N	IQTT.fx -	1.7.1											<u>200</u> 8		×
File	Extras	Help													
						Connect	Disconnect							Ŀ	• •
Pu	ublish	Subscribe	Scripts	Broker Sta	tus Lo	g									
*	/testTo	pic/1				- Publish				Qo5 0	Q051	QoS 2	Retaine		0°,*
															-

Fig. 110 Successful connection

8.2.2. Transparent transmission

In the Publish field, select Publish topic1, enter the topic, bind to the Port1, select Qos 0, uncheck retained message. We use the /PubTopic1 as an example to describe the process. After finishing configuring the Publish topic1, please scroll down to the bottom of the page and click on "Save & Apply" button to save all the changes that you have made. All configurations take effect after a system reboot.

USR IOT Communication Expert of Industrial IoT	Be Honest Do Best ! ⊄r⊄jirogida
Status Status Network Port Gateway Edge Computing IO Fuction Cloud Service System	WQTT Gateway MQTT Gateway function supports SSL, clean session and QOS, supports connecting to the third-party MQTT served: supports up to 16 publish topics and 16 subscribe topics, supports port mapping function, which can bind each topic to a different serial port. Basic configuration Publish Subscribe
	Publish topic2
	Jinan USR IOT Technology Limited. http://www.pusr.com

Fig. 111 Add Publish topic

On MQTT.fx interface, click to enter the Subscribe Tab to enter /PubTopic1 in the topic box. Then, select a QoS level, click the Subscribe button, and the list of subscribed topics will appear on the left. The current number of subscribed topics is 0, as shown in the following figure:



WQTT.fx - 1.7.1	- 🗆 X
File Extras Help	
EMQX • 🔅 🕻	Disconnect Disconnect
Publish Subscribe Scripts Broker Status Log	
/PubTopic1 👻 Sub	cribe QoS1 QoS1 QoS2 Autoscroll Cor
/PubTopic1 0 Dump Messages Mute Unauborne	
Topics Collector (0) Scan Stop 🕵	DUB Retained

Fig. 112 Subscribe to the M100 topic

Launch serial debug assistant on PC, and open COM Port with the M100's serial default settings as below:



Fig. 113 Serial debug assistant setting

Click send button. On the MQTT.fx page, you will receive a message from the cloud that was sent from the M100. For Payload decoded by select "JSON Pretty Format Decoder" to show the message.



MQTT.fx - 1.7.1 X e Extras Help - 🔅 🖸 **P** Disconnect Publish Subscribe Scripts Broker Status Log QoS0 QoS1 /PubTopic1 - SI Oo5.2 00+ /PubTopic1 /PubTopic1 3 QoS 0 /PubTopic1 Scan Stop 😽 Topics Collector (0) 3 QoS 0 20-10-2022 11:44:57.42297 ssage" : "hello from M100 Payload decoded by JSON Pretty Fomat Decoder

Fig. 114 Receive message from M100

8.2.3. Topic distribution

In the Publish field, select Publish topic2, enter the topic, topic alias, bind to the Port1, select Qos 0, uncheck retained message. We use the /PubTopic2 as an example to describe the process. After finishing configuring the Publish topic2, please scroll down to the bottom of the page and click on "Save & Apply" button to save all the changes that you have made. All configurations take effect after a system reboot.

USR IOT Communication Expert of Industrial IoT		Be Honest Do Best! #文∣English
> Status > Network > Port Cateway	MQTT Gateway MQTT Gateway function supports SSL, clean session and QOS, supports connecting to the third-party MQTT serverit supports up to 16 publish topics and 16 subscribe topics, supports port mapping function, which can bind each topic to a different serial port.	Î
Edge Computing IO Fuction > Cloud Service > System	Basic configuration Publish Subscribe Custom mode Disable • Publish topic1	
	Transmission Mode Topic distribution Topic String /PubTopic2 Topic identification isst Binding port Pert 1. QOS QOS0 ~ Retained message	
	IO Control/Query Publish topic3 Sime&Apply	
	Jinan USR IOT Technology Limited. http://www.pusr.com	

Fig. 115 Topic distribution mode

On the MQTT.fx interface, click to enter the Subscribe Tab to enter /PubTopic2 in the topic box. Then, select a QoS level, click the Subscribe button, and the list of subscribed topics will appear on the left. The current number of subscribed topics is 0, as shown in the following figure:

User Manual



MQTT.fx - 1.7.1						3000		×
File Extras Help								
EMQX	- 0 🖸	Disconnect					-	•
Publish Subscribe Scrip	ots Broker Status Log							
/PubTopic2	- Sub	scribe		Q650 Q05	1 Qo5 2	Autoscro		0°*
/PubTopic1	1 ump Messages Mute Unsubscribe	/PubTopic1					G	3 QoS 0
/PubTopic2 De	ump Messages Mute Unsudacrites							
Topics Collector (0)	Scan Stop ot≁			Payload decoded by	JSON Pretty	Fomat De	coder	

Fig. 116 Subscribe to the M100 topic

Launch serial debug assistant on PC, and open COM Port with the M100's serial default settings as below:

COM3,115200,None,8,One - Serial Debug Assistant	0000		х
<u>∧</u> ∧ ? © [*]			ŝ
Serial Port: COM3 V » test,{"message":"hello from M100"}			
Baud Rate : 🥄 115200 🗸			
Data Bits : 8 ~			
Parity : None V			
Stop Bits : One V			
Close serial port			
Receiving settings.			
Receive and save to file			
HEX display			
Pause receiving display			
Auto break frame ? 20			
Receive scripts 🐊 Add Timesta 🗸			
Save data Empty data			
Send settings.			
Send a file Extension cmd			
HEX Send			
Sending scripts M ADD8 V test, {"message": "hello from M100"}			
Timing send			
		-	
Line break Send : 34 Receive : 0		Reset	count

Fig. 117 Serial debug assistant setting

Enter the correct serial data format: topic alias,payload-test,{"message":"hello from M100"}, Click send button. On the MQTT.fx page, you will receive a message from the cloud that was sent from the M100.



MQTT.fx - 1.7.1				<u></u>		×
File Extras Help						
EMQX	• 🗘 💽	Disconnect			-	••
Publish Subscribe	Scripts Broker Status Log					
/PubTopic1	Sub	scribe	Qo50 Qo51 Qo52	Autoscro		0%*
/PubTopic1	Dump Messages Mute Unsubscribe	/PubTopic2				6 QoS 0
/PubTopic2	Dump Messages Mute Unsubscribe					
Topics Collector (0)	Scan Stop 08-	/PubTopic2				6
		20-10-2022 15:45:04.56704112			0	QoS 0
		{ "message" : "hello from M100" }				
			Payload decoded by JSON Pret	tty Fomat De	ecoder	•

Fig. 118 Receive message from M100

8.2.4. Custom mode

In the Publish field, select Custom mode, bind to the Port1. Click on "Save & Apply" button to save all the changes that you have made. All configurations take effect after a system reboot.

USR IOT Communication Expert of Industrial IoT		Be Honest Do Best! 中文 English
Vormunication Expert of Industrial IaT Status Network Port Gateway Edge Computing IO Fuction Cloud Service System	MQTT Gateway MQTT Gateway function supports SSL, clean session and QOS, supports connecting to the third-party MQTT served! supports up to 16 publish topics and 16 subscribe topics, supports port mapping function, which can bind each topic to a different serial port. Basic configuration Publish Subscribe Custom mode Enable • Binding port Put t. Surved/kgpt	Se Honest Do Best ! ⊕t☆ rogleb
	linan HSRIOT Technology Limited http://www.pusr.com	
	Juan 05K 101 recliniology chintee. http://www.pusi.com	

Fig. 119 Custom mode

On the MQTT.fx, click to enter the Subscribe Tab to enter /PubTopic3 in the topic box. Then, select a QoS level, click the Subscribe button, and the list of subscribed topics will appear on the left. The current number of subscribed topics is 0, as shown in the following figure:



MQTT.fx - 1.7.1						12	- [×
File Extras Help									
EMQX		Disconnect						•	•
Publish Subscribe	Scripts Broker Status Log								
/PubTopic3	▼ Subs	ribe		Q45	Qo51	QoS 2	utoscroll		(v)
/PubTopic1	Dump Messages Mute Unsubscribe	/PubTopic1						Q	3 oS 0
/PubTopic2	0	/PubTopic1						Q	4 oS 0
(DubTopic2	Dump Messages Mute Unsubscribe	/PubTopic2						0	5 05 0
7-00700	Dump Messages Mute Unsubscribe								
Topics Collector (0)	Scan Stop O(*								
				Payload d	ecoded by Plain) Text Decod	er		•

Fig. 120 Subscribe to the M100 topic

Launch serial debug assistant on PC, and open COM Port with the M100's serial default settings as below:

COM3,115200,None,8,One - Serial Debug Assistant	1558		х
<u>∧</u> ∧ ? ☺ [*]			ŝ
Serial Port : COM3 V			
Baud Rate : 🦼 115200 🗸			
Data Bits : 8 ~			
Parity : None V			
Stop Bits : One V			
Close serial port			
Receiving settings.			
Receive and save to file			
HEX display			
Pause receiving display			
Auto break frame ? 20			
Receive scripts A Add Timesta 🗸			
Save data Empty data			
Send settings.			
Send a file Extension cmd			
HEX Send			
Sending scripts ADD8 V /PubTopic3,0,0N,{"message":"hello from M100"}			
Timing send 1.0 sec			
Line break \do (CRLF) Send : 0 Receive : 0		Reset	count

Fig. 121 Serial debug assistant setting

Enter the correct serial data format: topic,Qos,Retain,payload-/PubTopic3,0,ON,{"message":"hello from M100"}, Click send button. On the MQTT.fx page, you will receive a message from the cloud that was sent from the M100.



MQTT.fx - 1.7.1									×
File Extras Help									
EMQX		*	Cor	Disconnect					••
Publish Subscribe	Scripts Broke	er Status	Log						
/PubTopic3			Subsc	ribe	QoS0 QoS1	Qo5 2	Autoscro		00*
/PubTopic1	Dump Messages	Mute 🕡	nsubscribe	/PubTopic2					7 QoS 0
/PubTopic2			Ð	/PubTopic3					8 QoS 0
(BubTanie?	Dump Messages	Mute 🕐	nsubscribe						
7Fabropics	Dump Messages	Mute 🕕	nsubscribe						
				/PuhTonic3					
Topics Collector (0)		Scan Stop	00	20-10-2022 17-49-14 64154680					8
				{ 					4000
				<pre>inessage . inecto if oil M100 }</pre>					
				Pa	yload decoded by JS	ON Prett	y Fomat De	ecoder	•

Fig. 122 Receive message from M100

8.3. Subscribe to a topic

In the Subscribe field, select Subscribe topic1, enter the topic, bind to the Port1, select Qos 0. We use the /SubTopic1 as an example to describe the process. After finishing configuring the Subscribe topic1, please scroll down to the bottom of the page and click on "Save & Apply" button to save all the changes that you have made. All configurations take effect after a system reboot.

	Communication Expert of Industrial In	я	e Honest Do Best! 中文 English
Jinan USR 10T Technology Limited. http://www.pusr.com	Conversional Constraints of Conversion Conve	MQTT Gateway MQTT Gateway MQTT Gateway function supports SSL clean session and QOS, supports connecting to the third-party MQTT servecit supports up to 16 publish topics and 16 subscribe topics, supports port mapping function, which can bind each topic to a different serial port. Basic configuration Publish Subscribe Subscribe topic1 Image: Subscribe topic2 Image: Subscribe topic2 Subscribe topic2 Image: Subscribe topic2 Image: Subscribe topic2	e Honest Do Best : Inglah
		Jinan USR IOT Technology Limited. http://www.pusr.com	

Fig. 123 Add subscribe topic

On MQTT.fx interface, click to enter the Publish Tab to enter /SubTopic1 in the topic box, and enter the message of "hello world" in the message input box, select a QoS level, and click Publish to publish the message, as shown in the following figure:



MQTT.fx - 1.7.1									1 <u>000</u> 1		×
File Extras Help											
EMQX		- 0	Connect	Disconnect						•	r 🔴
Publish Subscribe	Scripts Brok	ker Status Log									
> /SubTopic1			- Publish				Q050 Q051	Qo5 2	Retaine		0°*
("message":"hello")											

Fig. 124 Publish message to M100

Click Publish to send the messages and return to the serial debug assistant. We can find that the serial port has received the message, as shown in the following figure:

COM3,115200,None,8,One - Serial Debug Assistant		0.550		х
<u>A</u> 🗠 ? 😅				ŝ
Serial Port : 🖸 COM3 🗸	{"message":"hello"}			
Baud Rate : 🥼 115200 🗸]			
Data Bits : 8 🗸				
Parity : None 🗸]			
Stop Bits : One 🗸]			
Close serial port				
Receiving settings. Receive and save to file HEX display Pause receiving display Auto break frame ? Receive scripts Add Timesta Save data Empty data Send settings. Send a file HEX Send Extension cmd				
□ Sending scripts ▲ ADD8 ✓ □ Timing send 1.0 sec □ DTR □ RTS	/PubTopic3,0,ON,{"message":"hello from M100"}			
Line break	Send : 0 Receive : 19		Reset	count

Fig. 125 Receive message from cloud



9. Edge computing

The USR-M100 supports Modbus RTU Master for retrieving field site data from serial meters. After collecting data, users can convert serial data to MQTT json format data, allowing users to get field site data. This two-in-one design reduces system complexity and the amount of space required in the network topology, as well as overall installation time. In addition, you can extend the useful life of legacy devices by connecting them to Ethernet and accessing the devices using a preferred protocol,TCP/UDP, HTTP, MQTT. First, users need to enable edge computing function.

Communication Expert of Industrial IoT		Be Honest Do Best! 中文 English
Status Status Network Ort Gateway Edge Computing IO Fuction Cloud Service System	Edge Computing Gateway Including edge acquidition, edge computing, edge reporting and other functions, supports Modbus RTU to Json, Modbus RTU to Modbus TCP and other general industrial protocol conversion. SETINE Edge Computing Data Acquidition Data Acquidition Data Query and Report Enable Edge Computing Enable Swe Next	42 [nglih
	Jinan USR IOT Technology Limited. http://www.pusr.com	

Fig. 126 Enable edge computing

9.1. Add modbus slave device

Connect serial device to the serial port of USR-M100 gateway, and then configure the slave parameter on the data acquisition tab. Click add slave to add a device, click edit to configure the device.

Communication Expert of Industrial IoT	Be	Honest Do Best! 中文 English
 Status Network Port Gateway MQIT Gateway Edge Computing IO Furction Cloud Service System 	Edge Computing Gateway Including edge exquisition, edge computing, edge reporting and other functions, supports Modbus RTU to Json, Modbus RTU to Modbus TCP and other general industrial protocol conversion. SETTING Edge Computing Data Acquisition Data Query and Report Linkage control Select edge computing profile Choose Bie Expert.	
	No. Name!! Point Source!! Slave addr!! Operations 1 device01 Point 1 Edd Delate 2 rode0102 dent16 Edd: Delate 2 rode0102 dent16 Edd: Delate Add slave 1 Edd: Delate Edd: Delate	
	Save Next Jinan USR IOT Technology Limited. http://www.pusr.com	

Fig. 127 Add a slave device



	Edge Computing Gateway			
work t	Including edge acquisition, edge computing, edge reporting and other functions, supp protocol conversion.	orts Modbus RTU to Json, Modbus RTU t	to Modbus TCP and other general industrial	
t1 t2	SETTING Edge Computing Data Acquisition Data Query and Report Linka	e control		
eway	Select edge computing profile Choose I THsee	isor Ø		
ITT Gateway	*Port UAR	1 v	last: 126 nodes	
e Computing	No Name1 Point Source1 Slave Address 1	(1~255)	ti Data trineti Operations	
Fuction	*Polling interval 100	(10~65535)ms	1. Data type: . Operations	
ud Service	1 device01 Port1		uint16 Edit Delete	
tem	Show advanced settings 🗹		uint16 Edit Delete	
	Add Enable Address mapping			
	Merge collection			
	Bave	Cancel		

Fig. 128 Polling slave device configuration

In the slave property, enter the device name, bind to the Port1, enter the slave address and polling interval, enable merge collection function, the description of the configuration parameters on this interface is shown in <u>table 14</u>. We use the temperature and humidity THsensor as an example to describe the process. After finishing configuring the slave device, please scroll down to the bottom of the page and click on "Save" button to save all the changes that you have made. All configurations take effect after a system reboot.

9.2. Add modbus data points

9.2.1. Register type and offset

Register type	Address range	Description
Coil points	00001 - 09999	Read, function code 0x1,0x5,0xF, bool values
Discrete inputs	10001 - 19999	Read only, function code 0x2, bool values
Input registers	30001 - 39999	Read only, function code 0x4, int,uint,float values
Holding registers	40001 – 49999	Read/Write, function code 0x3,0x6,0x10,int,uint,float values

Table 22 Typical Register Tables

The Modbus register addressing starts with register 0, but some device manufacturers start with the number 1 in the device documentation. In this case, the number minus 1 should give the correct register address. Offsets can be represented in different ways. Sometimes as Hex values and sometime the offset will also contain the register type. For example Offsets in the Holding Register range might start with a 4 such as 411001, in the SCADA this would be entered as 11001.

9.2.2. Raw data types and byte order

A standard Modbus Holding Register or Input Register is a 16 bit (2 Byte) value. Often this is not enough so different equipment will utilize multiple modbus registers to hold a larger value. Here is a list of Data Types supported in the M100 gateway.



Table 23 Data types	Table 23	Data types	
---------------------	----------	------------	--

Туре	Function code	Objects count	Note
Bool	1-2	1+	Bool
int8	3-4	1+	Integer 8 bit
uint8	3-4	1+	Unsigned integer 8 bit
int16	3-4	1	Integer 16 bit. Big-endian.high byte first
uint16	3-4	1	Unsigned integer 16 bit. Big-endian.
int32(ABCD)	3-4	2	Integer 32 bit. Big-endian.
int32(CDAB)	3-4	2	Integer 32 bit. Little-Endian byte swap
uint32(ABCD)	3-4	2	Unsigned integer 32 bit. Big-endian.
uint32(CDAB)	3-4	2	Unsigned integer 32 bit. Little-Endian byte swap.
float32(ABCD)	3-4	2	Float 32 bit. Big-endian.
float32(CDAB)	3-4	2	Float 32 bit. Little-Endian byte swap.
float64	3-4	4	Float 64 bit.

Note that these could be referred to in different ways. for example a 4 Byte Signed Integer might be referred to as a 32 bit Integer in equipment documentation. For binary values we also need to know what "bit" of the register to look at for the binary value. For this reason a single 16 bit modbus register could represent up to 16 individual binary data points. Sometimes the Data Type is inferred by listing the number of registers. For example 2 registers might mean a 4 byte value.

9.2.3. Data points configuration

First select the slave device, click add nodes to add a data point, click edit to configure the data point, click delete to delete a data point.







Communication Expert of Industrial IoT					Be Honest Do Best! 中文 English
Status Network Port Uart1	Edge Computing Gateway Including edge acquisition, edge computing, ec protocol conversion. SETTING	dge reporting and other function	ns, supports Modbus RTU to Json, Modbus I	RTU to Modbus TCP and other general industrial	
Uart2' Websocket Cateway MQTT Gateway Edge Computing IO Fuction Cloud Service System	Edge Computing Data Actualization Gelect edge computing profile Choose 1 No. Name11 Point Source11 1 THeresor Port1 Add	Data Query and Report "Node name "Function code "Register address "Data type "Timeout Reporting on change Show advanced settings Enable Address mapping Calculation formula	Linkape control immerature 03 0 (0-65534) uint16 200 (10-65535)ms Save Cancel	last: 126 nodes 11 Data type11 Operations uint16 Edit Delete uint16 Edit Delete ootes	



In the data point property, enter the node name, select modbus function code, enter the register address and response timeout, select the right data type, input the calculation formula, the description of the configuration parameters on this interface is shown in <u>table 15</u>. We use the temperature and humidity data points as an example to describe the process. After finishing configuring the data points, please scroll down to the bottom of the page and click on "Save" button to save all the changes that you have made. All configurations take effect after a system reboot.

Communication Expert of Industrial IoT		Be Honest Do Best! 中文 English
Status Network Port Uart1 Uart2 Websocket Gateway Edge Computing IO Fuction Cloud Service System	Edge Computing Gateway Including adge acquidition, edge computing, edge reporting and other functions, supports Modbus RTU to Joon, Modbus RTU to Modbus TCP and other general industrial protocol conversion. SETTINC Edge Computing Data Acquidition Data Acquidition Data Acquidition Index edge computing profile Data Acquidition Select edge computing profile Data Acquidition No. Name!! Point Source?! Slave addf?! Add slave 1 Edge Computing Add slave	
	Save Nod	
	Jinan USR IOF Technology Limited. http://www.pusr.com	

Fig. 131 Sensor register reading

After the correct slave and data points configuration, the modbus polling command will print on the corresponding serial port regularly, as shown in Fig.132.



COM3,115200,None,8,One - Serial Debug Assistant	-		×
<u>∧</u> № ? © [*]			ŝ
Serial Port: G COM3 V 01 03 00 01 00 01 D5 CA			
Baud Bate: 01 03 00 00 01 84 0A			
01 03 00 01 05 CA			
Data Bits: 8 01 03 00 00 01 84 0A			
Parity: None V 01 03 00 01 00 01 D5 CA			
Close serial port 01 03 00 01 00 01 D5 CA			
01 03 00 00 01 84 0A			
Receiving settings. 01 03 00 01 00 01 D5 CA			
Receive and save to file 01 03 00 00 01 84 0A			
HEX display 01 03 00 01 00 01 D5 CA			
Pause receiving display 01 03 00 00 01 84 0A			
Receive scripts Add Timesta V Add Timesta V A			
Save data Empty data 01 03 00 01 04 01 D5 CA			
Send settings.			
Send a file Extension cmd			
HEX Send			
Sending scripts 🐊 ADD8 🗸			
Timing send 1.0 sec			
Line break Ido (CRLE) Send : 0 Receive : 160		Reset	count

Fig. 132 Modbus polling command

9.3. Export and import configuration

There are three main reasons for using the Import and Export functions.

- Applying the same configuration to multiple units. The Import/Export configuration function is a convenient way to apply the same settings to units located in different sites. You can export the configuration as a file and then import the configuration file onto other units at any time.
- Backing up configurations for system recovery. The export function allows you to export configuration files that can be imported onto other gateways to restore malfunctioning systems within minutes.
- ✤ Troubleshooting. Exported configuration files can help administrators to identify system problems that provide useful information for Technical Service Team when maintenance visits are requested.

The export function saves all the configuration settings and parameters of the data acquisition in a *.csv file. To begin, click the Export button.



🔗 USR IOT Communication Expert of Industrial IoT	E
	ustrial
Edge Computing last: 12	126 nodes
> Cloud Service No. Name! Point Source! Slave addr! Operations No. Name! Register address! Data type! Oper	erations
> System 1 Theensor Port1 1 Edd Delete 1 temperature 40001 uln116 Edd	Delete
2 humidity 40002 ulm16 Edit	Delete
Ad nodes Save Net	





Fig. 134 Configuration file

Once the file is saved, it can be imported into your target unit to duplicate the same settings. Select the target unit first and click the choose file button to import. Select the file you want to import, and then click the open button. The data points setting will display on the webpage. After finishing importing the configuration file, please scroll down to the bottom of the page and click on "Save" button to save all the changes that you have made. All configurations take effect after a system reboot.



status	Edge Computing Gateway		
Port	Including edge acquisition, edge computing, edge reporting and other functions, supports Modbus RTU to Json, Modbus RTU to Modbu protocol conversion.	is TCP and other general industrial	
Uart1	SETTING		
Uart2 Websocket	Edge Computing Data Acquisition Data Query and Report Linkage control		_
Gateway			
MQTT Gateway	Select edge computing profile Choose file Export		
Edge Computing		last: 126 node	•5 ⁰
IO Fuction	No. Name!↓ Point Source!↓ Slave addr!↓ Operations No. Name!↓ Register address!↓	Data type	
Sustem	1 Telephone Part 1 Part 1 temperature 4001	uist16	
5) 50011	Call Delete	Edit Delete	
	2 humidity 40002	uint16 Edit Delete	
	Add slave		
	Add nod	es	
	Save		

Fig. 135 Import the configuration file

9.4. Data report

9.4.1. Communication channel

Users can select TCP/UDP/HTTP in socketA of each serial port, MQTT Gateway, or AWS IOT service as the communication channel. When select MQTT or AWS IOT channel, user need configure the MQTT broker parameters in MQTT Gateway tab or Cloud service tab at first, and setting the report topic in the Fig.137.

USR IOT Communication Expert of Industrial Ic	π	Be Honest Do Best! 中文 English
 Status Network Port Gateway Edge Computing IO Fuction Cloud Service System 	Edge Computing Gateway Including edge acquisition, edge reporting and other functions, supports Modbus RTU to Ison, Modbus RTU to Modbus TCP and other general industrial protocol convension. STTINE Edge Computing Data Acquisition Outa channel Outa Query/Set Data Query/Set Data Query/Set Data Query/Set Data Query/Set Data Report of nocles Report Agreement	
	Jinan USR IOT Technology Limited. http://www.pusr.com	

Fig. 136 Communication channel select



USR IOT Communication Expert of Industrial IoT			Be Honest Do Best 中文 Engli
> Status	Data channel		
> Network	Channel select	MQTT ~	
> Port	Data Query/Set		
MQTT Gateway	Data Query	Disable ~	
Edge Computing	Data Set	Disable ~	
IO Fuction	Data Report of nodes		_
Cloud Service System	Reporting method	Enable	
	Report Topic	/UploadTopic	
	QOS	QOS0 v	
	Periodic reporting		
	Reporting on regular	Gstart NTP First)	
	Failure Padding		
	Quotation Mark		
	Report Agreement		
	Json template	[Current" rede0101", "Votage" node0102] // © (<2048 bytes)	
		Save Ned	
	,	nan USR IOT Technology Limited. http://www.pusr.com	

Fig. 137 MQTT data report setting

9.4.2. Report method

There are three ways to report the data acquired to the communication channel: on change, interval, timer. The description of the configuration parameters on this interface is shown in table 16. After finishing parameter setting, please click on "Save" button to save all the changes that you have made. All configurations take effect after a system reboot.

Communication Expert of Industrial IoT		Be Honest Do Best! 中文∣English
Status Network Port Gateway MQTT Gateway Edge Computing	Edge Computing Gateway Including edge acculation, edge computing, edge reporting and other functions, supports Modbus RTU to Json, Modbus RTU to Modbus TCP and other general industrial protocol conversion. SETTING Edge Computing Data Acquisition Data Query and Report Unkage control	Ĵ Į
IO Fuction Cloud Service System	Select edge computing gridill Choose No. Name! Point Source!! *Function code *Begister address 0 *Begister address *Begister address <th></th>	

Fig. 138 Report on change



USR IOT Communication Expert of Industrial IoT			Be Honest Do Best 中文 Englis
> Status	Data channel		
> Network	Channel select MQTT	~ @	
✓ Gateway	Data Query/Set		
MQTT Gateway	Data Query Disable	~	
Edge Computing	Data Set Disable		
Cloud Service	Data Report of nodes		
> System	Reporting method Enable	v	
	Report Topic //UploadTopic		
	QOS QOS0	~	
	Periodic reporting 🛛 🗹		
	Reporting interval 5	(1~36000)s	
	Reporting on regular 🛛 (Start NTP first)		
	Regular time Reporting at fixed t Reporting each hour	ime v 00 : 00 @	
	Failure Padding Reporting every quai Reporting every mini Reporting at fixed tin	ter de he	
	Quotation Mark		
	Report Agreement		
	Json template {Current "node0101 node0102"}	√Voltage* ∕∕ ❷ (<2048 bytes)	

Fig. 139 Interval and timer report

9.4.3. Payload-Json template

A JSON object contains zero, one, or more key-value pairs, also called properties. The object is surrounded by curly braces {}. Every key-value pair is separated by a comma. The order of the key-value pair is irrelevant.

A JSON array contains zero, one, or more ordered elements, separated by a comma. The JSON array is surrounded by square brackets [].

A key-value pair consists of a key and a value, separated by a colon (:). The key is a string, which identifies the key-value pair. The value can be any of the following data types: string(surrounded by quotation marks (" ")),number,float,array(JSON array),object(JSON object (can be nested)),boolean(true or false),empty.

Example 1

{

```
"THsensor1": {
```

```
"temperature": "temperature",
```

```
"humidity": "humidity"
```

```
},
```

```
"LUXsensor1": {
```

"illumination": "illumination"

```
},
```

"time": "sys_net_time"

```
}
```

```
Example 2
```

{

```
"service":[{
```

```
"sensor1": {
```

```
"temperature": "temperature1",
```

```
"humidity": "humidity1",
```

```
"user_define": "bedroom"
```



}, "sensor2": { "tomporat

```
"device_id":"sys_mac"
```

}

We can use a tool to compact it. Below is a free online tool: <u>https://jsonformatter.org/</u>. Paste the message in the column on the left and then, click Minify JSON. It will show a compact JSON format message in the column on the right. Click Copy to Clipboard.



Fig. 140 Json formatter

Paste the message in the Json template on the page and click on "Save&Apply" button to save all the changes that you have made. All configurations take effect after a system reboot.

USR IOT Communication Expert of Industrial IoT		Be Honest Do Best! 中文 English
Edge Computing Data A	cquisition Data Query and Report Linkage control	-
Network Data channel		
> Port Channel select	MOTT v	
✓ Gateway NOT Communication		
Edge Computing		
IO Fuction Data Query	Disable	
Cloud Service	Disable v	
> System Data Report of nodes		
Reporting method	Enable	
Report Topic	/UploadTopic	
QOS	QOS0 Y	
Periodic reporting		
Reporting on regular	(Start NTP first)	
Failure Padding		
Quotation Mark		
Report Agreement		
Json template	("Thsensort": (Temperature" "Temperature": humidity" "humidity"). LUXsens 🖌 🚇 (<2040 bytes)	
	Save Next	
	Jinan USR IOT Technology Limited. http://www.pusr.com	



Fig. 141 Json template setting

There are three type data point, user define, system, and register value in a Json template.

♦ System data points

The system data points defined by USR-M100 gateway is shown in table 24.

System data points	Description
sys_sn	SN number
sys_mac	MAC address
sys_ver	Software version
sys_time	GMT time
sys_unix_time	Unix time

Fable 24	System data	points
		1

♦ Modbus register value data points

The node name configured in the section 9.2.3 is register value data points.

♦ User define

In addition to the above two types of data points, users can also define your own data points. Such as "user_define": "living room".

9.4.4. Test

We now use modbus slave software to simulate two modbus slave device. The connection and and parameters settings are show in Fig.142. USB to RS485 converters are connecting PC with serial UART1 of USR-M100 gateway. We use MQTT.fx to connect to the same broker and subscribe the report topic of USR-M100, we can see the message transmitted at the specified interval.

Communication Expert of Industrial IoT				Be Honest Do Best 中文 Engl
VISR IOT Communication Expert of Industrial IoT > Status > Network Vart Uart1 Uart2 Websocket > Gateway > Cloud Service > System	UART TO NET Data transmission parameter com SETTING Port Socket Data bits Parity Stop bits	figuration 115200 8 None 1	(600-230400)bps bit	Be Honest Do Best dix [Gog
	Flow ctrl	NONE	(0-1460)huter	
	UART Packet Length UART Packet Time Sync Baudrate(RFC2217) Enable Uart Heartbeat	0 0N	ио-темодиуния (0-255)ms Ф	
			Save&Apply	

Fig. 142 Serial port parameters



ile Edit Connection Setup Display Vie	w Window Help
Mbsiave1 D = 1: F = 03 No connection 0 273 1 67 2 6 6 6 7 8 9 9	Connection Setup Connection Port1 Setial Port Cancel USB Setial Port USB Setial Port IS200 Baud @ RTU \ ASCII Rew Control None Patty DSR CTS RTS Toggle IStop Bit TCP/IP Server PAddress Port IT2216.14.15 ISCO IPV4 Ignore Unit ID IPV6
r Help, press F1	Port 3: 115200-8-N-1

Fig. 143 Modbus slave simulation

 stats ktock vor urd urd urd velocket velocket<th>Communication Expert of Industrial IoT</th><th>Be Honest Do Best 41⊄ [rogid</th>	Communication Expert of Industrial IoT	Be Honest Do Best 41⊄ [rogid
System	Status Network Port Uart1 Uart2 Websocket Gateway MQTT Gateway Edge Computing IO Fuction Chart Service IOF Fuction Chart Service	Edge Computing Gateway Including edge acquisition, edge computing, edge reporting and other functions, supports Modbus RTU to Json, Modbus RTU to Modbus TCP and other general industrial protocol conversion. SETTING Edge Computing Data Acquisition Data Acquisition Data Query and Report Linkage control Select edge computing profile Choces lie Export
	> System	1 THumor Port1 1 Example added 2 LUXeenor Port1 2 Exit Delete Add same Add same Note

Fig. 144 Data acquisition setting



USR IOT Communication Expert of Industrial IoT
Data channel
Network Channel select MQTT
v Port Data Query/Set
Uart1
Uart2 Uata Query Disable ~
Websocket Data Set Disable ~
Cateway Data Report of nodes
MQTT Gateway
Edge Computing
IO Fuction Report Topic //UploadTopic
Cloud Service QOS QOS0 ~
System Periodic reporting 💟
Reporting Interval 5 (1=36/00)s
Reporting on regular
railure Padoing
Quotation Mark
Report Agreement
Joon template THisensort: 'Tamperature'' amperature'' ' O (<2048 bytes)
Save Next



MQTT.fx - 1.7.1			<u> </u>		×
File Extras Help					
EMQX	- 🔅 😋	Disconnect			• •
Publish Subscribe	Scripts Broker Status Log				
/UploadTopic	Subsc	ribe	Qo50 Qo51 Qo52 Au	toscroll	00*
/UploadTopic	Dump Messages Mute Unsubscribe	/UploadTopic		Retained	1 QoS 0
		/UploadTopic		1	2 QoS 0
		/UploadTopic			3 QoS 0
		/UploadTopic			4
Topics Collector (0)	Scan Stop 08-	/UploadTopic			4
		07-01-2023 16:57:41.61061169			QoS 0
		{ "THsensor1" : { "temperature : 27.3, "humidity" : 18.6 }, "LUX1" : { "LUX1" : { "tumination" : 123 } }			
			Payload decoded by JSON Pretty Fom	at Decoder	•

Fig. 146 Message reported

9.5. Data query

There are three methods to actively query the data collected through the serial port from the communication channel: Json format, Modbus TCP, Modbus RTU. Firstly, user need enable the data query function. We can query data by Json format in MQTT or HTTP channel,and via modbus TCP or RTU format in TCP/UDP mode.

9.5.1. Json

When select MQTT or AWS IOT channel, user need configure the MQTT broker parameters in MQTT Gateway tab or Cloud service tab at first, select Json query mode and setting the query topic in the Fig.147. In actual application, respond topic should be different from report topic.



Communication Expert of Industrial IoT				Be Honest Do Best! 中文 English
> Status	Edge Computing Data Acc	uisition Data Query and Repor	Linkage control	-
> Network	Data desced			č
> Port	Data channel			
✓ Gateway	Channel select	MQTT ~ 🔍		
MQTT Gateway	Data Query/Set			
Edge Computing	Data Ouerr	Cashie		
IO Fuction	Data Query	Euspie		
> Cloud Service	Data Set	Disable ~		
> System	Query or Set type	Json ~		
	Query or Set Topic	/DownloadTopic		
	QOS	Q050 ~		
	Respond Topic	/RespondTopic		
	QOS	Q050 ~		
	Data Report of nodes			
	Reporting method	Disable ~		
	Report Agreement			
			Save Next	
	ii	nan USR IOT Technology Limiter	. http://www.pusr.com	

Fig. 147 JSON query type

The Json content need conform to template described in section 9.4.3.

WQTT.fx - 1.7.1		– 🗆 ×
File Extras Help		
EMQX • 🗘	Connect Disconnect	₽ ●
Publish Subscribe Scripts Broker Status Log		
> /DownloadTopic	Publish	QoSO QoS1 QoS2 Retained OST

Fig. 148 Json query message



MQTT.fx - 1.7.1 X File Extras Help - 🔅 💽 dt Disconnect -Publish Subscribe Scripts Broker Status Log Qo50 Qo51 Qo52 00+ /RespondTopic -/RespondTopic Ð 1 QoS 0 /RespondTopic /RespondTopic Scan Stop 😽 Topics Collector (0) 1 14-01-2023 16:25:28.5912837 QoS 0 mperature" : 27.6, midity" : 43.7 Payload decoded by JSON Pretty Fomat Decoder

Fig. 149 Json response message

9.5.2. Modbus slave address and register mapping

This function is very useful in data query and only used in modbus TCP/RTU query mode. When user select Modbus TCP/RTU query mode to get data, the M100 gateway will be confused if there are the same slave address in different serial port or same register address in different slave devices. All slave devices and registers on a gateway are planned and managed in a unified manner. For example, user can map slave address 1 in Port1 to slave 1 in M100 gateway, map slave address 1 in Port2 to slave 2 in M100 gateway.

Communication Expert of Industrial IoT	Be Honest Do Best ! नगर/[mglish
 Status Network Port Gateway MQT Gateway Edge Computing IO Fuction Cloud Service System 	Edge Computing Gateway Including edge acquisition, edge computing, edge reporting and other functions, supports Modbus RTU to Json, Modbus RTU to Modbus TCP and other general industrial protocol conversion. SETTING Edge Computing Data Acquisition Data Query and Report Linkage control Sediet edge computing profile Choose Bite Export. Sediet edge computing profile Choose Bite Export. No. Name[1 Register address[1 Data type]1 Operations 1 tomperatures 2 4001 unit for Several
-	2 LUXeesor Port1 2 Edit Dielen 3 Themson2 Port2 1 Edit Dielen Add slave Save Kest
	Jinan Osk för recimology Linnes. Intp://www.post.com

Fig. 150 Same slave ID and register address

99

User Manual



Communication Expert of Industrial IoT		Be Honest Do Best! 中文 English
 Status Network Port Gateway Edge Computing IO Fuction Cloud Service System 	Edge Computing Gateway Including edge acquisition, edge computing, edge reporting and other functions, supports Modbus RTU to Json, Modbus RTU to Modbus TCP and other general industria protocol conversion. SETTING Edge Computing Data Acquisition Data Query and Report Linkage control Select edge computing profile Choose 4Port UART2 Last: 123 m	r codes@
	No. Name11 Point Source11 1 T14aencor Point1 2 LUXannor Point1 3 T14aencor Point2 Add Marge collection Cancel	ni Alle
	Jinan USR IOT Technology Limited. http://www.pusr.com	





9.5.3. Modbus TCP

When select socket channel, user need configure parameters of the socket A of Uart1 in PORT tab at first, then select Modbus TCP query type. We use slave address mapping and register mapping described in section 9.5.2 as here for illustration.



Communication Expert of Industrial IoT				Be Honest I
Status Network Port Gateway	Edge Computing Gateway Including edge acquisition, edge protocol conversion.	computing, edge report	ting and other functions, supports Modbus RTU to Json, Modbus RTU to Modbus TCP and other general industrial	
MQTT Gateway Edge Computing IO Fuction	Edge Computing Data Acc	quisition Data Qu	uery and Report Linkage control	_
Cloud ServiceSystem	Data channel Channel select	Socket1	~ 0	
	Data Query/Set Data Query	Enable	v	
	Data Set Query or Set type	Disable ModbusTCP	v	
	Data Report of nodes	Distric		
	Report Agreement	UISADIO	v	
			Save Next	



Communication Expert of Industr	lioT Be	Honest Do Best! 中文 English
Status Status Network Port Uart1	UART TO NET Data transmission parameter configuration SETTING	
Uart2 Websocket > Gateway	Port Socket SOCKET A	
> Cloud Service > System	Working Mode TCP Sarver None Maximum Sockets supported 8 Exceeding Maximum KICK Local Port Number 502 (1-65535)	
	PRINT OFF Modbus Poll Response Timeout 200 (10-9999)ms	
	Operating Mode None -	
	Jinan USR IOT Technology Limited. http://www.pusr.com	

Fig. 154 Socket A parameters setting





<mark>ងរ</mark> ្ហ Modbus P	oll - Mbpoll2																		-		×
<u>File Edit Co</u>	onnection <u>S</u> etup	Functions		isplay <u>V</u> iew	Wind	low	Hel	р													
🗅 🗳 🔒 🍯	X □ 県	à л 0	5 0	6 15 16 17 2	22 2	3 T	C	1 8	} \ ?												
Mbpoll1																		8			
$T_{\rm Y} = 29$ Fr	= 0: ID = 3: E =	03: SR =	100)0me																	
1 - 20. En	- 0.10 - 0.1 -	00.011-	100	501113																	
	Alias	00000		Mbpoll2																	-
	- Alido	00000	Tx	= 31: Err = 0:	ID =	1: F	= 0	3: SI	R = 1	1000)ms	1									
			_						_												
1				Alia	as			0000	D												
2		26	0					2	7												
3	į.	45						4	2												
4					-																
5			2	I Communit		. т.,	cc .														~
			3	Communi	cauo	1112	HIC														~~
0			4	Exit		Stop			Clear		1	Save			Сору		Log	Stop	p on Error	Time s	tamp
7			5	Tx:076-03	4B	00	00	00	06	01	03	00	00	00	02						
8			6	Rx:077-03	4B	00	00	00	07	01	03	04	00	1B	00	2B					
9			7	Tx:078-03	4C	00	00	00	06	03	03	00	02	00	02						
			1	Rx:079-03	40	00	00	00	07	03	03	04	00	1A	00	2D					
			8	Bx:081-03	4D	00	00	00	07	01	03	04	00	1B	00	2B					
			9	Tx:082-03	4E	00	00	00	06	03	03	00	02	00	02	2.0					
				Rx:083-03	4E	00	00	00	07	03	03	04	00	1A	00	2D					
				Tx:084-03	4F	00	00	00	06	01	03	00	00	00	02	-					
				Rx:085-03	4F	00	00	00	07	01	03	04	00	1B	00	2B					
				Rx:087-03	50	00	00	00	07	03	03	04	00	1A	00	2D					
				Tx:088-03	51	00	00	00	06	01	03	00	00	00	02						
For Help, pres	s F1.			Rx:089-03	51	00	00	00	07	01	03	04	00	1в	00	2B					~

Fig. 156 Modbus TCP response

9.5.4. Modbus RTU

When select socket channel, user need configure parameters of the socket A of Uart1 in PORT tab at first, then select Modbus RTU query type. We use slave address mapping here for illustration.



Communication Expert of Industrial IoT		Be Honest Do Bes 中文 En
Status Status Network Port Gateway MQIT Gateway	sputing Gateway ge acquisition, edge computing, edge reporting and other functions, supports Modbus RTU to Json, Modbus RTU to Modbus TCP and other general industrial wersion.	
Edge Computing Edge Compute IO Fuction	uting Data Acquisition Data Query and Report Linkage control	- 1
Cloud Service Data channe System	nel	
Data Query	Channel select Sockatt v V	l.
	Data Guery Enable ~	
	Query or Set type ModbusRTU v	
Data Report	Reporting method Disable ~	
Report Agre	reement	l .
	Save	



File Edit Connection Setup Functions Display View Window Help Image: Connection Setup Image: Connection	ងរ៉ូ Modbus Poll - Mbpoll2			<u> </u>		\times
Image: Construction Image: Construction Alias 00000 Alias 00000 Image: Construction Image: Construction Image: Construction	File Edit Connection Setup Functions	Display View Window Help				
Tx = 81402: Err = 586: ID = 3: F = 03: S Connection Alias 00000 Alias 00000 I Image: Connection I Image: Connection Image: Connection Image:	🗅 😂 🖬 🎒 🗙 🗂 🗒 🏚 💷 05	06 15 16 17 22 23 TC 🖭 🤋 🎌				
0 Image: Construction of the fill	Mbpoli1 Tx = 81402: Err = 586: ID = 3: F = 03: S No connection Alias	Connection Setup Connection				
3 45 4 5 6 7 8 9 12100 Baud B Data bits Pesponse Timeout 200 [ms] Delay Between Polls 500 [ms] Remote Modbus Server IP Address or Node Name 17216:14.73 Server Port Connect Timeout 502 3000 [ms]		Serial Settings USB Serial Port (COM3)	Cancel			_
7 8 9 Image: Construction of the second seco	3 45 4 - 5 - 6 -	115200 Baud V 8 Data bits V None Parity V	ASCII Response Timeout 200 [ms] Delay Between Polls 500 [ms]			
Server Port Connect Timeout	7 8 9 -	Remote Modbus Server IP Address or Node Name 172.16.14.73	[]			
	Ľ	Server Port Connect Timeout 502 3000 [ms]	● IPv4 ○ IPv6		_	
For Help, press F1. [172.16.14.73]: 502	For Help, press F1.		[172.16.14.73]: 502			

Fig. 158 Modbus RTU simulator settings



む Modbus Poll - Mbpoll2 File Edit Connection Setup Functions D	Display View Win	ndow Help	– 🗆 X
□ 📽 🖬 🎒 🗙 🗂 🗏 🏩 л. 05 0	6 15 16 17 22 2	23 TC 🔄 🦹 👯	
∭ Mbpoll1 [Tx = 81415: Err = 586: ID = 3: F = 03: SR	R = 1000ms		
Alias 00000 0 Tx	Mbpoll2 = 81418: Err = 58	36: ID = 1: F = 03: SR = 1000ms	
1 2 3 45 1	Alias	00000 27 43	
4 2 5 3 6 4	Communicatio	on Traffic Stop Clear Save	Copy Log Stop on Error Time stamp
7 8 9 7 6 7 7	Tx:324424-01 Rx:324425-01 Tx:324426-03 Rx:324427-03	1 03 00 00 02 C4 0B 1 03 04 00 1B 00 2B CA 2F 3 03 00 02 00 02 64 29 3 03 04 00 1A 00 2D 38 25	3 9
8	Tx: 324428-01 Rx: 324429-01 Tx: 324430-03 Rx: 324431-03	1 03 00 00 02 C4 0B 1 03 04 00 1B 00 2B CA 2B 3 03 00 02 00 02 64 29 3 03 04 00 1A 00 2D 38 25 4 02 04 00 1A 00 2D 38 25	3
	Tx: 324432-01 Rx: 324433-01 Tx: 324434-03 Rx: 324435-03 Tx: 324436-01	1 03 04 00 1B 00 2B CA 0B 1 03 04 00 1B 00 2B CA 2F 3 03 00 02 00 02 64 29 3 03 04 00 1A 00 2D 38 29 1 03 00 00 00 02 C4 0B	3
For Help, press F1.	Rx:324437-01	1 03 04 00 1B 00 2B CA 2B	3 v

Fig. 159 Modbus RTU response



10. IO channels

USR-M100 can support a number of Digital Input (DI), Relays (Rly), Analog Input (AI) ports. All modules are equipped with an in-built web server, which allows for showing the module status and changing the configuration. To access the web server, open the browser and enter the IP address of the module, default address for a new module (default IP address is 192.168.0.7). Please use the following credentials:

Username:admin Password:admin (by default).

There are three methods to actively query the IO status from the communication channel: Modbus TCP, Modbus RTU and MQTT modbus RTU. We can query IO status by modbus RTU format in MQTT or HTTP channel, and via modbus TCP or RTU format in TCP/UDP mode.

10.1. IO function

10.1.1. Web interface

This page allows for entering the configuration parameters and showing the actual value of the inputs and outputs. To open this page, please navigate to IO Function tab.

Communication Expert of Industrial IoT		Be Honest Do Best! 中文 English
Status Network Port Gateway MQTT Gateway Edge Computing US textine	IO Function IO Device Function Config and Status Configuration IO Control ID Function	
 Cloud Service System 	Do1 D02 D1 Status	
	DI1 DI2 O O	_
	Alf(uA) Al2(uA) 0 0	-
	Save&Apply Jinan USR IOT Technology Limited, http://www.pusr.com	
	······································	

Fig. 160 IO status

Because the I/O status of USR-M100 is mainly displayed via Modbus protocol, the user has to configure the Modbus settings. Fig.161 shows the Modbus Slave ID that must be set for the Modbus protocol. Please refer to section 2.3.3 for details.



USR IOT Communication Expert of Industrial IoT					Be Honest Do Bes 中文 6	t ! nglish
IO Control IO Function						^
> Status						
Slave Address	100	(1~;	255)			
Cateway Register	Register Type	Register Address	Function Code			
MOTT Gateway	DO	00001~00002	0x01,0x05,0x0	F		
Edge Computing	DI	10001~10002	0x02			
IO Fuction	AI	30001~30004	0x04			
> Cloud Service						
> System Timing Function						
limert Enable	Disable	✓ (Start	t NTP or Time Synchro	inization first)		
Timer2 Enable	Disable	✓ (Start)	t NTP or Time Synchro	inization first)		
Timer3 Enable	Disable	∽ (Start	t NTP or Time Synchro	inization first)		
Timer4 Enable	Disable	✓ (Start)	t NTP or Time Synchro	inization first)		
Track Fachio	21.11					
Limers Enable	Disable	✓ (Start	t NTP or Time Synchro	nization first)		
Timer6 Enable	Disable	✓ (Start	t NTP or Time Synchro	inization first)		
DO Function						
Restart Hold	Disable	~				
DO Action Config	Execute IO	Execute Action		Execute Time		
	DO1	No Action	_	1		
				(1~65535s)		
	000	1.0	10	(*)		v

Fig. 161 IO configuration

10.2. Modbus TCP query/control

We choose socket A of Uart1 as the communication channel as an example to illustrate it. User can also choose socket B and other Uart port.

Communication Expert of Industri	B	e Honest Do Best! 中文 English					
 > Status > Network > Port Uart1 Uart2 Websocket > Gateway Edge Computing IO Fuction > Cloud Service > System 	UART TO NET Data transmission parameter configuration SETTINC Tot Socket SOCKET A Working Mode TOP Server Name Working Mode TOP Server Name Maximum Sockets supported B Local Fort Number 92 PRINT OFF Working Mode Print OFF Coperating Mode Nome Socket B Coperating Mode Nome Supported Supported Supported Supported BaseDone Timeout 280 (1-05539) Fint Off Supported Supported Supported Supported Supported BaseDone Timeout 280 (1-05539) Fint Operating Mode Nome Supported Supported Supported Supported BaseDone Timeout 280 (1-05539) Fint Operating Mode Nome Supported Supported Supported Supported Supported BaseDone Timeout 280 (1-05539) Supported Supported Supported Supported Supported Supported BaseDone Timeout 280 (1-05539) Supported Supported Supported Supported Supported Supported BaseDone Timeout 280 Supported						
Jinan USR IDT Technology Limited. http://www.pusr.com							

Fig. 162 Socket setting for modbus TCP



File Edit Connection Display View Window Help Image:	¥,	Modbus Poll - Mbp	oll1				1411	×
Image: Contraction Image: Contraction <th>File</th> <th>e Edit Connection</th> <th>Setup Functions</th> <th>Display View Window Help</th> <th></th> <th></th> <th></th> <th></th>	File	e Edit Connection	Setup Functions	Display View Window Help				
Image: Connection Setup Alias 00000 1 0 2 0 3 0 4 0 5 0 6 15200 Baud 9 0 1 0 2 0 3 0 4 0 5 0 6 0 7 0 8 0 9 0 12:16:14.73 Server Port Connect Timeout 19:19:40 0 10:2 3000 10:19:6 10:19:6	l E) 🖻 🖬 🚭 🗙 🛙	「二見 眞 几 05	06 15 16 17 22 23 TC 🖭 🤋 🎌				
For Help, press F1. [172.16.14.73]: 502		Abpoll1 x = 25: Err = 0: ID = o connection Alias 0 1 2 3 4 5 6 7 8 9	= 100: F = 02: SR =	Connection Modbus TCP/IP Serial Settings USB Serial Port (COM3) 115200 Baud 8 Data bits None Parity 1 Stop Bit Advanced Remote Modbus Server IP Address or Node Name 172,16,14,73 Server Port 502 3000 [ms]	OK Cancel Mode RTU ASCII Response Timeout 200 [ms] Delay Between Polls 500 [ms]			
	For	Help, press F1.			[172.16.14.73]: 5	502		

Fig. 163 Modbus TCP simulator settings

10.2.1. DI status query

합 Modbus Poll - Mbpoll1		<u> </u>	X
File Edit Connection Setup Functions D	splay View Window Help		
🗋 🖆 🖨 🌂 🗂 🖳 🏩 л. 05 0	6 15 16 17 22 23 TC 🖳 🛿 🛠		
Mbpoll1			
Tx = 30: Err = 0: ID = 100: F = 02: SR = 1	Read/Write Definition X		
Alias 00000			
0 1			
1 0	Function: 02 Read Discrete Inputs (1x) Cancel		
2	Address: 0 Protocol address. E.g. 10011 -> 10		
3	Quantity: 2		
4	Scan Rate: 1000 [ms] Apply		
5	Disable		
6	Read/Write Disabled		
7			
8	View		
9	● 10 ○ 20 ○ 50 ○ 100 ○ Fit to Quantity ✓		
	Hide Alias Columns PLC Addresses (Base 1)		
	Address in Cell		
For Help, press F1.	[172.16.14.73]: 502		.1

Fig. 164 Slave ID and register address


Modbus Poll - Mbpoll	1												— >
ile Edit Connection S	Setup Functio	ons Display	liew	Windo	w H	elp							
D 📽 🖬 🎒 🗙 🗂	見直し	05 06 15 16	17	22 23	ТС	[]	8	?					
💬 Mbpoll1													
Tx = 1073: Err = 0: ID =	= 100: F = 02	2: SR = 1000m	IS										
Alias	00000												^
0	1												
1	0												
2		511											
2		Communic	ation	Traffic									×
<u> </u>					-		- 12	-		-	_		
4		Exit	S	top		Clear		8	Save			Сору	Log Stop on Error Time stamp
5		Tx:024-04	52 (00 00	00	06	64	02	00	00	00	02	^
6		Rx:025-04	52 (00 00	00	04	64	02	01	01			
		Tx:026-04	53 (00 00	00	06	64	02	00	00	00	02	A Contraction of the second
7		Rx:027-04	53 (00 00	00	04	64	02	01	01			
8		Tx:028-04	54 (00 00	00	06	64	02	00	00	00	02	
		Rx:029-04	54 (00 00	00	04	64	02	01	01			
91		Tx:030-04	55 (00 00	00	06	64	02	00	00	00	02	
		Rx:031-04	55 (00 00	00	04	64	02	01	01			
		Tx:032-04	56 (00 00	00	06	64	02	00	00	00	02	1
		Rx:033-04	56 (00 00	00	04	64	02	01	01			
		Tx:034-04	57 (00 00	00	06	64	02	00	00	00	02	l de la companya de la
		Rx:035-04	57 (00 00	00	04	64	02	01	01			
		Tx:036-04	58 (00 00	00	06	64	02	00	00	00	02	
		Rx:037-04	58 (00 00	00	04	64	02	01	01			¥
r Help, press F1.													[172,16.14.73]; 502

Fig. 165 Read DI values

 > Status > Network: ✓ Port Uart1 Uart2 Webooket ✓ Gateway MQTT Gateway Edge Computing Do Louis OD Status DD 1 D2 D0 D2 D0 D1 D2 D0 D1 D2 D0 D1 D2 D0 D1 D2 D2 D2 D2 D2 D2 D1 D2 D3 D4 D4<th>Communication Expert of Industrie</th><th>lar</th><th>Be Honest Do Best! 中文 English</th>	Communication Expert of Industrie	lar	Be Honest Do Best! 中文 English
Ng, Kuryang Image: Constraint of the second	Status Network Port Uart1 Uart2 Websocket Gateway Edde Computing	IO Function IO Device Function Config and Status Configuration IO Function DO Status DO 1 D02	
A1 (ωλ) A12(ωλ) 0 0	IO Fuction Cloud Service System	DI Status Dri Di2 Image: Constraint of the state	
		Al Status Al1(uA) Al2(uA) 0 0 Saves&Apply	

Fig. 166 DI values



10.2.2. Al status query

鉛 Modbus Poll - Mbpoll1		– 🗆 🗙
<u>File Edit Connection Setup Functions Dis</u>	play <u>V</u> iew <u>W</u> indow <u>H</u> elp	
🗅 🗃 🖬 🎒 🗙 🗂 🗒 🏩 🕮 05 06	15 16 17 22 23 TC 🖳 🔋 🎌	
📴 Mbpoll1		
Tx = 340: Err = 0: ID = 100: F = 04: SR = 1	000mc Read/Write Definition	
Alias 00000		
0	Slave ID: 0K	
1	Function: 04 Read Input Registers (3x) V Cancel	
2 0	Address: 0 Protocol address. E.g. 30011 -> 10	
3	Quantity: 4	
4	Scan Rate: 1000 [ms]	
5		
6	Disable on error Read/Write Once	
7	View	
8		
9		
	Hide Allas Columns PLC Addresses (Base 1) Address in Cell Enron/Daniel Mode	
For Help, press F1.	[1/2.16.14.73]: 502	-2



한 Modbus Poll	Mbpoll1									0.00	a 191									_		×
<u>File Edit Conne</u>	ection Se	tup Functions	Display View	Wi	ndov	<u>н</u>	elp															
D 🗳 🖬 🎒	× 🗖	🗏 🋕 💷 05	06 15 16 17	22	23	ТС	2	?	?													
Dec Nal Ut							, i									1			57	1		
	0.10 - 4	00. E = 04. CD	- 1000																-			
1X - 590. Ell -	0. ID - I	100. F - 04. SK	- 1000ms																			
	Alias	00000																	^	1		
0		0																				
1																						
		0																				
2		0																				
3																						
4			Commun	nicati	on Ti	affic																X
5							2012			101			1.112			122			4			
6			E <u>x</u> it		<u>S</u> to	5		Cjea	ər		Sav	e		Cop	y		Log	3] Stop on <u>E</u> rror	<u> </u>	e stamp
-			Tx:26300-	-0B	AE	00	00	00	06	64	04	00	00	00	04							-
			Rx:26301-	-0B	AE	00	00	00	0B	64	04	08	00	00	00	00	00	00	00	00		
8			Tx:26302-	-0B	AF	00	00	00	06	64	04	00	00	00	04							
9			Rx:26303-	-0B	AF	00	00	00	0B	64	04	80	00	00	00	00	00	00	00	00		
5.			Tx:26304-	-0B	BU	00	00	00	06	64	04	00	00	00	04	~~	0.0		0.0			
			RX:26305	OP	BU P1	00	00	00	0B	64	04	08	00	00	00	00	00	00	00	00		
			Bx:26307-	-08	B1	00	00	00	0B	64	04	08	00	00	00	00	00	0.0	00	0.0		
			Tx:26308	-0B	B2	00	00	00	06	64	04	00	00	00	04	00						
			Rx:26309-	-0B	B2	00	00	00	0B	64	04	08	00	00	00	00	00	00	00	00		
			Tx:26310-	-0B	в3	00	00	00	06	64	04	00	00	00	04							
			Rx:26311-	-0B	в3	00	00	00	0B	64	04	80	00	00	00	00	00	00	00	00		
			Tx:26312	-0B	В4	00	00	00	06	64	04	00	00	00	04					0.00		
			Rx:26313	-0B	В4	00	00	00	0B	64	04	08	00	00	00	00	00	00	00	00		~
or Help, press F1														[17]	2.16.	14.73]: 50	2				

Fig. 168 Read AI values



10.2.3. DO query/control

훱 Modbus Poll - Mbpoll1		122	×
File Edit Connection Setup Functions Disp	olay <u>V</u> iew <u>W</u> indow <u>H</u> elp		
D 📽 🖬 🎒 🗙 🗂 🗒 🏛 💷 🕮 05 06	15 16 17 22 23 TC 🖻 🔋 🎌		
Mbpoli1			
Tx = 67: Err = 0: ID = 100: F = 01: SR = 100	Read/Write Definition X		
Alias 00000	Slave ID: 100 DK		
00			
1 0	Function: UT Read Lotis (Ux) Cancel		
2	Address: 0 Protocol address. E.g. 11 -> 10		
3	Quantity: 2		
4	Scan Rate: 1000 [ms]		
5	Disable		
6	Read/Write Disabled		
7			
8	View Rows		
9	10 0 20 0 50 0 100 0 Fit to Quantity		
	Hide Alias Columns PLC Addresses (Base 1) Address in Cell Enron/Daniel Mode		
For Heip, press F1.	[172.16.14.73]: 502		



웹 Modbus <u>File E</u> dit <u>(</u>	Poll - Mbpoll ⁻ Connection <u>S</u>	1 etup F <u>u</u> nctions	<u>D</u> isplay <u>V</u> iew <u>W</u> i	ndow 1	Help										2_		×
🗅 🚔 d	🗐 🗙 🔳	見直 1. 05	06 15 16 17 22	23 TC	0	8	?										
Mhaoll1		20 <u>275 Mi</u>															
$T_{\rm V} = 205 \cdot 1$		100- E - 01- CD	= 1000mc														
1 - 305. 1	_11 = 0.10 =	100.1 - 01. 51	- 1000115														
	Alias	00000												^			
0		0															
		0															
-		0															
2																	
3																	
4	1		Communitant	T													~
5			Communicati	on Tram	6												\sim
			Exit	Stop		Clea	ar	1	Sav	/e	1	Сору	Log		on Error	Time st	amp
6			Tx · 27886-10	40.00	00	0.0	06	64	01	00	00	00 02		. — .			
7			Bx:27887-10	4C 00	00	00	04	64	01	01	00	00 02					
8			Tx:27888-10	4D 00	00	00	06	64	01	00	00	00 02					
			Rx:27889-10	4D 00	00	00	04	64	01	01	00						
1 91		1	Tx:27890-10	4E 00	00	00	06	64	01	00	00	00 02					
			Rx:27891-10	4E 00	00	00	04	64	01	01	00						
			Tx:27892-10	4F 00	00	00	06	64	01	00	00	00 02					
			Rx:27893-10	4F 00	00	00	04	64	01	01	00						
			Tx:27894-10	50 00	00	00	06	64	01	00	00	00 02					
			Rx:27895-10	50 00	00	00	04	64	01	01	00						
			Tx:27896-10	51 00	00	00	06	64	01	00	00	00 02					
			Rx:27897-10	51 00	00	00	04	64	01	01	00						
			Tx:27898-10	52 00	00	00	06	64	01	00	00	00 02					
			Rx:27899-10	52 00	00	00	04	64	01	01	00						~
or Help, pre	ss F1.											[172.16.	14.73]: 502				Lis.

Fig. 170 Read DO status



ងរៀ Modbus Poll - Mbpoll1	- D X
Elle Edit Connection Setup Functions D	splay View Window Help 5 15 16 17 22 23 TC 2 % ?
Image: Constraint of the second state of the second sta	Is 16 17 22 23 TC IC IC IC IC I000ms Image: State ID: Image: State
	Rx:28601-11 B1 00 00 04 64 01 00 Cx:28602-11 B2 00 00 06 64 01 00 00 02 Rx:28603-11 B2 00 00 04 64 01 01 00 Cx:28603-11 B3 00 00 06 64 01 00 00 02 Cx:28604-11 B3 00 00 06 64 01 00 02 Cx:28605-11 B3 00 00 04 64 01 00 02
or Help, press F1.	[172.16.14.73]: 502

Fig. 171 Write DO

Communication Expert of Industrial IoT		Be Honest Do Best! 中文∣English
Status Network Port Gateway MQTT Gateway Edge Computing I/O Fuction Cloud Service USR Cloud Alibibas Cloud	IO Function ID Device Function Configuration ID Control ID Function	
AWS IoT System	DI Status DI 1 DI2 OO	
	Al Status Al1(uA) Al2(uA) 0 0	
	Jinan USR IOT Technology Limited. http://www.pusr.com	

Fig. 172 DO Values

10.3. Modbus RTU query/control

We choose socket A of Uart1 as the communication channel as an example to illustrate it. User can also choose socket B and other Uart port.



🕺 Modbus Poll - Mbpoll1	- 🗆 X	
File Edit Connection Setup Functions Display View Window Help		
D 🖆 🖬 🎒 🗙 🛅 🚊 🕮 05 06 15 16 17 22 23 TC 🖳 💡 😵	(c)	
Mbpolii Image: Connection Setup Alias 00000 Alias 00000 Alias 00000 Connection Image: Connection Setup Alias 00000 Connection Image: Connection Setup Setial Settings Image: Connection Setup USB Setial Port (COM3) Image: Connection Setup B Data bits Image: Connection Setup None Parity Delay Between Polis Solo Image: Setue Port Remote Modbus Server IP Address or Node Name IT216:14.73 Image: Server Port Solo Image: Im		
For Help, press F1. [172.16.14.73]: 502		.11

Fig. 173 Modbus RTU simulator settings

10.3.1. DI status query

월 Modbus Poll - I	Mbpoll1									19 <u>1</u> 19		×
File Edit Connec	tion <u>S</u> etup F <u>u</u> nctions	<u>D</u> isplay <u>V</u> iew <u>V</u>	/indow <u>H</u>	Help	@ \ 9							
		5 06 15 16 17 22	2 23 10	빈	8 41							
🔛 Mbpoll1												
Tx = 1625: Err =	0: ID = 100: F = 02: S	SR = 1000ms										
Ali	ias 00000								i i			
0	1											
1	0											
2												
3												
										3		
4		Communica	ation Traff	ic								\times
5			22		2:			1 10			_	
6		Exit	Stop		Clear		Save	Сору	Log	Stop on Errc	ir 🛄 Timi	e stamp
7		Tx:1104-64	02 00	00 (00 02	FO	3E					^
		Rx:1105-64	02 01	01 1	7E 84							
8		Tx:1106-64	02 00	00 (00 02	FO	3E					
9		Rx:1107-64	02 01	01	7E 84							
		Tx:1108-64	02 00	00 0	00 02	FU	3E					
		Rx:1109-64	02 01	01	/E 84		25					
		TX:1110-64	02 00	00 0	00 02	F.O	3E					
		Rx:1111-64	02 01	01	/E 84	-	25					
		TX:1112-64	02 00	00 0	10 02	F.O	3E					
		RX:1113-64	02 01	01	/E 84		25					
		TX:1114-64	02 00	01 1		E.O	SE					
		KX:1115-64	02 01	00 4	E 84	RC	210					
		TX:1116-64	02 00	01 1	70 02	E.O	JE					
		KX:111/-64	02 01	UT	/E 04							Ŷ
For Help, press F1.								[172.16.1	4.73]: 502			

Fig. 174 Read DI values



10.3.2. Al status query

웹 Modbus Poll - M <u>F</u> ile <u>E</u> dit <u>C</u> onnecti	Ibpoll1 ion <u>S</u> etup F <u>u</u> nctions	<u>D</u> isplay <u>V</u> iew <u>W</u>	ndov	w <u>H</u>	elp														[×
D 🖻 🖬 🎒 🗙	🛅 🗒 🚊 л 05	06 15 16 17 22	23	тс	0	?	?														
🗒 Mbpoll1																	<u>_</u>]				
Tx = 249: Err = 0:	ID = 100: F = 04: SF	t = 1000ms															=				
																_	_				
Alia	s 00000																				
0	0																				
1																					
2	0																				
-																					
3				0.0409												_					
4		Communicati	on T	raffic																	\times
5					1			1 10	-		1.10				1.400.000		_		_		
6		Exit	Sto	φ		Clea	ar		Sav	/e		Cop	J.Y		Log		∐ Sto	op on Erro		ime st	amp
7		Tx:29372-64	04	00	00	00	04	F8	3C												^
		Rx:29373-64	04	08	00	00	00	00	00	00	00	00	CB	CO							
8		Tx:293/4-64	04	00	00	00	04	F.8	30	00	00	00	CB	00							
9		Tx:29376-64	04	00	00	00	04	F8	30	00	00	00	CB	cu							
		Rx:29377-64	04	08	00	00	00	00	00	00	00	00	CB	CO							
		Tx:29378-64	04	00	00	00	04	F8	3C												
		Rx:29379-64	04	08	00	00	00	00	00	00	00	00	CB	C0							
		Tx:29380-64	04	00	00	00	04	F 8	3C												
		Rx:29381-64	04	08	00	00	00	00	00	00	00	00	CB	CO							
		Tx:29382-64	04	00	00	00	04	F8	3C	1200	1000			102030							
		Rx:29383-64	04	08	00	00	00	00	00	00	00	00	CB	CO							
		Tx:29384-64	04	00	00	00	04	F8	30	0.0	00	00	an	00							
		KX:29385-64	04	08	00	00	00	00	00	00	00	00	CB	00							
or Help, press F1.												[17	2.16.	14.73]: 502				-	in the second	

Fig. 175 Read AI values

10.3.3. DO control/query

해 Modbus Poll ·	- Mbpoll1				- 🗆 X
File Edit Conne	ection <u>S</u> etup F <u>u</u> nction ★ ➡ ■ ■ □	IS DISPLAY VIEW Window Help 05 06 15 16 17 22 23 TC 00 1 1 №			
Ty = 145: Err =	0. ID - 100. E - 01.	2P = 1000mc			
1X - 145. Ell -	0.1D = 100.F = 01.3	SR - 1000ms			
4	Alias 00000			^	
0	0				
1	0				
2					
3					
4		Communication Traffic			×
2		Exit Stop Clear	Save	Copy Log Stop	on Error 🔲 Time stamp
6		Tx 23998-64 01 00 00 00	84 3F		
7		Rx:23999-64 01 01 00 4F 44			
8		Tx:24000-64 01 00 00 00 02	2 B4 3E		
		Rx:24001-64 01 01 00 4F 44	1		
191		Tx:24002-64 01 00 00 00 02	8 B4 3E		
		Rx:24003-64 01 01 00 4F 44			
		Tx:24004-64 01 00 00 02	2 B4 3E		
		Rx:24005-64 01 01 00 4F 44	l l		
		Tx:24006-64 01 00 00 02	2 B4 3E		
		Rx:24007-64 01 01 00 4F 44			
					11.
For Help, press F1.				[1/2.16.14./3]: 502	12

Fig. 176 Read DO status



ងរៀ Modbus Poll - Mbpoll1		- 🗆 X
<u>File Edit Connection Setup Functions</u>	<u>D</u> isplay <u>V</u> iew <u>W</u> indow <u>H</u> elp	
D 🛎 🖬 🎒 🗙 🖸 📙 🏛 🗔 🖊 05	06 15 16 17 22 23 TC 🔄 😵 🎌	
Tx = 224: Err = 0: ID = 100: F = 01: SR	= 1000ms	3
Alias 00000		<u>~</u>
0 0	Write Single Coil X	
1 0 2 3 4 5 6	Slave ID: 100 Send Address: 0 Cancel Value © Dr: 0 Off Result N/A Copy Log	×
7	Tx: 24152 Close dialog on "Response ok"	^
8	Rx: 24153 Use Function Rx: 24155 Image: Stress Str	
	Rx:24157 Tx:24158-64 01 00 00 02 B4 3E Rx:24159-64 01 01 00 4F 44 Tx:24160-64 01 00 00 02 B4 3E Rx:24161-64 01 00 00 02 B4 3E Rx:24162-64 01 00 00 02 B4 3E Rx:24162-64 01 00 00 02 B4 3E Rx:24163-64 01 01 00 4F 44 Tx:24164-64 01 00 00 02 B4 3E Rx:24163-64 01 00 00 02 B4 3E Rx:24165-64 01 00 00 02 B4 3E Rx:24165-64 01 01 00 4F 44	v
For Help, press F1.	[172.16.14.73]: 502	

Fig. 177 Write DO

Communication Expert of Indust	Hallot :	3e Honest Do Best! 中文 English
Status Network Port Gateway Edge Computing	IO Function IO Device Function Configuration IO Control IO Function	
IO Fuction > Cloud Service > System	D01 D02 Image: Contract of the second	
	AI Status A1(uA) Al2(uA) 0 0	
	Save&Apply Jinan USR IOT Technology Limited. http://www.pusr.com	v

Fig. 178 DO Values

10.4. MQTT query/control

When enable MQTT gateway or AWS IOT service, user need configure the MQTT broker parameters in MQTT Gateway tab or Cloud service tab at first. Users can query or control IO ports by enabling IO control/query box on publish or subscribe tab. Note that the query or response data is modbus RTU protocol.



USR IOT Communication Expert of Industrial IoT			Be Honest Do Best! 中文 English
) factor	MQTT Gateway		
> Status > Network	MQTT Gateway function supports supports port mapping function,	SSL clean session and QOS, supports connecting to the third-party MQIT server. It supports up to 16 publish topics and 16 subscribe topics, which can bind each topic to a different serial port.	
✓ Port			1
Uart1	Basic configuration Publis	Subscribe	
Uart2			
Websocket	Enable MQTT	Enable	
✓ Gateway	MOTT Version	MOTL311	
MQTT Gateway			
Edge Computing	Client ID	123456	
IO Fuction	Server Address (IP)	broker.empx.io	
> Cloud Service	Local/Remote Port NO.	0 (0~65535) 1883 (1~65535)	
> System			
	KeepAlive	60 (0~65535)s	
	Reconnecting time Without Data	0 (0~65535)s	
	Reconnection Interval	1 (1~65535)s	
	Class up session		
	Clean up session		
	User Credentials		
	Enable last will		
	SSL protocol	Disable V None V	
		Save&Apply	

Fig. 179 MQTT gateway settings

Communication Expert of Industrial IoT	Be Honest Do Best! 中文∣English
Status Network Network Network Not Uart 1 Uart 2 Webscket Status Gateway MQT Gateway MQT Gateway Edge Computing 10 Futtion Cloud Service System Publish topic 2 Detion topic 1 Transport Status 1 Webschet Detion topic 2 Cutom Mode Transport Status 1 Work Gateway Detion topic 2 Work Gateway Detion topic 2 Detion topic	pic,
Jinan USR IOT Technology Limited. http://www.pusr.com	

Fig. 180 Publish topic IO control/query



USR IOT Communication Expert of Industrial IoT	в	e Honest Do Best! #v≿∣English
 Status Status Network Port Uart1 Uart2 Websocket Gateway Edge Computing IO Fuction Claud Service System 	MQTT Gateway MQTT Gateway MQTT Gateway supports port mapping function, which can blind each topic to a different serial port. Basic contifiguration Public Subscribe topic1 C Tansmission Mode Without Topic Binding port Put 1: Gos Goss U Control/Query Subscribe topic2	+∞ μαμα
	Jinan USR IOT Technology Limited. http://www.pusr.com	

Fig. 181 Subscribe topic IO control/query

10.4.1. DI status query

S MQTTX File Edit Vi	ew Window Help										×
	Connections	Ŧ	EMQX 🛛 🛛							0 0	
×	• EMQX@broker.emqx		+ New Sub	scription	Hex	\sim			All Receiv	ved Pub	lished
			/PubTopic1	QoS 0				Торіс	:: /SubTopic1	QoS: 0	
ዊ								64 (02 00 00 0 2023-01-1	0 02 F0	3E 8:951
+					Topic: /F 6402 0	PubTopic1 (101 7e84	QoS: 0				
					2023-01-	16 14:26:09:5	60				
ß											
ŝ					Payload:	Hex 🗸	QoS:	0 ~	O Retain	Meta	
					/SubTopic	:1					V
0					64 02 00	00 00 02 F0	3E			÷	0

Fig. 182 DI query and response





10.4.2. Al status query

				– 🗆 X
File Edit V	iew Window Help			
	Connections +	EMQX 🛛 🌀		() <u>/</u>
N	EMQX@broker.emqx	+ New Subscription	● Hex ~	All Received Published
				Topic: /SubTopic1 QoS: 0
		/Publopic1 QoS 0		64 02 00 00 00 02 F0 3E
-				2023-01-16 14:33:09:346
ው			Tonic: /PubTonic1 OoS: 0	
			C402_0101_7-04	
+			0402 0IDI /604	
			2023-01-16 14:33:11:639	
				Topic: /SubTopic1 QoS: 0
				64 04 00 00 00 02 78 3E
				2023-01-16 17:13:57:354
E			i	
			Topic: /PubTopic1 QoS: 0	
			6404 0400 0000 00ce 82	
			2023-01-16 17:13:57:870	
<u>ت</u> ې			Payload: Hex V QoS: (0 ∨ O Retain Meta
			/SubTopic1	~
0			64 04 00 00 00 02 78 3E	€ ⊖ €
				-

Fig. 183 Al query and response

10.4.3. DO control/query

S MQTTX File Edit V	iew Window Help			- 🗆 X
	Connections +	EMQX 🛛 🔞		() <u>/</u>
S	EMQX@broker.emqx	+ New Subscription		All Received Published
		/PubTopic1 QoS 0		54 04 00 00 00 02 78 3E 2023-01-16 17:13:57:354
ዊ			Topic: /PubTopic1 QoS: 0	
			6404 0400 0000 00ce 82	
+			2023-01-16 17:13:57:870	
				opic: /SubTopic1 QoS: 0
				54 01 00 00 00 02 B4 3E
				2023-01-16 17:26:03:953
5			Topic: /PubTopic1 QoS: 0	
			6401 0103 0f45	
			2023-01-16 17:26:06:196	
\$			Payload: Hex V QoS: 0	✓ O Retain Meta
			/SubTopic1	~
0			64 01 00 00 00 02 B4 3E	€ ⊖ €
				(







Fig. 185 DO control and response

10.5. DO Timing trigger control

USR-M100 support 6 timing tasks, users can do scheduled action for DO or device restart.

USR IOT Communication Export of Industrial IoT				Be Honest Do Best! #xt∣English
> Status				^
> Network Timert Enable	Enable	✓ (Start NTP or Time Sync	ironization first)	
> Port Timing Time	01 : 50	:00 PM 💿		
V Gateway Timing Action	DO Action	~		
MQ11 Gateway Edge Computing DO Action	DO1	~ Flip	~	
IO Fuction Timer2 Enable	Disable	 Start NTP or Time Sync 	ronization first)	
> Cloud Service Timer3 Enable	Disable	V IStart NTP or Time Surg	contraction first	
> System	Dicable	to the second		
Timer Enable	Disable	· (start WP or time sync	renzaben mst.	
	Disable	 Istart WiP or Time Sync 	ronization hrst)	
limerò Enable	Disable	✓ (Start NTP or Time Sync	ronization first)	
DO Function				
Restart Hold	Disable	~		
DO Action Config	Execute IO	Execute Action	Execute Time	
	DO1	No Action ~	10	
	DO2	No Asten	20	
		NoAction	(1~65535s)	
DI Function				
Filter Time	10 inan USR IOT	(10~65535ms) Technology Limited, http:	//www.pusr.com	×

Fig. 186 Timing trigger control

10.6. Edging computing and linkage control

First, users need to enable edge computing function.



10.6.1. Add IO module

Click add slave to add the IO port. In the slave property, enter the device name, bind to the IO, enter the polling interval. Click save.

Ormmunication Expert of Industrial IoT	Be Honest Do Best ! #0≿[faqBah
Status Network Port Gateway MQTT Gateway	Edge Computing Gateway Including edge acquisition, edge computing, edge reporting and other functions, supports Modbus RTU to Json, Modbus RTU to Modbus TCP and other general industrial protocol conversion. SETTING Edge Computing Data Compared Departs Industrial I
Edge Computing IO Fuction > Cloud Service > System	Rage Computing Data Sequences Select edge computing profile No. Name! Point Source! *Slave Address *Boling interval 00 (10-55335)ms with 6 with 6 with 6 with 6 with 6
	Jinan USR IOT Technology Limited. http://www.pusr.com

Fig. 187 Add IO Port

10.6.2. Add IO data points

Click add nodes to add the IO data points. In the data point property, enter the node name, enter the response timeout. Click save.

Communication Expert of Industrial IoT		Be Honest Do Best! 中文 English
 Status Network Port Gateway Edge Computing IO Fuction Cloud Service System 	Edge Computing Gateway Including edge scapisition, edge computing, edge reporting and other functions, supports Modbus RTU to Modbus	pererai industriai ast: 123 node:@ 11 Operations
	Jinan USK IOF Technology Limited. http://www.pusr.com	

Fig. 188 Add IO data points



	Edge	Computing	Gateway								
atus	Includi	Including edge acquisition, edge computing, edge reporting and other functions, supports Modbus RTU to Json, Modbus RTU to Modbus TCP and other general industrial								general industrial	
etwork	protoc	protocol conversion.									
ort	SETTI	NG									
OTT Gateway		Commentation of the second	Data Association	Data							
lae Computing	Edge	Computing	Data Acquisition	Data Query a	ind Report Linka	ge contro					
Fuction	Select e	dge computing	profile Choose file	Export							
oud Service										last: 117 nodes	
istem	No.	Name†↓	Point Source†↓	Slave addr†↓	Operations	No.	Name†↓	Register address†↓	Data type†↓	Operations	
	1	THsensor	UART1	1	Edit Delete	4	DO1	00001	DO_Type	Edit Delete	
	2	LUXsensor	UART1	2	Edit Delete	2	DO2	00002	DO_Type	Edit Delete	
	3	THsensor2	UART2	1	Edit Delete	3	DI1	10001	DI_Type	Edit Delete	
	(4)	M100_IO	ю	100	Edit Delete	4	DI2	10002	DI_Type	Edit Delete	
	-					5	Al1	30001	Al_Type	Edit Delete	
			Add sl	ave		6	AI2	30003	Al_Type	Edit Delete	
					Save	Ne	xt			~	
						-					

Fig. 189 Save the configuration

After finishing configuring the slave device, please scroll down to the bottom of the page and click on "Save" button to save all the changes that you have made. All configurations take effect after a system reboot.

10.6.3. IO status report

Users can select TCP/UDP/HTTP in socket A of each serial port, MQTT Gateway, or AWS IOT service as the communication channel. When select MQTT or AWS IOT channel, user need configure the MQTT broker parameters in MQTT Gateway tab or Cloud service tab at first, and setting the report topic in the Fig.190. Here we use MQTT as an example.

ぷ	USR IOT Communication Expert of Industri	al loT		Be Honest Do Best! 中文 English
(3 /3	> Status	Edge Computing Data Ac	Cquisition Data Query and Report Linkage control	-
	> Network	Data channel		
	> Port	Channel select	MQTT 🗸 🖉	
	MOTT Gateway	Data Query/Set		
	Edge Computing			
	IO Fuction	Data Query	Disable ~	
	> Cloud Service	Data Set	Disable ~	
	> System	Data Report of nodes		
		Reporting method	Enable	
		Report Topic	/UploadTopic	
		QOS	QOS8 ~	
		Periodic reporting		
		Reporting interval	10 (1~36000)s	
		Reporting on regular	(Start NTP first)	
		Failure Padding		
		Quotation Mark		
		Report Agreement		
		Json template	("Hisessor" Comparature" ↓ Chemperature "Temperature" ↓ humidity "Tumidity", "LUKens ≠ ∅ (<2048 bytes)	
			Jinan USR IOT Technology Limited. http://www.pusr.com	Ŭ

Fig. 190 IO status report method



S MQTTX × File Edit View Window Help +EMQX 🛛 🚺 0 0 ... Connections × EMQX@broker.emqx.... Plaintext V All Received Published + New Subscription Topic: /UploadTopic QoS: 0 Polar@fwemqx01.abb... /PubTopic1 {"THsensor":{"temperature":1 7.300000, "humidity":45.50000 ዊ 0},"LUXsensor":{"lumination": 535},"DI":{"DI1":1,"DI2": 0},"DO":{"DO1":0,"DO2":0},"A /UploadTopic QoS 0 I":{"AI1":0,"AI2":0}} 2023-03-08 19:19:03:361 Topic: /UploadTopic QoS: 0 {"THsensor":{"temperature":1 7.300000,"humidity":45.50000 0},"LUXsensor":{"lumination": 535},"DI":{"DI1":1,"DI2": 0},"DO":{"DO1":0,"DO2":0},"A I":{"AI1":0,"AI2":0}} 2023-03-08 19:19:23:723 Payload: JSON V QoS: 2 V O Retain Meta Topic $\leftarrow - \rightarrow$



10.6.4. IO query

Here we use MQTT as an example.

SR IOT Communication Expert of Industrial IoT		Be Honest Do Best! 中文 English
Status Edge Computing Dat	Acquisition Data Query and Report Linkage control	- 1
Network Data channel Data channel		
✓ Gateway Channel set	et MQTT v 🎯	
MQTT Gateway		
Edge Computing IO Fuction Data Qu	ry Enable ~	·
> Cloud Service Data	et Enable ~	
> System Query or Set b	Json 🗸	
Query or Set To	ic /DownloadTopic	
٩	NS QOS0 ~	
Respond To	ic /RespondTopic	
q	NS QOS0 ~	
Data Report of nodes		
Reporting meth	d Disable ~	
Report Agreement		
	Save Net	
		y.
	Jinan USR IOT Technology Limited. http://www.pusr.com	

Fig. 192 IO status query



S MQTTX File Edit Vie	ew Window Help	~	– 🗆 X
	Connections 🕀	EMQX 🛛 🥑	U 🖉 …
S	EMQX@broker.emqx	+ New Subscription	● Plaintext ∨ All Received Published
ይ	Polar@fwemqx01.abb	/PubTopic1 QoS 0 /UploadTopic QoS 0	Topic:/DownloadTopic QoS:0 {"DO1":"DO1","DO2":"DO2","DI 1":"DI1","DI2":"DI2","AI1":"A I1","AI2":"AI2")
+		/RespondTopic QoS 0	2023-03-08 19:30:27:314
			Topic:/RespondTopic QoS:0 {"DO1":0,"D02":0,"D11":1,"DI 2":0,"AI1":0,"AI2":0}
B			2023-03-08 19:30:27:825
ŝ			
2			Payload: JSON V QoS: 0 V O Retain Meta /DownloadTopic V
0			>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>

Fig. 193 IO status query test

10.6.5. Linkage control

When enable Edge computing function, users can set trigger conditions for Digital output control. There are two control logic: follow logic and threshold trigger.

turk	IOT unication Expert of Industrial IoT									В
Port Including edge equilition, edge exporting and other functions, supports Modbus RTU to Modbu	Status Network	Edge Computing	Gateway							
MQTT Gateway Edge Computing OF function Cloud Service System	> Port ~ Gateway	Including edge acquis protocol conversion.	ition, edge computing, ed	dge reporting and oth	her functions, su	pports Modbus Rī	TU to Json, Modbu	RTU to Modbus TCP a	nd other general i	industrial
Cloud Service System Linkage Event Configuration Linkage Event Configuration Servit Ser	MQTT Gateway Edge Computing	SETTING Edge Computing	Data Acquisition	Data Query and R	eport Lini	age control				
Linkage Event Configuration Linkage Event Configuration Mainmum trigger Event Stage Event Trigger Trigger Trigger Linkage Linkage Mainmum trigger Event Goeration Name Exable Condition Point Point Execution Interval Mainmum trigger Event Goeration Save&Apply Save&Apply Save&Apply Save Save <td>Cloud Service System</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>last: 10 events</td>	Cloud Service System									last: 10 events
Vent Frent Description Point Trigger Trigger Event Sean Minimum trigger Event Operations Name Enable Condition Point Action Execution Interval time Description Operations Series/Apply Add Event Condition Series/Apply Series/App					Linkage Ev	ent Configuration	n			Ĩ
RUN ALLENNE RUN Brenskippin		Event Event Name Enable	Event Trigger Condition	Event Trigger Point	Trigger Action	Trigger Execution	Event Scan Interval	Minimum trigger time	Event Description	Operations
					s	add Event	l I			
Jinan USR IOT Technology Limited. http://www.pusr.com			Jinan USR IO	T Technology Lim	iited. http	://www.pusr.co	m			

Fig. 194 Add event

Local follow logic

There are forward follow and reverse follow, here we use forward follow as an example. The triggers can be DI ,DO.



	ser Manual
Be Ho Communication Expert of Industrial IoT	onest Do Best! 中文 English
 Status Network Port Casteway Edge Computing Gateway Edge Computing Linking edge acquisition, edge mporting and other functions, supports Modius RTU to Juon, Modius RTU to M	

Fig. 195 DI control DO

We can see that the DO1 NO close when DI level changes to 1 or on.

Communication Expert of Industrial IoT		Be Honest Do Best! 中文 English
Status Network Port Gateway MQTT Gateway Edae Computing	IO Function IO Device Function Config and Status Configuration IO Control IO Function	
IO Fuction Cloud Service System	DO Status bo1 DO2 Image:	•
	DI Status DI 1 DI 2 O	
	AI Status AII (uA) AI2(uA) 0 0	•
	Sava&Apply Jinan USR IOT Technology Limited. http://www.pusr.com	v

Fig. 196 Test result

> Threshold trigger

There are >,>=,<,<=,within threshold, out of threshold triggers, here we use within threshold as an example. The triggers can be serial device data ,AI. Here we choose temperature data point as an example.



USR IOT Communication Expert of Industrial IoT					Be Honest Do Be 中文
> Status > Network > Port	Edge Computing Gateway Including edge acquisition, edge computing, ed protocol conversion.	ge reporting and other functions	i, supports Modbus RTU to Json, Modbus RTU	U to Modbus TCP and other general i	industrial
Gateway MQTT Gateway	SETTING				
IO Furties	Edge Computing Data Acquisition	Data Query and Report	Linkage control	_	
> Cloud Service		*Event name	event2		
> System		Enable	Enable ~		last: 9 events@
		Trigger Condition	Out of Threshold v 2		
	Event Event Event Trig Name Enable Conditio	*Trigger Point	temperature	rigger Event Description	Operations
	DI1_DO2 Enable Forward Fol	*Scanning Cycle	100 (0~10000)ms	DI control DO	Edit
		*Min Trigger Interval	1000 (500~10000)ms	_	Delete
		*Upper Threshold	20 🔘		
		*Lower Threshold	15 🔘		
		*Trigger Execution	D02 ~		
		*Trigger Action	Normal Open(NO) ~		
		*Event Description	Data control DO		
			ave Cancel		

Fig. 197 Serial device data control DO



11. AWS IoT service

In order to reduce the length of this document, we have organized this section into a special document. Please refer to "USR-M100 Quick Start Guide with AWS IoT" for detail.

12. PUSR cloud service

In order to reduce the length of this document, we have organized this section into a special document. Please refer to "USR-M100 Quick Start Guide with PUSR cloud" for detail.

13. Warranty

14. Contact Us

Jinan USR IOT Technology Limited

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16. Revision History

Version	Date	Author	Description
1.0.0	2023.01.30	Dean,Gao	Initial