

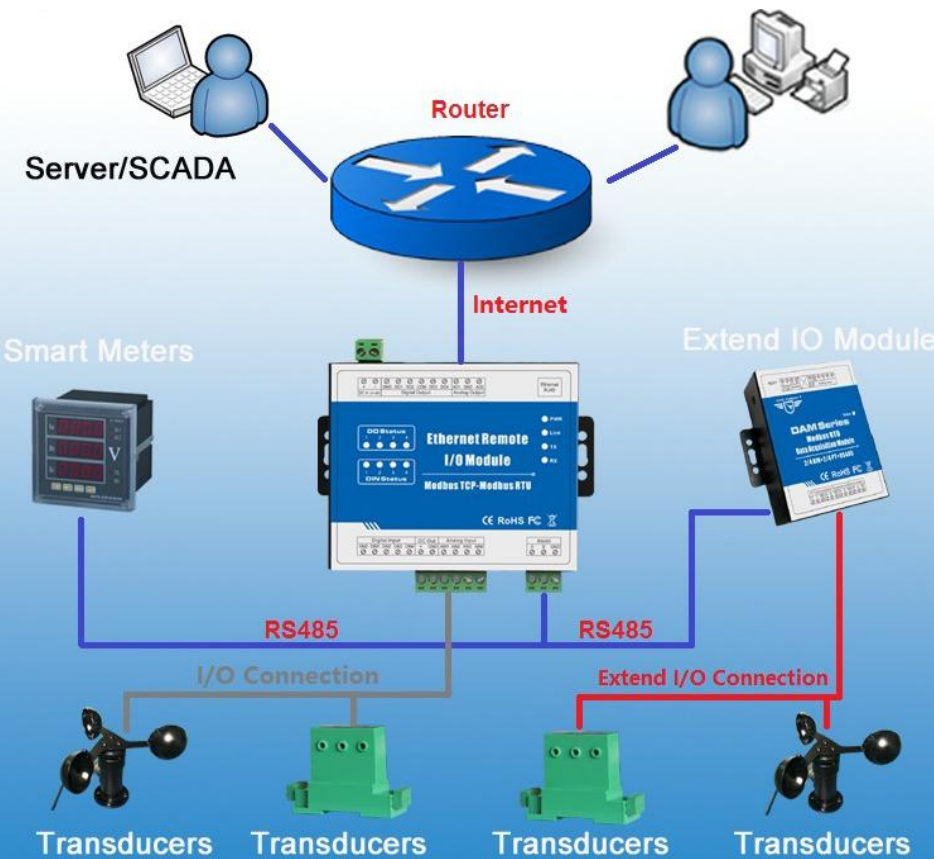
Mapping Registers for extending I/O or Instrument

Max. 10MHz High Speed Pulse Counter

Max. 300KHz High Speed Pulse Output

Modbus TCP Ethernet Remote I/O Module

KING PIGEON



MxxT Series User Manual

Ver 1.0

Date Issued: 2017-04-15

King Pigeon Hi-Tech. Co., Ltd.

www.GPRS-M2M.com

MxxT Series Ethernet Remote IO Extend I/O Diagram



Industrial Ethernet Remote I/O Module IoT Data Acquisition Module

Modbus TCP Ethernet Remote I/O Module Model List

Model	Descriptions	DC Output	DC Input	Typical Power Consumption
M100T	1 RJ45,1 RS485, 2 DI, 2 AI, 2 DO(Sink) or Relay	1 DC	12~36VDC	1.2W-1.68W
M110T	1 RJ45,1 RS485, 4 DI, 4 DO(Sink) or Relay	1 DC		
M120T	1 RJ45,1 RS485, 4 DI, 4 AI, 2AO, 4 DO(Sink) or Relay	1 DC		
M130T	1 RJ45,1 RS485, 8 DI, 4 DO(Sink) or Relay	1 DC	24VDC	1W-1.2W
M140T	1 RJ45,1 RS485, 8 DI, 8 DO(Sink) or Relay	1 DC		
M150T	1 RJ45,1 RS485, 8 DI, 4 AI, 4 DO(Sink) or Relay	1 DC		
M160T	1 RJ45,1 RS485, 8 DI, 48 AI, 8 DO(Sink) or Relay	1 DC		
M200T	1 RJ45,1 RS485, 2AO	1 DC	24~36VDC	1.2W-1.68W
M210T	1 RJ45,1 RS485, 4 DI	1 DC	12~36VDC	
M220T	1 RJ45,1 RS485, 4 DO(Sink) or Relay	1 DC		
M230T	1 RJ45,1 RS485, 4 AI	1 DC		
M240T	1 RJ45,1 RS485, 4 RTD, 2/3 wire PT100/pt1000	---		0.75W-0.95W
M310T	1 RJ45,1 RS485, 8 DI	1 DC	24VDC	1W-1.2W
M320T	1 RJ45,1 RS485, 8 DO(Sink) or Relay	1 DC		
M330T	1 RJ45,1 RS485, 8 AI	1 DC		
M340T	1 RJ45,1 RS485, 8 RTD, 2/3 wire PT100/pt1000	↔		0.75W-0.95W
M410T	1 RJ45,1 RS485, 16 DI	1 DC	12~36VDC	1.1W-1.32W
M420T	1 RJ45,1 RS485, 16 DO(Sink) or Relay	↔		0.75W-1W

Special instructions for ordering

- 1) If the model provides digital input, the DIN default type: wet contact, optional: dry contact. The input type cannot be changed after manufacturer delivered. The DIN1 default is high-speed count mode; it can be changed to low-speed count mode by open the shell and change the internal jumper. If require dry contact input, please note when ordering, if DIN1 require high-speed pulse count mode then must be wet contact.
- 2) If the model provides digital output, the DO default type: SINK, optional: Relay. The output type cannot be changed after manufacturer delivered. The DO1 supports high-speed pulse output; DO2 can be used to control the direction of the stepper motor. If require relay output, please note when ordering, if DO1, DO2 used for high-speed pulse output then must be Sink.
- 3) The model number: M240T, M340T support thermal resistance temperature transmitter default type: PT100, optional: PT1000, if you need PT1000 type of thermal resistance, please note when ordering.
- 4) All models support the register mapping, can extend I/O or instruments by Modbus RTU/ASCII protocol.
- 5) The valid number of I / O ports corresponding to the model number is described in the Model List, the not included I/O port in the model is invalid, although in the hardware reserved them.



Table of Contents

1.	Brief introduction -----	4
2.	Standard Packing list -----	4
3.	Mainly Features -----	4
4.	Technical Specification-----	5
5.	Physical Layout and Installation Diagram-----	7
6.	Initialize/Reset the Module -----	10
7.	Settings & Operation the Module by Web Configuration Interface -----	10
8.	Register List, Modbus Function Code, Register Address, Data Type -----	20
9.	Warranty -----	24

This handbook has been designed as a guide to the installation and operation of MxxT Series Ethernet Remote I/O Module.

Statements contained in the handbook are general guidelines only and in no way are designed to supersede the instructions contained with other products.

We recommend that the advice of a registered electrician be sought before any Installation work commences.

King Pigeon Hi-Tech.Co., Ltd, its employees and distributors, accept no liability for any loss or damage including consequential damage due to reliance on any material contained in this handbook.

King Pigeon Hi-Tech.Co., Ltd, its employees and distributors, accept no liability for any Network upgrading or due to the technology specifications contained in this handbook.

【UPGRADE HISTORY】

DATE	FIRMWARE VERSION	HARDWARE VERSION	DESCRIPTION



1. Brief introduction

The MxxxT Ethernet Remote I/O Module is an industrial class, isolated designed, high reliability, high stability and high precision data acquisition module, embedded 32-Bit High Performance Microprocessor MCU, Integrated 1 Industrial 10/100M adaptive Ethernet module inside. It provides multi I/O, supports standard Modbus TCP, can be intergraded into SCADA, OPC server, and other automation systems. It is design for working in the harsh industrial application environment, widely used in a variety of industrial automation, security monitoring system, automatically measurement and control system.

The MxxxT Ethernet Remote I/O module provides a RS485 interface, through the RS485 bus, it can cascade Modbus I/O devices or Modbus meters, e.g.: a variety of digital input or digital outputs, analog inputs or outputs, thermal resistance IO module combination, save costs. At the same time, the Ethernet Remote I/O module has register mapping function, the cascade Modbus I/O data are automatically collected to the mapping memory area, the TCP Client query without waiting then can get a quick response to meet the industrial timely requirements.

The MxxxT Ethernet Remote I/O module provides different I/O ports for variety applications. Includes optical-isolated digital inputs, compatibles dry contact and wet contact, supports max 700KHz high speed pulse counter, digital outputs supports 10Hz~300Khz high speed pulse output or relay outputs, isolated 12bits analog inputs, supports 0~5V, 0~10V, 4~20mA, 0~20mA analog signal, 12bits analog outputs, supports 0~10VDC signal output, resistance thermal detector inputs compatibles 2/3 wires PT100 and PT1000. All of the I/O ports are high sampling frequency and special filtering strategy to ensure its reliability.

The MxxxT Ethernet Remote I/O module can work at wide working voltage range, the range is 12 ~ 36VDC with anti-reverse protection design. Also, it provides 1channel 12~36VDC power output for external device to save wiring cost.

2. Standard Packing List

Ethernet Remote I/O Module X 1; User Manual X 1.

Note: The package does not include AC/DC Adaptor.

Optional: 35mm Standard DIN rail fixed Bracket

3. Mainly Features

- Embedded 32-Bit High Performance Microprocessor MCU, inbuilt watchdog;
- Power supply 12~36VDC with over voltage and phase-reversal protection;
- Embedded Web server for configuration and management;
- Integrated 10/100M adaptive Ethernet module, supports Modbus TCP protocol;
- Optical isolated digital input(Compatible Dry or Wet type), supports max 700KHz high speed pulse counter;
- Digital output(Sink) or relay output, supports 10Hz~300KHz high speed pulse output;
- Isolated analog input, 12-bit resolution, supports 0~20mA,4~20mA,0-5VDC, 0-10VDC;
- Analog output, 12-bit resolution, supports 0-10VDC;
- RTD input, supports PT100 and PT1000 resistance sensor, compatible 2 or 3 wires;
- High sampling frequency and special filtering strategy to ensure reliability;
- 1 RS485 Serial port, supports Modbus RTU/ASCII Master, can extend I/O modules;



Industrial Ethernet Remote I/O Module IoT Data Acquisition Module

- Supports register mapping function and extend I/O inquiry strategy;
- Provides 1 channel VDC power source output for external device, saving wiring cost;
- LED instructions work status, with reset button to reset, easy on-site installation and commissioning;
- Using metal shell, protection class IP30. Metal shell and system security isolation, especially suitable for industrial applications in the field;
- Small size, L105 * W88 * H30mm, compatible wall installation and DIN35mm industrial rail installation.

4. Technical Specifications

• Digital Input	
Sensor Type	Wet Contact (NPN or PNP), Dry Contact
I/O Mode	DI or Event Counter
Dry Contact	<ul style="list-style-type: none"> • On: short to GND, logic=1 • Off: open, logic=0
Wet Contact (DI to COM)	<ul style="list-style-type: none"> • On: 10 to 30 VDC, logic=1 • Off: 0 to 3 VDC, logic=0
Counter Frequency	Only the 1 st Channel can be used as pulse counter, Compatibles DI and counter simultaneously. Counter value will save after power off. High Speed Mode: Max. 700Khz(Default); Low Speed Mode: Max. 10KHz (Optional, can open the cover to choose low speed mode.)
Digital sampling frequency	500Hz
Digital filtering strategy	Continues 3 times
Isolation	Optical Isolated, 3k VDC or 2k Vrms
• Digital Output	
Type	Sink or Relay(DC 5A/30V, 5A/250VAC)
I/O Mode	DO or Relay or Pulse Output
Pulse Output Frequency	10Hz~300KHz(Only the 1 st Channel is Sink type can be used as high speed pulse output)
Over-Voltage Protection	50 VDC
Over-Temperature Shutdown	175°C (typical), 150°C (min.)
Load Current	Max.500 mA per channel
Digital sampling frequency	500Hz
Isolation	If DO is Sink type, then no isolation. If it is Relay, then is electrical isolation.
• Analog Input	
Type	Differential input
Resolution	12 bits
I/O Mode	Voltage / Current (backside switch selectable)



Industrial Ethernet Remote I/O Module IoT Data Acquisition Module

Input Range	0~5VDC , 0~10VDC, 0~20 mA, 4~20mA,
Accuracy	±0.1% FSR @ 25°C ±0.3% FSR @ -10 and 60°C ±0.5% FSR @ -40 and 75°C
Sampling frequency	20Hz
Isolation	Electrical isolation
• RTD Input	
Sensor Type	PT100 or PT1000
Measurement Range	-150~+420°C
Resolution	0.1°C or 0.1 ohm
Input Connection	2- or 3-wire
Accuracy	±0.1% FSR @ 25°C ±0.3% FSR @ -40 and 75°C
Sampling frequency	20Hz
Isolation	No
• Analog Output	
Type	Differential input
Resolution	12 bits
Output Range	0 to 10 VDC
Drive Current	1A (max.)
Accuracy	±0.1% FSR @ 25°C ±0.3% FSR @ -10 and 60°C ±0.5% FSR @ -40 and 75°C
Isolation	No
• Working Power Requirements	
Input Voltage	12~36VDC for no-AO output model, 24~36VDC for AO output model; Peak Voltage:+40VDC, Power consumption: Less than 1.7W, If equipped relay output, then each Relay action: 0.15W.
Input Current	139 mA @ 24 VDC
• Power Output	
Output Voltage	12~36VDC, equal to the input voltage.
Output Current	139 mA @ 24 VDC
• LAN	
Ethernet	10/100 Mbps adaptive Ethernet module, RJ45 ports
Protection	15KV ESD Protection

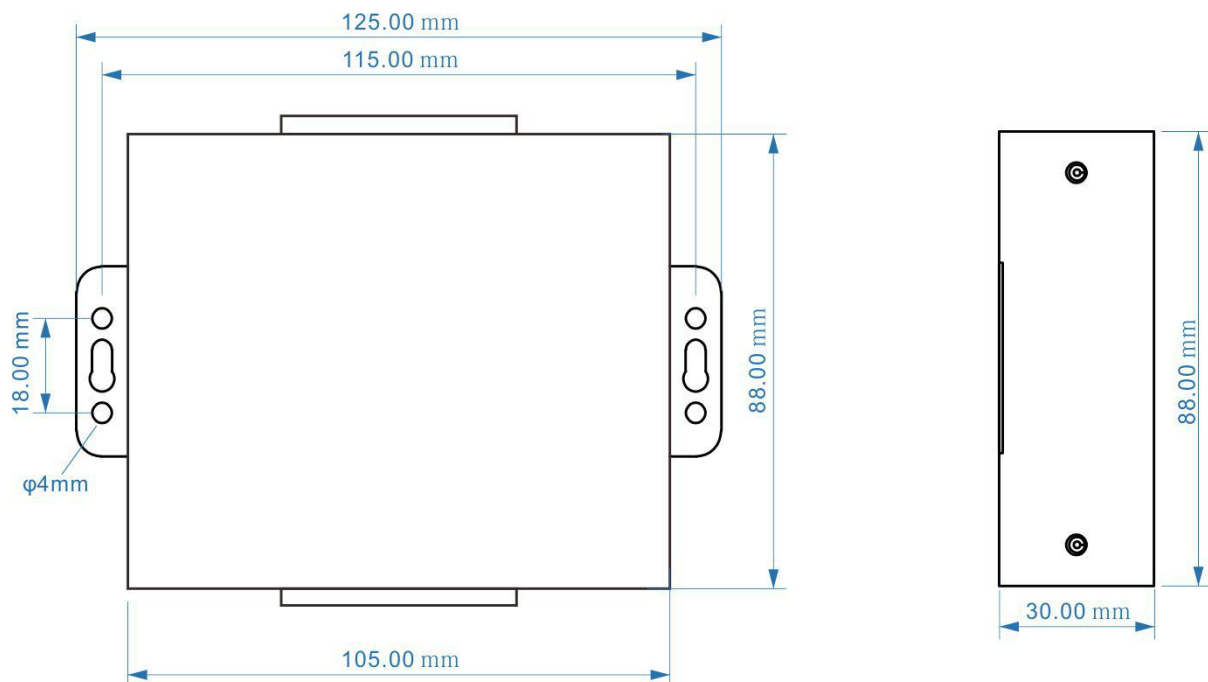


Industrial Ethernet Remote I/O Module IoT Data Acquisition Module

Protocols	Modbus TCP, TCP/IP
Max. TCP Connection	5
• Serial Port	
RS485	MODBUS RTU/ASCII Master.
Protection	15KV ESD Protection
Modbus Slave address	1~255
Inquiry Frequency	100mS
Baud Rate	1200,2400,4800,9600,19200,38400,57600,115200,128000Bps;
Mapping registers	Bit register: 300, 16-Bit register: 300. Total 600 mapping registers.
• Physical Characteristics	
Wiring	I/O cable max. 14 AWG
Dimensions	105 x 88 x 30 mm
Weight	Under 205 g
Mounting	DIN rail or wall
• Environmental Limits	
Operating Temperature	Standard Models: -10 to 60°C (14 to 140°F) Wide Temp. Models: -40 to 75°C (-40 to 167°F)
Storage Temperature	-40 to 85°C (-40 to 185°F)
Ambient Relative Humidity	5 to 95% (non-condensing)
Altitude	Up to 3000 m

5. Physical Layout and Installation Diagram

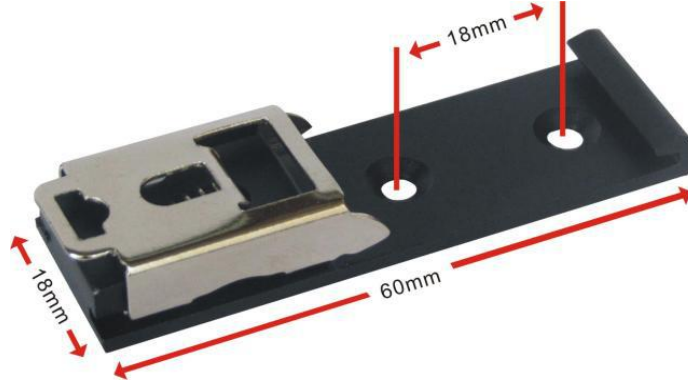
5.1 Physical layout





Industrial Ethernet Remote I/O Module IoT Data Acquisition Module

35mm Standard DIN rail fixed Bracket(Optional Bracket)



35mm DIN Rail Fixed Bracket

5.2 Led Instruction

+ -	GND DO1 DO2 DO3 DO4 COM DO5 DO6 DO7 DO8 COM	A B GND	Reset	Ethernet RJ45
DC In 12-36V	Digital Output	RS485		

DO Status

1 2 3 4 5 6 7 8

● ● ● ● ● ● ● ●

DIN Status

1 2 3 4 5 6 7 8

● ● ● ● ● ● ● ●

Ethernet Remote I/O Module



Modbus TCP-Modbus RTU

CE RoHS FC

Digital Input										Analog Input									
GND	DIN1	DIN2	DIN3	DIN4	GND	DIN5	DIN6	DIN7	DIN8	DC Out	AIN1	AIN2	AIN3	AIN4	GND	AIN5	AIN6	AIN7	AIN8
○	○	○	○	○	○	○	○	○	○	+	○	○	○	○	○	○	○	○	○

LED Indicator Instruction

	Power Indicator: Power on the module will always on.
	Link Indicator: MODBUS TCP connection successful will always on.
	RS485 Indicator: Flicks while data transmitting on RS485 Serial port.
	Error Indicator: will turn on when power on occurs error or upgrade firmware failure.

	Digital input status indicator, turn on while status change.
	Digital Output status indicator, turn on while relay close or Sink output high level.

5.3 Interface Instructions for installation

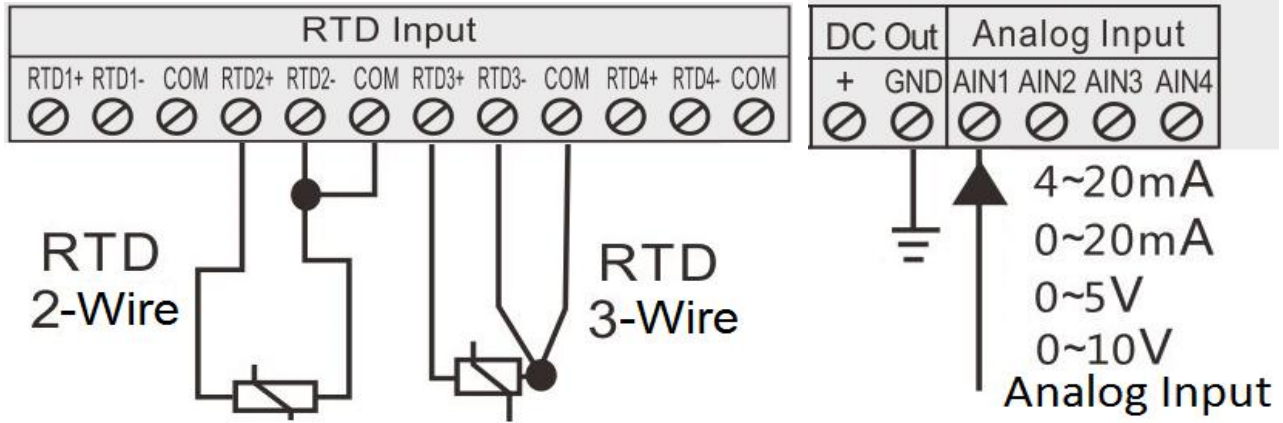
See below interface definition, please connect the correct wires.

Interface Definition Instruction		
DC in 12~36V	+	DC12~36V positive input, 1A, for power on the Unit. If need to use the AO port, then please power on it by DC24~36v.
	-	DC12~36V negative input.
DC Out	+	DC Power output positive for external device, output voltage= input voltage.
	GND	DC Power output negative port.
Reset		Reset button. Recovery the parameters to factory default value.
Ethernet RJ45		Ethernet port.
RS485	A	RS485 data A
	B	RS485 data B
	GND	RS485 data ground if required.
Digital Input	DINx+	The x channel digital input positive
	GND	Digital input negative
Digital Output	DOx+	The x channel Digital Output High Level or Relay NO port.
	GND	Sink output: GND (For output type is SINK.)
	COM	Relay output: COM.(For output type is Relay)
Analog Input	AINx+	The x channel Analog input positive.
	GND	Analog input negative.
Analog Output	AOx+	The x channel Analog output positive.
	GND	Analog output negative.
RTD Input	RTDx+	The x channel Resistance Thermal input positive.
	RTDx -	Resistance Thermal input negative.
	COM	Resistance Thermal input COM port.

5.4 Typically Wiring Instruction:

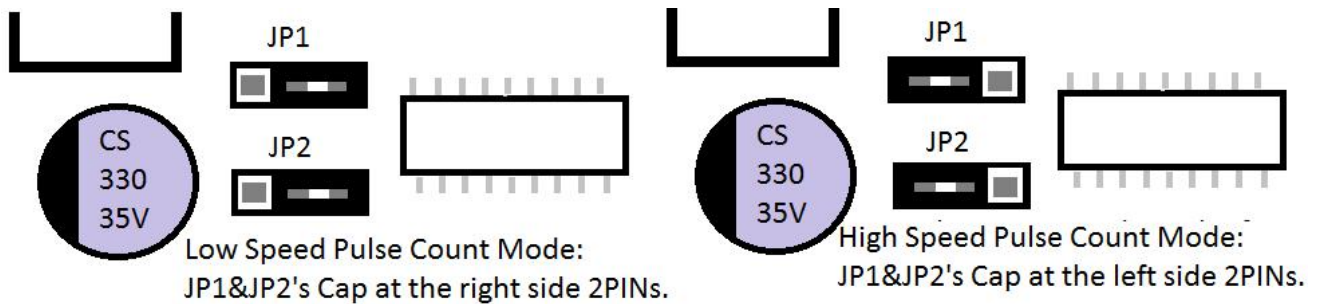
Tips:

Resistance Thermal Detector (RTD) compatibles 2-wire or 3-wire, please reference abovementioned wiring instruction. If the sensor near the module and the wire resistance is small can be ignored, can be used 2-wire wiring, if the distance is far and the wire resistance affect the value, should be used 3-wire way connection.



5.5 Setup the DIN1 High Speed Pulse Count & Low Speed Pulse Count Mode:

The DIN1 can be used as pulse counter, default is high speed mode, the max. frequency is 700Khz. it can be change to low speed pulse count mode by open the shell, and change the JP1&JP2's Caps to the right side 2PINs, see below pictures.



6. Initialize/Reset the Module

The module can be reset to factory default once mistake programmed. Please follow below steps to initialize it. After initialized, the parameters will set as factory default.

- 1) Switch off the Unit
- 2) Press and hold the RESET button;
- 3) Power ON the Unit, holding 3 seconds, the PWR, Link, RS485, Error Led Indicators will turn on, then loose the RESET Button, except the PWR Led indicator turn on, the others will turn off.
- 4) Restart the unit then recovery to factory default settings, and will enter to work mode. All of the parameters will reset to factory default, except the register mapping parameters.

7. Settings&Operation the Module by Web Configuration Interface

The MxxT Ethernet Remote I/O module provides a standard Ethernet RJ45 interface, through the direct line connect to the router, switches, HUB and other interconnect switching equipment, or through the cross-line connect to PC and other terminal devices. The user can program parameters, firmware upgrades and debugging through the WEB configuration interface. In the actual use, the Master will communicate it by MODBUS TCP link to read and write the local register address and mapped registers of the slave I / O.

Below are the steps to setup the parameters by Web Configuration, please follow it step by step.

7.1 Login the Web Configuration Interface:

- 1) Through the direct line connect to the router, switches, HUB and other interconnect switching equipment, or



Industrial Ethernet Remote I/O Module IoT Data Acquisition Module

through the cross-line connect to PC and other terminal devices.

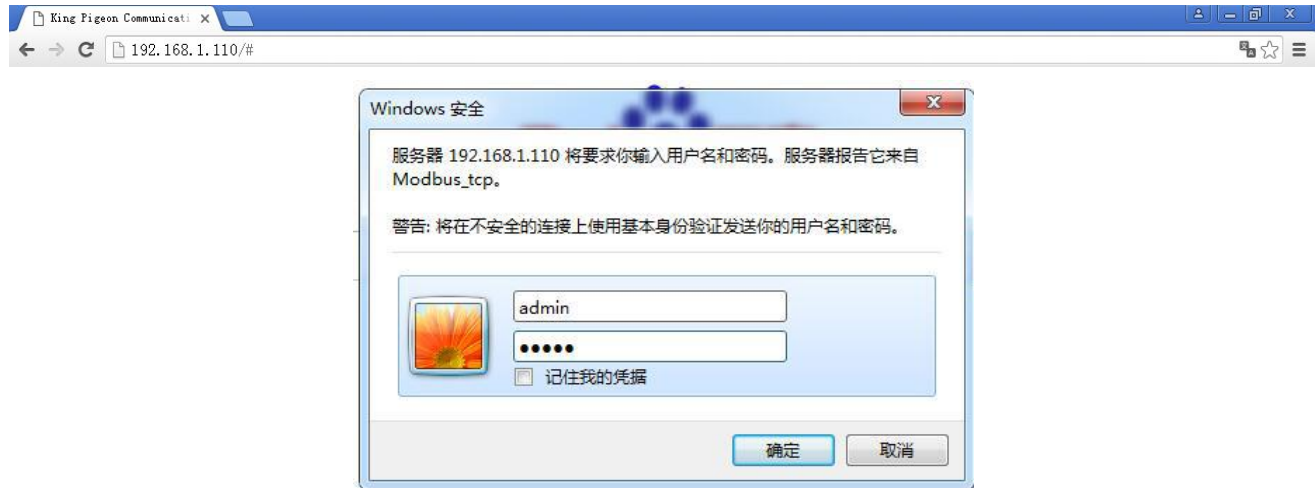
2) Powered on the module, the PWR LED indicator will turn on and the module will initialize within 1 second.

3) At the PC, open the browser, the browser must compatibles HTML5, e.g.: IE9 or Google Chrome 8 or later version. In the address bar, enter the device IP address, the device will prompt to enter the account number and password to login, then click confirm button log in the WEB configuration interface.

Tips:

* Device Default IP address: 192.168.1.110, default account number: admin, default password: admin.

* In the local network area, please ensure no device occupied the IP address 192.168.1.110.



7.2 Parameter Settings

After login the Web Configuration Interface, in the left corner will display the module number to identify the device model number. The module number cannot modify it. The other parameters can follow below instructions to program them.

7.2.1 System Setup

The user can setup the module time, restart, and upgrade firmware. The module built-in a CR2032 battery to save the time information while the module power goes off, it can maintains approximately 2 years.





Industrial Ethernet Remote I/O Module IoT Data Acquisition Module

Lock-in PC Time: Click Set button, the module will automatically synchronize the computer time, please ensure the PC time is correct before operation.

Module Restart: Click Reboot button to restart the module.

Upgrade Firmare: Click Browser, then load the new firmware that provided by the manufacturer, the firmware name is: app.bin. After loaded, please click Restart button to reboot the module, then the Link LED indicator will turn on 1 second, and RS485 LED Indicator turn on 5 seconds, stands for the firmware upgraded successful.

7.2.2 Network Setup

The module works as Modbus TCP Server mode, the local port 502 (Modbus protocol default port) is in the listening state, waiting for the remote Modbus Master (TCP Client) to initiate the connection to the local 502 port to establish a TCP connection. After the TCP connection established, the Modbus Master can exchange data with the module. The Ethernet mode of the module default is Auto Mode, no need to setup it.

Configuration Web for Remote Ethernet I/O Data Acquisition Modules

Model No: M120T

Current Location: Network Setting

Network Setup

Obtain an IP address automatically
 Specify an IP address

IP address	192	168	1	110
Default Gateway	192	168	1	1
Subnet Mask	255	255	255	0
Primary DNS Server	192	168	1	1
Secondary DNS Server	192	168	1	1

Notice: Please ensure the IP address can be used.

Modbus TCP Setting (Modbus Slave/TCP Server)

Listening Port	502
Slave ID	1
Allow TCP Links	2

Note: Effective after Reboot

Obtain an IP address Automatically: Tick it stands for: the device automatically obtains the IP address in the LAN. Only when the router in the LAN allows the dynamic allocation of IP addresses can be used.

Specify an IP Address: Tick it stands for the user setup a fixed IP address for the module.

IP Address: The module IP address in the LAN, default IP address is 192.168.1.110.

Default Gateway: The gateway for the IP module, setup it the same as the LAN Router gateway.

Subnet Mask: The module subnet mask, it is 255.255.255.0.

Primary/Secondary DNS: Reserved, only when the module establishes connection to the server purpose.

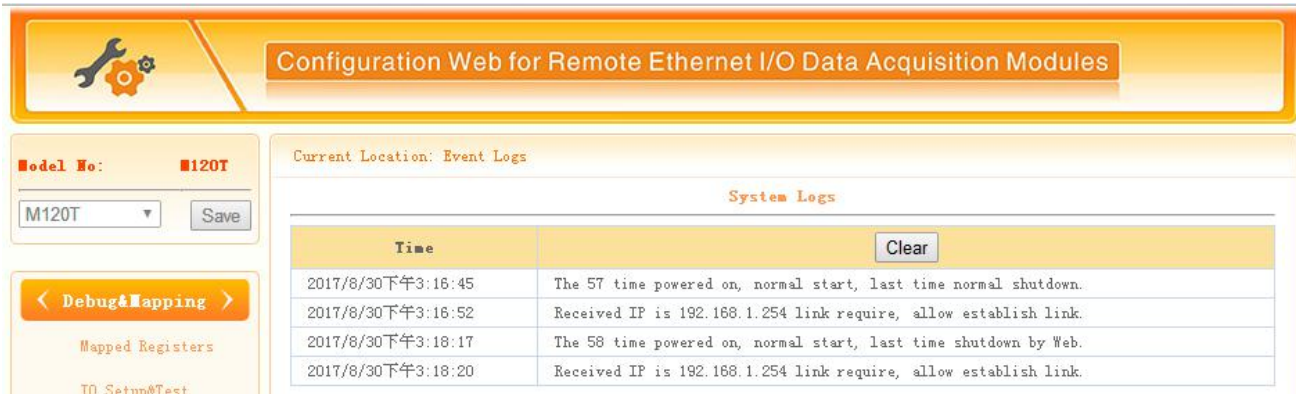
Listening Port: The module listen TCP Client establish connection port. Default is 502.

Slave ID: 1~255, the module ID. This ID is used to identify the ID number of the device in Modbus TCP protocol communication. This device is in Modbus Slave mode, it is necessary to set the device ID so that the Modbus Master in the network can recognize the device.

Allow TCP Links: Allowing how many TCP Client simultaneously establish connection to the module. The module allows 2 TCP clients simultaneously log in the Web Configuration Interface and max. 5 TCP Clients simultaneously establish connection.

7.2.3 System Logs

The module provides system log functions. The user can easily analyze the operation and the faults. Includes auto restart reason, restart times, upgrade firmware, modify time information, modify account number and password. Total 400 logs will be saved in the memory for review.



The screenshot shows a web interface for configuration. At the top, there is a header with a gear icon and the text "Configuration Web for Remote Ethernet I/O Data Acquisition Modules". Below this, there is a sidebar on the left with a "Model No:" field set to "M120T" and a "Save" button. The main content area is titled "Current Location: Event Logs" and "System Logs". It contains a table with two columns: "Time" and "Clear". The table lists four log entries:

Time	Clear
2017/8/30下午3:16:45	The 57 time powered on, normal start, last time normal shutdown.
2017/8/30下午3:16:52	Received IP is 192.168.1.254 link require, allow establish link.
2017/8/30下午3:18:17	The 58 time powered on, normal start, last time shutdown by Web.
2017/8/30下午3:18:20	Received IP is 192.168.1.254 link require, allow establish link.

The Record types includes below:

- L"The %d time powered on, normal start, last time normal shutdown."
- L" The %d time powered on, normal start, last time shutdown by Web."
- L" The %d time powered on, normal start,last time shutdown by memory error."
- L" The %d time powered on, normal start,last time shutdown by hardware error."
- L" The %d time powered on, normal start,last time shutdown by CPU bus error."
- L" The %d time powered on, normal start,last time shutdown by Command error"
- L" The %d time powered on, normal start,last time shutdown by OS error."
- L"Upgraded firmware, CRC32 = 0x%08X, now is new firmware."
- L"Received upgrade firmware, reboot will upgrade."
- L"IP is %d.%d.%d.%d disconnect link normally, current link: %d."
- L"Received IP is %d.%d.%d.%d link require, allow establish link."
- L"Received IPis %d.%d.%d.%d link require, exceed max qty, forbidden to link."
- L"Received web lock-in computer time, using new time for logging."
- L"Modify account number successful, effective after reboot."

7.2.4 User Setup

Modify the account number, password. After modification, please save and restart the module then can take effect.

ati X
38.1.110/#

Configuration Web for Remote Ethernet I/O Data Acquisition Modules

Model No: M120T

Current Location: Account Setting

User Setup

Old Login Name:	<input type="text"/>
Old Login Password:	<input type="text"/>
New Login Name:	<input type="text"/>
New Login Password:	<input type="text"/>
Re-enter New Password:	<input type="text"/>

Max.: 20 Characters.

Save

Effective after Reboot

7.2.5 I/O Setup&Test

Through this page, users can quickly test the device's own I / O port function, e.g.: manual test the Digital output and analog output, calibrate the thermal resistance value etc.

Configuration Web for Remote Ethernet I/O Data Acquisition Modules

Model No: M120T

Current Location: IO Setup&Test

Input Coil Status — Monitoring DI Input Status

Addr	0	1	2	3	4	5	6	7	8	9
0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0

DIN1 counter default trigger direction: Rising Edge Trailing Edge

Notice: Can change the DIN 1 counter trigger direction in running, but this change will not be save. Addr.=0 is the 1st channel.

Output Coil Status — Monitoring DO Output Status

Addr	0	1	2	3	4	5	6	7	8	9
0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Turn ON Turn OFF

DO1 for pulse output, DO2 for direction control Enable (Must Reboot)

Input Coil: Digital inputs, when the digital input close or level voltage is 10 to 30 VDC, will display logic=1, otherwise will display logic=0. The registers of the channel please refer to the corresponding channel for the register in chapter 8.

DIN1 counter default trigger direction: To setup when power on the unit, the default of the DIN1 pulse counter trigger condition, rising edge or falling edge (Trailing). In the running mode, the user can dynamically change the trigger condition through the master, the device does not save the dynamically trigger condition after power off.

Output Coils: Tick any one or more channel, and then click the ALL ON or ALL OFF button to test the outputs manually. Click ALL ON, SINK type will output high level and Relay output close, click ALL OFF, outputs the opposite state.

DO1 for pulse output, DO2 for direction control: Tick the box in the front of the Enable, and reboot the module to take effect. It stands for assigned the DO1 as pulse output type, and DO2 as direction control output. Only restart the module then the settings can take effect. Meanwhile, If ticked, click ALL ON or ALL OFF, the DO1 and DO2 will not response because of they were used to Pulse output type.

Analog Output Manual Test

Notice	12Bit, range: 0~4095 correspond to 0~10VDC.	Output
AO1:	<input type="text" value="0"/> <input type="range" value="0"/>	0.00V <input type="text" value="0"/>
AO2:	<input type="text" value="0"/> <input type="range" value="0"/>	0.00V <input type="text" value="0"/>

Notice:

1. Move the Slider then release it will output the value.
2. This value is unidirectional write, if change it by master will not return its value.

ADC Value of AIN/RTD (PT100/1000)

1	2	3	4	5	6	7	8
1487	2	1	1	0	0	0	0

Converted RTD (PT100/PT1000) Value (Unit: °C)

1	2	3	4	5	6	7	8
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Calibrate of RTD (PT100/PT1000) Value (Unit: °C, +/-)

1	2	3	4	5	6	7	8
<input type="text" value="0.0"/>	<input type="text" value="0.0"/>	<input type="text" value="0.0"/>	<input type="text" value="0.0"/>	<input type="text" value="0.0"/>	<input type="text" value="0.0"/>	<input type="text" value="0.0"/>	<input type="text" value="0.0"/>

AO1/AO2: The analog output AO1 and AO2 channels. Through the slider to adjust the AO output value, release the slider then can take effect, for manually test the analog outputs. The AO1 and AO2 output value cannot be preset. It was adjusted by Master while working. The resolution is 12bits, the range 0-4095 corresponds to the output voltage 0~10VDC, the maximum load capacity is 1 Ampere.

ADC Value of AIN/RTD: Analog to digital converter input value. The corresponding analog input channel or thermal resistance PT100 / 1000 channel value.

Converted RTD PT100/PT1000 Registers Value: PT100/PT1000 input converted value. Unit is °C. It is the corresponding thermal resistance PT100 / 1000 channel converted temperature value.

Calibrate of RTD PT100/PT1000 Value: The deviation value of the temperature value, unit is °C. The user can enter the calibration value to correct the converted temperature value. Please click Save after entering the calibration value.

Calibrate value = Actual value –Converted RTD PT100/1000 value.

E.g.: If the actual temperature is 96 °C, but at the converted RTD PT100/PT1000 Value is 95 °C, then the value should enter 96-95=1 °C, On the contrary, should enter 95-96=-1°C.



Industrial Ethernet Remote I/O Module IoT Data Acquisition Module

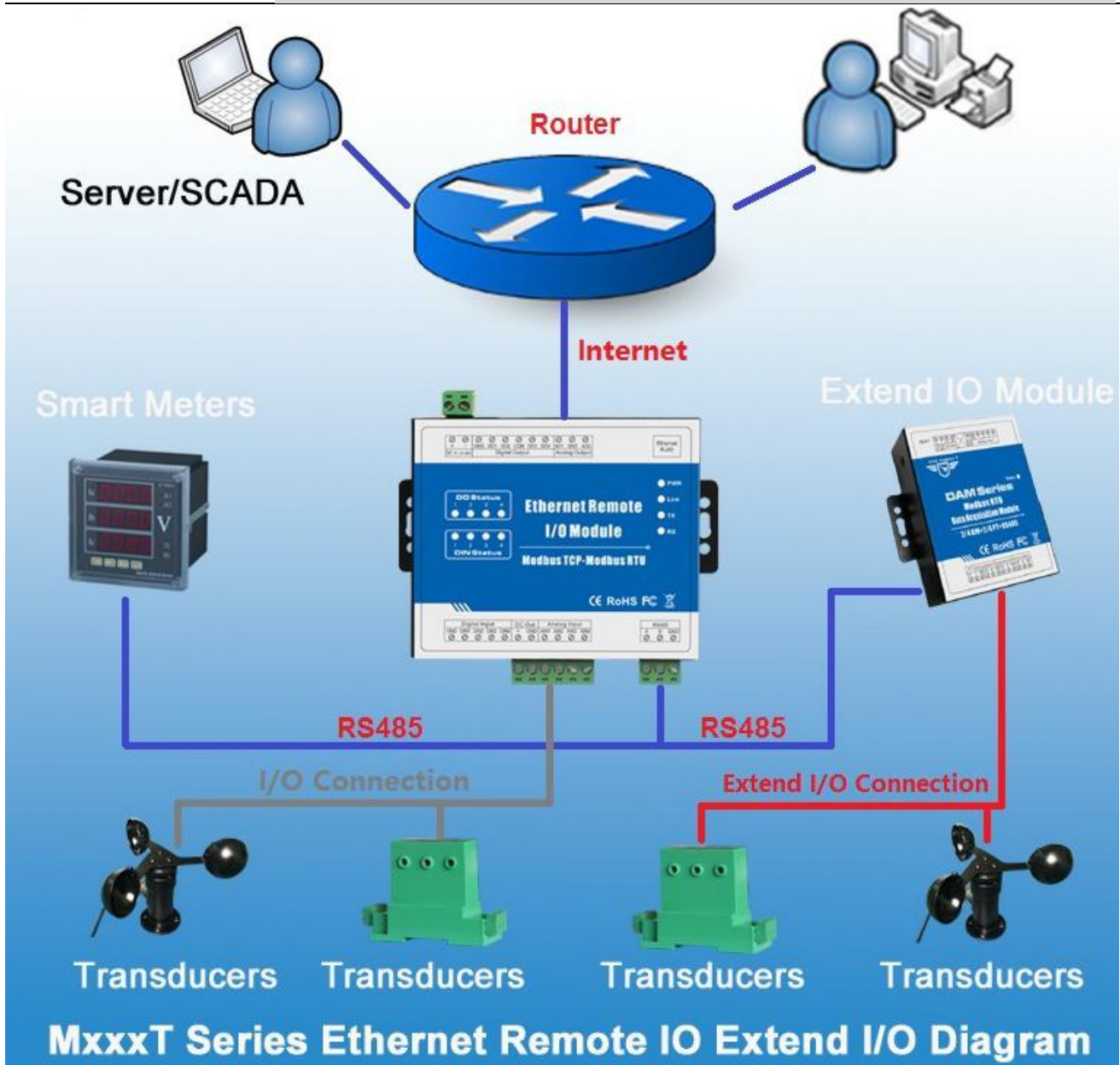
7.2.6 Mapping Registers(Program Modbus Slave register mapping function)

The MxxT series Ethernet Remote I/O Module provides a serial port to extend Modbus slaves. Through the serial port, when the module own's I/O port is insufficient, or need to read the external instrument, controller and other Modbus RTU, Modbus ASCII device data, the module can cascade Modbus Slave over the RS485 serial port. At this time, the module works in Modbus Master mode, support 01,02,03,04,05,06,15,16 function code to automatic query cascaded modbus slaves, the query interval time is 100mS.

The data obtained by the module query is stored directly in the mapping register. If the data needs to be written to the Modbus Slave, the device automatically writes the value from the corresponding register in the mapping register to the slave. In this way, the Modbus Slave's register address is directly mapped to the MxxT series Ethernet I/O acquisition module. When the TCP client reads and writes data, it directly exchanges data with the register data of the mapping area without waiting.

In the internal memory, 300 Bit type registers and 300 16-bit type register mapping areas are provided for storing the exchange data between the TCP Client (Modbus Master) and the Slave connected to the serial port. Thereby reducing the communication response latency of the entire network device and improving the communication efficiency.

The working process is: TCP Client (Modbus Master) read or writes data to the MxxxT Ethernet remote I/O module, at the same time, the MxxxT Ethernet remote I/O module is also read or writes data to the cascaded Modbus Slave over the RS485 serial port. The MxxxT Ethernet remote I/O module acts as a Modbus Slave for the TCP Client (Modbus Master) and as a Modbus Master for the RS485 serial interface. When the module cascaded Modbus Slave, the whole network diagram is as follows:



Model No: M120T

Current Location: Mapping Register

Serial Port Parameter Settings

Used as Modbus-RTU Master
 Used as Modbus-ASCII Master

Baud Rate	Data Bit	Stop Bit	Parity Bit
9600	8bit	1bit	No

Not support 7bit + no parity mode, changing the parameters while communication will cause error, should restart the module.

Save

Used as Modbus RTU Mode/Modbus ASCII Master: Select Modbus RTU or Modbus ASCII as the serial port communication protocol. The module performs as Modbus Master.

RS485 Parameters: Setup the RS485 Serial port parameters. It supports:

Baud Rate:1200-128000, Data Bit: 7bit,Stop Bit: 0.5,1,1.5,2,Parity Bit: ODD

Baud Rate:1200-128000, Data Bit:7bit, Stop Bit:0.5,1,1.5,2,Parity Bit:Even

Baud Rate:1200-128000, Data Bit:8bit, Stop Bit:0.5,1,1.5,2,Parity Bit:NO

Baud Rate:1200-128000, Data Bit:8bit, Stop Bit:0.5,1,1.5,2,Parity Bit:ODD

Baud Rate:1200-128000, Data Bit:8bit Stop Bit:0.5,1,1.5, ,Parity Bit:Even



Industrial Ethernet Remote I/O Module IoT Data Acquisition Module

Tips: RS485 Network Connection:

If the slave is only provides RS-232 interface, please use the RS-232/RS-485 converter connected to the 485 network. It is strongly recommended to use the isolated RS485 converter to improve system reliability.

In a BUS, all of the equipments 'data A + should be connected together, and data B- should be connected together, cannot be reversed, RS485 signal to the GND terminal should be shorted together, and connect to the module's ground only.

RS-485 network generally allows up to 32 nodes in parallel devices, more than 32 systems need to use RS485 repeater to expand.

RS-485 communication line should be shielded twisted pair, the shield should be single-ended ground; RS485 communication distance of up to 1200 meters, when a bus connected to a lot of RS485 devices, or use the baud rate higher communication distance Will be correspondingly shortened, then you can use RS485 repeater to expand.

RS-485 network has a variety of topology, the general use of linear connection, that is, from the host start from near and far will be more than one device connected to the network one by one. In the far end can be connected to 120 ~ 300Ω / 0.25 watts of terminal matching resistance (depending on the communication quality to determine).

< Basic Setting >

Mapping Registers--Read Coil & Register

Slave ID	Event	Start Addr	Qty	Mapped Addr. (100~399)	
<input type="text"/>	IC ▾	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="button" value="Mapping"/>

Notice: See explanations of Write Coil&Register.

Mapping Registers--Write Coil & Register

Mapped Addr. (100~399)	Qty	Event	Slave ID	Start Addr	
<input type="text"/>	<input type="text"/>	HC ▾	<input type="text"/>	<input type="text"/>	<input type="button" value="Mapping"/>

Notice:

1. Data Type Bit and Registers are assign automatically;
2. Slave ID and Qty. cannot be set as 0.
3. IC=Input Coil, HC=Holding Coil, IR=Input Register, HR=Holding Register.
4. Mapped Addr.= The start address of mapping register. Cannot overflow.
5. The Module will read or write the correspond to registers by the correct Function code, the interval time is 100mS.
6. The mapped register address will list at the Mapped Registers page.

Mapping Registers--Read Coil & Registers: Mapping registers between the slaves and module. After configuration, the module will Read the Modbus slaves automatically by the corresponding read coil and register function codes according to the mapped registers.

Slave ID: The Modbus Slave ID, range: 1~255.

Event: Setup the module carries out actions to the slaves. Includes: Input Coil, Holding Coil, Holding register, Input register. The Input Coil and Holding Coil will automatically assign to the Bit Type Mapped Registers area. The Input Registers and Holding Registers will automatically assign to the 16-Bit Mapped Registers area.

Start Address: The start address that the module to read in the slave.

Quantity: The quantity of the register that the module to read.

Mapped Addr 100~399: The start mapping register address in the mapping area for saving the slave registers's value.

Mapping: Click it to finished register mapping. The slave's register has mapped to the module's internal mapping memory.



Industrial Ethernet Remote I/O Module IoT Data Acquisition Module

Mapping Registers--Write Coil & Registers: Mapping registers between the slave and module. After configuration, the module will write the Modbus slaves automatically by the corresponding Function codes according to the mapped registers.

Mapped Addr. 100~399:The start mapped register address in the mapping area for reading and then write to the slave's register.

Quantity: The quantity of the register that the module should write to the modbus slave.

Event: Setup the module carry out actions to the slaves. Includes: Input Coil, Holding Coil, Holding register, Input register. The Input Coil and Holding Coil will automatically assign to the Bit Type Mapped Registers area. The Input Registers and Holding Registers will automatically assign to the 16-Bit Type Mapped Registers area.

Slave ID: The Modbus Slave ID, range: 1~255.

Start Address: The start address that the module to write in the slave.

Mapping: Click it to finished register mapping. The slave's register has mapped to the module's internal mapping memory.

7.2.7 Mapped Register List

The mapped register list in the Web page is only readable and cannot be written. It is used to display the current value of the register in the mapping area, which is convenient for user debugging. There are 300 registers for the Bit Type register, used to store one bit can represent the state of the data, e.g.: input coil, holding coil value. 300 registers for the 16-bit type register, used to store input register and holding register data. The module will automatically assign and stored them according to the coil or register set in Mapping Registers page.

Model No: M120T

M120T

Current Location: Mapped Registers

Bit Type Mapped Registers:

Addr	0	1	2	3	4	5	6	7	8	9
100	0	0	0	0	0	0	0	0	0	0
110	0	0	0	0	0	0	0	0	0	0
120	0	0	0	0	0	0	0	0	0	0
130	0	0	0	0	0	0	0	0	0	0
140	0	0	0	0	0	0	0	0	0	0
150	0	0	0	0	0	0	0	0	0	0
160	0	0	0	0	0	0	0	0	0	0
170	0	0	0	0	0	0	0	0	0	0
180	0	0	0	0	0	0	0	0	0	0
190	0	0	0	0	0	0	0	0	0	0
200	0	0	0	0	0	0	0	0	0	0
210	0	0	0	0	0	0	0	0	0	0
220	0	0	0	0	0	0	0	0	0	0
230	0	0	0	0	0	0	0	0	0	0
240	0	0	0	0	0	0	0	0	0	0
250	0	0	0	0	0	0	0	0	0	0

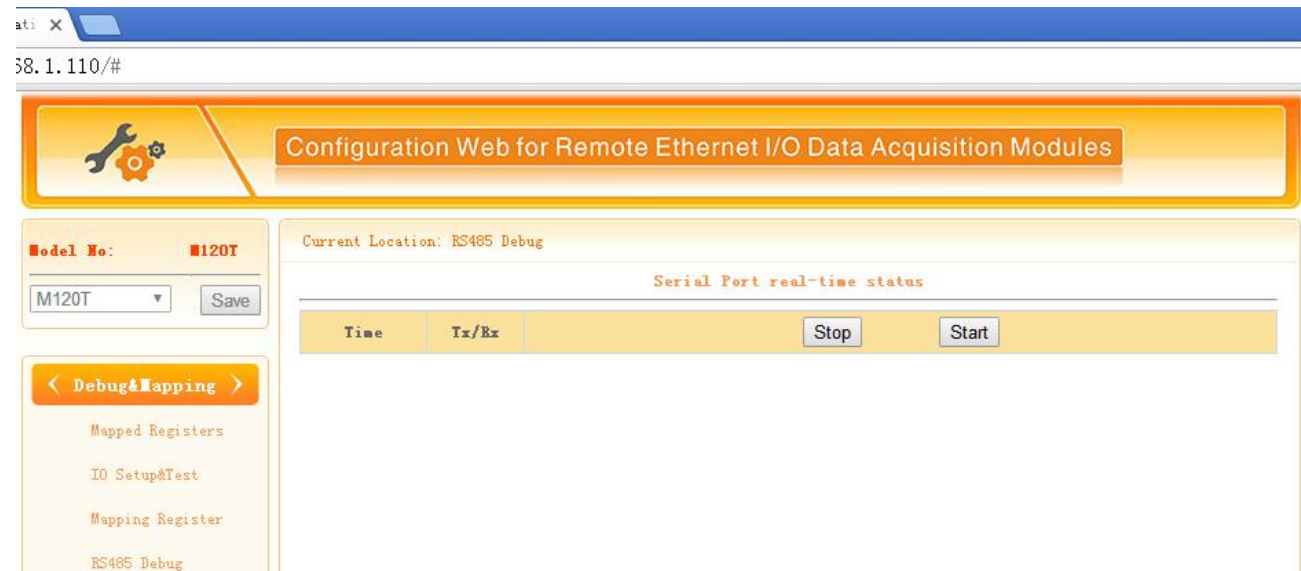
16-Bit Type Mapped Registers

Decimal Hexadecimal

Addr	0	1	2	3	4	5	6	7	8	9
100	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
110	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
120	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
130	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
140	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
150	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
160	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
170	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
180	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
190	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
200	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000

7.2.8 Serial Port Status

The user can quickly debug and monitor the serial communication data by this page; it is useful for the equipment debugging and installation. Click the Start button can start monitoring, after monitoring is completed, click Stop to exit the serial monitoring.



The screenshot shows a web interface for configuration. At the top, there's a title bar "ati x" and a URL "38.1.110/#". Below that is a navigation bar with a wrench icon and the text "Configuration Web for Remote Ethernet I/O Data Acquisition Modules". The main content area is divided into two sections. On the left, there's a sidebar with "Model No.: M120T" and a dropdown menu showing "M120T" with a "Save" button. Below that is a "Debug & Mapping" section with links for "Mapped Registers", "IO Setup&Test", "Mapping Register", and "RS485 Debug". The right section is titled "Current Location: RS485 Debug" and "Serial Port real-time status". It features a table with columns "Time" and "Tx/Rx", and two buttons: "Stop" and "Start".

8. Register List, Modbus Function Code, Register Address, Data Type

The register address, Modbus function code, data type, usage, and precautions for this module are described in the following table.

8.1 Read Input Coil (Function Code 2: Read Coil)

Read Input Coil (Function Code 2: Read Coil)			
Channel	Register Address	Data Type	Description
DIN 1	0	1Bit	DIN1 Value, Read Only,0=Open,1=Close.
DIN 2	1	1Bit	DIN2 Value, Read Only,0=Open,1=Close.
DIN 3	2	1Bit	DIN3 Value, Read Only,0=Open,1=Close.



Industrial Ethernet Remote I/O Module IoT Data Acquisition Module

DIN 4	3	1Bit	DIN4 Value, Read Only,0=Open,1=Close.
DIN 5	4	1Bit	DIN5 Value, Read Only,0=Open,1=Close.
DIN 6	5	1Bit	DIN6 Value, Read Only,0=Open,1=Close.
DIN 7	6	1Bit	DIN7 Value, Read Only,0=Open,1=Close.
DIN 8	7	1Bit	DIN8 Value, Read Only,0=Open,1=Close.
DIN 9	8	1Bit	DIN9 Value, Read Only,0=Open,1=Close.
DIN 10	9	1Bit	DIN10 Value, Read Only,0=Open,1=Close.
DIN 11	10	1Bit	DIN11 Value, Read Only,0=Open,1=Close.
DIN 12	11	1Bit	DIN12 Value, Read Only,0=Open,1=Close.
DIN 13	12	1Bit	DIN13 Value, Read Only,0=Open,1=Close.
DIN 14	13	1Bit	DIN14 Value, Read Only,0=Open,1=Close.
DIN 15	14	1Bit	DIN15 Value, Read Only,0=Open,1=Close.
DIN 16	15	1Bit	DIN16 Value, Read Only,0=Open,1=Close.
Notice	This Table corresponds to all MxxT series models, some of the models do not exist in the corresponding channel then its register address is empty. For example, if DIN1 and DIN2 are available for M100T, the DIN3 to DIN16 registers are empty.		

8.2 Read and Write Holding Coil (Function Code 1: Read Coil, Function Code 5: Write Single Coil, Function Code 15: Write multi Coils.)

<i>Read and Write Holding Coil (Function Code 1, Function Code, Function Code 15.)</i>			
Channel	Register Address	Data Type	Description
DO 1	0	1Bit	DO1 Value, Read/Write, 0=Open,1=Close.
DO 2	1	1Bit	DO2 Value, Read/Write, 0=Open,1=Close.
DO 3	2	1Bit	DO3 Value, Read/Write, 0=Open,1=Close.
DO 4	3	1Bit	DO4 Value, Read/Write, 0=Open,1=Close.
DO 5	4	1Bit	DO5 Value, Read/Write, 0=Open,1=Close.
DO 6	5	1Bit	DO6 Value, Read/Write, 0=Open,1=Close.
DO 7	6	1Bit	DO7 Value, Read/Write, 0=Open,1=Close.
DO 8	7	1Bit	DO8 Value, Read/Write, 0=Open,1=Close.
DO 9	8	1Bit	DO9 Value, Read/Write, 0=Open,1=Close.
DO 10	9	1Bit	DO10 Value, Read/Write, 0=Open,1=Close.
DO 11	10	1Bit	DO11 Value, Read/Write, 0=Open,1=Close.
DO 12	11	1Bit	DO12 Value, Read/Write, 0=Open,1=Close.



Industrial Ethernet Remote I/O Module IoT Data Acquisition Module

DO 13	12	1Bit	DO13 Value, Read/Write, 0=Open,1=Close.
DO 14	13	1Bit	DO14 Value, Read/Write, 0=Open,1=Close.
DO 15	14	1Bit	DO15 Value, Read/Write, 0=Open,1=Close.
DO 16	15	1Bit	DO16 Value, Read/Write, 0=Open,1=Close.
Notice	This Table corresponds to all MxxT series models, some of the models do not exist in the corresponding channel then its register address is empty. For example, if DIN1 and DIN2 are available for M100T, the DIN3 to DIN16 registers are empty.		

8.3 Read Input Register (Function Code 4: Read Input Register.)

<i>Read Input Register (Function Code 4: Read Input Register.)</i>			
Channel	Register Address	Data Type	Description
AIN1/RTD 1	0	1 Word	AIN1/RTD1 Value, Read Only.
AIN2/RTD 2	1	1 Word	AIN2/RTD2 Value, Read Only.
AIN3/RTD 3	2	1 Word	AIN3/RTD3 Value, Read Only.
AIN4/RTD 4	3	1 Word	AIN4/RTD4 Value, Read Only.
AIN5/RTD 5	4	1 Word	AIN5/RTD5 Value, Read Only.
AIN6/RTD 6	5	1 Word	AIN6/RTD6 Value, Read Only.
AIN7/RTD 7	6	1 Word	AIN7/RTD7 Value, Read Only.
AIN8/RTD 8	7	1 Word	AIN8/RTD8 Value, Read Only.
RTD 1	8	1 Word	After converted RTD1 Value, Read Only.
RTD 2	9	1 Word	After converted RTD2 Value, Read Only.
RTD 3	10	1 Word	After converted RTD3 Value, Read Only.
RTD 4	11	1 Word	After converted RTD4 Value, Read Only.
RTD 5	12	1 Word	After converted RTD5 Value, Read Only.
RTD 6	13	1 Word	After converted RTD6 Value, Read Only.
RTD 7	14	1 Word	After converted RTD7 Value, Read Only.
RTD 8	15	1 Word	After converted RTD8 Value, Read Only.
Reserved	16~25	1 Word	Reserved
Product Model	26	1 Word	Product Model Number
Product LOT	27	1 Word	Product LOT
Product SN	28	1 Word	Product Serial Number
Power On Times	29	1 Word	Power On Times
Hardware Version	30	1 Word	Hardware Version



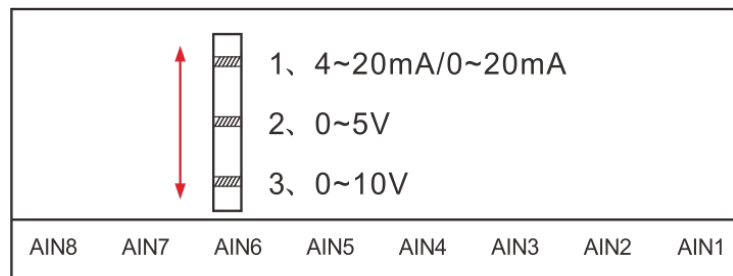
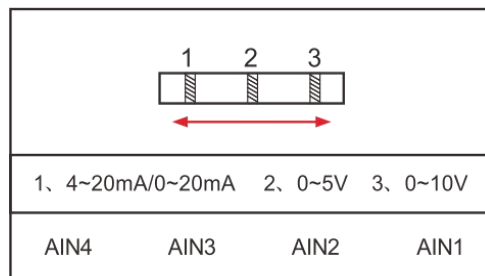
Industrial Ethernet Remote I/O Module IoT Data Acquisition Module

Firmware Version	31	1 Word	Firmware Version
Notice	This Table corresponds to all MxxT series models, some of the models do not exist in the corresponding channel then its register address is empty. For example, if DIN1 and DIN2 are available for M100T, the DIN3 to DIN16 registers are empty.		

Tips:

- 1) In the above table, the RTD input value provides ADC measurement value and converted value for choice.
- 2) AIN value is the ADC measurement value, the user can calculate its really value follow the below formula:
A) At the backside of the module, the user can choose the correct analog input type for each channel. Includes:
1 : 0-20mA/4-20mA; 2: 0-5V; 3: 0-10V .

Please set the switch to correct position according to the analog input transducer. The backside label is below:



B) According to the input type, following the below formula to calculate the real value of the transducer.

If the transducer measurement range is $b \sim a$, a =maximum measurement value, b = minimum measurement value. If the read ADC value= M , should calculate the real value= Y .

***If the channel input type is 0-20mA, the formula is:**

If $M > 4021$, then $Y = a$;

If $0 \leq M \leq 4021$, then $Y = M * (a - b) / 4021 + b$.

***If the channel input type is 4-20mA, the formula is:**

If $M > 4021$, then $Y = a$;

If $804 \leq M \leq 4021$, then $Y = (M - 804) * (a - b) / 3217 + b$;

If $M < 804$, then $Y = b$.

***If the channel input type is 0-5V, the formula is:**

If $M > 4006$, then $Y = a$;

If $0 \leq M \leq 4006$, then $Y = M * (a - b) / 4006 + b$.

***If the channel input type is 0-10V, the formula is:**

If $M > 4004$, then $Y = a$;

If $0 \leq M \leq 4004$, then $Y = M * (a - b) / 4004 + b$.

8.4 Read and Write Holding Register (Function Code 3: Read Holding Register, Function Code 6: Write single Holding Register, Function Code 16: Write multi Holding Registers)

Read and Write Holding Register (Function Code 3, Function Code 6, Function Code 16)			
Channel	Register Address	Data Type	Description
AO 1	0	1 Word	AO1/AO2 output value, resolution 12bits, Range = 0 -



Industrial Ethernet Remote I/O Module IoT Data Acquisition Module

AO 2	1	1 Word	4095 corresponds to output voltage 0-10V, Maximum loading is 1 Ampere.
DIN1Pulse Counter Trigger	2	1 Word	0= Falling, 1=Rising, can be changed in operation, after opto-coupler isolation will become low level trigger.
DIN1 Pulse Counter	3	1 Word	32Bits, register address 3 is High 16-bit, 4 is low 16-bit. Counting does not affect the normal input, DIN1 high-speed mode pulse frequency up to 700KHz, low-speed mode the frequency up to 10KHz. Can change the High-speed or low-speed by internal switch. Default is high-speed mode.
DIN1 Pulse Counter	4	1 Word	
DO1Pulse Counter	5	1 Word	32Bits, register address 5 is High 16-bit, 6 is low 16-bit, Read Only, automatically clear the value.
DO1 Pulse Counter	6	1 Word	
DO1Pulse Frequency	7	1 Word	1-30000, unit:10Hz, means the DO1 output frequency range is 10Hz-300KHz. Can be changed in operation.
DO1 Pulse Duty Ration	8	1 Word	Range=10-90, stands for pulse Duty Ration is 10%-90%. Cannot be 0% and 100%. Can be changed in operation. Recommend set as 20% while driving the motor.
DO2 Pulse Output Direction	9	1 Word	=1 stands for output high level, =0stands for output low level. Can be changed in operation.
DO1 Pulse Output Quantity	10	1 Word	32Bits, register address 10 is high 16-bit, 11 is low 16-bit. Range=0-4294967295. Only can be changed after finished present operation.
DO1 Pulse Output Quantity	11	1 Word	
DO1 Pulse Output Control	12	1 Word	0=No Action, 1=Output specified pulse quantity. 2= Continuous output pulse. Complete the action automatically reset to zero, the user can read the register to determine whether the action is complete.
Reserved	13~31	1 Word	Reserved
Notice	This Table corresponds to all MxxT series models, some of the models do not exist in the corresponding channel then its register address is empty. For example, if DIN1 and DIN2 are available for M100T, the DIN3 to DIN16 registers are empty.		

8.5 Mapping Register----Transit BIT Register Address (Function Code 1: Read Coil, Function Code 5: Write Single Coil, Function Code 15: Write multi Coils.)

Transit BIT Register Address (Function Code 1, Function Code 5, Function Code 15.)		
Transit BIT Register Address	Data Type	Description
100~399	1Bit	The BIT type mapping registers in the internal memory of the module. Used to store the serial port slave and TCP Client exchange data.
Notice	Cannot Read and write the same address.	

8.6 Mapping Register----Transit 16-Bit Register Address(Function Code 3: Read Holding Register, Function Code 6: Write single Holding Register, Function Code 16: Write multi Holding Registers)



Industrial Ethernet Remote I/O Module IoT Data Acquisition Module

<i>Transit 16-Bit Register Address(Function Code 3;, Function Code 6, Function Code 16)</i>		
Transit 16-Bit Register Address	Data Type	Description
100~399	1 Word	The 16-Bit type mapping registers in the internal memory of the module. Used to store the serial port slave and TCP Client exchange data.
Notice	Cannot Read and write the same address.	

9. Warranty

- 1) This module is warranted to be free of defects in material and workmanship for one year.
- 2) This warranty does not extend to any defect, malfunction or failure caused by abuse or misuse by the Operating Instructions. In no event shall the manufacturer be liable for any module altered by purchasers

The End!

Any questions please help to contact us feel free.

[Http://www.GPRS-M2M.com](http://www.GPRS-M2M.com)