ET-2200 Series Ethernet I/O Modules User Manual

Ethernet I/O Module Ver. 1.6.0, Mar. 2023

ICPCON
ET-2260
PWR
D/O
D/I

WARRANTY

All products manufactured by ICP DAS are warranted against defective materials for a period of one year from the date of delivery to the original purchaser.

WARNING

ICP DAS assumes no liability for damages consequent to the use of this product. ICP DAS reserves the right to change this manual at any time without notice. The information furnished by ICP DAS is believed to be accurate and reliable. However, no responsibility is assumed by ICP DAS for its use, nor for any infringements of patents or other rights of third parties resulting from its use.

COPYRIGHT

Copyright © 2020 by ICP DAS. All rights are reserved.

TRADEMARK

Names are used for identification only and may be registered trademarks of their respective companies.

CONTACT US

If you have any questions, please feel free to contact us via email at: service@icpdas.com

TABLE OF CONTENTS

1. INTRODUCTION 6
- 1.1 Packing List 6
- 1.2 Features 7
- 1.3 Application 11

2. HARDWARE INFORMATION 12
- 2.1 Appearance 12
- 2.2 Specification 15
- 2.3 Wiring Connections 17
- 2.4 Wiring to the Connector 18
- 2.5 Dimensions 19

3. GETTING STARTED 24
- 3.1 Configuring the Boot Mode 24
- 3.2 Connecting the Power and the Host PC 25
- 3.3 Configuring the Network Settings 26
- 3.4 Modbus TCP Testing 28

4. WEB CONFIGURATION 30
- 4.1 Logging into the Web Server 30
- 4.2 Home 32
  - 4.2.1 Home – DI/DO 32
  - 4.2.2 Home – AI 33
  - 4.2.3 Home – AO 34
- 4.3 Network 35
  - 4.3.1 IP Address Configuration 35
  - 4.3.2 General Settings 39
  - 4.3.3 Restore Factory Defaults/Firmware Update 40
- 4.4 I/O Settings 43
  - 4.4.1 DO Control 43
  - 4.4.2 DI/DO Configuration 44
  - 4.4.3 Analog Input Configuration 47
  - 4.4.4 Analog Input Calibration 48
  - 4.4.5 RTC 49

- 4.4.6 Data Logger 49
- 4.4.7 Analog Output Configuration 51
- 4.5 Sync 52
  - 4.5.1 DIO Synchronization 52
- 4.6 PWM 54
  - 4.6.1 PWM Configuration 54
- 4.7 MQTT (AI) 55
- 4.8 Pair Connection 56
  - 4.8.1 I/O Pair-Connection Settings 56
- 4.9 Filter 59
  - 4.9.1 Filter Settings 59
- 4.10 Monitor 60
- 4.11 Change Password 61
- 4.12 Logout 62
- 4.13 MQTT 63
  - 4.13.1 Connectivity Settings 64
  - 4.13.2 Publication Settings 66
  - 4.13.3 Restore Factory Defaults 67
- 4.14 MQTT-DO 68
  - 4.14.1 MQTT – Digital Outputs 69
  - 4.14.2 Readbacks of the Digital Outputs 70
- 4.15 MQTT-DI 71
  - 4.15.1 MQTT – Digital Inputs 72
- 4.16 MQTT-AI 73
- 4.17 MQTT- Realization 74
  - 4.17.1 Set up Mosquitto 74
  - 4.17.2 Introduction to MQTTLens 80
  - 4.17.3 ET-2200 Periodic Publish Realization 83
- 4.18 SNMP 85
  - 4.18.1 SNMP Configuration Setting 86
  - 4.18.2 SNMP Specific Trap 87
  - 4.18.3 SNMP I/O Example 89
  - 4.18.4 SNMP Trap Example 94
  - 4.18.5 SNMP Problem Solving 96

5. I/O PAIR CONNECTION APPLICATIONS 98
- 5.1 One Module Polling the Remote DI/DO (1-to-1, Pull / Push Mode) 98
  - 5.1.1 Pull Mode 100
  - 5.1.2 Push Mode 101
- 5.2 Two Modules Pushing the Local DI to each other (1-to-1, Push Mode) 102
- 5.3 Several Modules Pulling the Remote DI (M-to-1) (Pull Mode) 105
- 5.4 Several Modules Pushing the Local DI (M-to-1) (Push Mode) 108
- 5.5 Shared Memory 111
  - 5.5.1 Address Mapping for Shared Memory 112
  - 5.5.2 Application of spreading the load 113
  - 5.5.3 Master/Slave/MTCP/MUDP Data Exchange 115
  - 5.5.4 Bits / Registers Data Exchange 116

6. MODBUS INFORMATION 117
- 6.1 What is Modbus TCP/IP? 117
- 6.2 Modbus Message Structure 118
  - 6.2.1 01(0x01) Read the Status of the Coils (Read DO Readback values) 121
  - 6.2.2 02(0x02) Read the Status of the Input (Read DI values) 123
  - 6.2.3 03(0x03) Read the Holding Registers (Read AO Readback values) 125
  - 6.2.4 04(0x04) Read the Input Registers (Read AI values) 127
  - 6.2.5 05(0x05) Force a Single Coil (Write DO value) 129
  - 6.2.6 06(0x06) Set a Single Register (Write AO value) 131
  - 6.2.7 15(0x0F) Force Multiple Coils (Write DO values) 133
  - 6.2.8 16(0x10) Set Multiple Registers (Write AO values) 135
- 6.3 Modbus Register Table (For DIO Module) 137
  - 6.3.1 Common Functions 137
  - 6.3.2 Specific Functions 139
- 6.4 Modbus Register Table (For AIO Module) 143
  - 6.4.1 Modbus Register Table for (P)ET-2217 143
  - 6.4.2 Modbus Register Table for ET-2217CI 147
  - 6.4.3 Modbus Register Table for (P)ET-2224/2228 150
- 6.5 Analog Input Type and Data Format Table 153

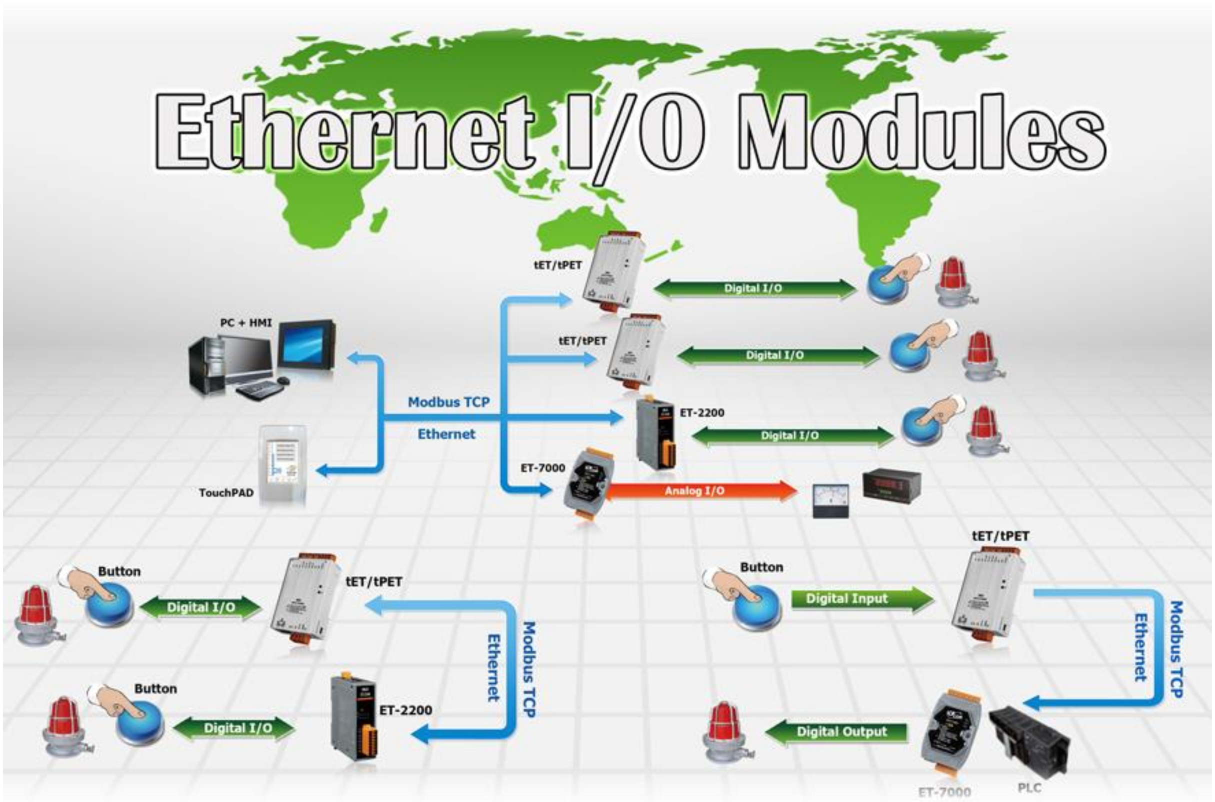
APPENDIX A: TROUBLESHOOTING 154
- A.1 How do I restore the web password for the module to the factory defaults? 154
- A.2 How to update the firmware via Ethernet? 156

A.3 Why is the Host computer unable to ping or search for the ET-2200 module? 159

A.4 What is Digital-Input Filter (DI Filter)? 160

APPENDIX B: REVISION HISTORY 161

1. Introduction


Ethernet I/O Modules
tET/tPET
Digital I/O
PC + HMI
tET/tPET
Digital I/O
Modbus TCP
Ethernet
ET-2200
Digital I/O
TouchPAD
ET-7000
Analog I/O
tET/tPET
Button
tET/tPET
Button
Digital Input
Digital I/O
Ethernet
Modbus TCP
Ethernet
Modbus TCP
Button
ET-2200
Digital I/O
Digital Output
ET-7000
PLC

The ET-2200 series modules, an IP-based Ethernet I/O module, feature a built-in web server that allows configuration, I/O monitoring, and I/O control by simply using a regular web browser. In addition, the ET-2200 also supports Modbus TCP/UDP protocol that makes perfect integration to SCADA software.

1.1 Packing List

The shipping package includes the following items:

ET-2200 Module x 1

Quick Start x 1

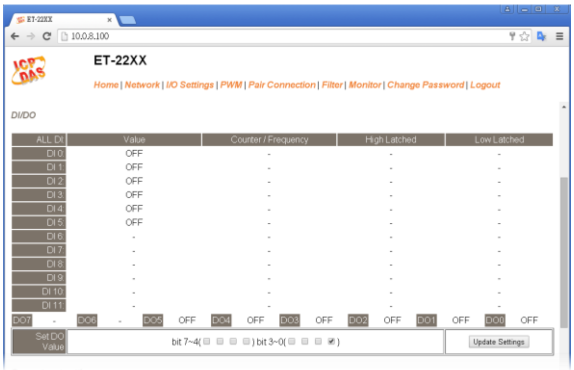
Note:

If any of these items are missing or damaged, please contact the local distributor for more information. Save the shipping materials and cartons in case you need to ship the module in the future.

1.2 Features

1. Built-in Web Server

The ET-2200 series module has a built-in web server that allows users to easily configure, monitor, and control the module from a remote location using a web browser.



ET-22XX
10.0.8.100

ET-22XX

Home | Network | I/O Settings | PWM | Pair Connection | Filter | Monitor | Change Password | Logout

DI/DO

ALL DI	Value	Counter / Frequency	High Latched	Low Latched
DI 0	OFF	-	-	-
DI 1	OFF	-	-	-
DI 2	OFF	-	-	-
DI 3	OFF	-	-	-
DI 4	OFF	-	-	-
DI 5	OFF	-	-	-
DI 6	-	-	-	-
DI 7	-	-	-	-
DI 8	-	-	-	-
DI 9	-	-	-	-
DI 10	-	-	-	-
DI 11	-	-	-	-

DO7 - DO6 - DO5 OFF DO4 OFF DO3 OFF DO2 OFF DO1 OFF DO0 OFF

Set DO Value: bit 7~4(☐ ☐ ☐ ☐) bit 3~0(☐ ☐ ☐ ☑)

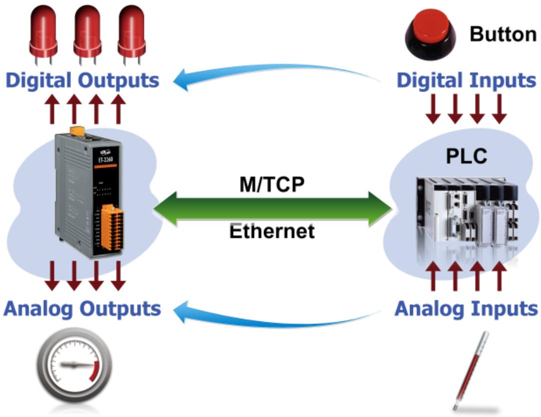
Update Settings

2. Modbus TCP/UDP, MQTT, or SNMP Protocols

The Modbus TCP and Modbus UDP slave functions on the Ethernet port can be used to provide data to remote SCADA software. All DI/DO modules and some AI/AO modules support MQTT and SNMP V2c protocols.

3. I/O Pair Connection (Push and Pull)

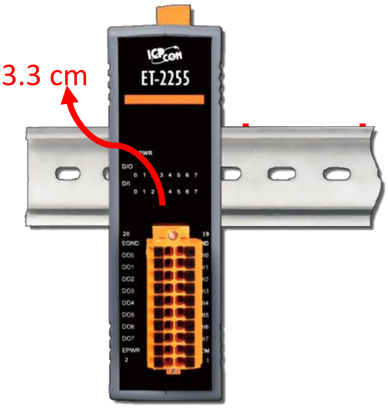
This function is used to create a DI to DO pair through the Ethernet. Once the configuration is completed, the ET-2200 module can continuously pull the status of the remote DI device using the Modbus TCP protocol and then write to local DO channels in the background.



Button
Digital Outputs
Digital Inputs
PLC
M/TCP
Ethernet
Analog Outputs
Analog Inputs

4. Slim-Type Housing

The ET-2200 modules are slim-type housing with about 3.3 cm in width. Compared with the palm-size module that has about 7 cm in width, more slim-type ET-2200 modules can be installed on the same DIN-Rail space.



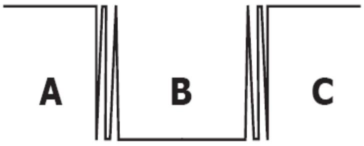
3.3 cm
ET-2255

5. Built-in Multi-function I/O

- All **Digital Output** modules provide:
  - A **Power-on Value:** On boot-up, the digital output value is set as the Power-on value.
  - A Safe Value: If Modbus TCP communication is lost for a specific time, the digital output value will be set as the user-defined safe value.
  - A **PWM Function**: The digital output channels support PWM (pulse generation) function that can be configured with different frequencies (100 Hz Max.) and different duty cycles for each channel. The term “High Duty Cycle” describes the duration of 'on' time in proportion to the regular interval or 'period' of time. Similarly, the term “Low Duty Cycle” corresponds to the duration of the 'off' time. Consequently, it is not necessary to keep switching from ON to OFF from a remote controller. In this way, the ET-2200 series module reduces the complexity required for the control system and enhances timing accuracy.

Note: Because of the characteristics of the relay functions, it is recommended that the PWM on modules with relay functions is not used for extended periods.

- All **Digital Input** modules provide:
  - **Digital input channels can also be used as 32-bit high-speed (3 kHz) counters.**
  - **High/Low Latched Status Commands:** The modules provide commands to read the status of any digital input channels that are latched high or latched low. The following is an example that shows the usefulness of the latched digital input. If we wish to read a keystroke from a key switch connected to the digital input channel of a module, the input signal of the keystroke is a pulse signal as shown in the figure.

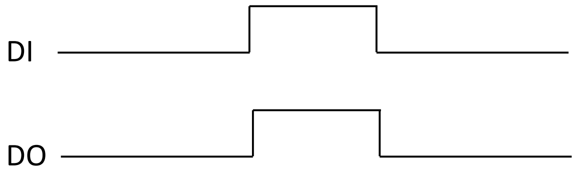


    If we just use the read digital input status command to read the signal and cannot send the command during the B period for some reasons, then we will lose the keystroke information. However, with the read-latched digital input command, we can still get the keystroke information even if we are not able to send the command in the B period.

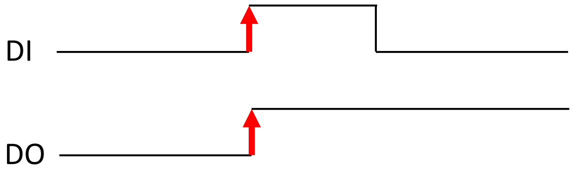
  - **Frequency Measurement**:
    ET-2200 series modules also provide a frequency measurement function that retrieves the digital input counter value at specific times and calculates the frequency. rather than polling via a remote host, the ET-2200 series modules can determine the frequency directly, reducing the communication delay caused by two ends and also improving the accuracy of the frequency measurement. To apply for more applications, this module provides 3 scan modes and 4 moving average methods for the user to select the best way in their applications.

- **DIO Synchronization (Mirror Local DI to DO)**: ET-2200 series modules also provide a DIO synchronization function. The DIO synchronization is divided into three modes: **Level Sync**, **Rising Active,** and **Falling Active**.

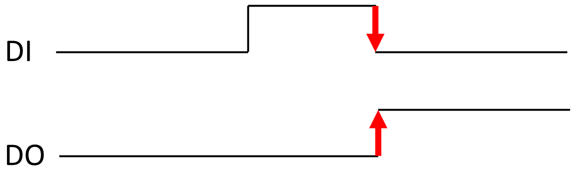
  - **Level Sync (DO = DI)** Mode: The synchronization operation in DI and DO.



  - **Rising Active (DO = ON)** Mode: When the specified DI state is from OFF to ON, the corresponding DO will be set to ON.



  - **Falling Active (DO = ON)** Mode: When the specified DI state is from ON to OFF, the corresponding DO will be set to ON.



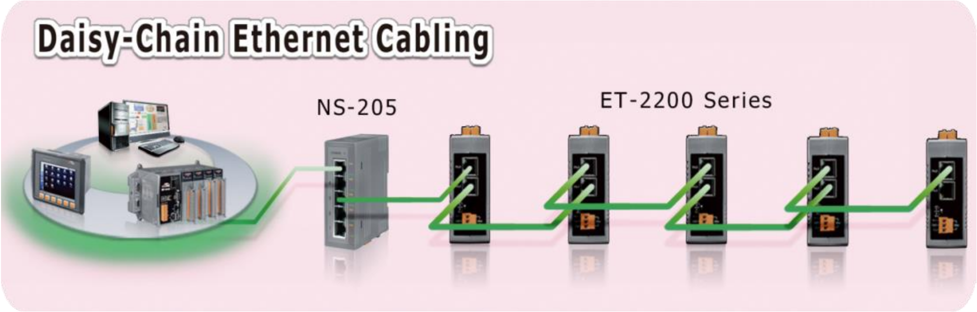
6. Built-in Dual Watchdog

The Dual Watchdog consists of a CPU Watchdog (for hardware functions) and a Host Watchdog (for software functions).

- **CPU Watchdog** automatically resets itself when the built-in firmware runs abnormally.
- **Host Watchdog** set the digital output with a predefined safe value when there is no communication between the module and host (PC or PLC) over a while (Watchdog timeout).

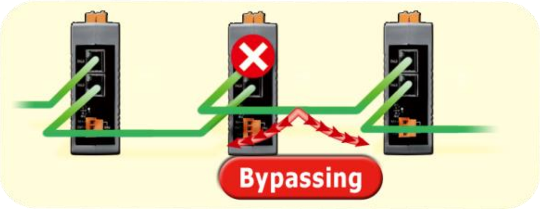
7. Daisy-chain Ethernet Cabling

The ET-2200 has a built-in two-port Ethernet switch to implement daisy-chain topology. The cabling is much easier and the total costs of cable and switch are significantly reduced.


Daisy-Chain Ethernet Cabling
NS-205
ET-2200 Series

8. LAN Bypass

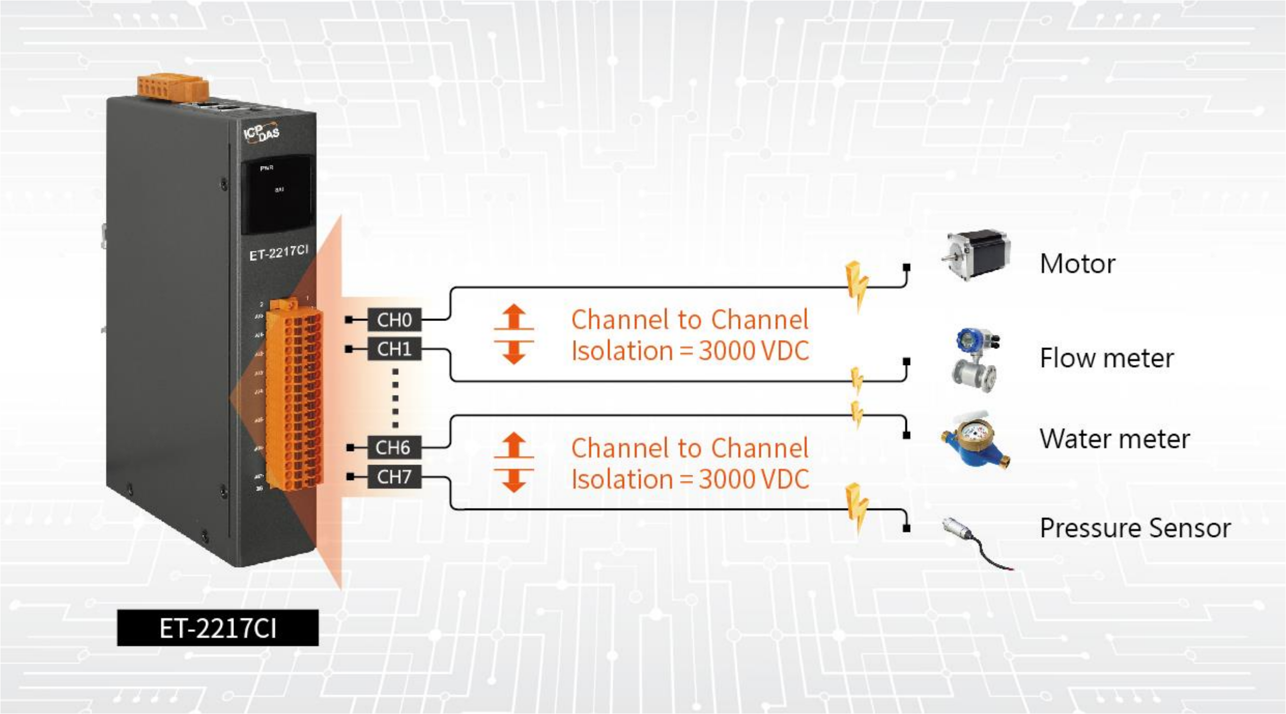
LAN Bypass feature guarantees Ethernet communication. It will automatically be active to continue the network traffic when the ET-2200 loses its power.



9. Highly Reliable Under Harsh Environment

- Wide Operating Temperature Range: -25 ~ +75°C
- Storage Temperature: -40 ~ +80°C
- Humidity 10 ~ 90% RH (Non-condensing)

1.3 Application

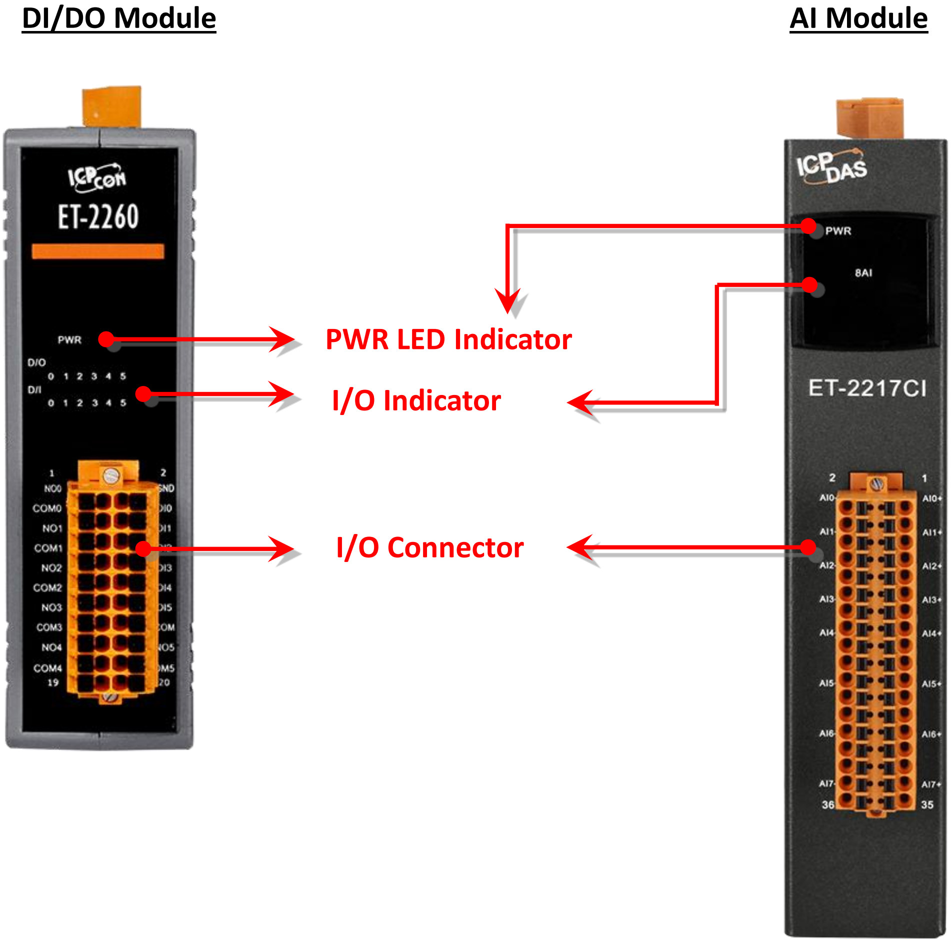

ET-2217CI
CH0
CH1
CH6
CH7
Channel to Channel
Isolation = 3000 VDC
Channel to Channel
Isolation = 3000 VDC
Motor
Flow meter
Water meter
Pressure Sensor
ET-2217CI

2. Hardware Information

2.1 Appearance

The front panel and top panel of the ET-2200 module contain the I/O connector, LEDs, Ethernet Port, and power connector.

Front Panel


DI/DO Module
AI Module
ICPCON
ET-2260
PWR
D/O
D/I
0 1 2 3 4 5
0 1 2 3 4 5
ICP DAS
PWR
8AI
ET-2217CI
PWR LED Indicator
I/O Indicator
I/O Connector

- **PWR LED Indicator**

Once power is supplied to the ET-2200 series module, the system LED indicator will illuminate.

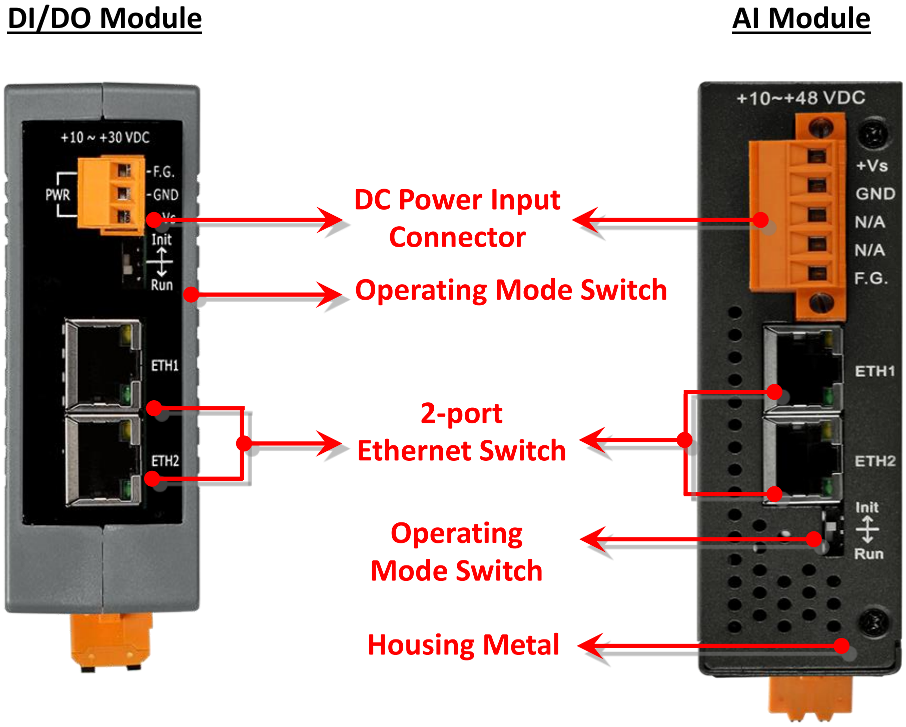
- **I/O Indicator**

The exact design and functionality depend on the module type which indicates the I/O status.

● I/O Connector

For more detailed information regarding the pin assignments for the I/O connector, refer to Section 2.3 “Pin Assignments”.

Top Panel


DI/DO Module
AI Module
+10 ~ +30 VDC
PWR
F.G.
GND
Vs
Init
Run
ETH1
ETH2
+10~+48 VDC
+Vs
GND
N/A
N/A
F.G.
ETH1
ETH2
Init
Run
DC Power Input Connector
Operating Mode Switch
2-port Ethernet Switch
Operating Mode Switch
Housing Metal

● DC Power Input Connector

The definition for **“+Vs”** and **“GND”** for use as the power supply applies to all types of ET-2200 series modules.

The valid power voltage range is from **+10 to +30 V_{DC}** or **+10 to +48 V_{DC}**.
(Refer to Section 2.2.1)

The definition for “F.G.” (Frame Ground):
Electronic circuits are constantly vulnerable to Electrostatic Discharge (ESD), which becomes worse in a continental climate area. ET-2200 series module features a new design for the frame ground, which provides a path that bypasses ESD, resulting in an enhanced ESD protection capability and ensuring that the module is more reliable.

● Operating Mode Switch

Init Mode: Use factory default settings for troubleshooting.

Run Mode: Use customer settings for normal operations.

The default setting of the operating mode is set to "Run". Refer to Section 3.1 “Configuring the Boot Mode" for more information.

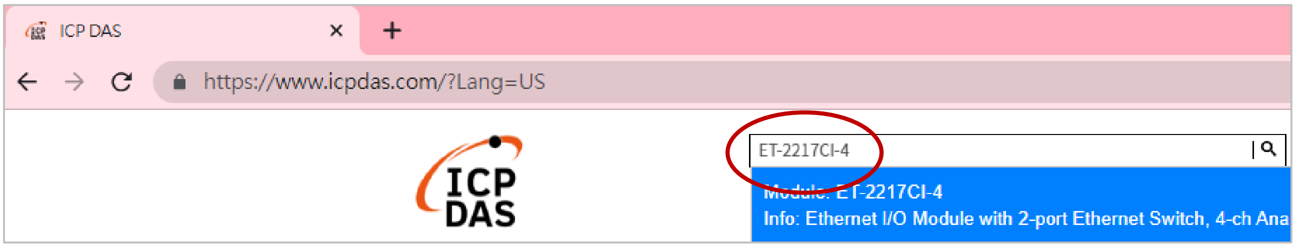
● 2-Port Ethernet Switch

The ET-2200 series modules are equipped with two RJ-45 10/100 Base-TX Ethernet switch ports. When an Ethernet link is detected and an Ethernet packet is received, the **Green LED** indicator and the **Yellow LED** indicator will be illuminated.

2.2 Specification

Product Page

The user can enter the model in the search bar on the website (https://www.icpdas.com/) to find out the product page.



ICP DAS
https://www.icpdas.com/?Lang=US
ICP DAS

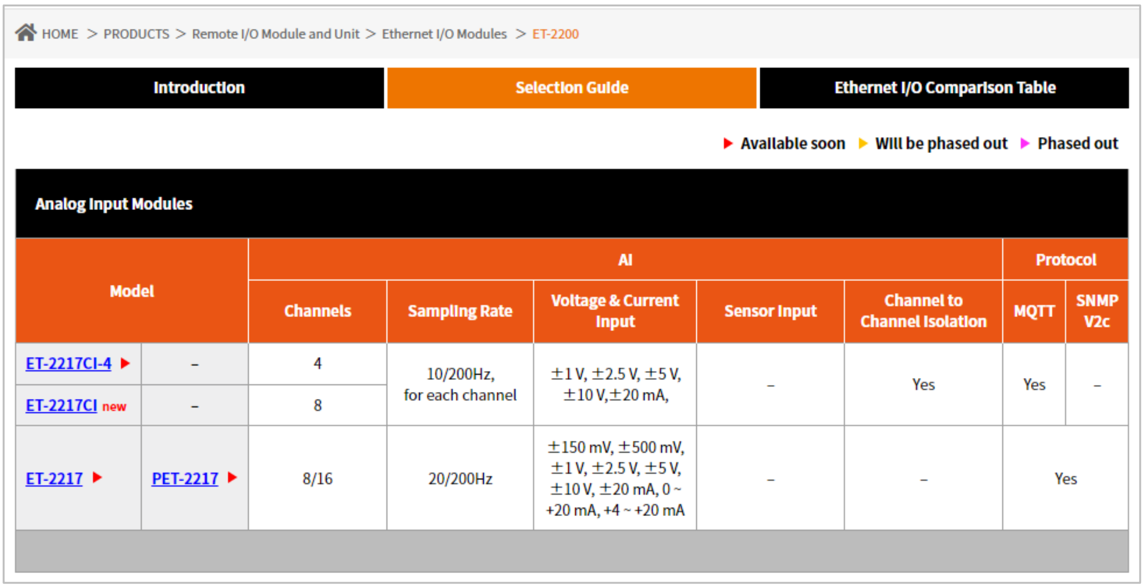
ET-2217CI-4

Module: ET-2217CI-4

Info: Ethernet I/O Module with 2-port Ethernet Switch, 4-ch Ana

ET-2200 Selection Guide:

https://www.icpdas.com/en/product/guide+Remote__I_O__Module__and__Unit+Ethernet__I_O__Modules+ET-2200#2724



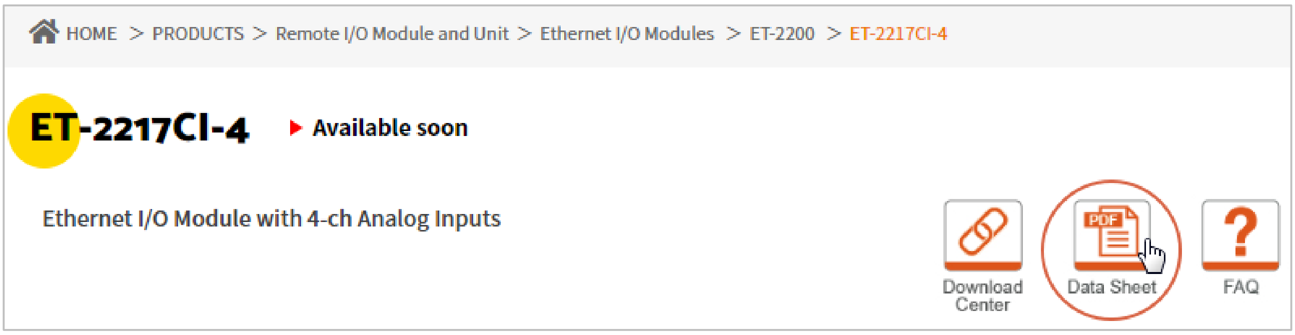
HOME > PRODUCTS > Remote I/O Module and Unit > Ethernet I/O Modules > ET-2200
Introduction
Selection Guide
Ethernet I/O Comparison Table

▶ Available soon ▶ Will be phased out ▶ Phased out

Analog Input Modules

Model		AI					Protocol	
		Channels	Sampling Rate	Voltage & Current Input	Sensor Input	Channel to Channel Isolation	MQTT	SNMP V2c
ET-2217CI-4 ▶	–	4	10/200Hz, for each channel	±1 V, ±2.5 V, ±5 V, ±10 V,±20 mA,	–	Yes	Yes	–
ET-2217CI new	–	8						
ET-2217 ▶	PET-2217 ▶	8/16	20/200Hz	±150 mV, ±500 mV, ±1 V, ±2.5 V, ±5 V, ±10 V, ±20 mA, 0 ~ +20 mA, +4 ~ +20 mA	–	–	Yes	

Also, click the "Data Sheet" icon on the product page to find out the information on Dimensions, Pin Assignments, and Wire Connections.



HOME > PRODUCTS > Remote I/O Module and Unit > Ethernet I/O Modules > ET-2200 > ET-2217CI-4
ET-2217CI-4
▶ Available soon
Download Center
PDF
Data Sheet
FAQ

Ethernet I/O Module with 4-ch Analog Inputs

Data Sheet:

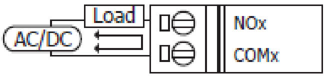
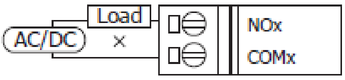
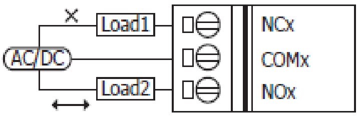
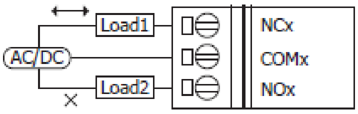
The following table lists the URL of the data sheet for the relevant models.

Model	File Name
www.icpdas.com/web/product/download/io_and_unit/ethernet/et2200/document/data_sheet/	
Analog Input Modules	
ET-2217CI-4, ET-2217CI	ET-2217CI-4_ET-2217CI_en.pdf
ET-2217, PET-2217	(P)ET-2217_en.pdf
Analog Output Modules	
ET-2224, PET-2224, ET-2228, PET-2228	(P)ET-2224_(P)ET-2228_en.pdf
ET-2224CI, ET-2228CI	ET-2224CI_ET-2228CI_en.pdf
Digital I/O Modules	
ET-2242, PET-2242, ET-2242-32, PET-2242-32	(P)ET-2242_(P)ET-2242-32_en.pdf
ET-2242U	ET-2242U_en.pdf
ET-2251, PET-2251, ET-2251-32, PET-2251-32	(P)ET-2251_(P)ET-2251-32_en.pdf
ET-2254, PET-2254, ET-2254P, PET-2254P	(P)ET-2254_(P)ET-2254P_en.pdf
ET-2255, PET-2255, ET-2255-32, PET-2255-32	(P)ET-2255_(P)ET-2255-32_en.pdf
ET-2255U, PET-2255U	(P)ET-2255U_en.pdf
Relay Output/Digital Input Modules	
ET-2260, PET-2260	(P)ET-2260_en.pdf
ET-2261, PET-2261	(P)ET-2261_en.pdf
ET-2261-16	ET-2261-16_en.pdf
ET-2268	ET-2268_en.pdf

2.3 Wiring Connections

The user can find out the Wire Connections diagram for each model in the data sheet on the website.

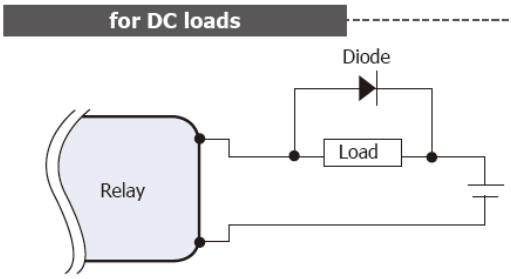
Wire Connections

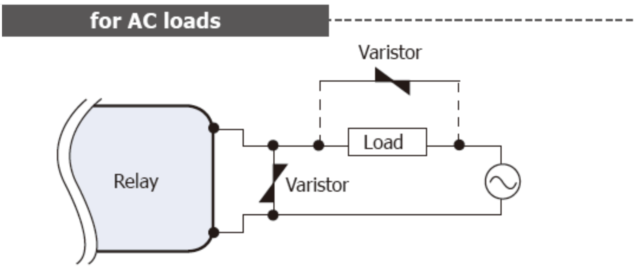
Relay Output	ON State Readback as 1	OFF State Readback as 0
Form A Relay in NO1, NO3, NO4, NO7		
Form C Relay in NO0, NO2, NO4, NO6		

AC/DC
Load
NOx
COMx
Load1
Load2
NCx

Note for the ET-2260/2261/2261-16/2268:

When inductive loads are connected to the relays, a large counter electromotive force may occur when the relay actuates because of the energy stored in the load. These flyback voltages can severely damage the relay contacts and greatly shorten the relay life. Limit these flyback voltages at your inductive load by installing a flyback diode for DC loads or a metal oxide varistor for AC loads.


for DC loads
Diode
Load
Relay

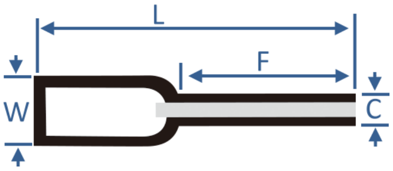

for AC loads
Varistor
Load
Relay
Varistor

Varistor Selection:

Operating Voltage	Varistor Voltage	Max. Peak Current
100 ~ 120 V_{AC}	240 ~ 270 V_{AC}	> 1000 A
200 ~ 240 V_{AC}	440 ~ 470 V_{AC}	> 1000 A

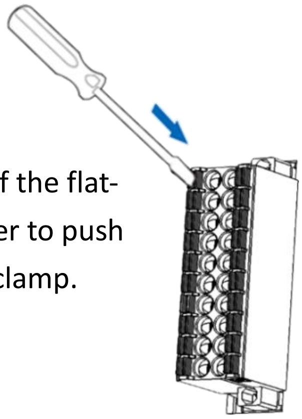
2.4 Wiring to the Connector

- **Insulated Terminals Dimensions:**



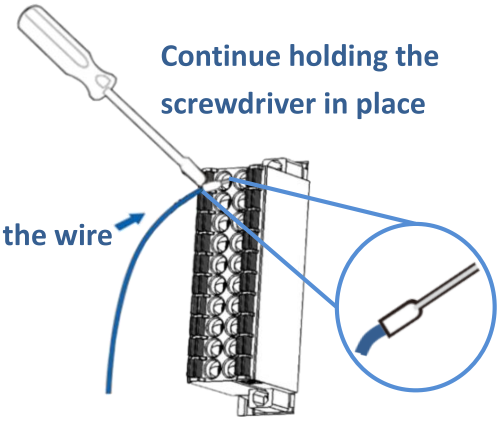
Dimensions (Unit: mm)				
Item NO.	F	L	C	W
CE007512	12.0	18.0	1.2	2.8

- **A tip for connecting the wire to the connector**



1. Use the blade of the flat-head screwdriver to push down the wire clamp.

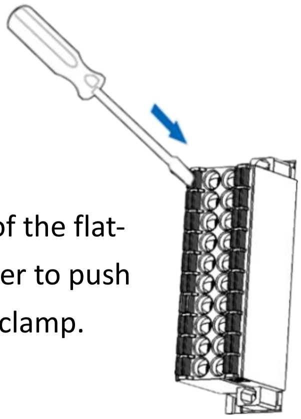
2. While holding the screwdriver in place, insert the wire into the terminal block.



Continue holding the screwdriver in place

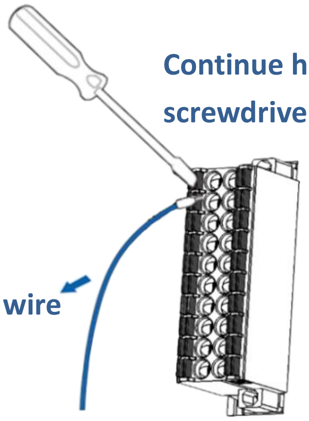
Insert the wire

- **A tip for removing the wire from the connector**



1. Use the blade of the flat-head screwdriver to push down the wire clamp.

2. While holding the screwdriver in place, remove the wire from the terminal block.



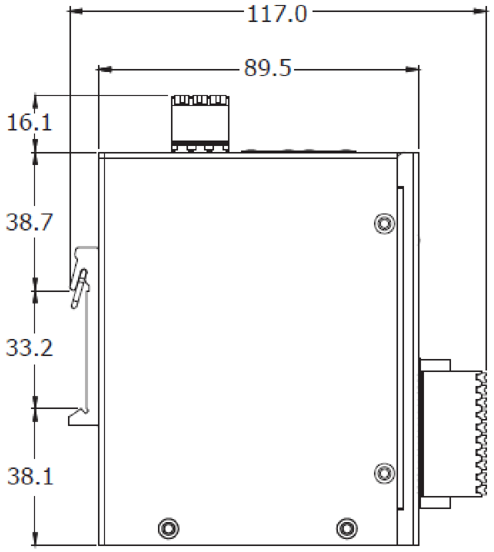
Continue holding the screwdriver in place

Remove the wire

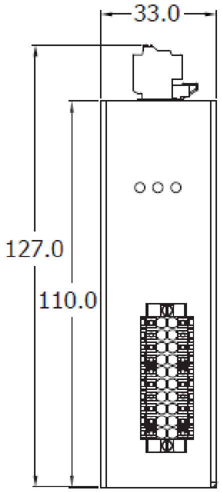
2.5 Dimensions

The following diagrams provide the dimensions of the ET-2200 series module and can be used as a reference when defining the specifications for any custom enclosures. All dimensions are in millimeters.

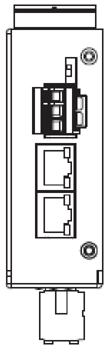
- **(P)ET-2217:**



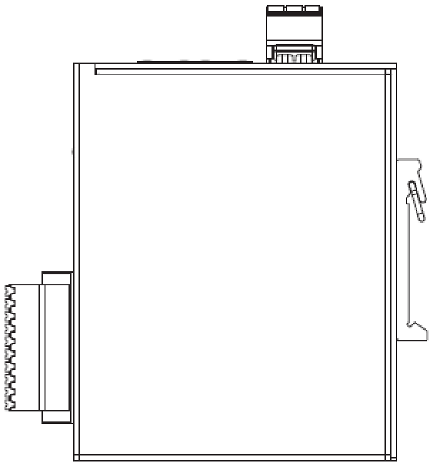
Right Side View



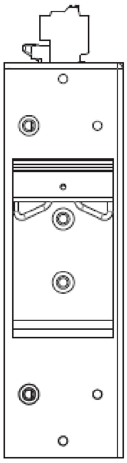
Front View



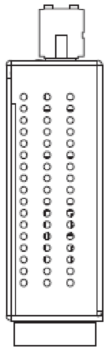
Top View



Left Side View

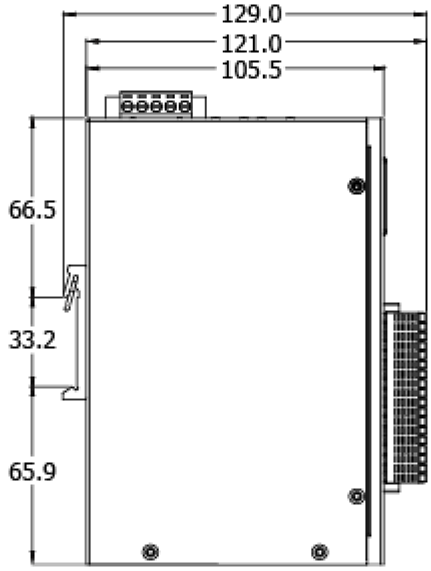


Rear View

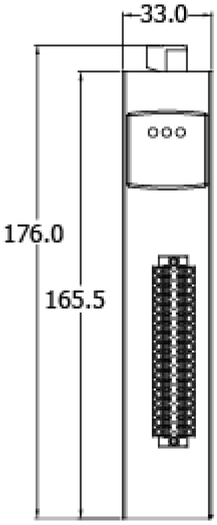


Bottom View

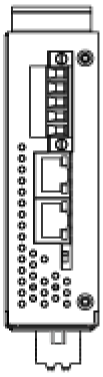
- **ET-2217CI, ET-2217CI-4, ET-2224CI, ET-2228CI:**


129.0
121.0
105.5
66.5
33.2
65.9

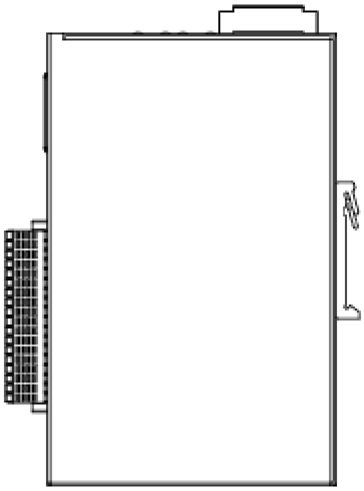
Right Side View


33.0
176.0
165.5

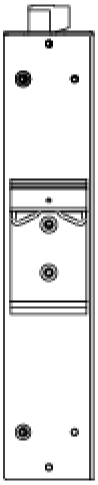
Front View



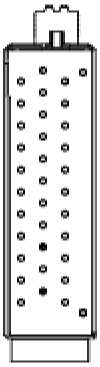
Top View



Left Side View

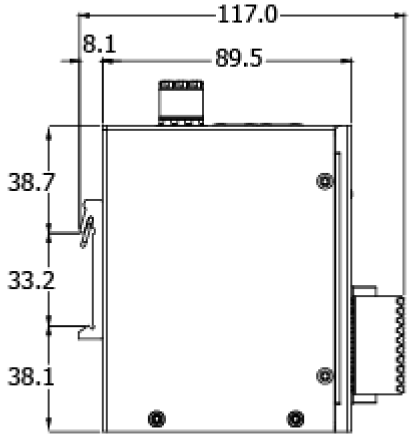


Rear View

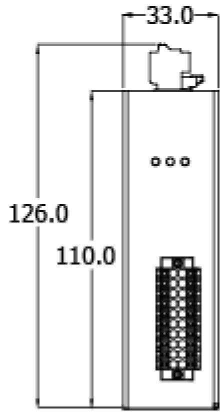


Bottom View

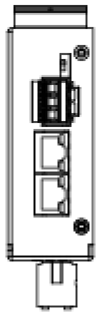
- **(P)ET-2224, (P)ET-2228:**


117.0
8.1
89.5
38.7
33.2
38.1

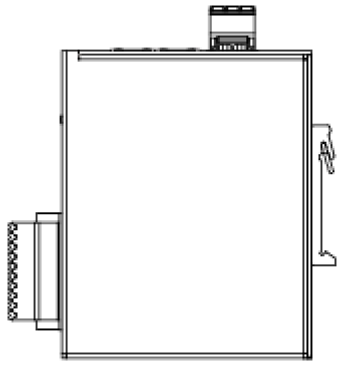
Right Side View


33.0
126.0
110.0

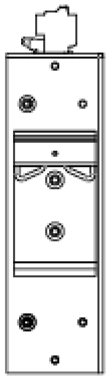
Front View



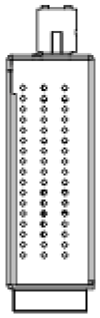
Top View



Left Side View

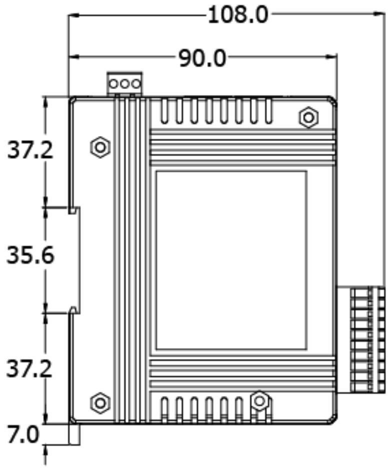


Rear View

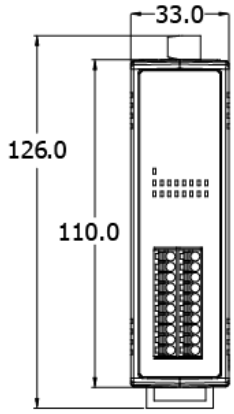


Bottom View

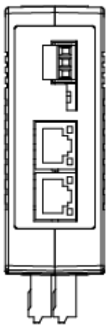
- **(P)ET-2242, ET-2242U, ET-2254(P), (P)ET-2255, ET-2255U, ET-2260, ET-2261, ET-2268:**


108.0
90.0
37.2
35.6
37.2
7.0

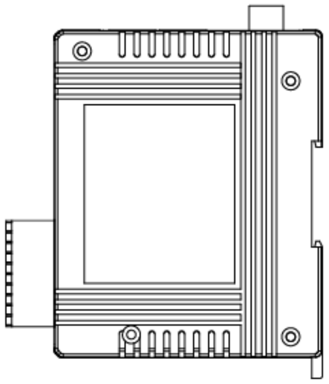
Right Side View


33.0
126.0
110.0

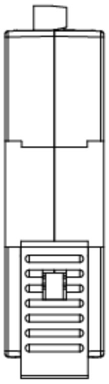
Front View



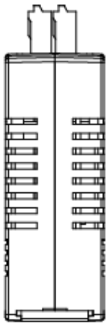
Top View



Left Side View

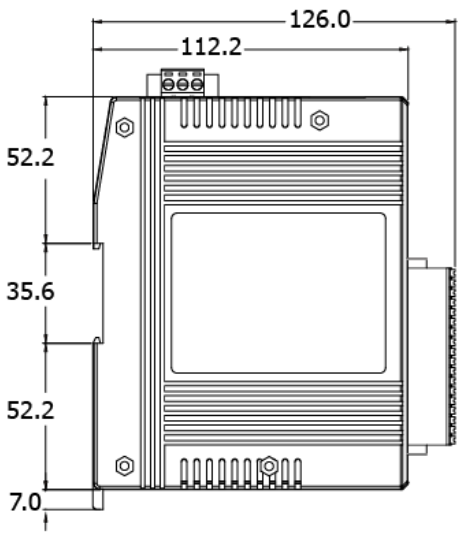


Rear View

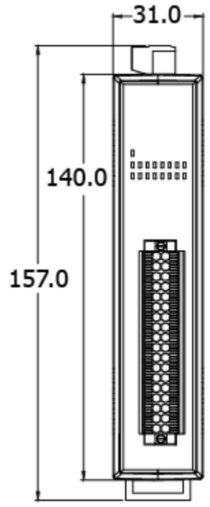


Bottom View

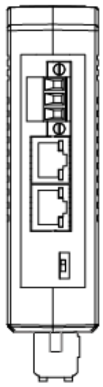
- **(P)ET-2242-32, (P)ET-2251-32, (P)ET-2255-32, ET-2261-16:**


126.0
112.2
52.2
35.6
52.2
7.0

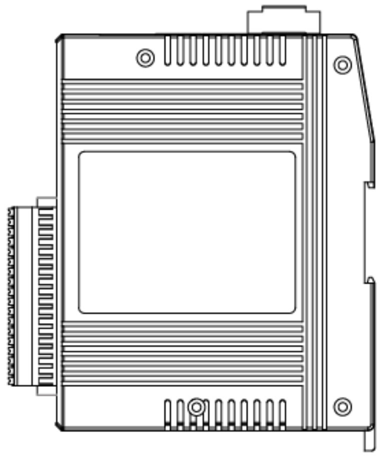
Right Side View


31.0
140.0
157.0

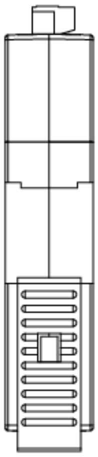
Front View



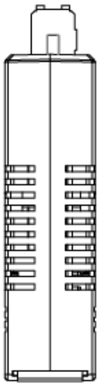
Top View



Left Side View



Rear View



Bottom View

3. Getting Started

This chapter provides a basic overview of how to configure and operate your ET-2200 series module.

3.1 Configuring the Boot Mode

The ET-2200 series modules have two operating modes that can be selected by using the switch mechanism incorporated into the chassis.

Note that the module must be rebooted after changing the operating mode.

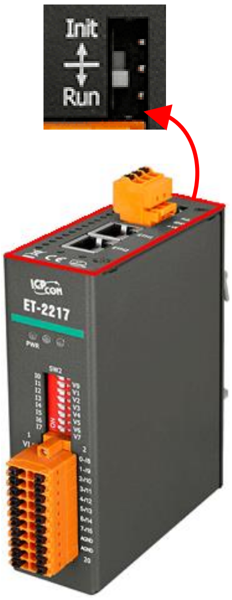
➢ Init Mode

Init Mode should only be selected for troubleshooting:

1. Put the switch in the **"Init"** position and then reboot the module to load factory settings.
2. Use eSearch Utility to reconfigure the module's network settings.
3. Put the switch back in the **"Run"** position and then reboot the module to work in Run mode.

➢ Run Mode

Run Mode is the default operating mode and should be used in most cases.



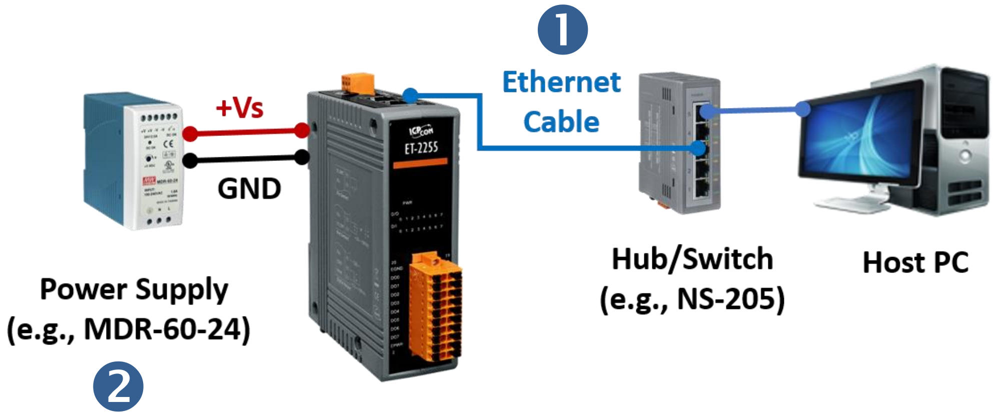
3.2 Connecting the Power and the Host PC

Step 1: Connect both the ET-2200 module and the Host PC to the same sub-network or the same Ethernet Switch

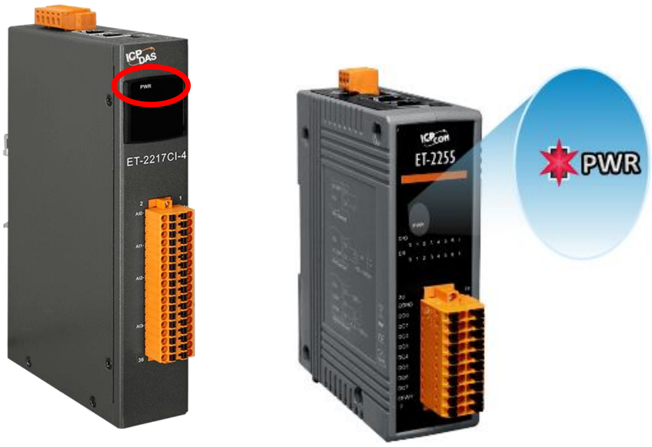
Ensure that the network settings on the Host PC have been correctly configured and are functioning normally. Ensure that the Windows firewall or any Anti-Virus firewall is properly configured to allow incoming connections, or temporarily disable these functions, otherwise, the **"Search Servers"** function in the eSearch Utility described in Section 3.3 "Configuring the Network Settings" may not perform as expected. Contact the System Administrator for instructions on how to do this.

Step 2: Apply power to the ET-2200. The valid power voltage range depends on the ET-2200 series module.

Note: PET-2200 can use with the PoE switch.


❶
Ethernet Cable
+Vs
GND
ET-2255
Hub/Switch (e.g., NS-205)
Host PC
Power Supply (e.g., MDR-60-24)
❷

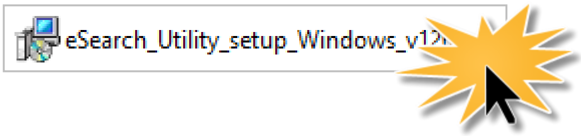
Step 3: Verify that the "PWR" LED indicator on the ET-2200 module is flashing


ET-2217CI-4
ET-2255
PWR

3.3 Configuring the Network Settings

Step 1: Get the eSearch Utility

The eSearch Utility can be obtained from the ICP DAS website at:


eSearch_Utility_setup_Windows_v1.2

https://www.icpdas.com/en/download/index.php?nation=US&kind1=&model=&kw=eSearch

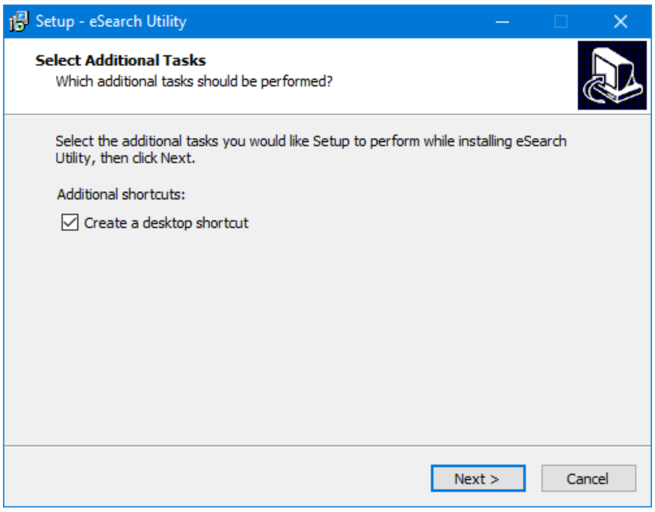
Step 2: Install the eSearch Utility

Follow the steps as suggested by the eSearch setup wizard to finish the installation.

eSearch Utility

After the installation has been completed, a new shortcut for the eSearch Utility will be displayed on your desktop.

Double-click the icon to run eSearch Utility.



Setup - eSearch Utility

Select Additional Tasks

Which additional tasks should be performed?

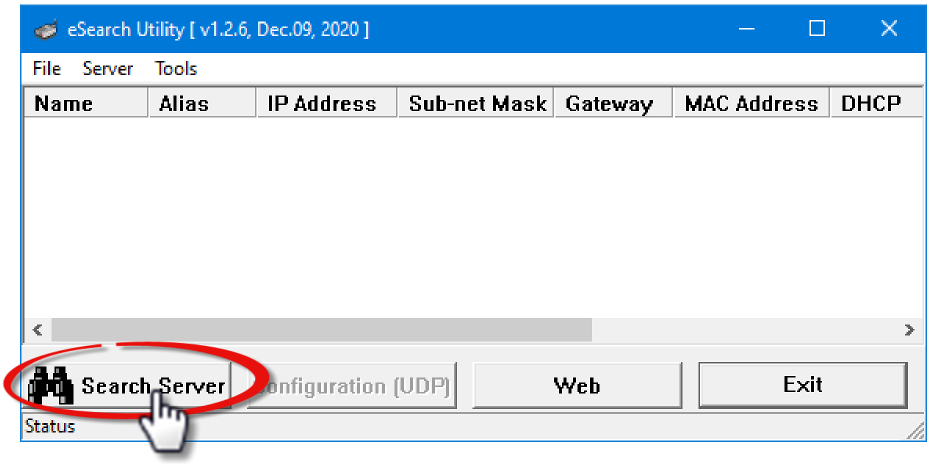
Select the additional tasks you would like Setup to perform while installing eSearch Utility, then click Next.

Additional shortcuts:

☑ Create a desktop shortcut

Next >
Cancel

Step 3: Click the "Search Servers" button to search for the ET-2200 module



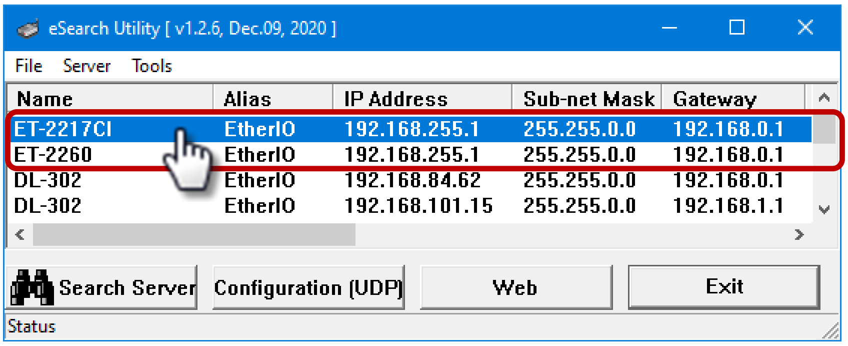
eSearch Utility [v1.2.6, Dec.09, 2020]

File
Server
Tools
Name
Alias
IP Address
Sub-net Mask
Gateway
MAC Address
DHCP
Search Server
onfiguration (UDP)
Web
Exit
Status

Step 4: Once the search process is complete, double-click the name of the ET-2200 module to open the "Configure Server (UDP)" dialog box

Factory Default Settings for the ET-2200 Series, as follows:

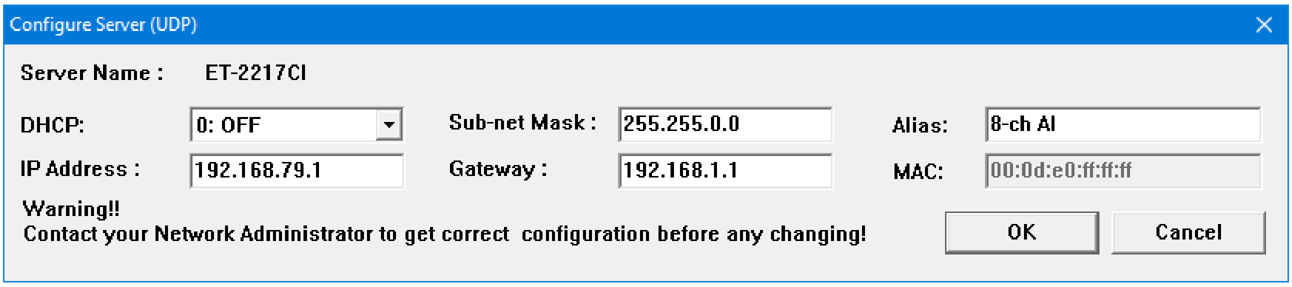
IP	192.168.255.1
Gateway	192.168.0.1
Mask	255.255.0.0


eSearch Utility [v1.2.6, Dec.09, 2020]
File
Server
Tools
Search Server
Configuration (UDP)
Web
Exit
Status

Name	Alias	IP Address	Sub-net Mask	Gateway
ET-2217CI	EtherIO	192.168.255.1	255.255.0.0	192.168.0.1
ET-2260	EtherIO	192.168.255.1	255.255.0.0	192.168.0.1
DL-302	EtherIO	192.168.84.62	255.255.0.0	192.168.0.1
DL-302	EtherIO	192.168.101.15	255.255.0.0	192.168.1.1

Step 5: Assign a new IP address and then click the "OK" button.

Enter the relevant values for the **IP Address, Subnet Mask and Gateway**, etc., and then click the **"OK"** button. The new settings for the ET-2200 module will take effect within 2 seconds. Contact your Network Administrator If the configuration is unknown.


Configure Server (UDP)
OK
Cancel

Server Name : ET-2217CI

DHCP: 0: OFF

IP Address : 192.168.79.1

Sub-net Mask : 255.255.0.0

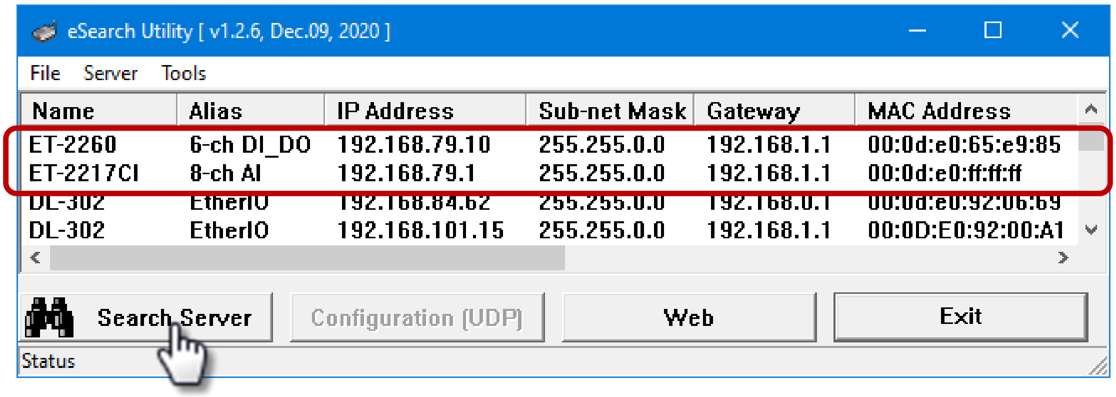
Gateway : 192.168.1.1

Alias: 8-ch AI

MAC: 00:0d:e0:ff:ff:ff

Warning!!
Contact your Network Administrator to get correct configuration before any changing!

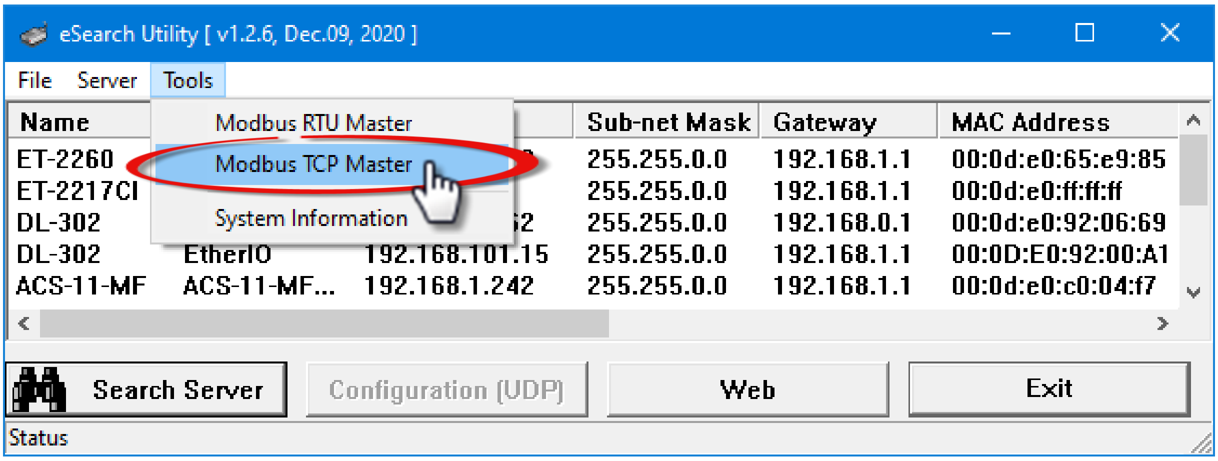
Step 6: Wait for 2 seconds and then click the "Search Servers" button again to ensure that the ET-2200 module is operating correctly using the new configuration


eSearch Utility [v1.2.6, Dec.09, 2020]
File
Server
Tools
Search Server
Configuration (UDP)
Web
Exit
Status

Name	Alias	IP Address	Sub-net Mask	Gateway	MAC Address
ET-2260	6-ch DI_DO	192.168.79.10	255.255.0.0	192.168.1.1	00:0d:e0:65:e9:85
ET-2217CI	8-ch AI	192.168.79.1	255.255.0.0	192.168.1.1	00:0d:e0:ff:ff:ff
DL-302	EtherIO	192.168.84.62	255.255.0.0	192.168.0.1	00:0d:e0:92:06:69
DL-302	EtherIO	192.168.101.15	255.255.0.0	192.168.1.1	00:0D:E0:92:00:A1

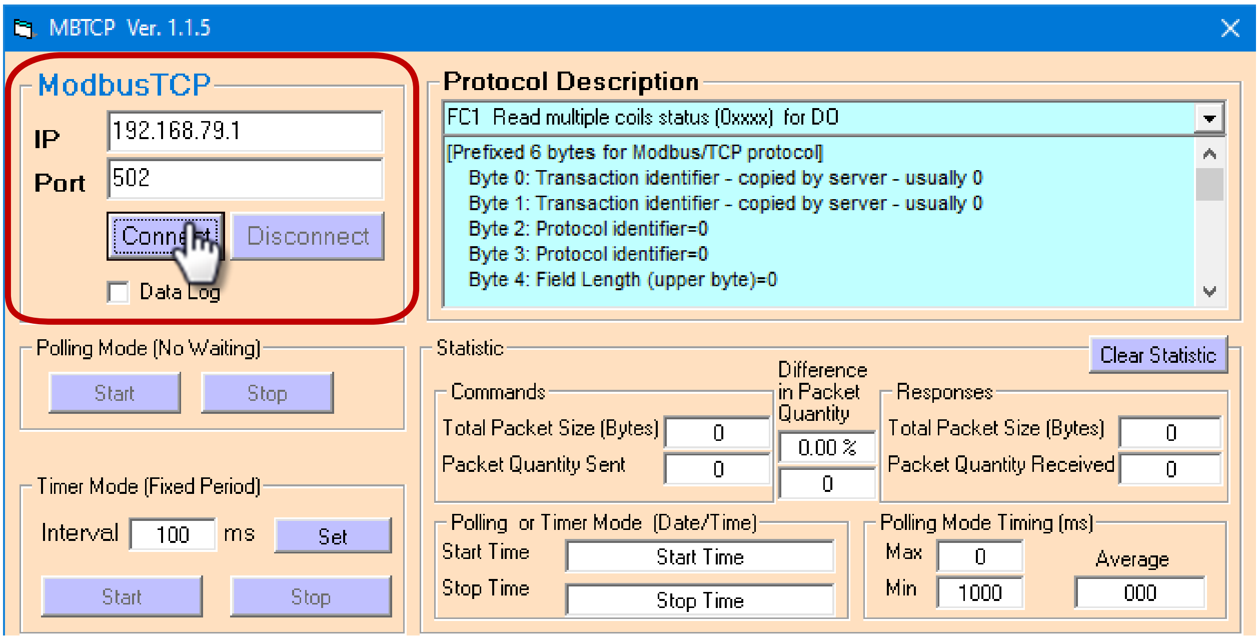
3.4 Modbus TCP Testing

Step 1: In the eSearch Utility, Select the "Modbus TCP Master" item from the "Tools" menu to open the Modbus TCP Master Utility.


eSearch Utility [v1.2.6, Dec.09, 2020]
File
Server
Tools
Modbus RTU Master
Modbus TCP Master
System Information
Search Server
Configuration (UDP)
Web
Exit
Status

Name			Sub-net Mask	Gateway	MAC Address
ET-2260			255.255.0.0	192.168.1.1	00:0d:e0:65:e9:85
ET-2217CI			255.255.0.0	192.168.1.1	00:0d:e0:ff:ff:ff
DL-302			255.255.0.0	192.168.0.1	00:0d:e0:92:06:69
DL-302	EtherIO	192.168.101.15	255.255.0.0	192.168.1.1	00:0D:E0:92:00:A1
ACS-11-MF	ACS-11-MF...	192.168.1.242	255.255.0.0	192.168.1.1	00:0d:e0:c0:04:f7

Step 2: Enter the IP address and TCP Port for the ET-2200 module in the "Modbus TCP" section, and then click the "Connect" button to connect to the ET-2200.


MBTCP Ver. 1.1.5
ModbusTCP
Connect
Disconnect
Protocol Description
Polling Mode (No Waiting)
Start
Stop
Timer Mode (Fixed Period)
Set
Start
Stop
Statistic
Clear Statistic
Commands
Responses
Polling or Timer Mode (Date/Time)
Polling Mode Timing (ms)

IP 192.168.79.1

Port 502

☐ Data Log

FC1 Read multiple coils status (0xxxx) for DO

```
[Prefixed 6 bytes for Modbus/TCP protocol]
    Byte 0: Transaction identifier - copied by server - usually 0
    Byte 1: Transaction identifier - copied by server - usually 0
    Byte 2: Protocol identifier=0
    Byte 3: Protocol identifier=0
    Byte 4: Field Length (upper byte)=0
```

Interval 100 ms

Total Packet Size (Bytes) 0

Packet Quantity Sent 0

Difference in Packet Quantity 0.00 % 0

Total Packet Size (Bytes) 0

Packet Quantity Received 0

Start Time: Start Time

Stop Time: Stop Time

Max 0

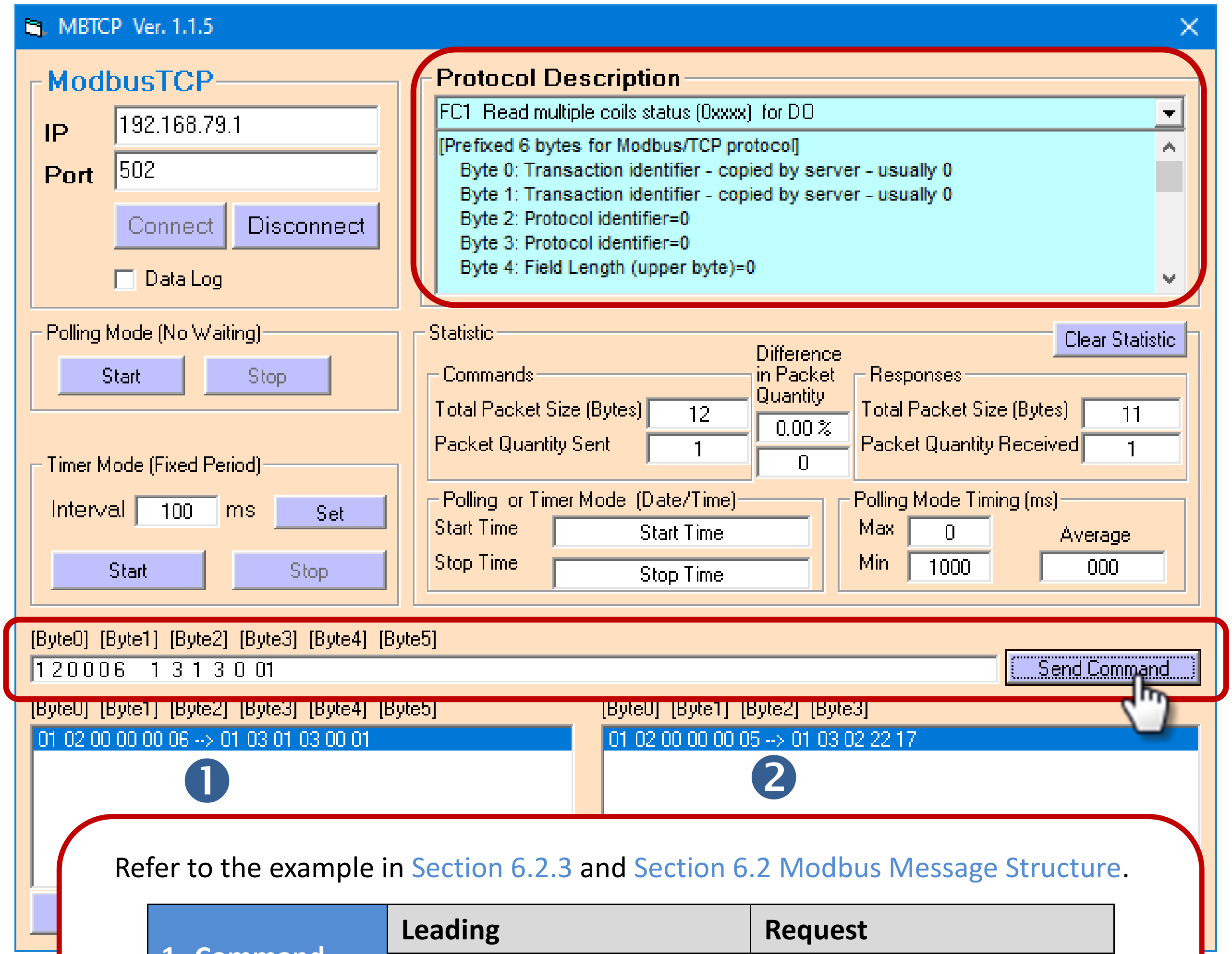
Min 1000

Average 000

Step 3: Refer to the "Protocol Description" field in the top right-hand section of the Modbus Utility windows. You can send a request command and confirm that the response is correct.

Example:

The Modbus NetID for the ET-2200 is **1** (refer to Section 4.3.1). Please send the command "1 2 0 0 0 6   1 3 1 3 01" and the response will be "1 2 0 0 0 5 1 3 2 **22 17**" which indicates the model is 2217.


MBTCP Ver. 1.1.5
ModbusTCP
Connect
Disconnect
Protocol Description
Polling Mode (No Waiting)
Start
Stop
Timer Mode (Fixed Period)
Set
Start
Stop
Statistic
Clear Statistic
Commands
Difference in Packet Quantity
Responses
Polling or Timer Mode (Date/Time)
Polling Mode Timing (ms)
Send Command
❶
❷

IP 192.168.79.1

Port 502

☐ Data Log

FC1 Read multiple coils status (0xxxx) for DO

```
[Prefixed 6 bytes for Modbus/TCP protocol]
   Byte 0: Transaction identifier - copied by server - usually 0
   Byte 1: Transaction identifier - copied by server - usually 0
   Byte 2: Protocol identifier=0
   Byte 3: Protocol identifier=0
   Byte 4: Field Length (upper byte)=0
```

Interval 100 ms

Total Packet Size (Bytes) 12

Packet Quantity Sent 1

0.00 %

0

Total Packet Size (Bytes) 11

Packet Quantity Received 1

Start Time: Start Time

Stop Time: Stop Time

Max 0

Min 1000

Average 000

```
[Byte0] [Byte1] [Byte2] [Byte3] [Byte4] [Byte5]
1 2 0 0 0 6   1 3 1 3 0 01
```

```
[Byte0] [Byte1] [Byte2] [Byte3] [Byte4] [Byte5]
01 02 00 00 00 06 --> 01 03 01 03 00 01
```

```
[Byte0] [Byte1] [Byte2] [Byte3]
01 02 00 00 00 05 --> 01 03 02 22 17
```

Refer to the example in Section 6.2.3 and Section 6.2 Modbus Message Structure.

1. Command	**Leading**	**Request**
	01 02 00 00 00 06	01 03 01 03 00 01
2. Response	**Leading**	**Response**
	01 02 00 00 00 05	01 03 02 **22 17**

4. Web Configuration

All ET-2200 series modules contain an advanced embedded web configuration system that provides I/O accessibility to the ET-2200 series module via a web browser.

4.1 Logging into the Web Server

You can access the embedded ET-2200 series web server from any computer that has an Internet connection.

Step 1: Laugh web browser

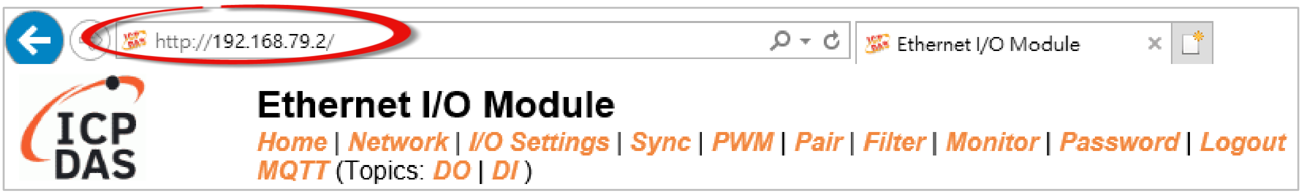
Open a standard web browser. For example, Mozilla Firefox, Google Chrome, and Internet Explorer are reliable and popular internet browsers that can be used to configure the ET-2200 series module.

Internet Explorer

Note that if you intend to use Internet Explorer, ensure that the cache function is disabled to avoid browser access errors.

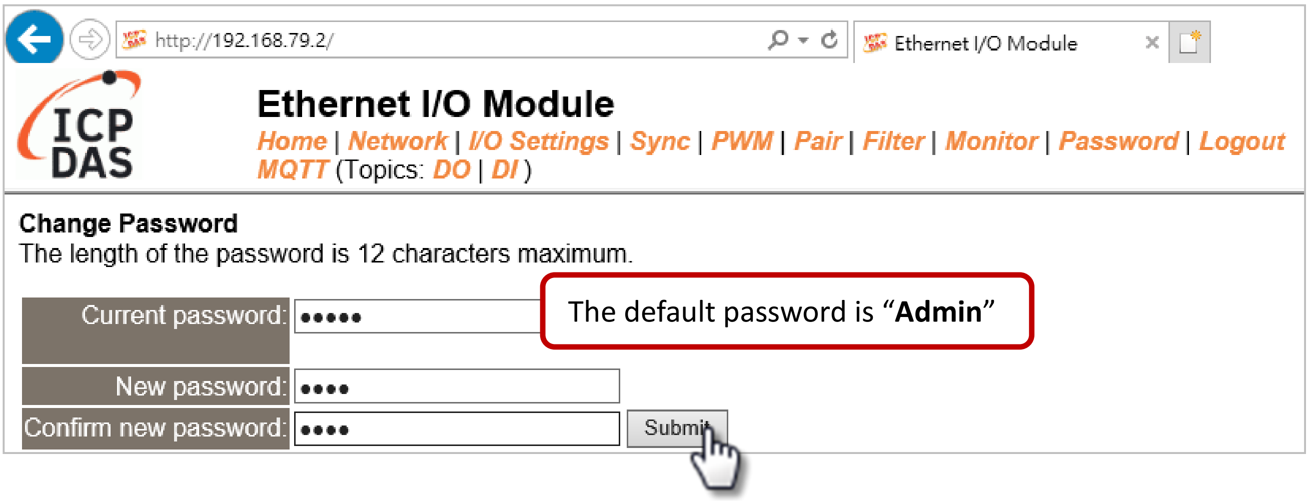
Step 2: Enter the URL for the ET-2200 module in the address bar of the browser or click the "Web" button in the eSearch Utility

Ensure that you have correctly configured the network settings for the ET-2200 series module, or refer to Section 3.3 "Configuring the Network Settings".


http://192.168.79.2/
Ethernet I/O Module
ICP DAS
Ethernet I/O Module
Home | Network | I/O Settings | Sync | PWM | Pair | Filter | Monitor | Password | Logout
MQTT (Topics: DO | DI)

Step 3: Enter the password to log into the ET-2200 Web Server

Once the login screen is displayed, enter the password in the related fields (the default password is "**Admin**"), and then click the **"Submit"** button to enter the configuration web page.


http://192.168.79.2/
Ethernet I/O Module
ICP DAS
Ethernet I/O Module
Home | Network | I/O Settings | Sync | PWM | Pair | Filter | Monitor | Password | Logout
MQTT (Topics: DO | DI)
Submit

Change Password
The length of the password is 12 characters maximum.

Current password: •••••
New password: ••••
Confirm new password: ••••

The default password is "**Admin**"

Refer to Section 4.10 "Change Password" if you want to change the password. After logging into the ET-2200 web server, the main page will be displayed. See Section 4.2 for more information.

Function Tabs for I/O Modules:

Note: "MQTT" is not available for ET-2217/ET-2224/ET-2228.

Function Tabs	**DI**	**DO**	**AI**	**AO**
Home	O	O	O	O
Network	O	O	O	O
I/O Settings	O	O	O	O
MQTT	O	O	O	Note
Syn	O	O	-	-
PWM	O	O	-	-
Pair	O	O	O	O
Filter	O	O	O	O
Monitor	O	O	O	O
Password	O	O	O	O
Logout	O	O	O	O

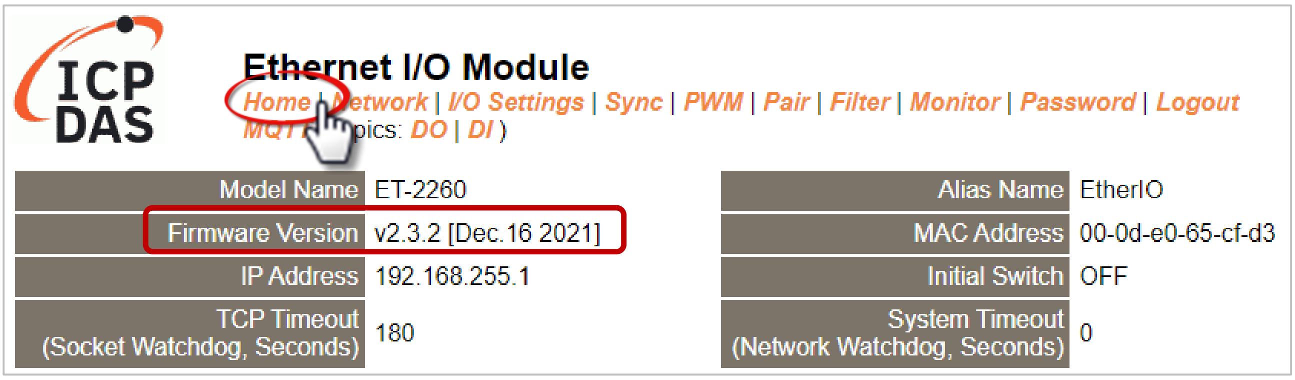
4.2 Home

Clicking the ***Home*** tab will display the main page allowing you to verify the ET-2200 series module hardware and software information and IO control, each of which will be described in more detail below.

4.2.1 Home – DI/DO

The first section provides basic information about the module including the Model Name, Firmware Version, IP Address, TCP Port Timeout, Alias Name, MAC Address, Initial Switch position, and System Timeout.

Note: After updating the Firmware, the user can check the version information on this page.

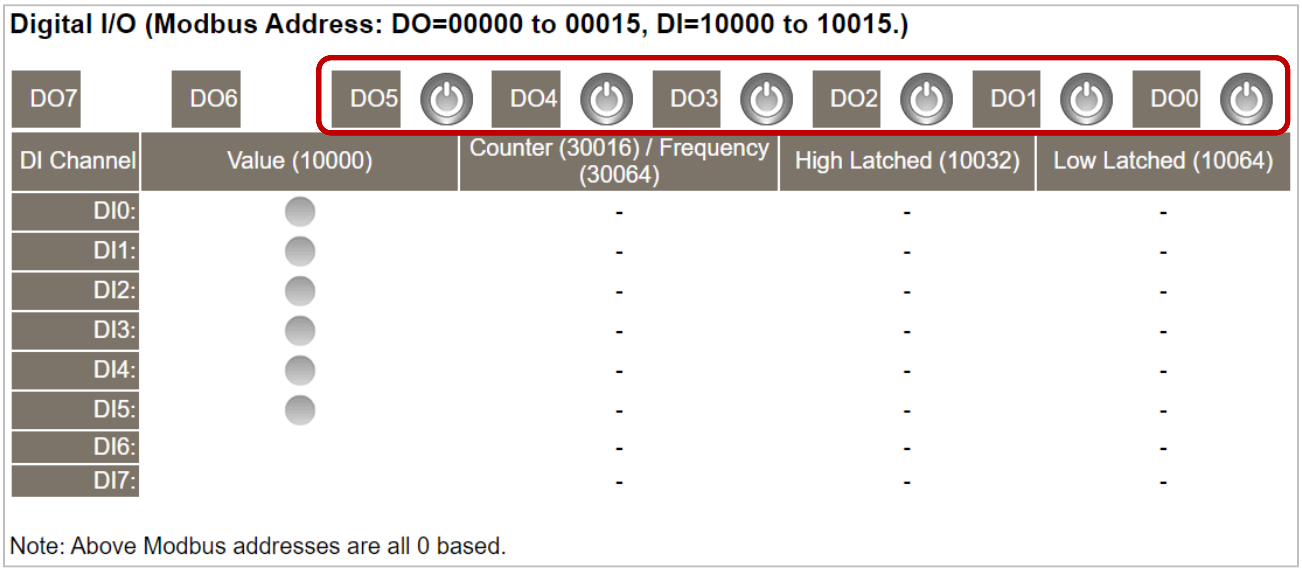


Ethernet I/O Module

Home | *Network* | *I/O Settings* | *Sync* | *PWM* | *Pair* | *Filter* | *Monitor* | *Password* | *Logout*
MQTT pics: *DO* | *DI*)

Model Name	ET-2260	Alias Name	EtherIO
Firmware Version	v2.3.2 [Dec.16 2021]	MAC Address	00-0d-e0-65-cf-d3
IP Address	192.168.255.1	Initial Switch	OFF
TCP Timeout (Socket Watchdog, Seconds)	180	System Timeout (Network Watchdog, Seconds)	0

The second section - Digital I/O provides information related to the current DIO status and DO control. Note: The user can click on the DO image to change the output status.



Digital I/O (Modbus Address: DO=00000 to 00015, DI=10000 to 10015.)

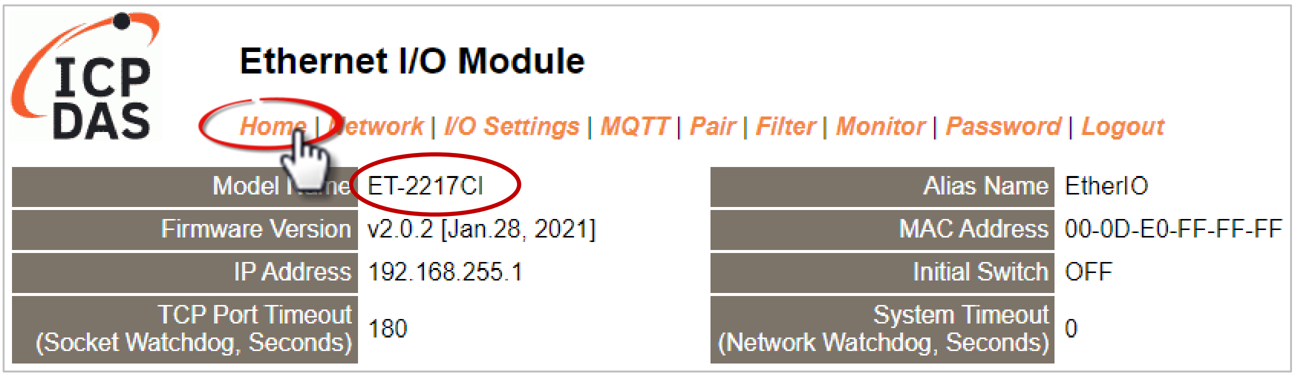
DI Channel	Value (10000)	Counter (30016) / Frequency (30064)	High Latched (10032)	Low Latched (10064)
DI0:	●	-	-	-
DI1:	●	-	-	-
DI2:	●	-	-	-
DI3:	●	-	-	-
DI4:	●	-	-	-
DI5:	●	-	-	-
DI6:		-	-	-
DI7:		-	-	-

Note: Above Modbus addresses are all 0 based.

4.2.2 Home – AI

This page will display different items depending on the model:

The first section provides basic information about the module including the Model Name, Firmware Version, IP Address, TCP Port Timeout, Alias Name, MAC Address, Initial Switch position, and System Timeout.

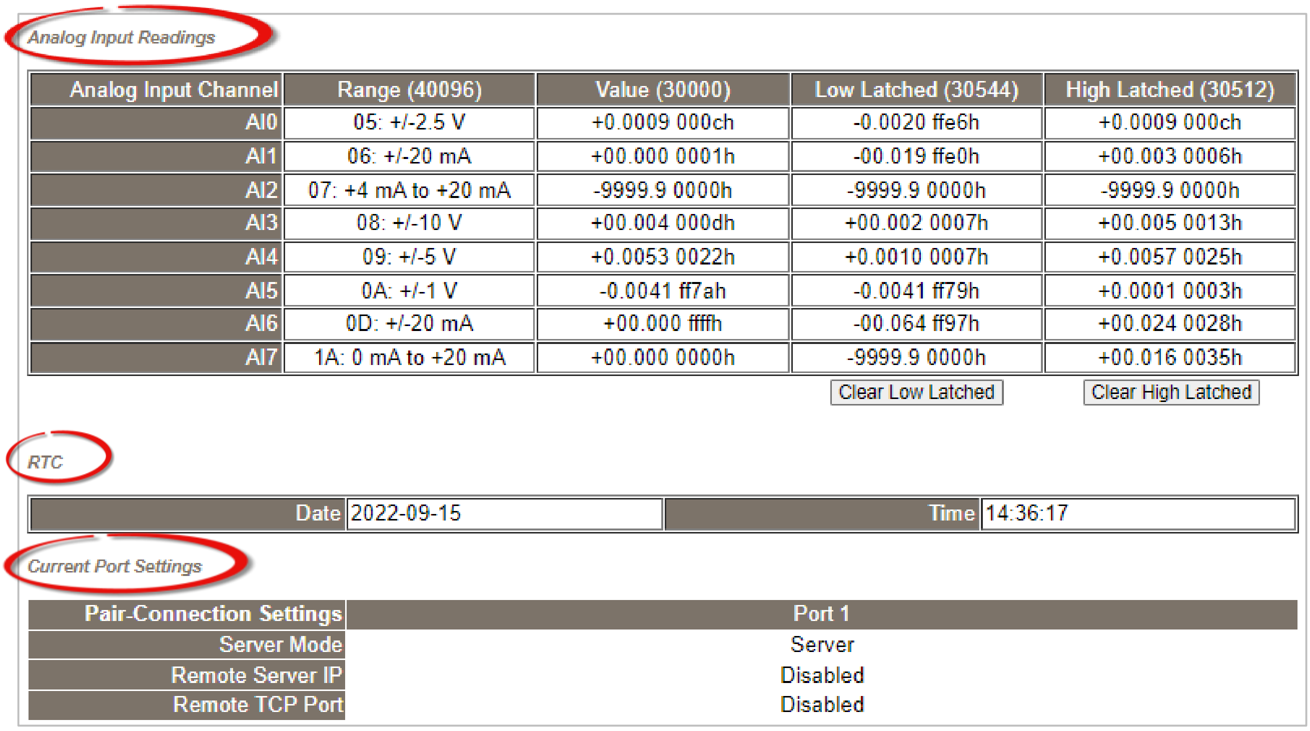


Ethernet I/O Module

Home | Network | I/O Settings | MQTT | Pair | Filter | Monitor | Password | Logout

Model Name	ET-2217CI	Alias Name	EtherIO
Firmware Version	v2.0.2 [Jan.28, 2021]	MAC Address	00-0D-E0-FF-FF-FF
IP Address	192.168.255.1	Initial Switch	OFF
TCP Port Timeout (Socket Watchdog, Seconds)	180	System Timeout (Network Watchdog, Seconds)	0

The second section - **Analog Input Readings**, provides information related to the AI data range, values, and latched values. In addition, the **RTC** section can display the system time. The **Current Port Setting** can display information about the Pair-Connection function.



Analog Input Readings

Analog Input Channel	Range (40096)	Value (30000)	Low Latched (30544)	High Latched (30512)
AI0	05: +/-2.5 V	+0.0009 000ch	-0.0020 ffe6h	+0.0009 000ch
AI1	06: +/-20 mA	+00.000 0001h	-00.019 ffe0h	+00.003 0006h
AI2	07: +4 mA to +20 mA	-9999.9 0000h	-9999.9 0000h	-9999.9 0000h
AI3	08: +/-10 V	+00.004 000dh	+00.002 0007h	+00.005 0013h
AI4	09: +/-5 V	+0.0053 0022h	+0.0010 0007h	+0.0057 0025h
AI5	0A: +/-1 V	-0.0041 ff7ah	-0.0041 ff79h	+0.0001 0003h
AI6	0D: +/-20 mA	+00.000 ffffh	-00.064 ff97h	+00.024 0028h
AI7	1A: 0 mA to +20 mA	+00.000 0000h	-9999.9 0000h	+00.016 0035h

RTC

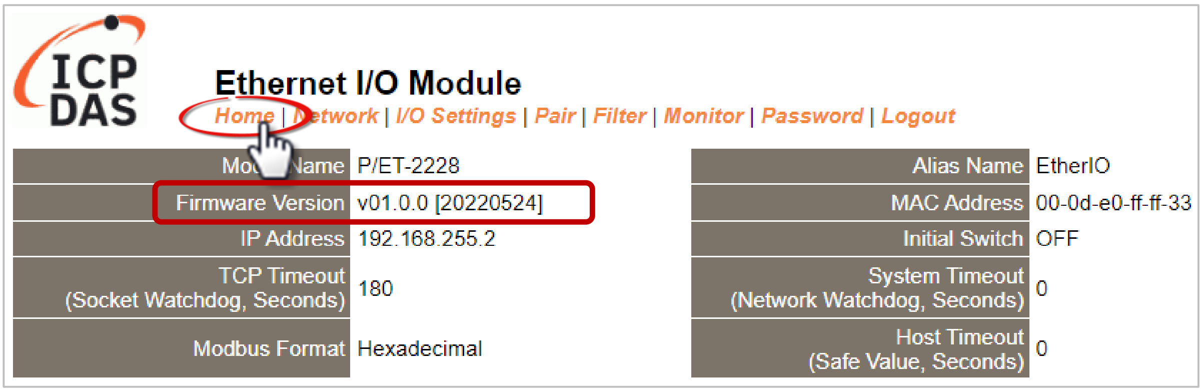
Date	2022-09-15	Time	14:36:17

Current Port Settings

Pair-Connection Settings	Port 1
Server Mode	Server
Remote Server IP	Disabled
Remote TCP Port	Disabled

4.2.3 Home – AO

The first section provides basic information about the module including the Model Name, Firmware Version, IP Address, TCP Port Timeout, Modbus Format, Alias Name, MAC Address, Initial Switch position, System Timeout, and Host Timeout.

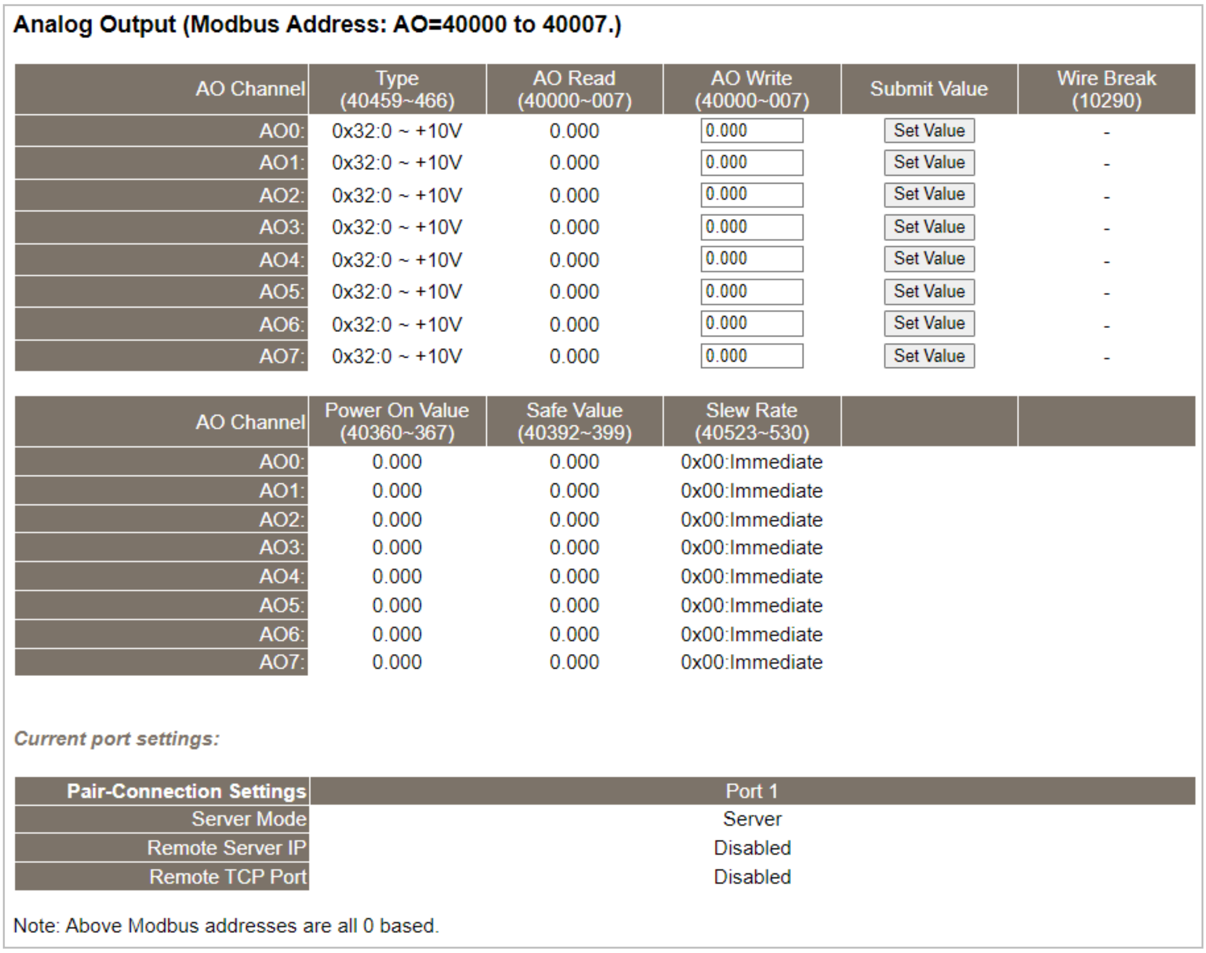


Ethernet I/O Module

Home | Network | I/O Settings | Pair | Filter | Monitor | Password | Logout

Model Name	P/ET-2228	Alias Name	EtherIO
Firmware Version	v01.0.0 [20220524]	MAC Address	00-0d-e0-ff-ff-33
IP Address	192.168.255.2	Initial Switch	OFF
TCP Timeout (Socket Watchdog, Seconds)	180	System Timeout (Network Watchdog, Seconds)	0
Modbus Format	Hexadecimal	Host Timeout (Safe Value, Seconds)	0

The second section - Analog Output, provides information related to the AO data type, read value, open wire detection, power-on value, safe value, and slew rate. Also, the AO value can be set.



Analog Output (Modbus Address: AO=40000 to 40007.)

AO Channel	Type (40459~466)	AO Read (40000~007)	AO Write (40000~007)	Submit Value	Wire Break (10290)
AO0:	0x32:0 ~ +10V	0.000	0.000	Set Value	-
AO1:	0x32:0 ~ +10V	0.000	0.000	Set Value	-
AO2:	0x32:0 ~ +10V	0.000	0.000	Set Value	-
AO3:	0x32:0 ~ +10V	0.000	0.000	Set Value	-
AO4:	0x32:0 ~ +10V	0.000	0.000	Set Value	-
AO5:	0x32:0 ~ +10V	0.000	0.000	Set Value	-
AO6:	0x32:0 ~ +10V	0.000	0.000	Set Value	-
AO7:	0x32:0 ~ +10V	0.000	0.000	Set Value	-

AO Channel	Power On Value (40360~367)	Safe Value (40392~399)	Slew Rate (40523~530)		
AO0:	0.000	0.000	0x00:Immediate		
AO1:	0.000	0.000	0x00:Immediate		
AO2:	0.000	0.000	0x00:Immediate		
AO3:	0.000	0.000	0x00:Immediate		
AO4:	0.000	0.000	0x00:Immediate		
AO5:	0.000	0.000	0x00:Immediate		
AO6:	0.000	0.000	0x00:Immediate		
AO7:	0.000	0.000	0x00:Immediate		

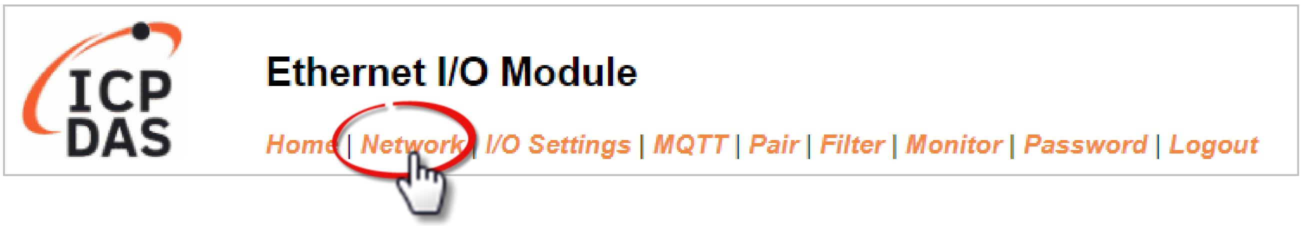
Current port settings:

Pair-Connection Settings	Port 1
Server Mode	Server
Remote Server IP	Disabled
Remote TCP Port	Disabled

Note: Above Modbus addresses are all 0 based.

4.3 Network

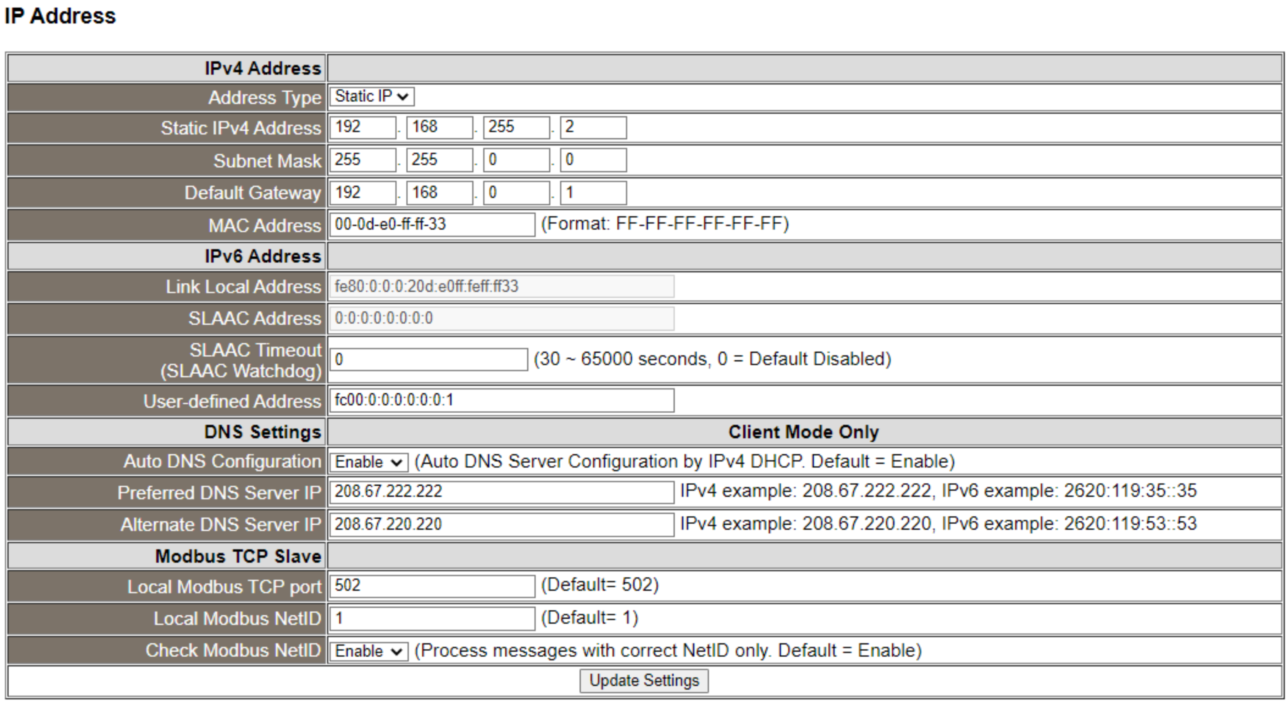
Note: **The function is available for AIO and DIO modules.**


ICP DAS
Ethernet I/O Module
Home | Network | I/O Settings | MQTT | Pair | Filter | Monitor | Password | Logout

The ***Network*** page provides four sections, each of which will be described in more detail below.

1. **IP Address:**
   It can be used to configure the Ethernet settings for ET-2200, e.g., the IPv4 address, the IPv6 address, DNS settings, and Modbus TCP Slave settings.
2. **General Settings:**
   It can be used to configure the Ethernet speed, system timeout, TCP timeout, UDP heartbeat settings, and web auto-logout for ET-2200.
3. **Other Operations:**
   It can be used to reset the ET-2200 to factory defaults or reboot, or remotely upgrade its firmware.

4.3.1 IP Address Configuration



IP Address

IPv4 Address	
Address Type	Static IP
Static IPv4 Address	192 . 168 . 255 . 2
Subnet Mask	255 . 255 . 0 . 0
Default Gateway	192 . 168 . 0 . 1
MAC Address	00-0d-e0-ff-ff-33 (Format: FF-FF-FF-FF-FF-FF)
IPv6 Address	
Link Local Address	fe80:0:0:0:20d:e0ff:feff:ff33
SLAAC Address	0:0:0:0:0:0:0:0
SLAAC Timeout (SLAAC Watchdog)	0 (30 ~ 65000 seconds, 0 = Default Disabled)
User-defined Address	fc00:0:0:0:0:0:0:1
DNS Settings	**Client Mode Only**
Auto DNS Configuration	Enable (Auto DNS Server Configuration by IPv4 DHCP. Default = Enable)
Preferred DNS Server IP	208.67.222.222 IPv4 example: 208.67.222.222, IPv6 example: 2620:119:35::35
Alternate DNS Server IP	208.67.220.220 IPv4 example: 208.67.220.220, IPv6 example: 2620:119:53::53
Modbus TCP Slave	
Local Modbus TCP port	502 (Default= 502)
Local Modbus NetID	1 (Default= 1)
Check Modbus NetID	Enable (Process messages with correct NetID only. Default = Enable)

Note: The IPv6 Address and DNS settings are not supported for some models.

The table describes the parameters contained in the "**IP Address Configuration**" section.

Item	Description
IPv4 Address	
Address Type	**Static IP:** If there is no DHCP server installed in your network, you can configure the network settings manually. Refer to Section"Manual Configuration" for more details.
	DHCP: Dynamic Host Configuration Protocol (DHCP) is a network application protocol that automatically assigns an IP address to each device. Refer to the Section "Dynamic Configuration" for more details.
Static IPv4 Address	This parameter is used to assign a specific IP address. Each ET-2200 module connected to the network must have its unique IP address.
Subnet Mask	This parameter is used to assign the subnet mask for the ET-2200 module. The subnet mask indicates which portion of the IP address is used to identify the local network or subnet.
Default Gateway	This parameter is used to assign the IP Address of the Gateway to be used by the ET-2200 module. A Gateway (or router) is a device that is used to connect an individual network to one or more additional networks.
MAC Address	This parameter is used to set the User-defined MAC address, which must be in the format FF-FF-FF-FF-FF-FF.
IPv6 Address	
Link Local Address	Each IPv6 device connected to the network must have a link-local address. The address is auto-configured by (P)ET-2200 and is always effective in the same link layer.
SLAAC Address	The (P)ET-2200 supports stateless address auto-configuration (SLAAC), which is automatically configured by the router. The default router is the link-local address of the router.
SLAAC Timeout (SLAAC Watchdog)	This parameter is used to set the Timeout value of SLAAC. If the SLAAC address is not assigned within the specified time, the system will reboot and configure the SLAAC address again.
User-defined Address	This parameter is used to set the IP address of the module. Each (P)ET-2200 connected to the network must have a unique IP address.

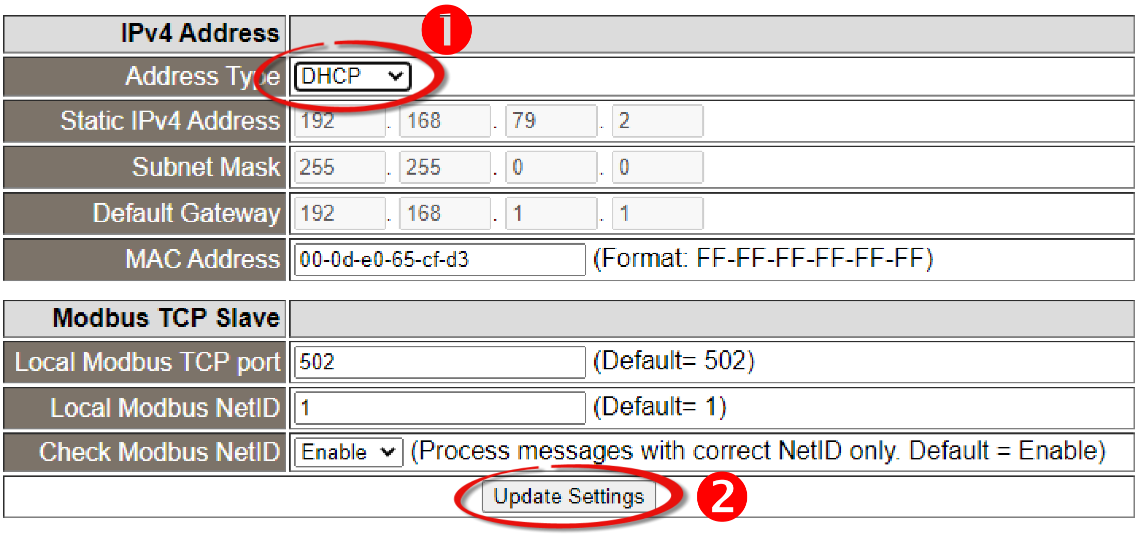
DNS Settings	
Auto DNS Configuration	Enable: The IP address of the DNS Server is automatically set by IPv4 DHCP. Disable: Automatically set to the preferred IP address of the DNS Server.
Preferred DNS Server IP	This parameter is used to set the preferred IP address of the DNS Server.
Alternate DNS Server IP	This parameter is used to set the alternate IP address of the DNS Server.
Modbus TCP Slave	
Local Modbus TCP port	This parameter is used to set the local port to be used by the Modbus slave device. The default value is 502.
Local Modbus NetID	This parameter is used to set the Network ID to be used by the Modbus slave device. The default value is 1.
Update Settings	Click this button to save the revised settings to the ET-2200 module.

Dynamic Configuration

Dynamic configuration is very easy to perform. If a DHCP server is connected to your network, a network address can be dynamically configured by using the following procedure:

Step 1: Select “**DHCP**” from the Address Type drop-down menu.

Step 2: Click the **“Update Settings”** button to complete the configuration.



IPv4 Address	
Address Type	DHCP
Static IPv4 Address	192 . 168 . 79 . 2
Subnet Mask	255 . 255 . 0 . 0
Default Gateway	192 . 168 . 1 . 1
MAC Address	00-0d-e0-65-cf-d3 (Format: FF-FF-FF-FF-FF-FF)
Modbus TCP Slave	
Local Modbus TCP port	502 (Default= 502)
Local Modbus NetID	1 (Default= 1)
Check Modbus NetID	Enable (Process messages with correct NetID only. Default = Enable)

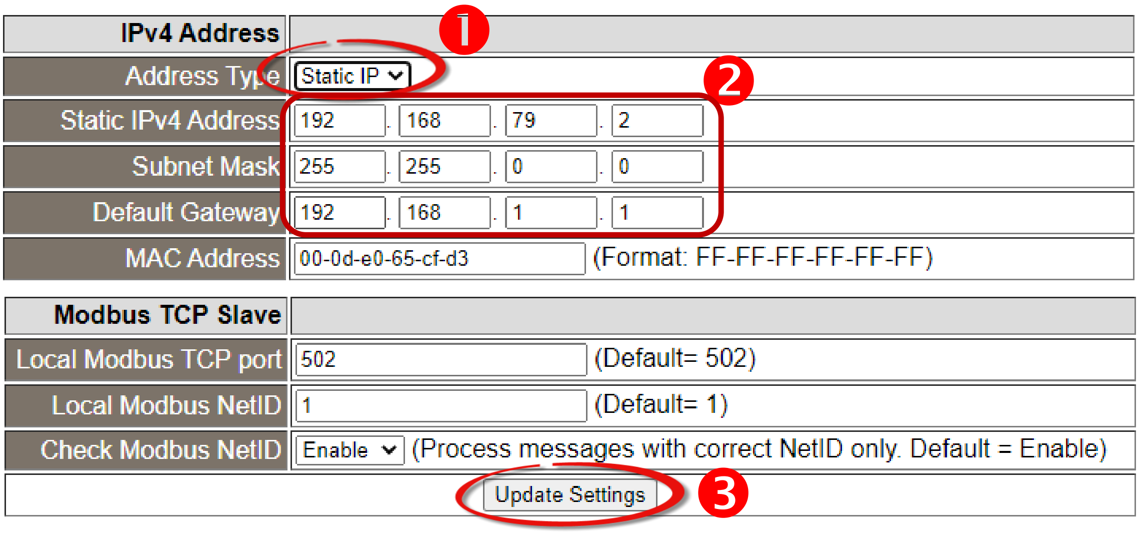
Manual Configuration

When using manual configuration, the network settings should be assigned as follows:

Step 1: Select **“Static IP”** from the **Address Type** drop-down menu.

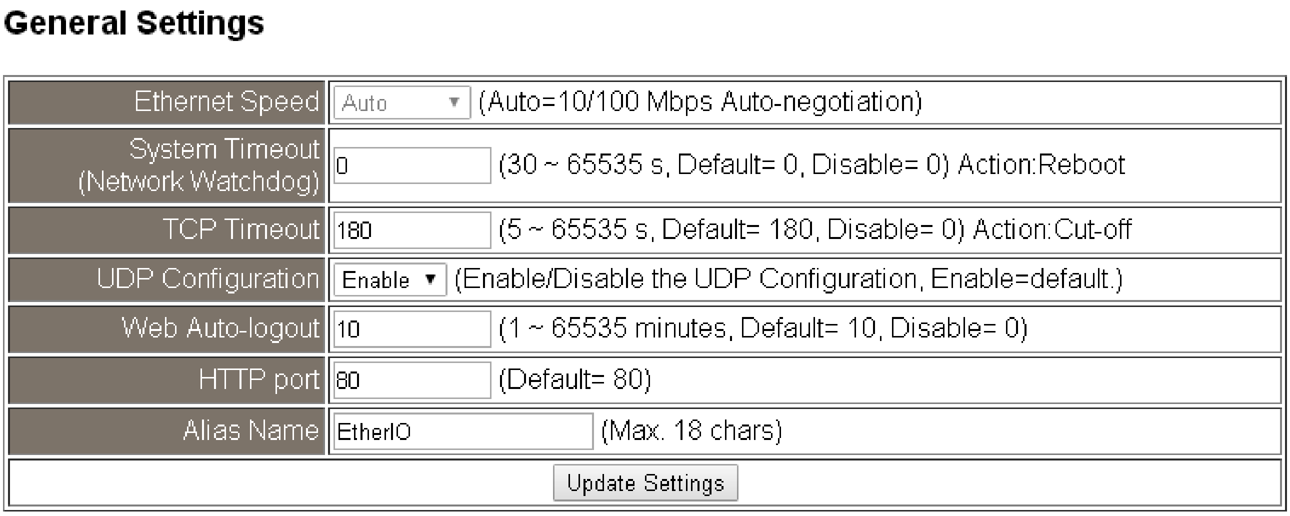
Step 2: Enter the relevant details in the respective **network settings** fields.

Step 3: Click the **“Update Settings”** button to complete the configuration.



IPv4 Address	
Address Type	Static IP
Static IPv4 Address	192 . 168 . 79 . 2
Subnet Mask	255 . 255 . 0 . 0
Default Gateway	192 . 168 . 1 . 1
MAC Address	00-0d-e0-65-cf-d3 (Format: FF-FF-FF-FF-FF-FF)
Modbus TCP Slave	
Local Modbus TCP port	502 (Default= 502)
Local Modbus NetID	1 (Default= 1)
Check Modbus NetID	Enable (Process messages with correct NetID only. Default = Enable)

4.3.2 General Settings



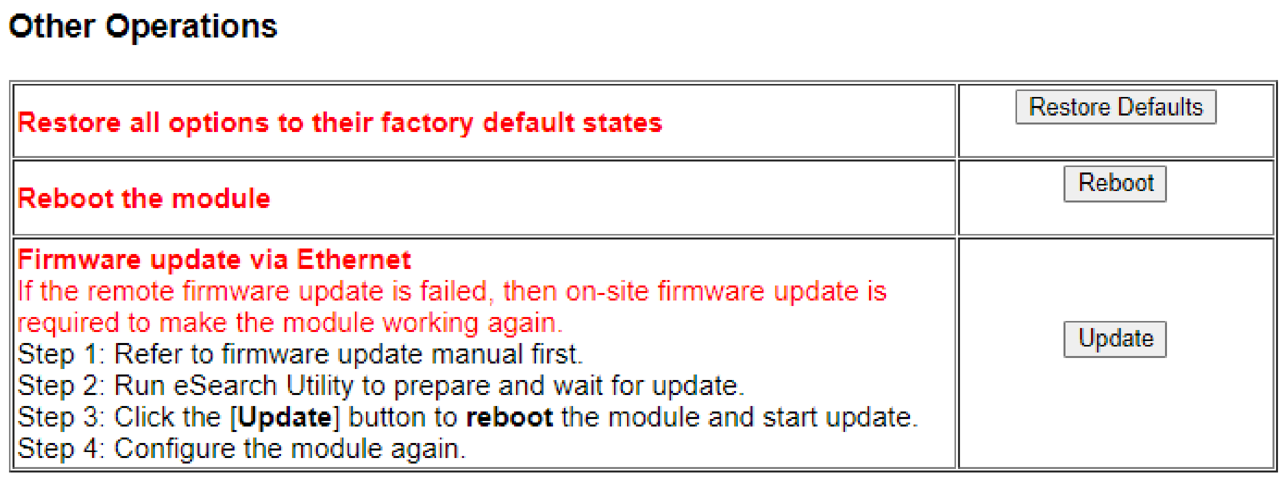
General Settings

Ethernet Speed	Auto (Auto=10/100 Mbps Auto-negotiation)
System Timeout (Network Watchdog)	0 (30 ~ 65535 s, Default= 0, Disable= 0) Action:Reboot
TCP Timeout	180 (5 ~ 65535 s, Default= 180, Disable= 0) Action:Cut-off
UDP Configuration	Enable (Enable/Disable the UDP Configuration, Enable=default.)
Web Auto-logout	10 (1 ~ 65535 minutes, Default= 10, Disable= 0)
HTTP port	80 (Default= 80)
Alias Name	EtherIO (Max. 18 chars)

The table describes the parameters contained in the "**General Settings**" section.

Item	Description
Ethernet Speed	This parameter is used to set the Ethernet speed. The default value is Auto (Auto = 10/100 Mbps Auto-negotiation).
System Timeout (Network Watchdog)	This parameter is used to configure the system timeout value. If there is no activity on the network for a specific time, the system will be rebooted based on the configured system timeout value.
TCP Timeout (Seconds)	This parameter is used to configure the TCP timeout value. If Modbus TCP communication is idle for a specific time, the system will cut off the connection.
UDP Configuration	This parameter is used to enable or disable the UDP configuration function.
Web Auto-logout	This parameter is used to configure the automatic logout value. If there is no activity on the web server for a specific time, the current user account will automatically be logged out.
Alias Name	This parameter is used to assign an alias name for each ET-2200 module to assist with easy identification.
HTTP Port	This parameter is used to assign specific a HTTP port to the ET-2200 module. The ET-2200 needs to be restarted when the HTTP port is changed. You need manually type the new HTTP port in the address bar of the browser. The default is 80. For example, if the HTTP port is set to 81, then enter the “IP address: HTTP port” (10.0.8.123:81).
Update Settings	Click this button to save the revised settings to the ET-2200 module.

4.3.3 Restore Factory Defaults/Firmware Update



Other Operations

Restore all options to their factory default states	Restore Defaults
Reboot the module	Reboot
Firmware update via Ethernet If the remote firmware update is failed, then on-site firmware update is required to make the module working again. Step 1: Refer to firmware update manual first. Step 2: Run eSearch Utility to prepare and wait for update. Step 3: Click the [**Update**] button to **reboot** the module and start update. Step 4: Configure the module again.	Update

Note: This setup page may be different for some modules, but the functions are the same.

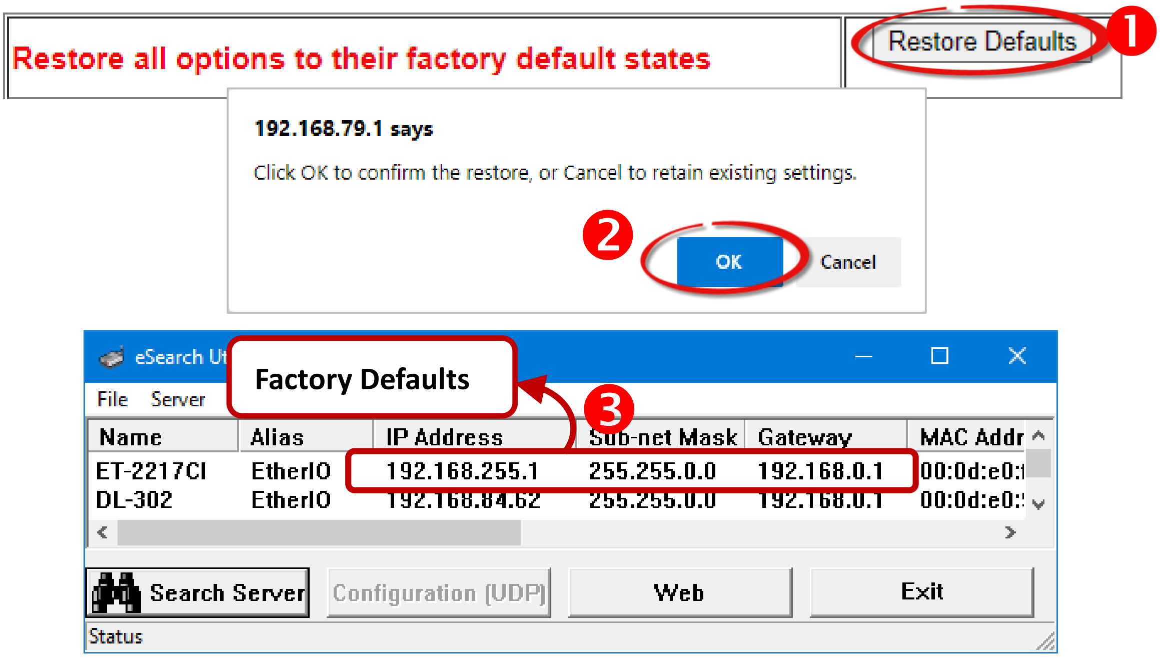
➢ Restore all options to their factory default states

To reset all parameters to their original factory default settings, use the following procedure:

Step 1: Click the **"Restore Defaults"** button to reset the configuration.

Step 2: Click the **"OK"** button in the message dialog box.

Step 3: Check whether the module has been reset to the original factory default settings for use with the **eSearch Utility.** Refer to Section 3.3 "Configuring the Network Settings".



Restore all options to their factory default states

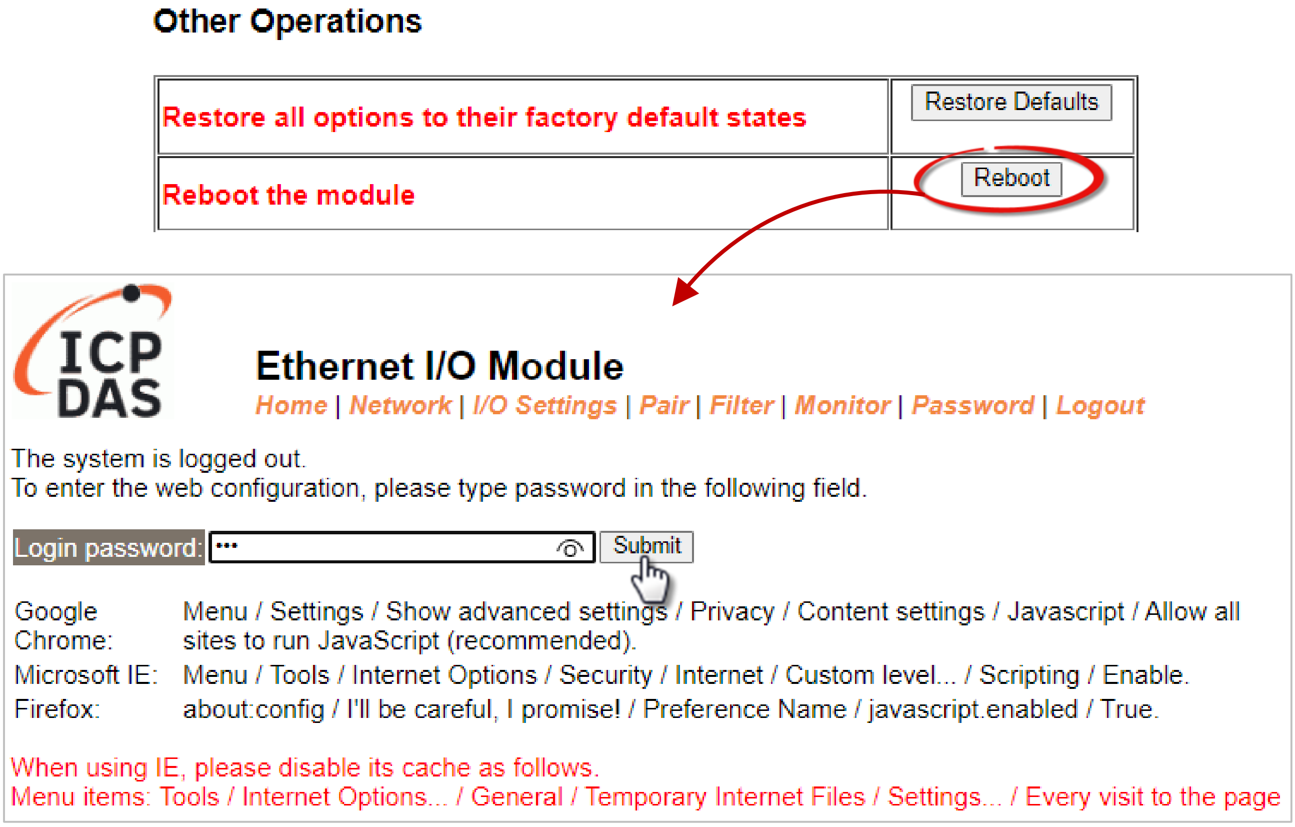
192.168.79.1 says

Click OK to confirm the restore, or Cancel to retain existing settings.

Name	Alias	IP Address	Sub-net Mask	Gateway	MAC Addr
ET-2217CI	EtherIO	192.168.255.1	255.255.0.0	192.168.0.1	00:0d:e0:
DL-302	EtherIO	192.168.84.62	255.255.0.0	192.168.0.1	00:0d:e0:

➢ Reboot the module

The **Reboot the module** function can be used to remotely force the ET-2200 module to reboot. After that, enter the password to log into the main page.



Other Operations

Restore all options to their factory default states	Restore Defaults
Reboot the module	Reboot

Ethernet I/O Module

ICP DAS
Home | Network | I/O Settings | Pair | Filter | Monitor | Password | Logout

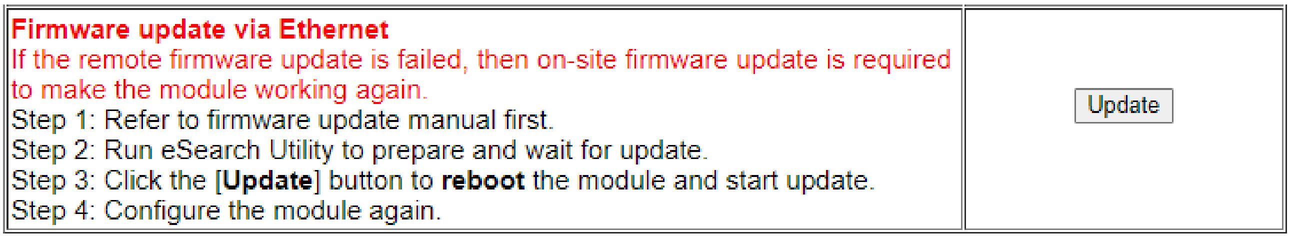
The system is logged out.
To enter the web configuration, please type password in the following field.

Login password: ••• Submit

Google Chrome:	Menu / Settings / Show advanced settings / Privacy / Content settings / Javascript / Allow all sites to run JavaScript (recommended).
Microsoft IE:	Menu / Tools / Internet Options / Security / Internet / Custom level... / Scripting / Enable.
Firefox:	about:config / I'll be careful, I promise! / Preference Name / javascript.enabled / True.

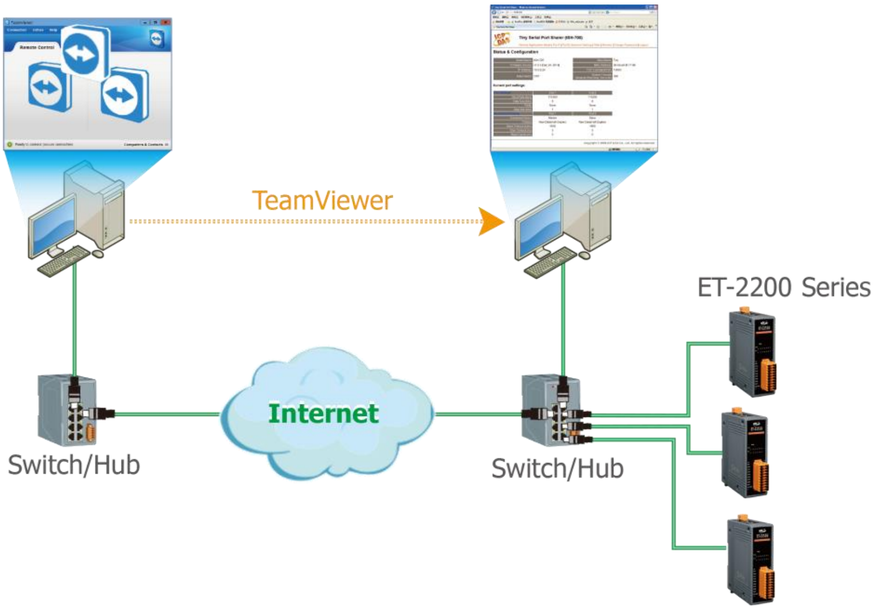
When using IE, please disable its cache as follows.
Menu items: Tools / Internet Options... / General / Temporary Internet Files / Settings... / Every visit to the page

➢ Firmware Update



Firmware update via Ethernet
If the remote firmware update is failed, then on-site firmware update is required to make the module working again.
Step 1: Refer to firmware update manual first.
Step 2: Run eSearch Utility to prepare and wait for update.
Step 3: Click the [**Update**] button to **reboot** the module and start update.
Step 4: Configure the module again.

The firmware update requires initialization and local network operations. The traditional firmware update requires adjusting the Init/Run Switch and rebooting the module manually for the initialization of firmware update, while new firmware allows the user to initialize the module via web interface without adjusting the hardware switch. Initialization via the web is useful when a module is installed in a remote field and can be accessed by a remote PC via TeamViewer.


TeamViewer
ET-2200 Series
Internet
Switch/Hub
Switch/Hub

Note:

If the remote firmware update fails, the module will not function properly. Please perform the traditional firmware update again and then the module will work normally.

For detailed information about how to remotely update the Firmware for the ET-2200 module, refer to the **ET-2200 Firmware Update Manual (EN)**. The download address is shown below:

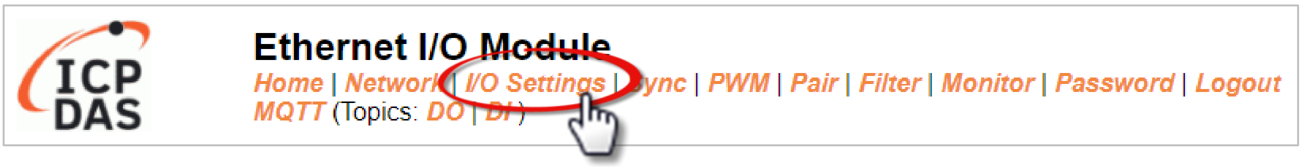
https://www.icpdas.com/en/download/show.php?num=2626

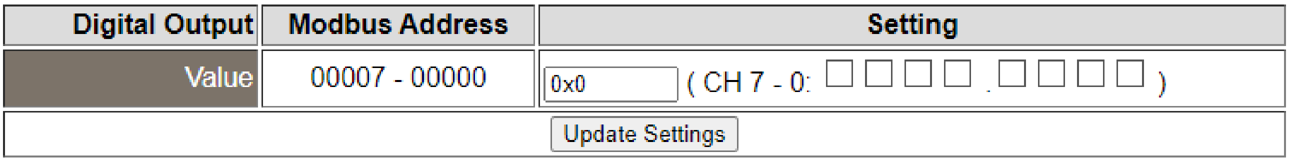
4.4 I/O Settings

The **I/O Settings** page allows you to configure the Digital Input, Digital Output, and Analog Input parameters for the ET-2200 series module.

Section	DI	DO	AI	AO
4.4.1 DO Control	-	✓	-	
4.4.2 DI/DO Configuration	✓		-	
4.4.3 Analog Input Channel	-		✓	-
4.4.4 Analog Input Calibration	-		ET-2217CI, ET-2217CI-4	-
4.4.5 Analog Output Configuration	-		-	✓
4.4.5 RTC	-		✓	-
4.4.6 Data Logger	-		✓	-

4.4.1 DO Control


ICP DAS
Ethernet I/O Module
Home | Network | I/O Settings | Sync | PWM | Pair | Filter | Monitor | Password | Logout
MQTT (Topics: DO | DI)



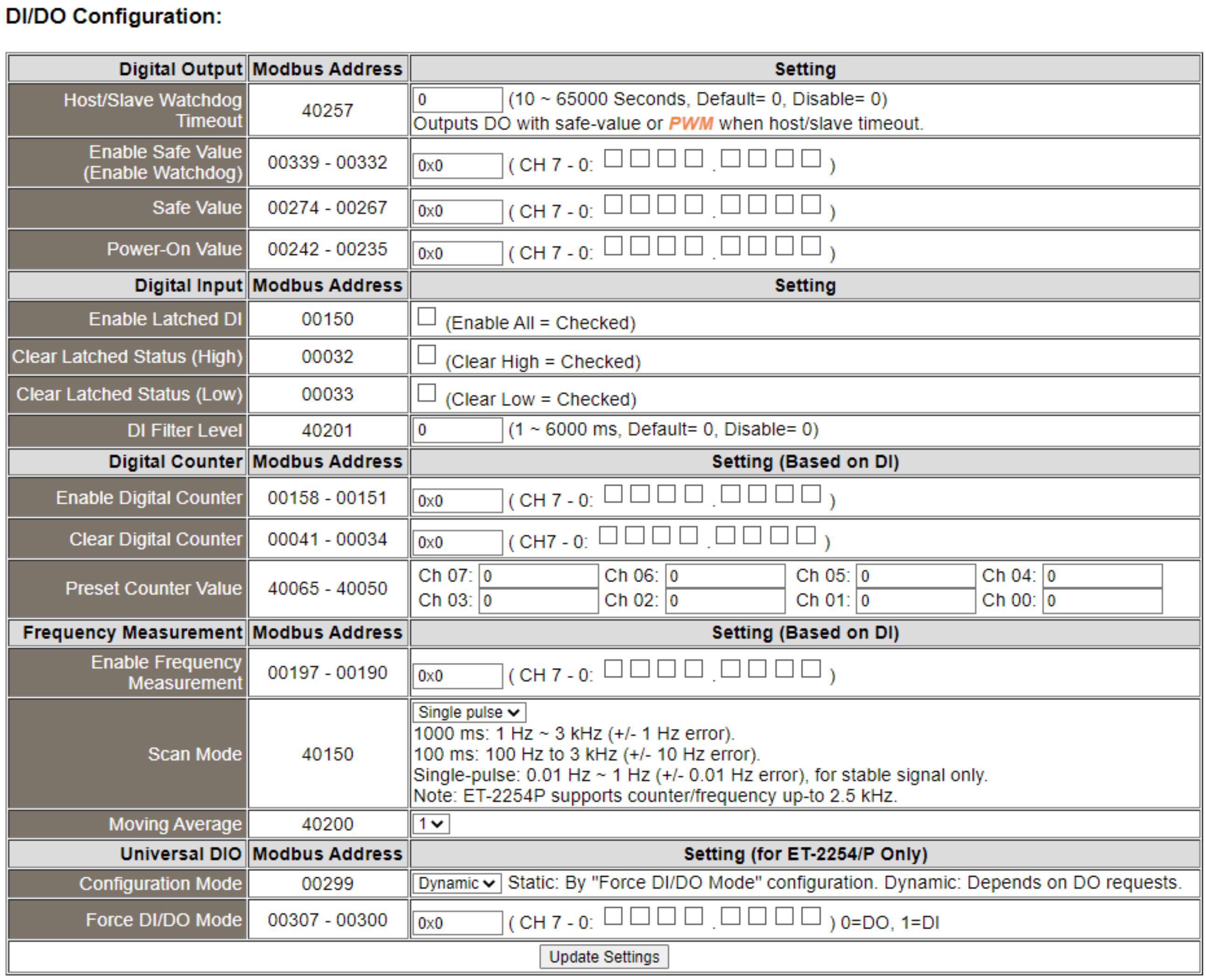
Digital Output	Modbus Address	Setting
Value	00007 - 00000	0x0 (CH 7 - 0: ☐ ☐ ☐ ☐ . ☐ ☐ ☐ ☐)

Update Settings

The table describes the parameters contained in the "**DO Control**" section.

Item	Description
Set DO value	This parameter is used to manually assign a specific value for the DO.
Update Settings	Click this button to save the revised settings to the ET-2200 module.

4.4.2 DI/DO Configuration



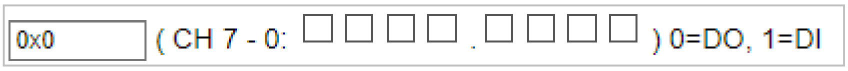
DI/DO Configuration:

Digital Output	**Modbus Address**	**Setting**
Host/Slave Watchdog Timeout	40257	0 (10 ~ 65000 Seconds, Default= 0, Disable= 0) Outputs DO with safe-value or PWM when host/slave timeout.
Enable Safe Value (Enable Watchdog)	00339 - 00332	0x0 (CH 7 - 0: ☐☐☐☐.☐☐☐☐)
Safe Value	00274 - 00267	0x0 (CH 7 - 0: ☐☐☐☐.☐☐☐☐)
Power-On Value	00242 - 00235	0x0 (CH 7 - 0: ☐☐☐☐.☐☐☐☐)
Digital Input	**Modbus Address**	**Setting**
Enable Latched DI	00150	☐ (Enable All = Checked)
Clear Latched Status (High)	00032	☐ (Clear High = Checked)
Clear Latched Status (Low)	00033	☐ (Clear Low = Checked)
DI Filter Level	40201	0 (1 ~ 6000 ms, Default= 0, Disable= 0)
Digital Counter	**Modbus Address**	**Setting (Based on DI)**
Enable Digital Counter	00158 - 00151	0x0 (CH 7 - 0: ☐☐☐☐.☐☐☐☐)
Clear Digital Counter	00041 - 00034	0x0 (CH7 - 0: ☐☐☐☐.☐☐☐☐)
Preset Counter Value	40065 - 40050	Ch 07: 0 Ch 06: 0 Ch 05: 0 Ch 04: 0 Ch 03: 0 Ch 02: 0 Ch 01: 0 Ch 00: 0
Frequency Measurement	**Modbus Address**	**Setting (Based on DI)**
Enable Frequency Measurement	00197 - 00190	0x0 (CH 7 - 0: ☐☐☐☐.☐☐☐☐)
Scan Mode	40150	Single pulse 1000 ms: 1 Hz ~ 3 kHz (+/- 1 Hz error). 100 ms: 100 Hz to 3 kHz (+/- 10 Hz error). Single-pulse: 0.01 Hz ~ 1 Hz (+/- 0.01 Hz error), for stable signal only. Note: ET-2254P supports counter/frequency up-to 2.5 kHz.
Moving Average	40200	1
Universal DIO	**Modbus Address**	**Setting (for ET-2254/P Only)**
Configuration Mode	00299	Dynamic Static: By "Force DI/DO Mode" configuration. Dynamic: Depends on DO requests.
Force DI/DO Mode	00307 - 00300	0x0 (CH 7 - 0: ☐☐☐☐.☐☐☐☐) 0=DO, 1=DI

The table describes the parameters contained in the "**DI/DO Configuration**" section.

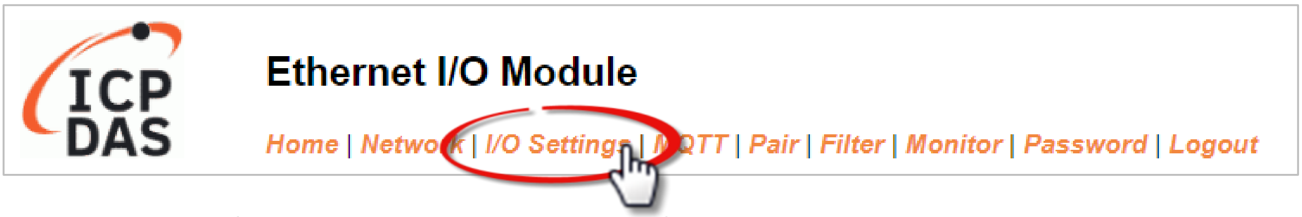
Item	Description
Digital Output	
Host/Slave Watchdog Timeout	This parameter is used to configure the Host Watchdog timeout value. If there is no Modbus TCP communication activity for the specified period (the timeout), then the Host Watchdog will activate an alarm.
Enable Safe Value (Enable Watchdog)	This parameter is used to enable the watchdog on each DO channel.

Item	Description
Safe Value	This parameter is used to define the DO safe value for the ET-2200 module. If the Host Watchdog alarm is activated, the DO will be set to the user-defined safe value.
Power-On Value	This parameter is used to define the DO Power-on value. On boot-up, the DO is set to the user-defined Power-on value.
Digital Input	
Enable Latched DI	This parameter is used to enable the latch function on all DI channels. The status of the DI will be recorded if it has been flagged as either high or low. 0 = Disable All; 1 = Enable All
Clear Latched Status (High)	This parameter is used to clear the status of all high-latched D/I. 0 = No Operation; 1 = Clear All
Clear Latched Status (Low)	This parameter is used to clear the status of all low-latched D/I. 0 = No Operation; 1= Clear All
DI Filter Level	The DI filter is a function that eliminates high-frequency noise from inputs. Settings range value: 1 ~ 6500 (ms); 0 = Disable (Default). Refer to Appendix A.4 "What is Digital-Input Filter (DI Filter)" for more details.
Digital Counter	
Enable Digital Counter	This parameter is used to enable the digital counter on each DI channel.
Clear Digital Counter	This parameter is used to clear the values of each DI counter.
Preset Counter Value	This parameter is used to set the default value for each DI counter.
Frequency Measurement (DI)	
Enable Frequency Measurement	This parameter is used to enable the frequency measurement function on each DI channel.

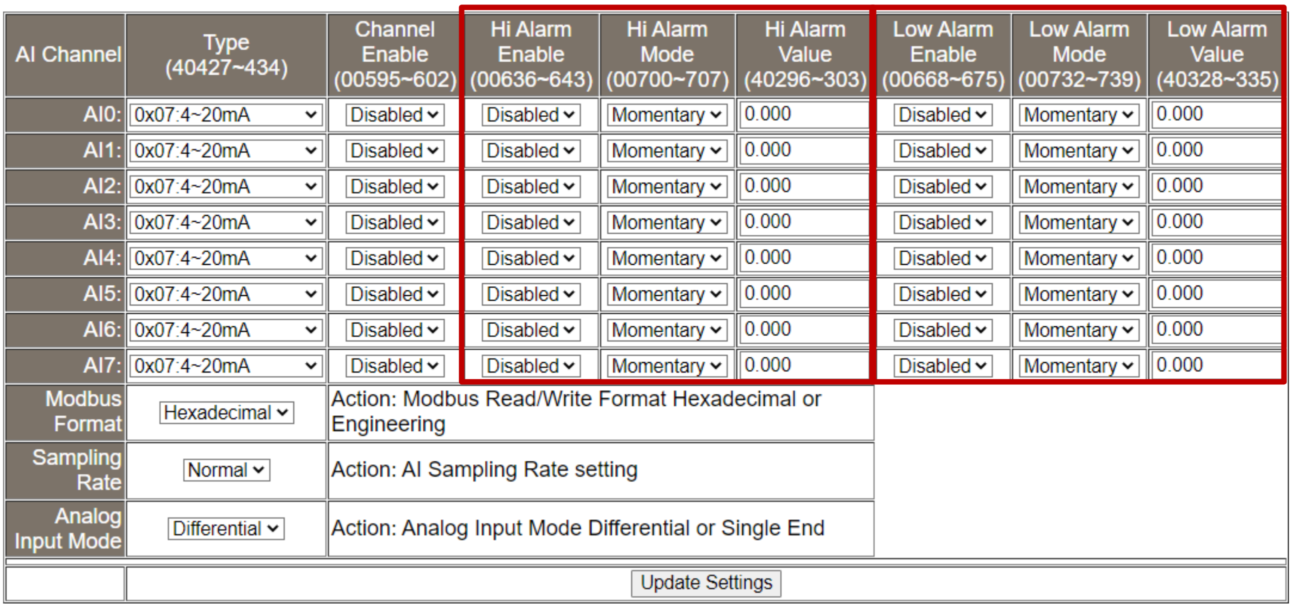
Item	Description
Scan Mode	This parameter is used to define the scan mode for the frequency measurement. **1000 ms:** This mode provides a normal update rate and normal accuracy. The acceptable frequency range for the input signal is 1 Hz to 3 kHz (± 1 Hz error). This mode can be used when the pulse width (signal source) contains small errors since the measurement is based on the pulse count. **100 ms:** This mode provides a fast update rate, but the accuracy is low. The acceptable frequency range for the input signal is 100 Hz to 3 kHz (± 10 Hz error). This mode can be used when the pulse width (signal source) contains small errors since the measurement is based on the pulse count. **Single-pulse:** This mode provides the highest accuracy but can only be used for a stable signal. The data update rate depends on the signal frequency and the acceptable signal frequency range for the input signal is 0.01 Hz to 3.5 kHz (± 0.01 Hz error). This mode can only be used when the pulse width (signal source) is stable since the measurement is based on the width of a single pulse.
Moving Average	1 ==> No Average is used 2 ==> Uses the average of 2 continuous sample values 4 ==> Uses the average of 4 continuous sample values 8 ==> Uses the average of 8 continuous sample values
Universal DIO	
Force DI/DO Mode **For ET-2254(P) only**	**Dynamic:** Dynamic I/O type based on DO requests. **Static:** Static I/O type by configuration (web or Modbus).  0x0 (CH 7 - 0: ☐ ☐ ☐ ☐ . ☐ ☐ ☐ ☐) 0=DO, 1=DI This parameter is used to set the Universal DIO channels to DI or DO Port. 1 ==> DI; 0 ==> DO
Update Settings	Click this button to save the revised settings to the ET-2200 module.

4.4.3 Analog Input Configuration

Note: The content in Sections 4.4.3 to 4.4.6 is available for some of the AI modules.


ICP DAS
Ethernet I/O Module
Home | Network | I/O Settings | MQTT | Pair | Filter | Monitor | Password | Logout

Note that some of the modules support the alarm function.

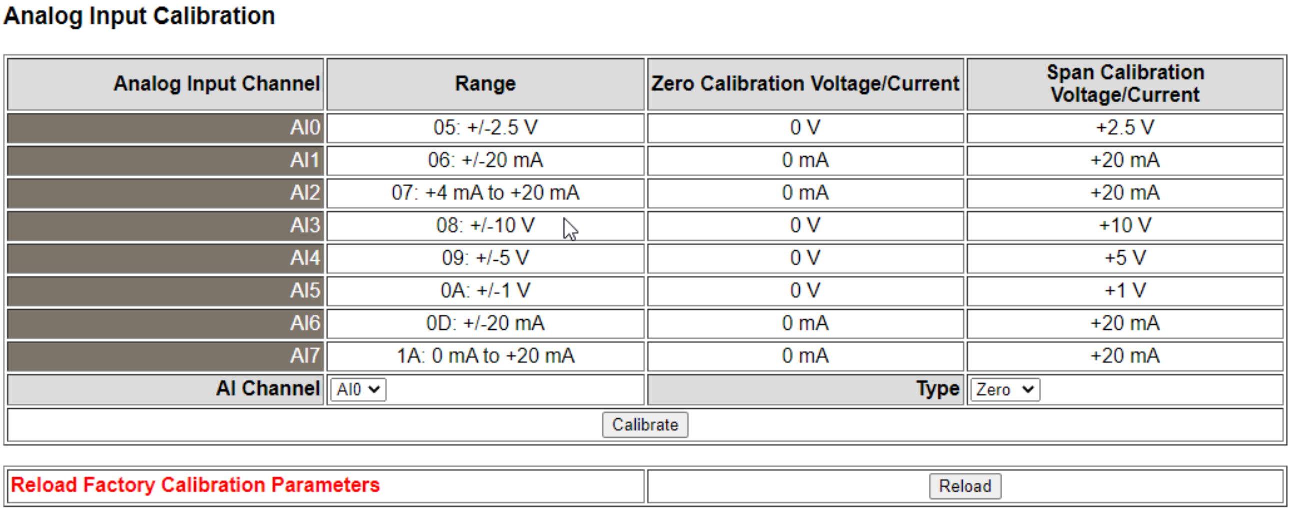


AI Channel	Type (40427~434)	Channel Enable (00595~602)	Hi Alarm Enable (00636~643)	Hi Alarm Mode (00700~707)	Hi Alarm Value (40296~303)	Low Alarm Enable (00668~675)	Low Alarm Mode (00732~739)	Low Alarm Value (40328~335)
AI0:	0x07:4~20mA	Disabled	Disabled	Momentary	0.000	Disabled	Momentary	0.000
AI1:	0x07:4~20mA	Disabled	Disabled	Momentary	0.000	Disabled	Momentary	0.000
AI2:	0x07:4~20mA	Disabled	Disabled	Momentary	0.000	Disabled	Momentary	0.000
AI3:	0x07:4~20mA	Disabled	Disabled	Momentary	0.000	Disabled	Momentary	0.000
AI4:	0x07:4~20mA	Disabled	Disabled	Momentary	0.000	Disabled	Momentary	0.000
AI5:	0x07:4~20mA	Disabled	Disabled	Momentary	0.000	Disabled	Momentary	0.000
AI6:	0x07:4~20mA	Disabled	Disabled	Momentary	0.000	Disabled	Momentary	0.000
AI7:	0x07:4~20mA	Disabled	Disabled	Momentary	0.000	Disabled	Momentary	0.000
Modbus Format	Hexadecimal	Action: Modbus Read/Write Format Hexadecimal or Engineering						
Sampling Rate	Normal	Action: AI Sampling Rate setting						
Analog Input Mode	Differential	Action: Analog Input Mode Differential or Single End						

The table describes the parameters contained in the "**Analog Input Configuration**" section.

Item	Description
Analog Input Channel	
AI0 ~ AI7	Set the data range for each channel and whether to enable or disable it. If the alarm is enabled and the alarm mode is set to “Momentary” which means the alarm status will automatically be cleared if the alarm occurred and the AI value is back to normal. If the mode is set to “Latch”, the alarm status can only be cleared by using the Clear command.
Analog Input	
Data Format	Set the data format, e.g., Hex or Engineering.
Sampling Rates	Set the sampling rate, e.g., 10 Hz or 200 Hz.
Analog Input Mode	Set the wiring mode, e.g., Differential or Single End.
Update Settings	Click this button to save the revised settings to the ET-2200 module.

4.4.4 Analog Input Calibration



Analog Input Calibration

Analog Input Channel	Range	Zero Calibration Voltage/Current	Span Calibration Voltage/Current
AI0	05: +/-2.5 V	0 V	+2.5 V
AI1	06: +/-20 mA	0 mA	+20 mA
AI2	07: +4 mA to +20 mA	0 mA	+20 mA
AI3	08: +/-10 V	0 V	+10 V
AI4	09: +/-5 V	0 V	+5 V
AI5	0A: +/-1 V	0 V	+1 V
AI6	0D: +/-20 mA	0 mA	+20 mA
AI7	1A: 0 mA to +20 mA	0 mA	+20 mA
AI Channel	AI0	**Type**	Zero

Reload Factory Calibration Parameters

The table describes the parameters contained in the "**Analog Input Calibration**" section.

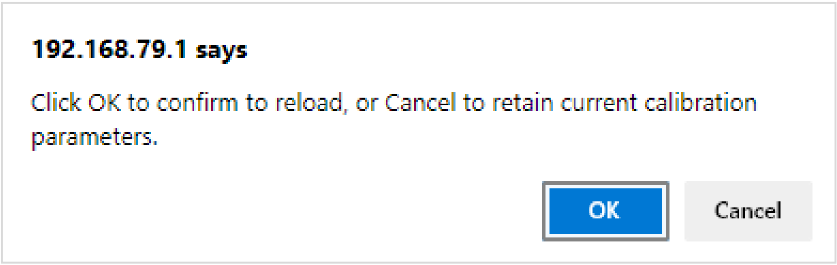
Item	Description
Analog Input Channel	
AI0 ~ AI7	Display the data range and the Zero or Span calibration voltage/current.
AI Channel	Select an AI channel to perform calibration.
Type	Select the type of calibration, e.g., Zero or Span.
Calibrate	Click the Calibrate button to perform calibration

➢ Reload Factory Calibration Parameters

Follow the steps to load the factory default settings.

Step 1: Click the "**Reload**" button to load the calibration parameters.

Step 2: Click the "**OK**" button in the dialog box to complete the setting.

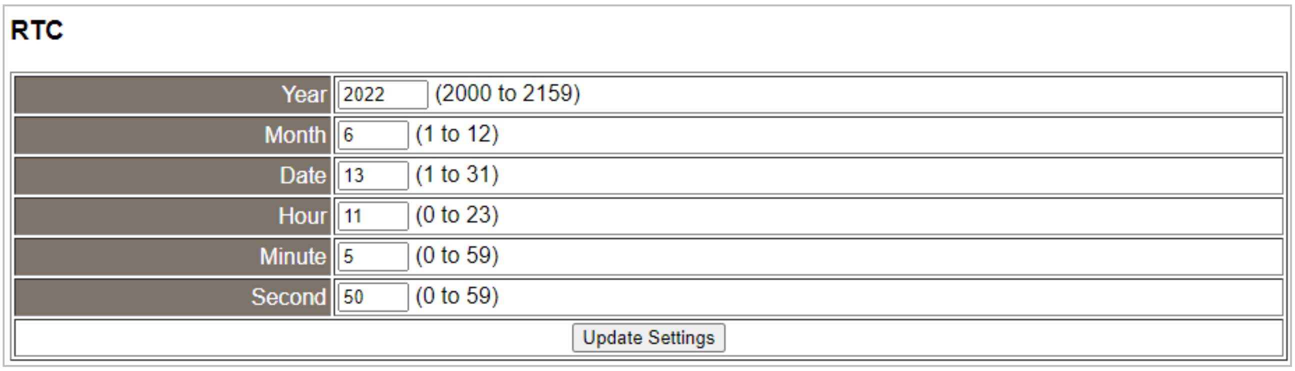


192.168.79.1 says

Click OK to confirm to reload, or Cancel to retain current calibration parameters.

4.4.5 RTC

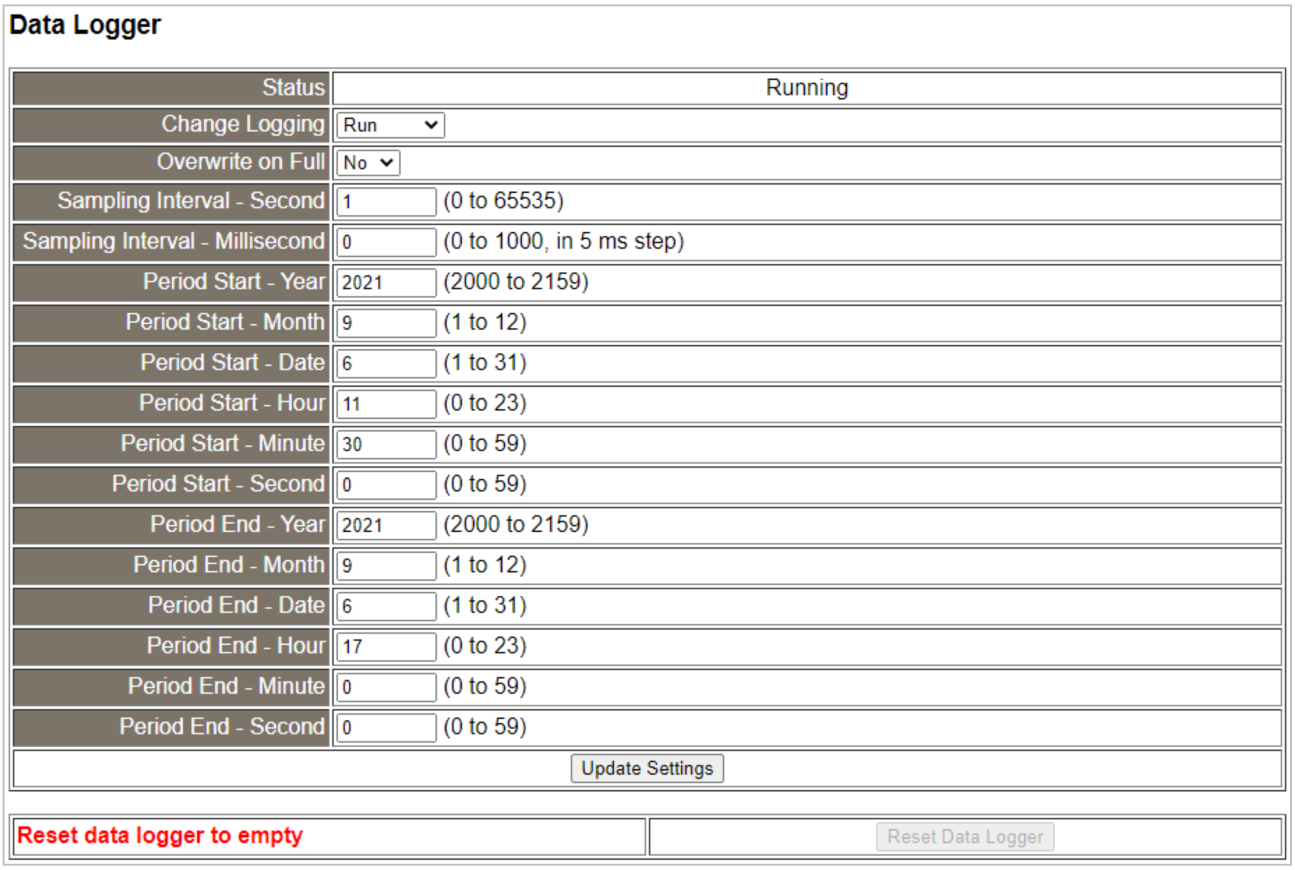
The function is used to set the system time and click the “Update Settings” button to save the revised settings to the ET-2200 module.



RTC

Year	2022 (2000 to 2159)
Month	6 (1 to 12)
Date	13 (1 to 31)
Hour	11 (0 to 23)
Minute	5 (0 to 59)
Second	50 (0 to 59)

4.4.6 Data Logger



Data Logger

Status	Running
Change Logging	Run
Overwrite on Full	No
Sampling Interval - Second	1 (0 to 65535)
Sampling Interval - Millisecond	0 (0 to 1000, in 5 ms step)
Period Start - Year	2021 (2000 to 2159)
Period Start - Month	9 (1 to 12)
Period Start - Date	6 (1 to 31)
Period Start - Hour	11 (0 to 23)
Period Start - Minute	30 (0 to 59)
Period Start - Second	0 (0 to 59)
Period End - Year	2021 (2000 to 2159)
Period End - Month	9 (1 to 12)
Period End - Date	6 (1 to 31)
Period End - Hour	17 (0 to 23)
Period End - Minute	0 (0 to 59)
Period End - Second	0 (0 to 59)

Reset data logger to empty

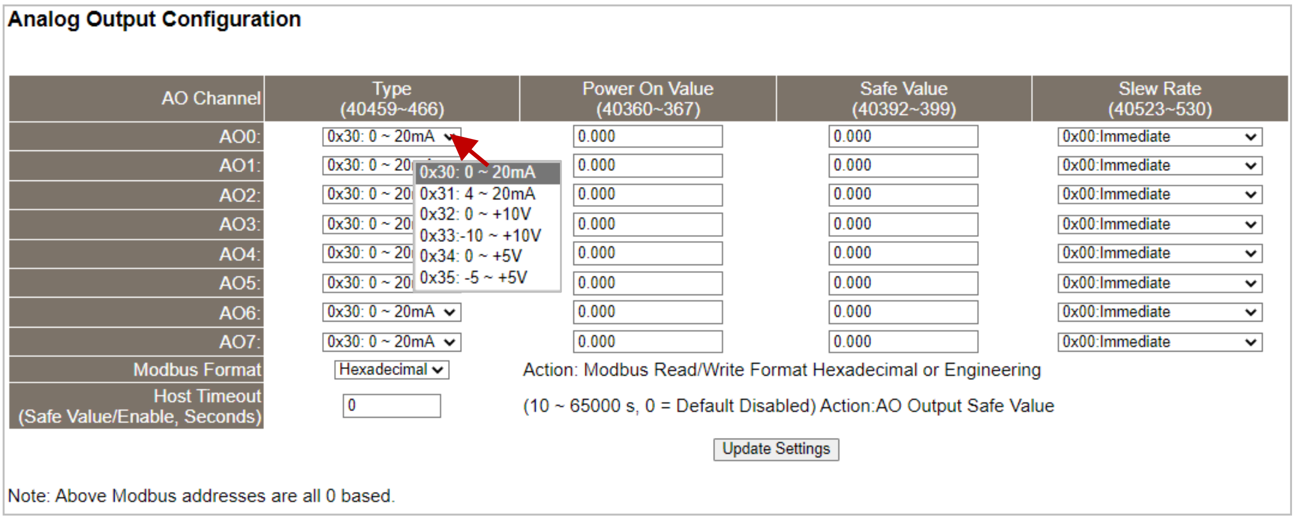
The table describes the parameters contained in the "**Data Logger**" section.

Item	Description
Status	Display the current status of data logging.
Change Logging	Set the status of data logging. It can be set to Stop, Run, Period, Pause, and Continue.
Overwrite on Full	Whether to overwrite data when it is full. It can be set to Yes or No.
Sampling Interval - Second	The time interval for logging data. (Range: 0-65535, Unit: second)
Sampling Interval - Millisecond	The time interval for logging data. (Range: 0-1000, in 5 ms step)
Period Start- Year, Month, Date, Hour, Minute, Second	The start time for logging data. (Year/Month/Date/Hour/Minute/ Second).
Period End- Year, Month, Date, Hour, Minute, Second	The end time for logging data. (Year/Month/Date/Hour/Minute/ Second).

➢ Reset data logger to empty

Click the “Reset Data Logger” button to remove data.

4.4.7 Analog Output Configuration



Analog Output Configuration

AO Channel	Type (40459~466)	Power On Value (40360~367)	Safe Value (40392~399)	Slew Rate (40523~530)
AO0:	0x30: 0 ~ 20mA	0.000	0.000	0x00:Immediate
AO1:	0x30: 0 ~ 20	0.000	0.000	0x00:Immediate
AO2:	0x30: 0 ~ 20	0.000	0.000	0x00:Immediate
AO3:	0x30: 0 ~ 20	0.000	0.000	0x00:Immediate
AO4:	0x30: 0 ~ 20	0.000	0.000	0x00:Immediate
AO5:	0x30: 0 ~ 20	0.000	0.000	0x00:Immediate
AO6:	0x30: 0 ~ 20mA	0.000	0.000	0x00:Immediate
AO7:	0x30: 0 ~ 20mA	0.000	0.000	0x00:Immediate
Modbus Format	Hexadecimal	Action: Modbus Read/Write Format Hexadecimal or Engineering		
Host Timeout (Safe Value/Enable, Seconds)	0	(10 ~ 65000 s, 0 = Default Disabled) Action:AO Output Safe Value		

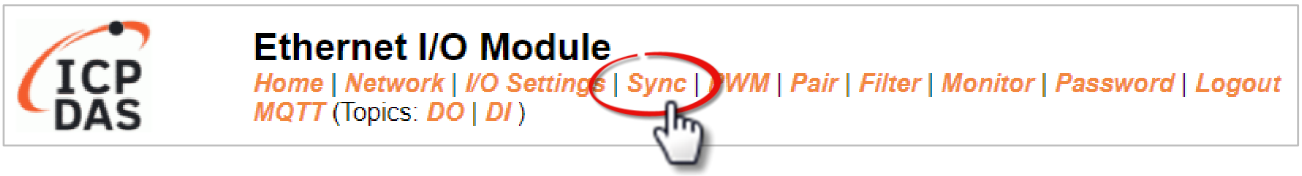
Note: Above Modbus addresses are all 0 based.

The table describes the parameters contained in the "**Analog Output Calibration**" section.

Item	Description
AO Channel	
AO0 ~ AO7	Set the data type, Power-on value, Safe value, and Slew Rate for each channel.
Modbus Format	Set the data format. It can be Hexadecimal or Engineering
Host Timeout	This parameter is used to configure the Host Watchdog timeout value. If there is no Modbus TCP communication activity for the specified period (the timeout), the AO will be set to the user-defined safe value.
Update Settings	Click this button to save the revised settings to the ET-2200 module.

4.5 Sync

Note: **The function is available for DIO modules.**



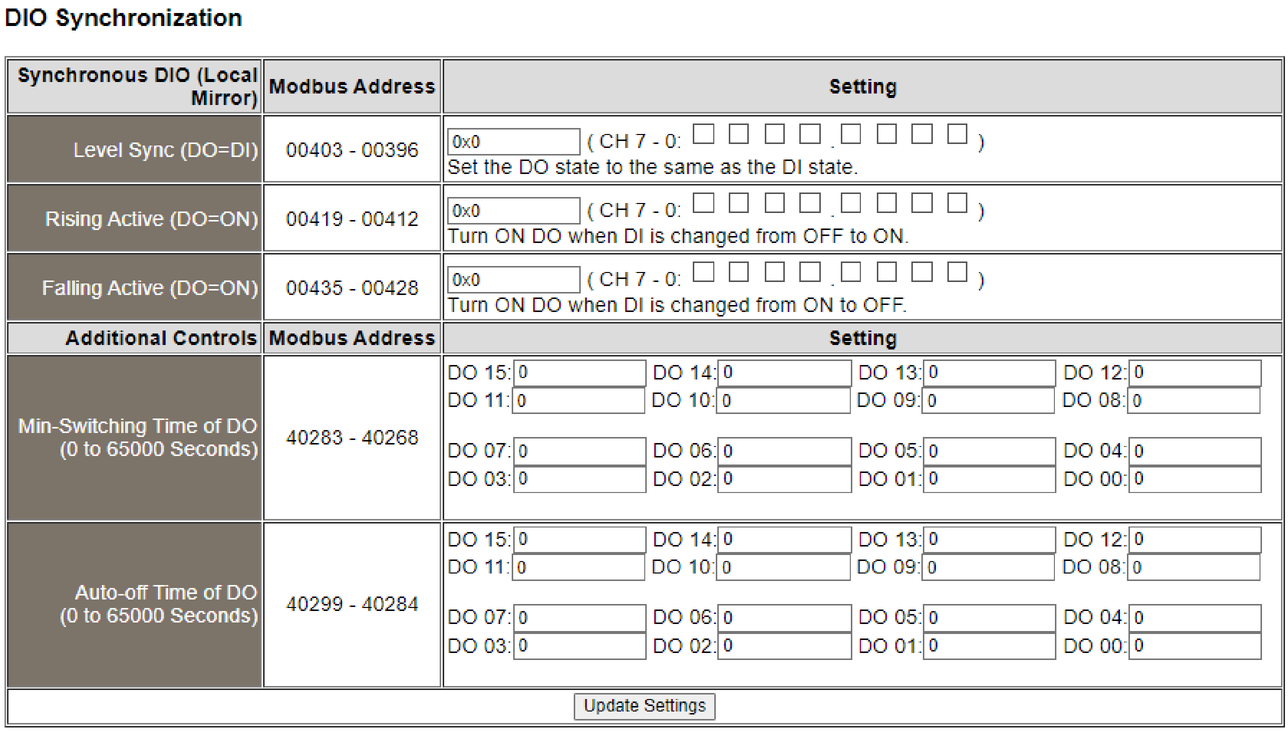
Ethernet I/O Module

Home | Network | I/O Settings | Sync | PWM | Pair | Filter | Monitor | Password | Logout

MQTT (Topics: DO | DI)

The **DIO Synchronization** section on the **Sync** page allows you to configure the Synchronous DIO, Min-switching time of DO, and Auto-off Time of DO for the ET-2200 series module, each of which will be described in more detail below.

4.5.1 DIO Synchronization



DIO Synchronization

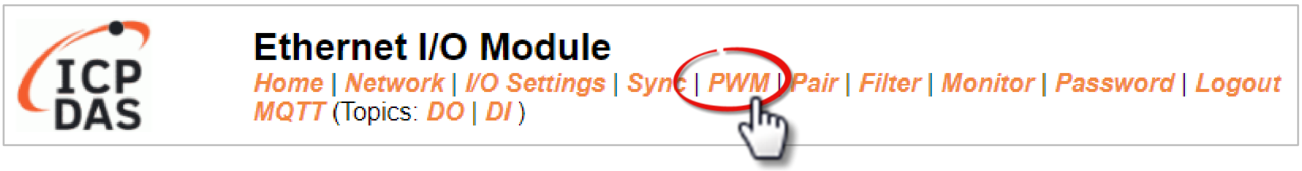
Synchronous DIO (Local Mirror)	Modbus Address	Setting
Level Sync (DO=DI)	00403 - 00396	0x0 (CH 7 - 0: ☐ ☐ ☐ ☐ . ☐ ☐ ☐ ☐) Set the DO state to the same as the DI state.
Rising Active (DO=ON)	00419 - 00412	0x0 (CH 7 - 0: ☐ ☐ ☐ ☐ . ☐ ☐ ☐ ☐) Turn ON DO when DI is changed from OFF to ON.
Falling Active (DO=ON)	00435 - 00428	0x0 (CH 7 - 0: ☐ ☐ ☐ ☐ . ☐ ☐ ☐ ☐) Turn ON DO when DI is changed from ON to OFF.
Additional Controls	**Modbus Address**	**Setting**
Min-Switching Time of DO (0 to 65000 Seconds)	40283 - 40268	DO 15: 0 DO 14: 0 DO 13: 0 DO 12: 0 DO 11: 0 DO 10: 0 DO 09: 0 DO 08: 0 DO 07: 0 DO 06: 0 DO 05: 0 DO 04: 0 DO 03: 0 DO 02: 0 DO 01: 0 DO 00: 0
Auto-off Time of DO (0 to 65000 Seconds)	40299 - 40284	DO 15: 0 DO 14: 0 DO 13: 0 DO 12: 0 DO 11: 0 DO 10: 0 DO 09: 0 DO 08: 0 DO 07: 0 DO 06: 0 DO 05: 0 DO 04: 0 DO 03: 0 DO 02: 0 DO 01: 0 DO 00: 0

The table describes the parameters contained in the "**DIO Synchronization**" section.

Item	Description
Synchronous DIO (Local Mirror) **Note:** **ET-2254 supports these functions when low 8-bit is DI0 to DI7 and high 8-bit is DO8 to DO15.**	
Level Sync (DO = DI)	This parameter is used to enable the synchronization operation in Digital Input/Output function.
Rising Active (DO = ON)	This parameter is used to enable rising activation in the Digital Input function. When the specified DI state changes from OFF to ON, the corresponding DO will be set to ON.
Falling Active (DO = ON)	This parameter is used to enable falling activation in the Digital Input function. When the specified DI state changes from ON to OFF, the corresponding DO will be set to ON.
Additional Controls	
Min-Switch Time of DO (0 to 65535 Seconds)	This parameter is used to set the minimum switching time between the ON and OFF states of the Digital Output. This protects some machines from being damaged by too many ON/OFF switches in a short time.
Auto-off Time of DO (0 to 65535 Seconds)	This parameter is used to set the auto-off time of the Digital Output. If the Digital Output is ON, the Digital Output will be auto-off based on the configured time value.
Update Settings	Click this button to save the revised settings of the DIO configuration to the ET-2200 module.

4.6 PWM

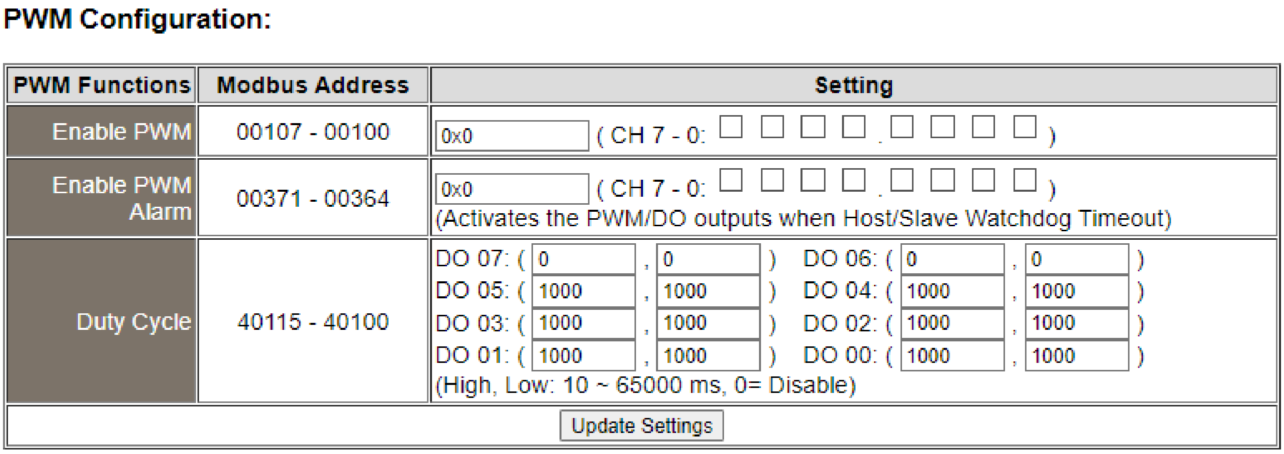
Note: **The function is available for DIO modules.**


ICP DAS
Ethernet I/O Module
Home | Network | I/O Settings | Sync | PWM | Pair | Filter | Monitor | Password | Logout
MQTT (Topics: DO | DI)

The **PWM Configuration** section on the **PWM** page allows you to enable and configure the PWM parameters for the ET-2200 series module, including the PWM Alarm and duty cycle, etc., each of which will be described in more detail below.

Note: **Because of the characteristics of the relay functions, it is recommended that the PWM on the ET-2260/2261/2268 module (i.e., modules with relay functions) is not used for extended periods.**

4.6.1 PWM Configuration



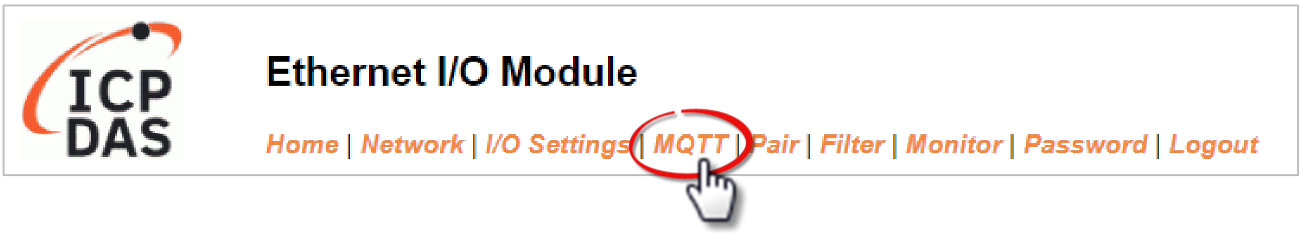
PWM Configuration:

PWM Functions	Modbus Address	Setting
Enable PWM	00107 - 00100	0x0 (CH 7 - 0: ☐ ☐ ☐ ☐ , ☐ ☐ ☐ ☐)
Enable PWM Alarm	00371 - 00364	0x0 (CH 7 - 0: ☐ ☐ ☐ ☐ , ☐ ☐ ☐ ☐) (Activates the PWM/DO outputs when Host/Slave Watchdog Timeout)
Duty Cycle	40115 - 40100	DO 07: (0 , 0) DO 06: (0 , 0) DO 05: (1000 , 1000) DO 04: (1000 , 1000) DO 03: (1000 , 1000) DO 02: (1000 , 1000) DO 01: (1000 , 1000) DO 00: (1000 , 1000) (High, Low: 10 ~ 65000 ms, 0= Disable)
Update Settings		

The table describes the parameters contained in the "**PWM Configuration**" section.

Item	Description	Defaults
Enable PWM	This parameter is used to enable the PWM output function.	0
Enable PWM Alarm	This parameter is used to enable the PWM output alarm function when the Host/Slave watchdog timeout.	0
Duty Cycle	This parameter is used to set the duty cycle for the DO channels. Two values are required for each DO channel. The first value is the high pulse width, while the second is the low pulse width. The duty cycle is in 1 ms units, and the resolution is approximately 5 ms. (10 to 65535 ms). A value of 0 will disable the duty cycle functions for that channel.	1000 (ms)
Update Settings	Click this button to save the revised settings to the ET-2200 module.	

4.7 MQTT (AI)


ICP DAS
Ethernet I/O Module
Home | Network | I/O Settings | MQTT | Pair | Filter | Monitor | Password | Logout

➢ Connectivity Settings

Refer to Section 4.13.1 Connectivity Settings for more details about the setting.

➢ Publication Settings

Refer to Section 4.13.2 Publication Settings for more details about the setting.

➢ Analog Inputs

Refer to Section 4.16 MQTT-AI for more details about the setting.

➢ Restore Factory Defaults

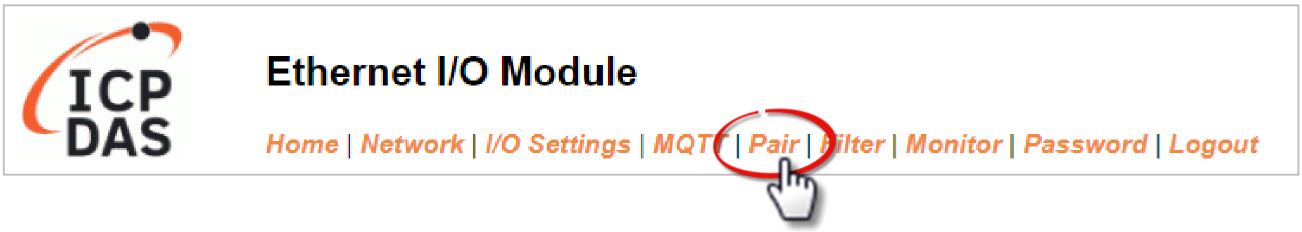
Refer to Section 4.13.3 Restore Factory Defaults for more details about the setting.

4.8 Pair Connection

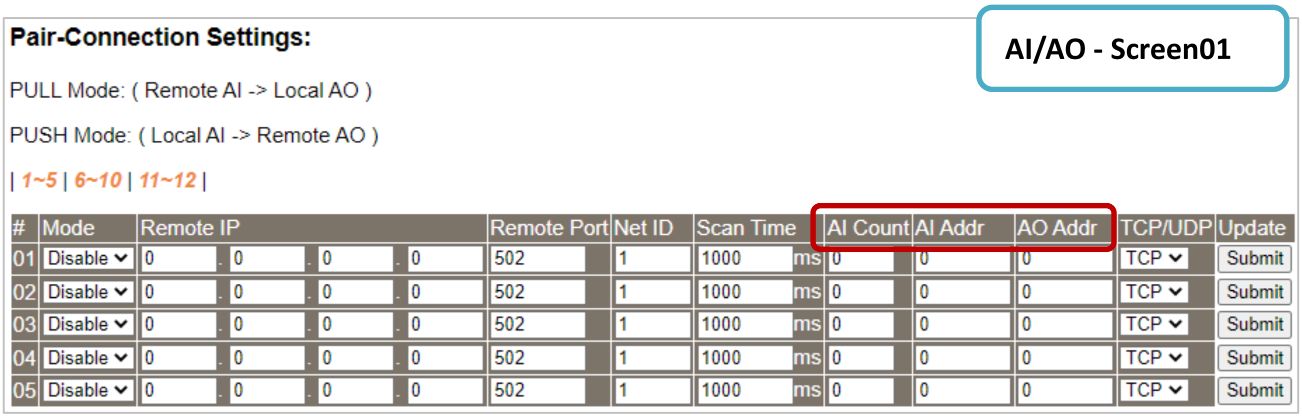
Note: The function is available for AI/AO and DI/DO modules.

The **I/O Pair Connection Settings** section on the **Pair** page allows you to enable and configure the DI-to-DO pair connections for the ET-2200 series module via the Modbus TCP (Ethernet) protocol.

4.8.1 I/O Pair-Connection Settings


ICP DAS
Ethernet I/O Module
Home | Network | I/O Settings | MQTT | Pair | Filter | Monitor | Password | Logout

Note: These screens may be different according to the model.



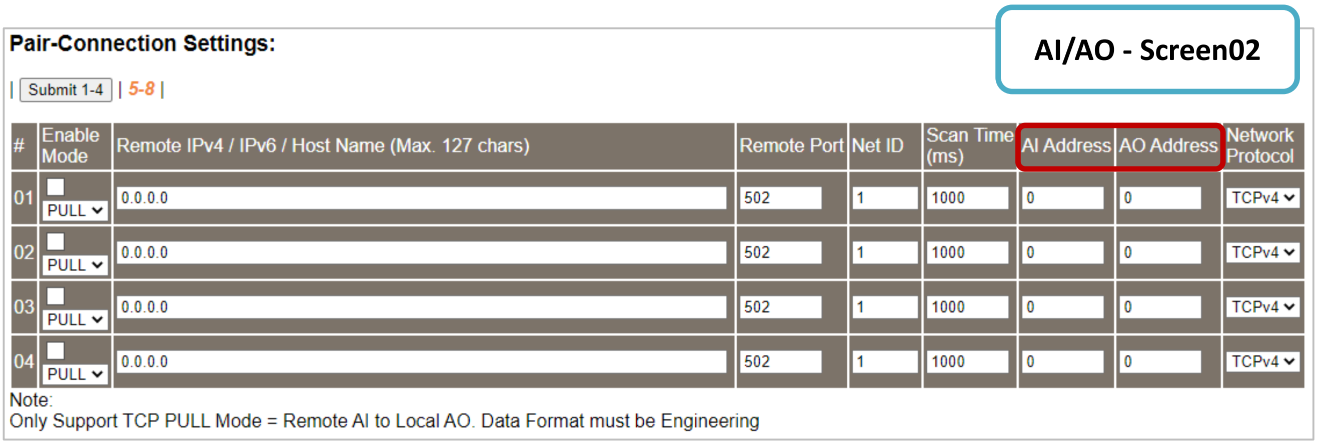
Pair-Connection Settings:

PULL Mode: (Remote AI -> Local AO)

PUSH Mode: (Local AI -> Remote AO)

| 1~5 | 6~10 | 11~12 |

#	Mode	Remote IP				Remote Port	Net ID	Scan Time	AI Count	AI Addr	AO Addr	TCP/UDP	Update
01	Disable	0	0	0	0	502	1	1000 ms	0	0	0	TCP	Submit
02	Disable	0	0	0	0	502	1	1000 ms	0	0	0	TCP	Submit
03	Disable	0	0	0	0	502	1	1000 ms	0	0	0	TCP	Submit
04	Disable	0	0	0	0	502	1	1000 ms	0	0	0	TCP	Submit
05	Disable	0	0	0	0	502	1	1000 ms	0	0	0	TCP	Submit

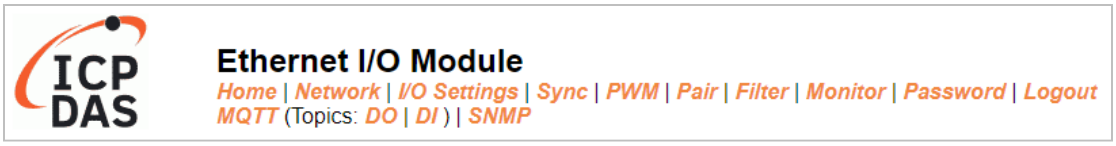


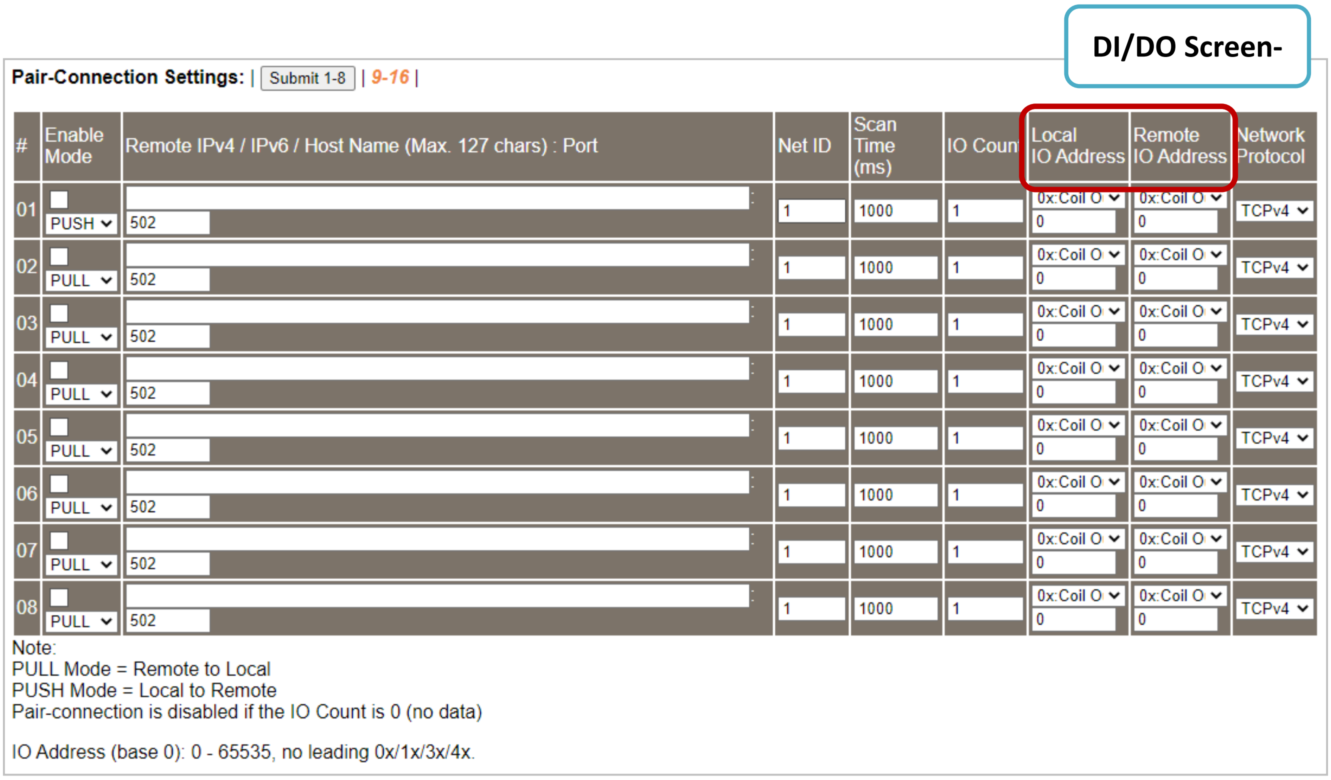
Pair-Connection Settings:

| Submit 1-4 | 5-8 |

#	Enable Mode	Remote IPv4 / IPv6 / Host Name (Max. 127 chars)	Remote Port	Net ID	Scan Time (ms)	AI Address	AO Address	Network Protocol
01	☐ PULL	0.0.0.0	502	1	1000	0	0	TCPv4
02	☐ PULL	0.0.0.0	502	1	1000	0	0	TCPv4
03	☐ PULL	0.0.0.0	502	1	1000	0	0	TCPv4
04	☐ PULL	0.0.0.0	502	1	1000	0	0	TCPv4

Note:
Only Support TCP PULL Mode = Remote AI to Local AO. Data Format must be Engineering


Ethernet I/O Module
Home | Network | I/O Settings | Sync | PWM | Pair | Filter | Monitor | Password | Logout
MQTT (Topics: DO | DI) | SNMP


DI/DO Screen-
Pair-Connection Settings: | Submit 1-8 | 9-16 |

#	Enable Mode	Remote IPv4 / IPv6 / Host Name (Max. 127 chars) : Port	Net ID	Scan Time (ms)	IO Coun	Local IO Address	Remote IO Address	Network Protocol
01	☐ PUSH	: 502	1	1000	1	0x:Coil O 0	0x:Coil O 0	TCPv4
02	☐ PULL	: 502	1	1000	1	0x:Coil O 0	0x:Coil O 0	TCPv4
03	☐ PULL	: 502	1	1000	1	0x:Coil O 0	0x:Coil O 0	TCPv4
04	☐ PULL	: 502	1	1000	1	0x:Coil O 0	0x:Coil O 0	TCPv4
05	☐ PULL	: 502	1	1000	1	0x:Coil O 0	0x:Coil O 0	TCPv4
06	☐ PULL	: 502	1	1000	1	0x:Coil O 0	0x:Coil O 0	TCPv4
07	☐ PULL	: 502	1	1000	1	0x:Coil O 0	0x:Coil O 0	TCPv4
08	☐ PULL	: 502	1	1000	1	0x:Coil O 0	0x:Coil O 0	TCPv4

Note:
PULL Mode = Remote to Local
PUSH Mode = Local to Remote
Pair-connection is disabled if the IO Count is 0 (no data)

IO Address (base 0): 0 - 65535, no leading 0x/1x/3x/4x.

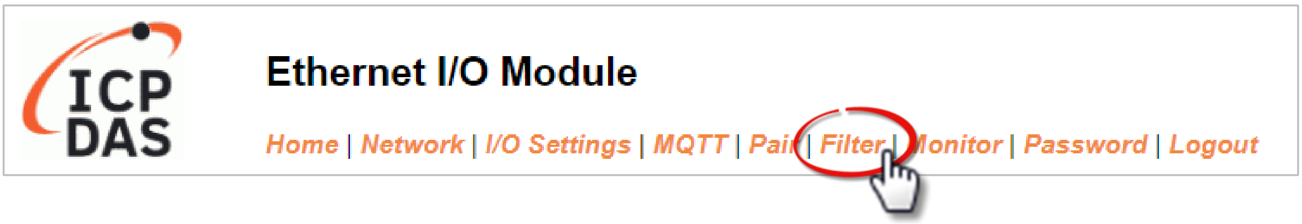
The table describes the parameters contained in the "**I/O Pair-Connection Settings**" section.

Item	Description	Defaults
Mode	Enabling or disabling the Client (Master) function of the ET-2200 module and selecting either **PULL** or **PUSH** mode. **PULL**: To read the remote AI (or DI) and write to the local AO (or DO). **PUSH**: To read the local AI (or DI) and write to the remote AO (or DO).	Disable
Remote IP	Set the IP address or the hostname of the remote device. Note that the user needs to set the correct DNS on the Network page before setting the hostname.	0
Remote Port	Set the TCP port number of the remote device. The valid range is 0 - 65535.	502
Net ID	Set the Modbus Net ID of the remote device. The valid range is 1 - 247.	1

Item	Description	Defaults
Scan Time	In "**PULL**" mode, the module will update the IO data according to the specified Scan Time. If there is no response from the Slave over the scan time, it is determined as Timeout. In **“PUSH”** mode, the module will update the remote AO (DO) data when the local AI (DI) data is changed. If the local AI (DI) data does not change during the specified Scan Time, the module will still forcefully update the data to the remote AO (DO). The valid range is 1000 to 42949672965 (ms)	1000 ms
IO Count (AI Count)	This parameter specifies how many I/O channels are mapped. (0= Disable)	0
Local IO Address (AI Address)	This parameter is used to select the local IO type and the start address. Shared memory is only available for DIO series modules: The DIO (Bit) address ranges from 3000 to 7094 The AIO (Register) address ranges from 3000 to 3254 DI, DO, AI, and AO data share the same memory block. If different IO data are written to the same address, the data will overwrite each other.	0
Remote IO Address (AO Address)	This parameter is used to select the remote IO type and the start address.	0
TCP/UDP	This parameter is used to set the type of Modbus protocol to be used and can be **TCPv4/TCPv6** or **UDPv4/ UDPv6**	TCP
Submit	Click the **“Submit”** button to save the revised settings to the ET-2200 module.	

4.9 Filter

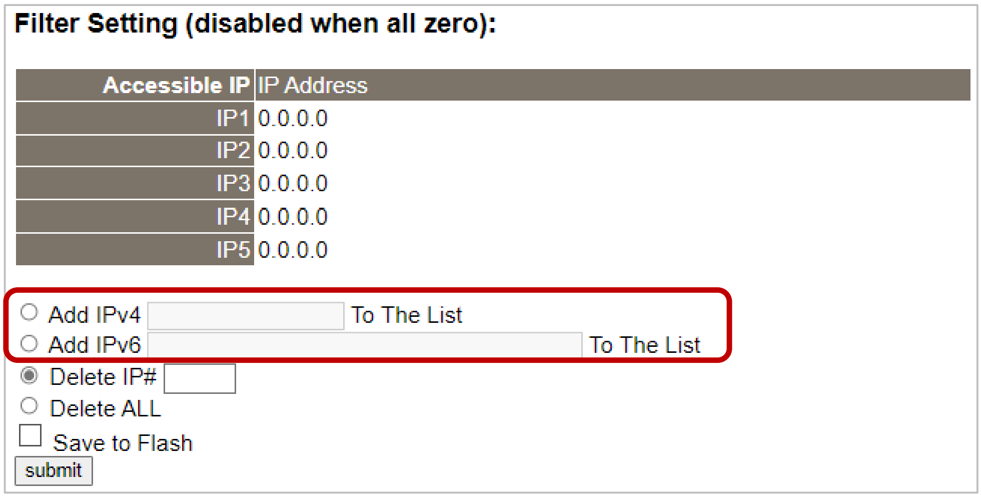
Note: **The function is available for AIO and DIO modules.**


Ethernet I/O Module
Home | Network | I/O Settings | MQTT | Pair | Filter | Monitor | Password | Logout

The **Filter Settings** section on the **Filter** page allows you to configure the IP Filter list for the ET-2200 series module, which will be described in more detail below.

4.9.1 Filter Settings

The ***Filter Settings*** function is used to query or set the IP Filter List (Available IP) for the ET-2200 series module. Only Clients whose IP address is specified in the list will be able to access the ET-2200 series module. Note that some of the modules do not support the IPv6 setting.



Filter Setting (disabled when all zero):

Accessible IP	IP Address
IP1	0.0.0.0
IP2	0.0.0.0
IP3	0.0.0.0
IP4	0.0.0.0
IP5	0.0.0.0

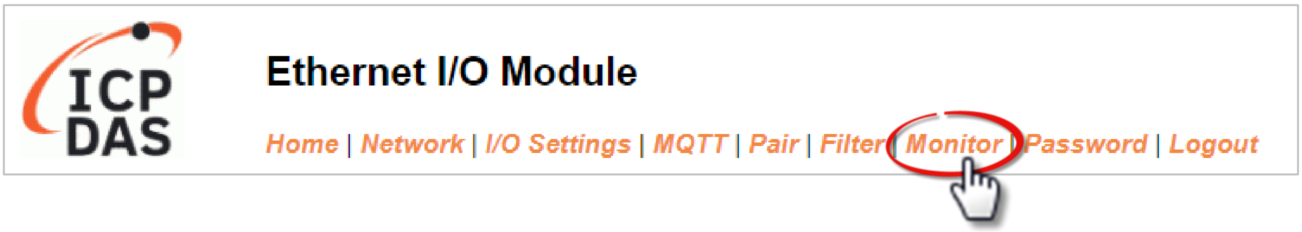
○ Add IPv4 To The List
○ Add IPv6 To The List
● Delete IP#
○ Delete ALL
☐ Save to Flash
submit

The table describes the parameters contained in the "**IP Address Configuration**" section.

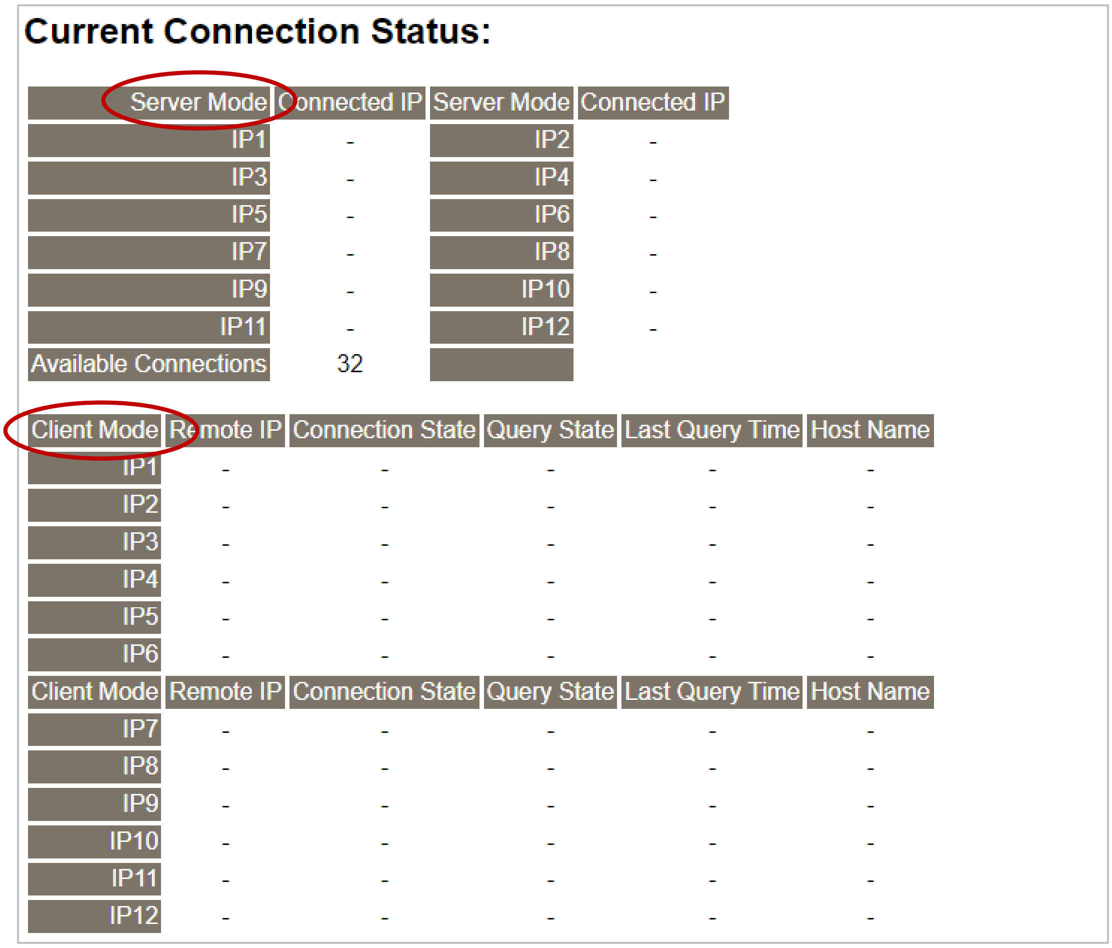
Item	Description
Add “IP” to the List	Used to add an IP address (IPv4 or IPv6) to the Available IP List.
Delete IP # “number”	Used to delete IP# address from the Available IP List.
Delete All	Used to delete all IP addresses currently contained in the Available IP List.
Save to Flash	Used to save the updated Available IP List to the Flash memory.
Submit	Click this button to save the revised settings to the ET-2200 module.

4.10 Monitor

Note: The function is available for AI/AO and DI/DO modules.


ICP DAS
Ethernet I/O Module
Home | Network | I/O Settings | MQTT | Pair | Filter | Monitor | Password | Logout

After clicking the **Monitor** tab, the user can check the connection status of the ET-2200 series module in the **Current Connection Status** section. Note that some of the modules only display IP addresses for the Server mode.



Current Connection Status:

Server Mode	Connected IP	Server Mode	Connected IP
IP1	-	IP2	-
IP3	-	IP4	-
IP5	-	IP6	-
IP7	-	IP8	-
IP9	-	IP10	-
IP11	-	IP12	-
Available Connections	32		

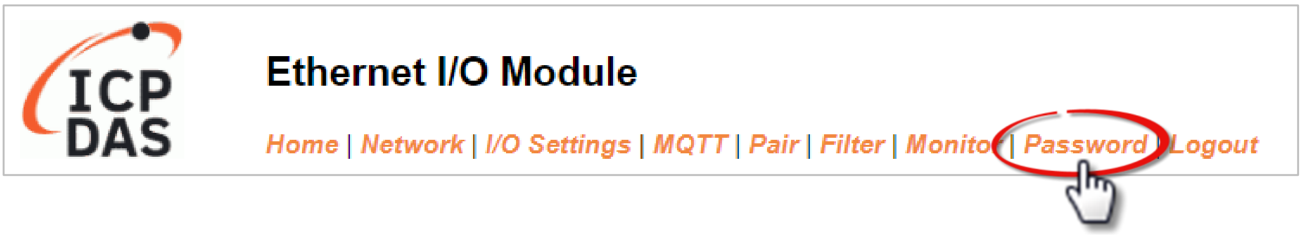
Client Mode	Remote IP	Connection State	Query State	Last Query Time	Host Name
IP1	-	-	-	-	-
IP2	-	-	-	-	-
IP3	-	-	-	-	-
IP4	-	-	-	-	-
IP5	-	-	-	-	-
IP6	-	-	-	-	-

Client Mode	Remote IP	Connection State	Query State	Last Query Time	Host Name
IP7	-	-	-	-	-
IP8	-	-	-	-	-
IP9	-	-	-	-	-
IP10	-	-	-	-	-
IP11	-	-	-	-	-
IP12	-	-	-	-	-

Item	Description
Server Mode (IP1 to IP12)	Display the connected IP address.
Available Connection	When used as a slave device, a maximum of 32 connections is allowed
Client Mode (IP1 to IP12)	Display the remote IP address, the connection state, the request state, the last query time, and the login hostname.

4.11 Change Password

Note: The function is available for AIO and DIO modules.


ICP DAS
Ethernet I/O Module
Home | Network | I/O Settings | MQTT | Pair | Filter | Monitor | Password | Logout

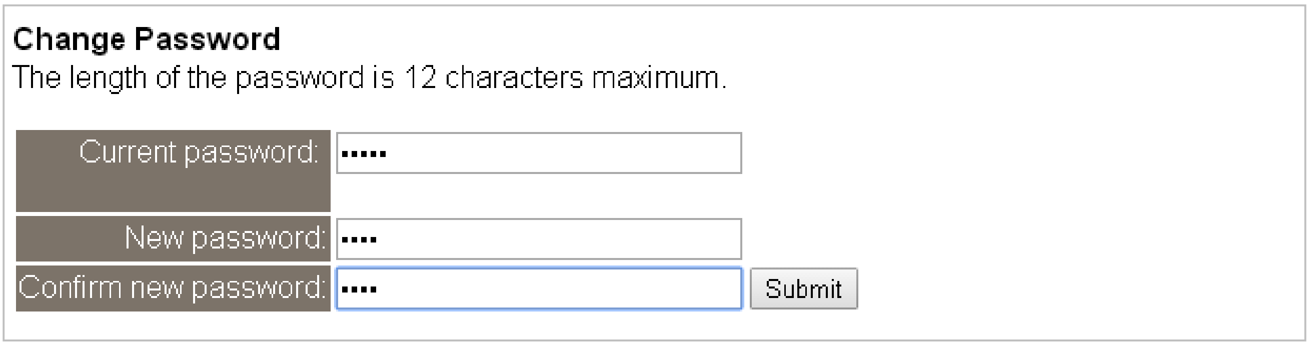
The **Password** page allows you to change the password that used to log in to ET-2200, follow the steps.

Step 1: Enter the old password in the **"Current password"** field. The first time you change the password, enter the default password "**Admin"**.

Step 2: Enter a new password in the **"New password"** field.
(please enter 1 to 12 digits of numbers or characters).

Step 3: Re-enter the new password in the **"Confirm new password"** field.

Step 4: Click the "**Submit**" button to update the password.



Change Password

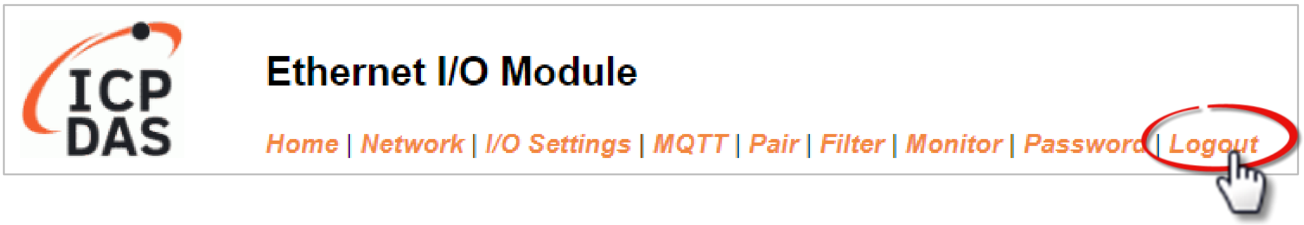
The length of the password is 12 characters maximum.

Current password:	•••••
New password:	••••
Confirm new password:	••••

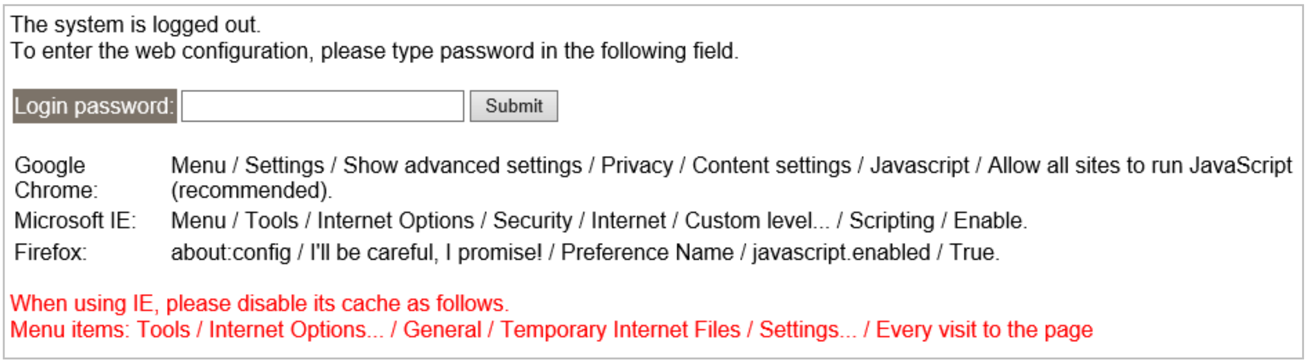
Note: If you forgot the password, refer to Appendix A1. How do I restore the web password for the module to the factory default password?

4.12 Logout

Note: **The function is available for AIO and DIO modules.**


ICP DAS
Ethernet I/O Module
Home | Network | I/O Settings | MQTT | Pair | Filter | Monitor | Password | Logout

Clicking the ***Logout*** tab will immediately log out from the system and return to the login page.



The system is logged out.
To enter the web configuration, please type password in the following field.

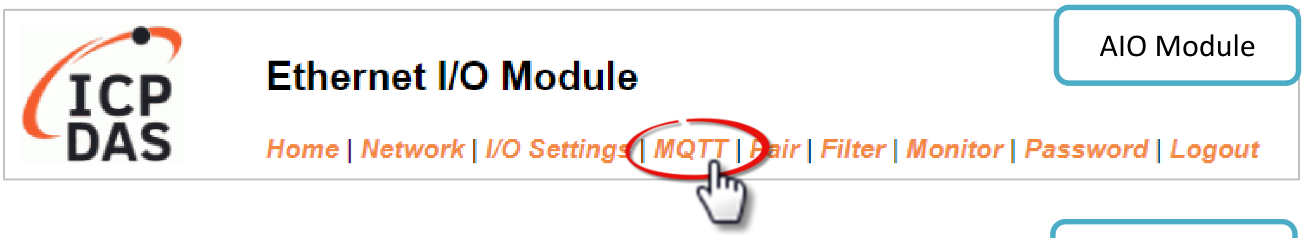
Login password: [   ] Submit

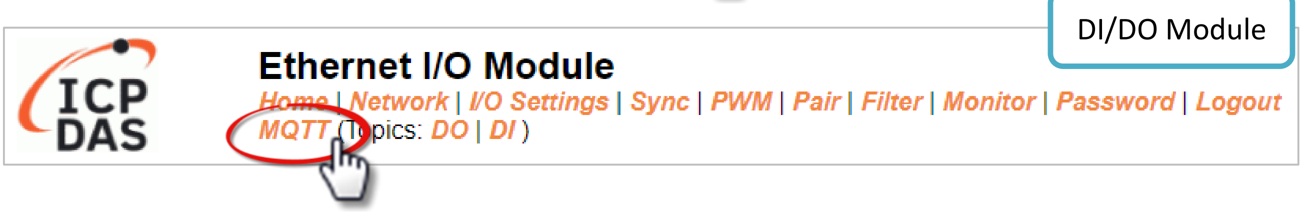
Google Chrome:	Menu / Settings / Show advanced settings / Privacy / Content settings / Javascript / Allow all sites to run JavaScript (recommended).
Microsoft IE:	Menu / Tools / Internet Options / Security / Internet / Custom level... / Scripting / Enable.
Firefox:	about:config / I'll be careful, I promise! / Preference Name / javascript.enabled / True.

When using IE, please disable its cache as follows.
Menu items: Tools / Internet Options... / General / Temporary Internet Files / Settings... / Every visit to the page

4.13 MQTT

Note: **The function is available for AI/AO and DI/DO modules. But, ET-2217/2224/2228 does not support this function.**


AIO Module
Ethernet I/O Module
Home | Network | I/O Settings | MQTT | Pair | Filter | Monitor | Password | Logout

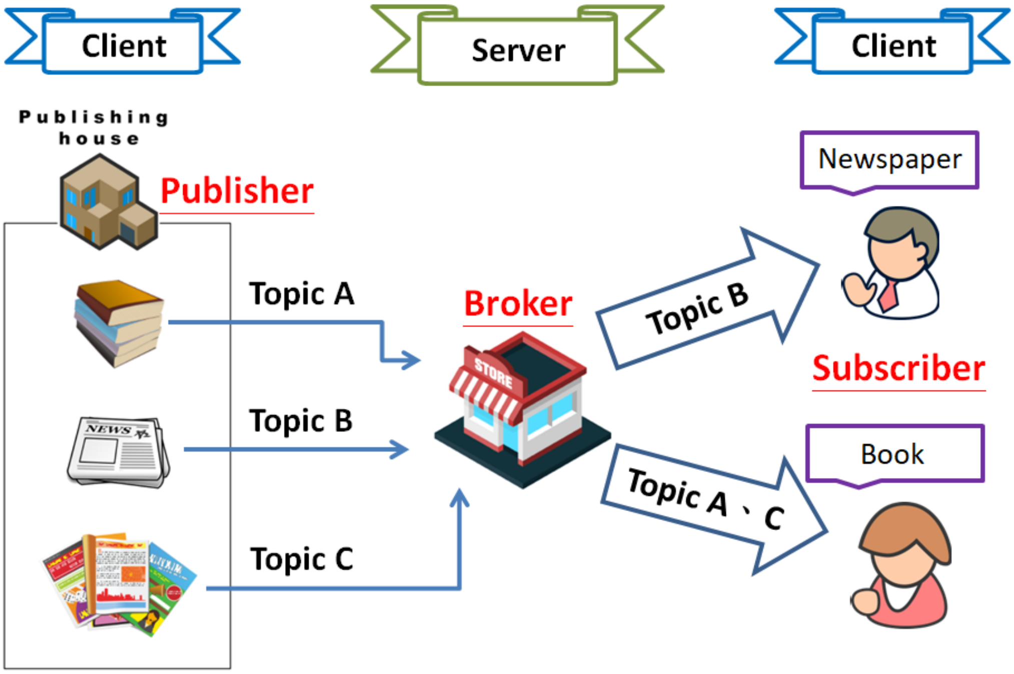

DI/DO Module
Ethernet I/O Module
Home | Network | I/O Settings | Sync | PWM | Pair | Filter | Monitor | Password | Logout
MQTT (Topics: DO | DI)

Chapter	DI	DO	AI	AO
4.13.1 Connectivity Settings	✓	✓	✓	✓
4.13.2 Publication Settings	✓	✓	✓	✓
4.13.3 Publication Settings	✓	✓	✓	✓
4.14 MQTT-DO	-	✓	-	-
4.15 MQTT-DI	✓	-	-	-
4.16 MQTT-AI	-	-	✓	-

MQTT is a Client Server Publish/Subscribe messaging transport protocol. It is simple, lightweight, and open, and is designed to be easy to implement. These characteristics make it ideal for use in many situations, including constrained environments such as for communication in Machine-to-Machine (M2M) and Internet of Things (IoT) contexts where a small code footprint is required and/or network bandwidth is at a premium.

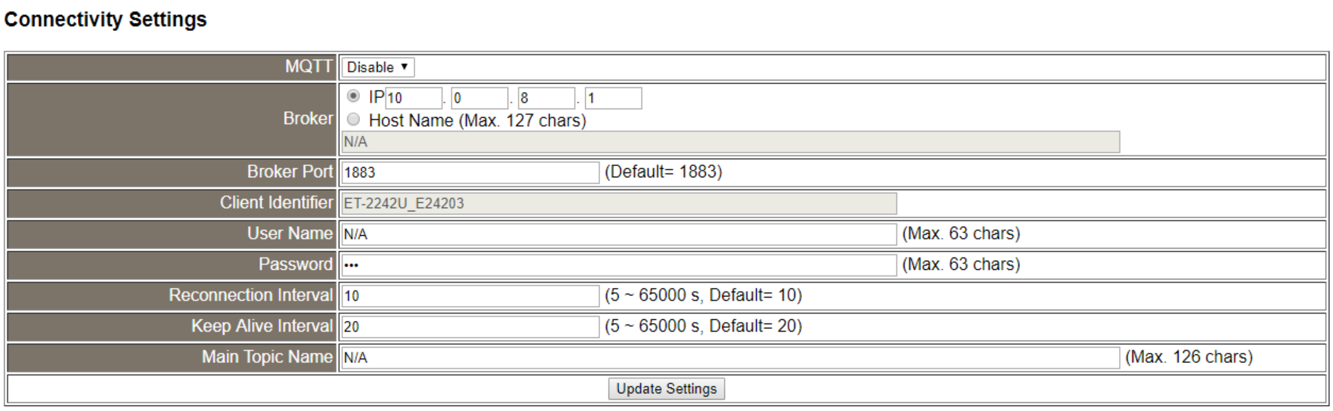
MQTT is a protocol consisting of a Publish/Subscribe mechanism where the Client only needs to know the IP address of the Broker. The Broker then acts as a central location to handle the sending and receiving of all messages between a Publisher and a Subscriber. The Publisher is the entity that publishes the topic and message, the Subscriber is the entity that receives the updated messages from the Broker.

When the Publisher updates a message related to a specific topic, it is transmitted to the Broker, which will then send the message to all Subscribers that have subscribed to that particular topic. Neither the Publisher nor the Subscriber needs to know the status of the other.


Client
Server
Client
Publishing house
Publisher
Topic A
Topic B
Topic C
Broker
STORE
NEWS
Topic B
Topic A、C
Newspaper
Subscriber
Book

The above is a schematic diagram of the system. Publishers are similar to various forms of the publishing house and focus on updating commodities for different topics such as novels, newspapers, magazines, etc. Subscribers are similar to consumers, who purchase, or subscribe to designated commodities in a bookstore (Broker), which presents the latest information that has been designated by the Subscriber.

4.13.1 Connectivity Settings



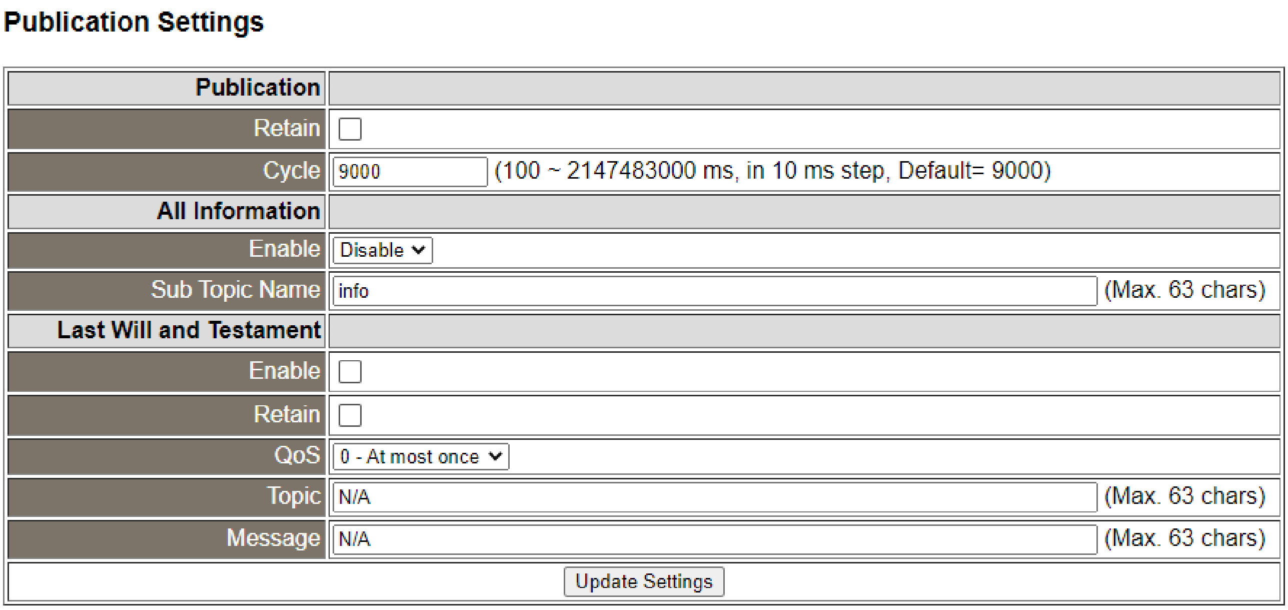
Connectivity Settings

MQTT	Disable ▼
Broker	● IP 10 . 0 . 8 . 1 ○ Host Name (Max. 127 chars) N/A
Broker Port	1883 (Default= 1883)
Client Identifier	ET-2242U_E24203
User Name	N/A (Max. 63 chars)
Password	••• (Max. 63 chars)
Reconnection Interval	10 (5 ~ 65000 s, Default= 10)
Keep Alive Interval	20 (5 ~ 65000 s, Default= 20)
Main Topic Name	N/A (Max. 126 chars)
	Update Settings

The table describes the parameters contained in the "**Connectivity Settings**" section.

Item	Description	Defaults
MQTT	Enables or Disables the MQTT connection function.	Disabled
Broker	The IP address or the Hostname for the MQTT broker.	N/A
Broker Port	The port number for the MQTT broker.	1883
Client Identifier	The client identifier uniquely identifies the MQTT client to the MQTT broker, and consists of the “module name”+ “_” (underscore character) + “the last 6 digits of the MAC address” and cannot be changed.	
User Name	This parameter is used when the MQTT broker requires authentication. The length should be no more than 63 characters.	N/A
Password	This parameter is used when the MQTT broker requires authentication. The length should be no more than 63 characters.	N/A
Reconnection Interval	The time interval between attempts by the ET-2200 module to connect to the broker if a connection failure occurs. The valid range is 5 to 65000 seconds	10(s)
Keep Alive Interval	The keep-alive mechanism is provided to ensure that both the client and the broker are alive and the connection is still open. If a Client doesn’t send any messages during the Keep Alive period, it must send a PINGREQ packet to the broker to confirm its availability. The broker must reply with a PINGRESP packet to also indicate its availability. The broker will disconnect a client, which doesn’t send a PINGREQ packet or any other message within one and a half times of the Keep Alive Interval. The valid range is 5 to 65000 seconds.	20(s)
Main Topic Name	The Topic Name is a combination of the Main Topic Name and the Sub Topic Name. The Main Topic Name can be empty. The same part of the Topic Names can be entered in the Main Topic Name field to improve the processing efficiency of all Topic Names. A shorter Topic Name also improves processing efficiency.	N/A
Update Settings	Click this button to save any revised settings to the ET-2200 device.	

4.13.2 Publication Settings



Publication Settings

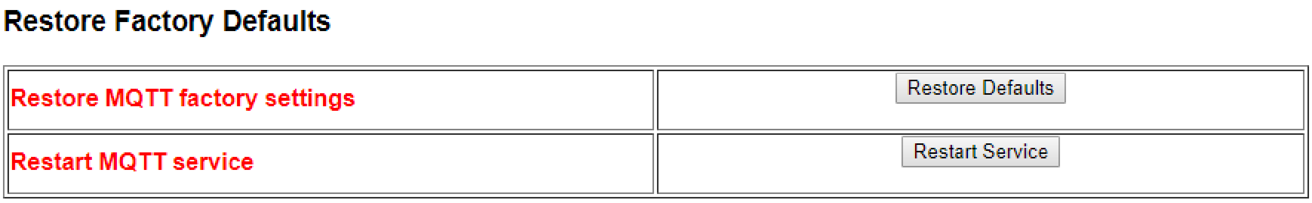
Publication	
Retain	☐
Cycle	9000 (100 ~ 2147483000 ms, in 10 ms step, Default= 9000)
All Information	
Enable	Disable
Sub Topic Name	info (Max. 63 chars)
Last Will and Testament	
Enable	☐
Retain	☐
QoS	0 - At most once
Topic	N/A (Max. 63 chars)
Message	N/A (Max. 63 chars)

The table describes the parameters contained in the "**Publication Settings**" section.

Item	Description	Defaults
Publication		
Retain	Check this option to ensure that the message is retained once it is published.	Disabled
Cycle	The time interval that the ET-2200 module periodically publishes data. The valid range is 100 to 2147483000 milliseconds in intervals of 10 milliseconds.	9000(ms)
All Information		
Enable	This option is used to enable or disable the All Information function. All Information adopts Periodic Publish, which includes the Module Name, the MAC address, DI, and DO states. The publishing period depends on the Cycle setting.	Disabled
Sub Topic Name	The Topic Name is a combination of the Main Topic Name and the Sub Topic Name. A shorter Topic Name improves processing efficiency.	info

Item	Description	Defaults
Last Will and Testament		
Enable	Check this option to enable the Last Will and Testament function.	Disabled
Retain	Check this option to ensure that the Last Will and Testament message is retained once it is published.	Disabled
QoS	The QoS for the Last Will and Testament message.	0 - At most once
Topic	The Topic Name for the last will and Testament message. The length should be no more than 63 characters	N/A
Message	The Last Will and Testament message. The length should be no more than 63 characters.	N/A
Update Setting	Click this button to save any revised settings to the ET-2200 device.	

4.13.3 Restore Factory Defaults

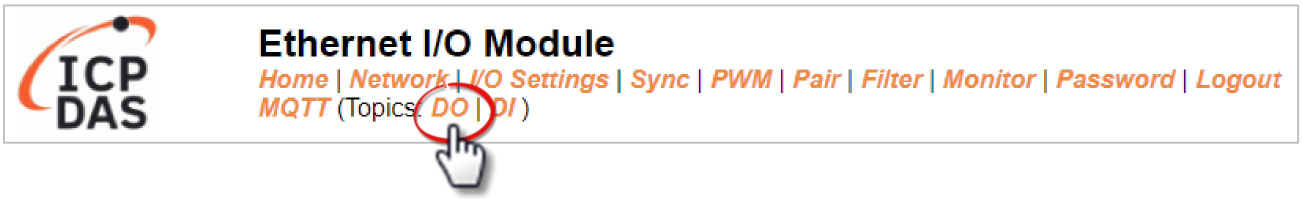

Restore Factory Defaults

Restore MQTT factory settings	Restore Defaults
Restart MQTT service	Restart Service

The table describes the parameters contained in the "**Restore Factory Defaults**" section.

Item	Description
Restore MQTT factory settings	Click this button to reset all MQTT settings to the default factory settings.
Restart MQTT service	Click this button to restart the MQTT service. This function should be used to reconnect with the Broker after adjusting the MQTT settings.

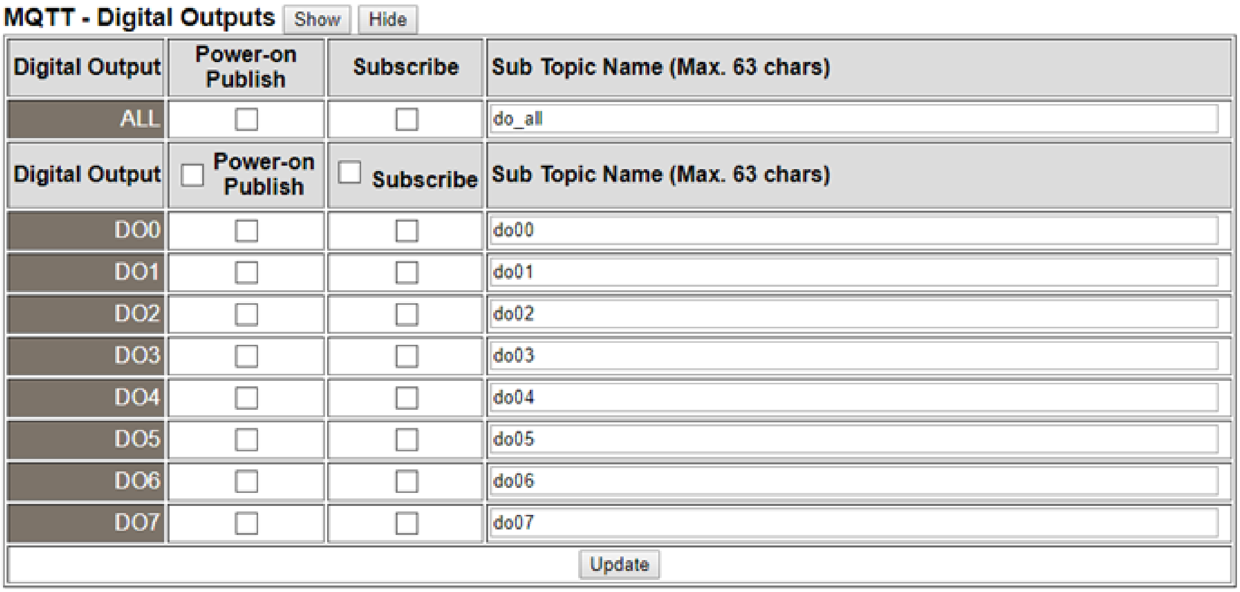
4.14 MQTT-DO


ICP DAS
Ethernet I/O Module
Home | Network | I/O Settings | Sync | PWM | Pair | Filter | Monitor | Password | Logout
MQTT (Topics: DO | DI)

The DO page is where you can set a full Topic Name, which is a combination of the Sub Topic Name and the Main Topic name. The Publish and Subscribe functions for each DO channel can be enabled or disabled on this page. You can use either a single-channel (DO0...) or multiple channels (ALL) to process the Topic operations. Multi-channel operation is recommended because it can help reduce the amount of network traffic.

In single-channel operation, the values 0 and 1 correspond to the OFF and ON settings, respectively. In multi-channel operation, a hexadecimal value represents the settings for all channels. For example, the value 0xFF00 indicates that channels 0 to 7 are OFF and channels 8 to 15 are ON. Please turn off unused Topics to reduce unnecessary processing, as it will affect operational efficiency.

4.14.1 MQTT – Digital Outputs

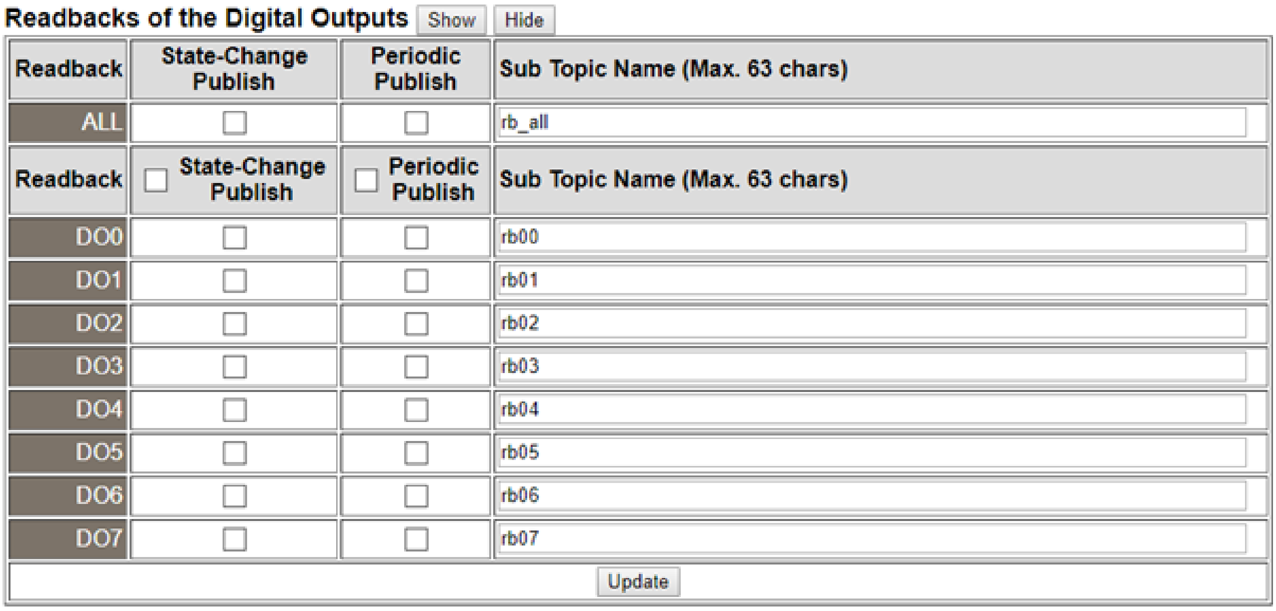


Digital Output	Power-on Publish	Subscribe	Sub Topic Name (Max. 63 chars)
ALL	☐	☐	do_all
Digital Output	☐ Power-on Publish	☐ Subscribe	Sub Topic Name (Max. 63 chars)
DO0	☐	☐	do00
DO1	☐	☐	do01
DO2	☐	☐	do02
DO3	☐	☐	do03
DO4	☐	☐	do04
DO5	☐	☐	do05
DO6	☐	☐	do06
DO7	☐	☐	do07

The table describes the parameters contained in the "**MQTT – Digital Outputs**" section.

Item	Description	Defaults
Power-on Publish	The DO status will be published when the module is Powered-on. Check the box to enable and uncheck it to disable the function	Disabled
Subscribe	The DO states depend on the updating message of the corresponding Topic. Check the box to enable and uncheck it to disable the function	Disabled
Sub Topic Name	The Topic Name is a combination of the Main Topic Name and the Sub Topic Name. A shorter Topic Name improves processing efficiency.	Corresponding DO
Update	Click this button to save the revised settings to the ET-2200 device.	

4.14.2 Readbacks of the Digital Outputs

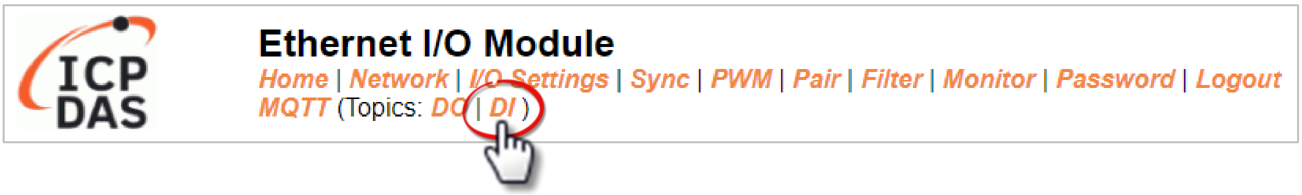


Readback	State-Change Publish	Periodic Publish	Sub Topic Name (Max. 63 chars)
ALL	☐	☐	rb_all
Readback	☐ State-Change Publish	☐ Periodic Publish	Sub Topic Name (Max. 63 chars)
DO0	☐	☐	rb00
DO1	☐	☐	rb01
DO2	☐	☐	rb02
DO3	☐	☐	rb03
DO4	☐	☐	rb04
DO5	☐	☐	rb05
DO6	☐	☐	rb06
DO7	☐	☐	rb07

The table describes the parameters contained in the "**Readbacks of the Digital Outputs**" section.

Item	Description	Default Value
State-Change Publish	A message will be published when the state of the corresponding DO is changed. Check the box to enable and uncheck it to disable the function	Disabled
Periodic Publish	Used to enable or disable the Periodic Publish function. The publishing period depends on the Cycle settings. Check the box to enable and uncheck it to disable the function	Disabled
Sub Topic Name	The Topic Name is a combination of the Main Topic Name and the Sub Topic Name. A shorter Topic Name improves processing efficiency.	Corresponding DO
Update	Click this button to save the revised settings to the ET-2200 device.	

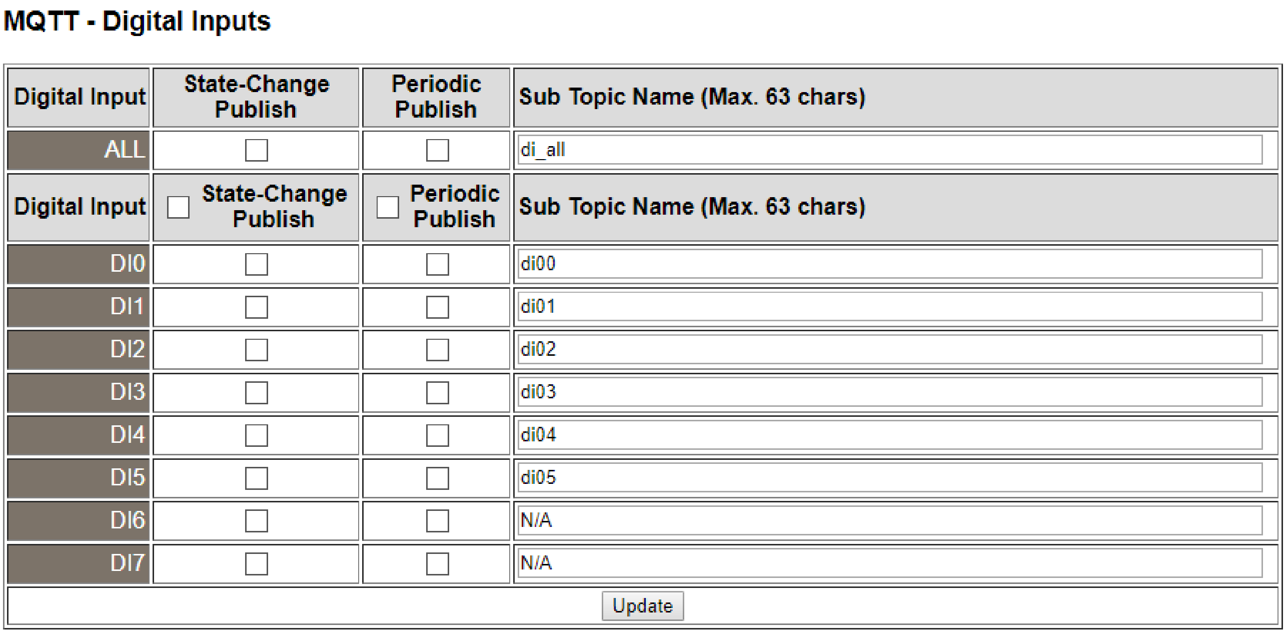
4.15 MQTT-DI


ICP DAS
Ethernet I/O Module
Home | Network | I/O Settings | Sync | PWM | Pair | Filter | Monitor | Password | Logout
MQTT (Topics: DO | DI)

The DI page is where you can set the Topic Name, which is a combination of the Sub Topic Name and the Main Topic name. The Publish function for each DI channel can also be either enabled or disabled on this page. You can use either a single-channel (DI0...) or multiple-channels (ALL) to process the Topic operations. Multi-channel operation is recommended because it can help reduce the amount of network traffic.

In single-channel operation, the values 0 and 1 correspond to the OFF and ON settings, respectively. In multi-channel operation, a hexadecimal value represents the settings for all channels. For example, the value 0xFF00 indicates that channels 0 to 7 are OFF, and channels 8 to 15 are ON. Please turn off (uncheck the checkbox) unused Topics to reduce unnecessary processing, as it will affect operational efficiency.

4.15.1 MQTT – Digital Inputs



MQTT - Digital Inputs

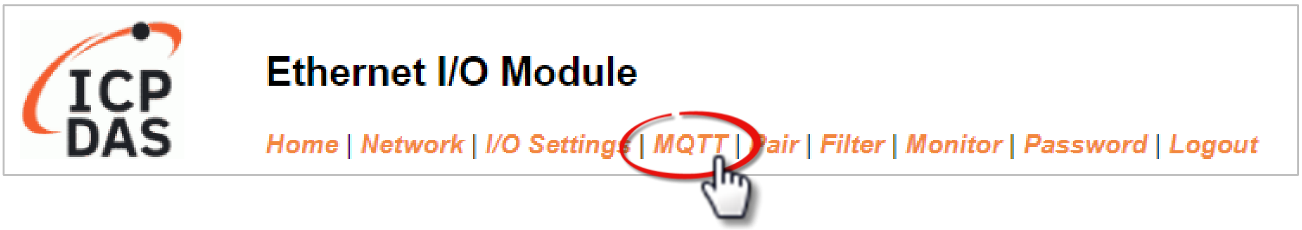
Digital Input	State-Change Publish	Periodic Publish	Sub Topic Name (Max. 63 chars)
ALL	☐	☐	di_all
Digital Input	☐ **State-Change Publish**	☐ **Periodic Publish**	**Sub Topic Name (Max. 63 chars)**
DI0	☐	☐	di00
DI1	☐	☐	di01
DI2	☐	☐	di02
DI3	☐	☐	di03
DI4	☐	☐	di04
DI5	☐	☐	di05
DI6	☐	☐	N/A
DI7	☐	☐	N/A

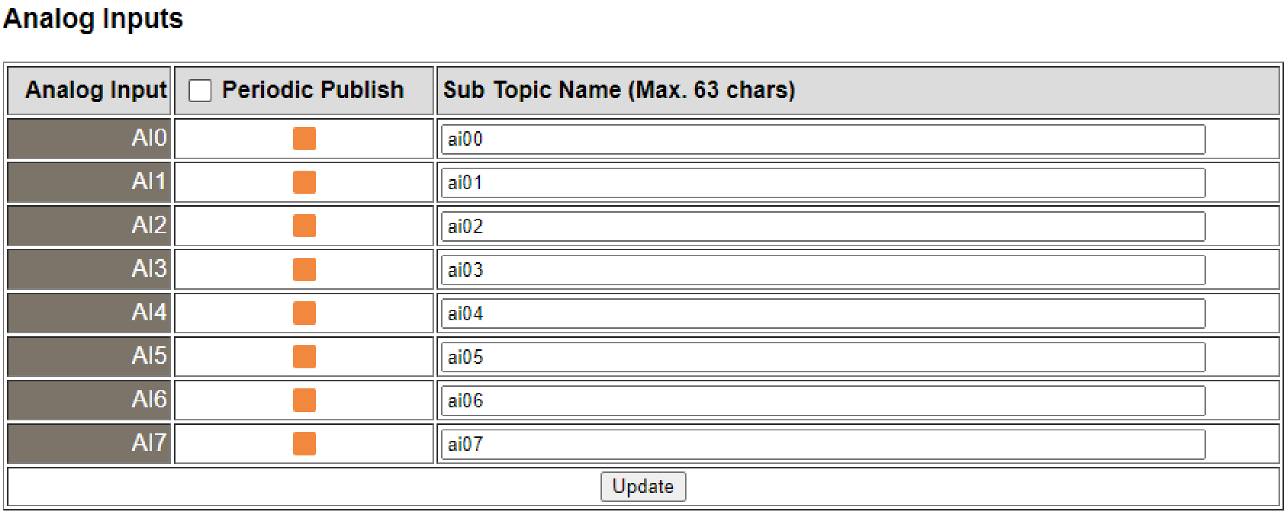
Update

The table describes the parameters contained in the "**MQTT – Digital Inputs**" section.

Item	Description	Default Value
State-Change Publish	A message will be published when the state of the corresponding DI is changed. Check the box to enable and uncheck it to disable the function	Disabled
Periodic Publish	to enable or disable the Periodic Publish function. The publishing period depends on the Cycle settings. Check the box to enable and uncheck it to disable the function	Disabled
Sub Topic Name	The Topic Name is a combination of the Main Topic Name and the Sub Topic Name. A shorter Topic Name improves processing efficiency.	Corresponding DI
Update	Click this button to save the revised settings to the ET-2200 device.	

4.16 MQTT-AI


ICP DAS
Ethernet I/O Module
Home | Network | I/O Settings | MQTT | Pair | Filter | Monitor | Password | Logout


Analog Inputs

Analog Input	☐ Periodic Publish	Sub Topic Name (Max. 63 chars)
AI0	🟧	ai00
AI1	🟧	ai01
AI2	🟧	ai02
AI3	🟧	ai03
AI4	🟧	ai04
AI5	🟧	ai05
AI6	🟧	ai06
AI7	🟧	ai07

The table describes the parameters contained in the "**MQTT – Analog Inputs**" section.

Item	Description	Defaults
Periodic Publish	to enable or disable the Periodic Publish function. The publishing period depends on the Cycle settings. Check the box to enable and uncheck it to disable the function	Disabled
Sub Topic Name	The Topic Name is a combination of the Main Topic Name and the Sub Topic Name. A shorter Topic Name improves processing efficiency.	Corresponding AI
Update	Click this button to save the revised settings to the ET-2200 device.	

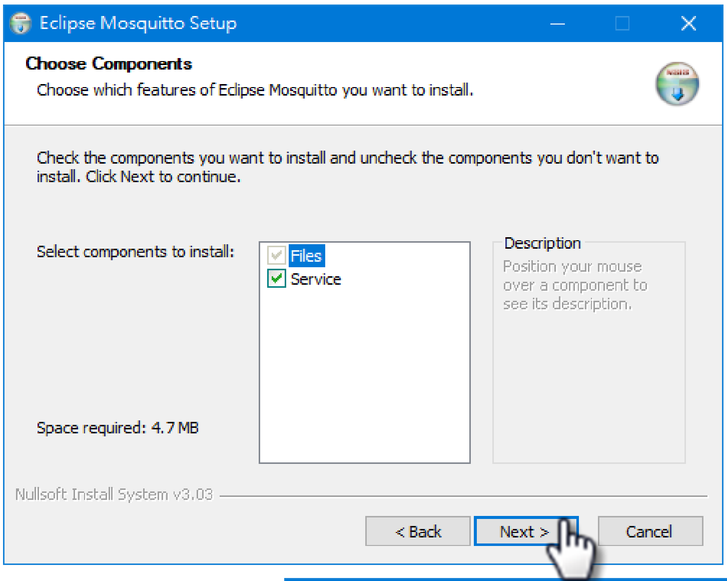
4.17 MQTT- Realization

This section described how to use the open-source software Mosquitto and MQTTLens to demonstrate the usage of MQTT protocol in conjunction with the ET-2200 series module.

4.17.1 Set up Mosquitto

Mosquitto is an open-source software application that allows you to create an MQTT Broker and can be installed on Windows, Mac OS, Linux, etc.

Step 1 Download the Installer (V1.6.4) from the official Mosquitto website and install the application.



Eclipse Mosquitto Setup

Choose Components

Choose which features of Eclipse Mosquitto you want to install.

Check the components you want to install and uncheck the components you don't want to install. Click Next to continue.

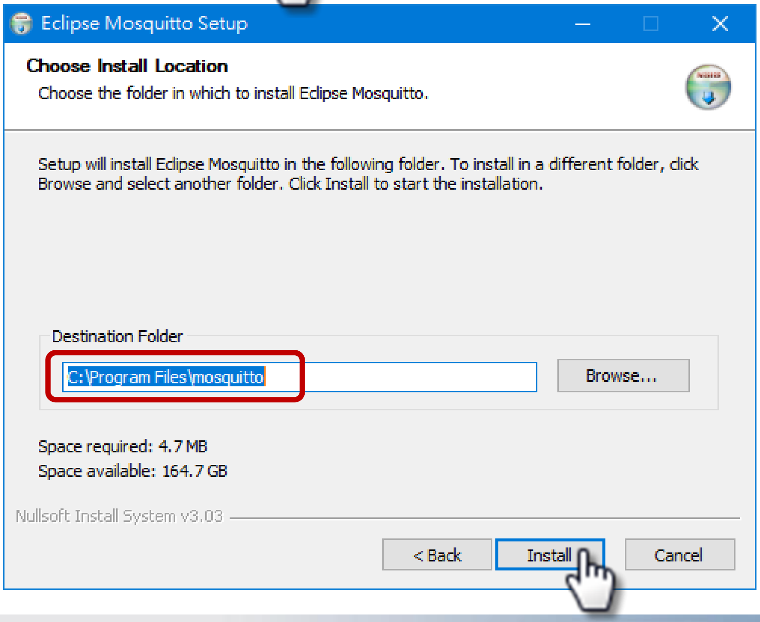
Select components to install:

☑ Files
☑ Service

Description
Position your mouse over a component to see its description.

Space required: 4.7 MB

Nullsoft Install System v3.03



Eclipse Mosquitto Setup

Choose Install Location

Choose the folder in which to install Eclipse Mosquitto.

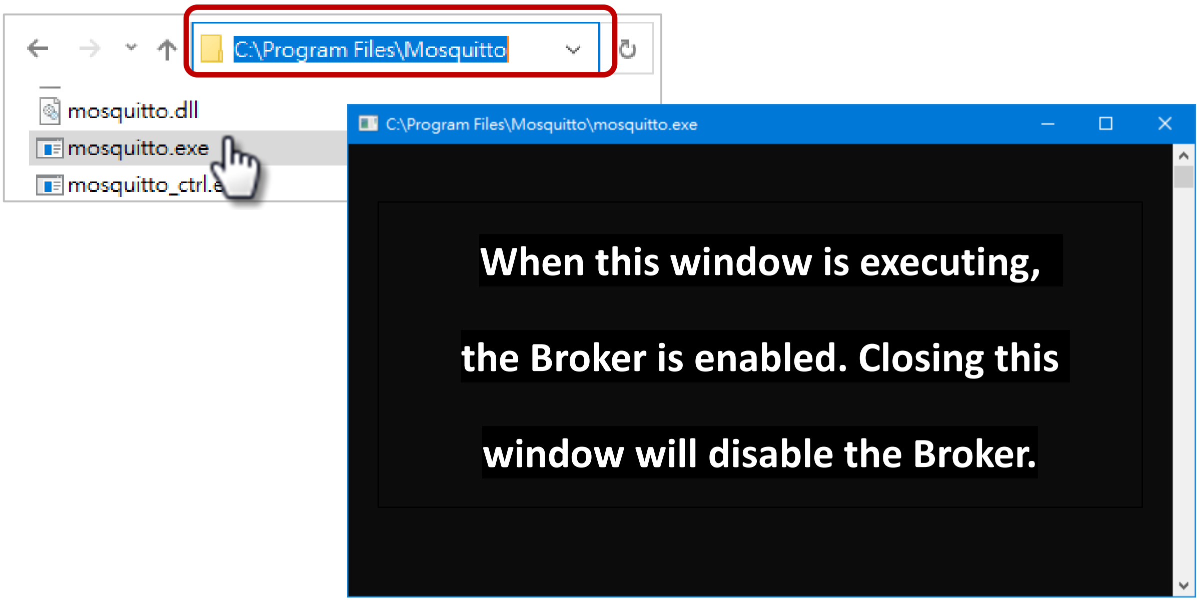
Setup will install Eclipse Mosquitto in the following folder. To install in a different folder, click Browse and select another folder. Click Install to start the installation.

Destination Folder: C:\Program Files\mosquitto

Space required: 4.7 MB
Space available: 164.7 GB

Nullsoft Install System v3.03

Step 2 Locate the “mosquitto.exe” file in the default installation path and double-click it to enable the Mosquitto server.


C:\Program Files\Mosquitto
mosquitto.dll
mosquitto.exe
mosquitto_ctrl.e
C:\Program Files\Mosquitto\mosquitto.exe

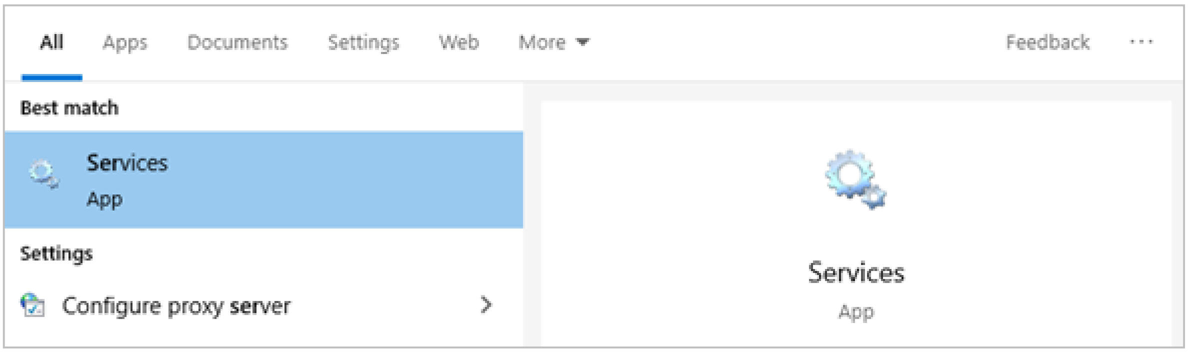
When this window is executing, the Broker is enabled. Closing this window will disable the Broker.

⚠ Why can’t I open “mosquitto.exe” or why does it crash?

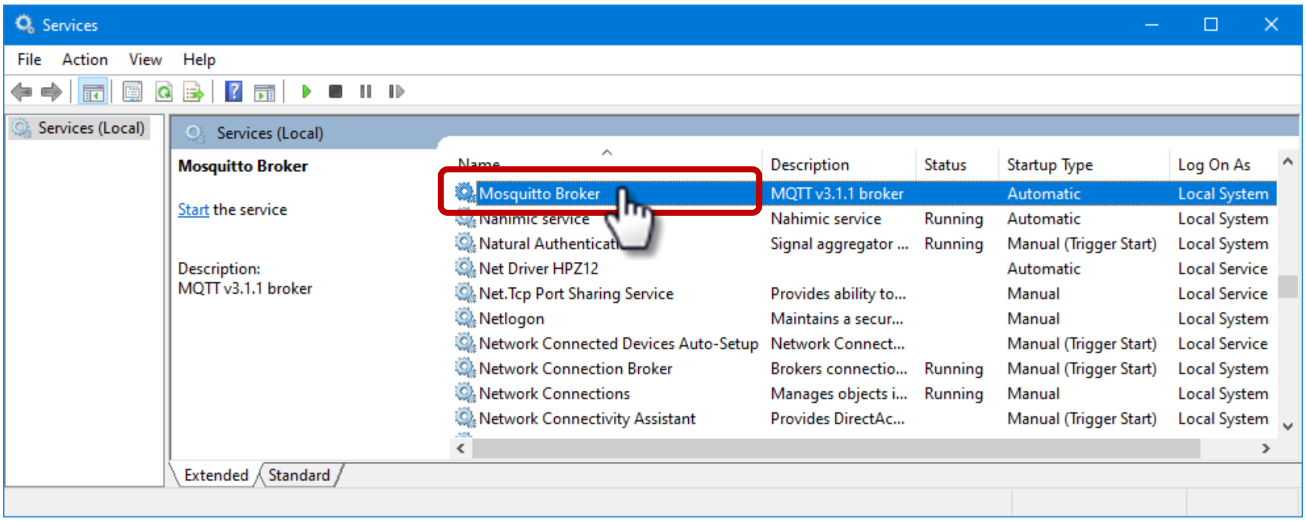
Once the Mosquitto installation is complete, **the Broker server will be automatically enabled by default when the computer boots.** Therefore, the Broker is already enabled after the computer reboots. At this time, clicking the “mosquitto.exe” file again will be the same as attempting to enable an already enabled-Broker server, and the attempt will be blocked.

To prevent the broker from automatically opening, you can change the settings in the Windows Services application. If it is not necessary to set it, go to Step 3.

Open the Services application by searching for “Services”.


All
Apps
Documents
Settings
Web
More
Feedback
Best match
Services
App
Settings
Configure proxy server
Services
App

In the Services application, locate the "Mosquitto Broker" item and double-click the name to open the **Properties** dialog. Click the **Stop** button and set the **Startup type** to **Manual**. Click **OK** to save your changes.

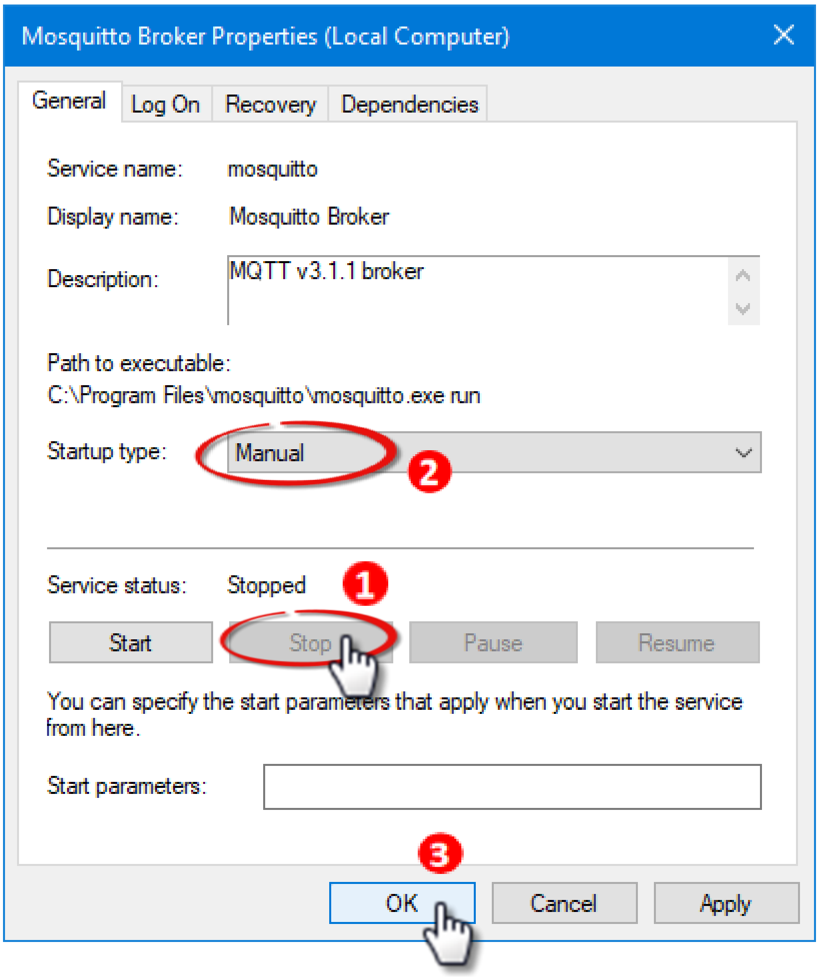

Services
File
Action
View
Help
Services (Local)
Services (Local)
Extended
Standard

Mosquitto Broker

Start the service

Description:
MQTT v3.1.1 broker

Name	Description	Status	Startup Type	Log On As
Mosquitto Broker	MQTT v3.1.1 broker		Automatic	Local System
Nahimic service	Nahimic service	Running	Automatic	Local System
Natural Authenticat	Signal aggregator ...	Running	Manual (Trigger Start)	Local System
Net Driver HPZ12			Automatic	Local Service
Net.Tcp Port Sharing Service	Provides ability to...		Manual	Local Service
Netlogon	Maintains a secur...		Manual	Local System
Network Connected Devices Auto-Setup	Network Connect...		Manual (Trigger Start)	Local Service
Network Connection Broker	Brokers connectio...	Running	Manual (Trigger Start)	Local System
Network Connections	Manages objects i...	Running	Manual	Local System
Network Connectivity Assistant	Provides DirectAc...		Manual (Trigger Start)	Local System


Mosquitto Broker Properties (Local Computer)
General
Log On
Recovery
Dependencies
Start
Stop
Pause
Resume
OK
Cancel
Apply
①
②
③

Service name: mosquitto

Display name: Mosquitto Broker

Description: MQTT v3.1.1 broker

Path to executable:
C:\Program Files\mosquitto\mosquitto.exe run

② Startup type: Manual

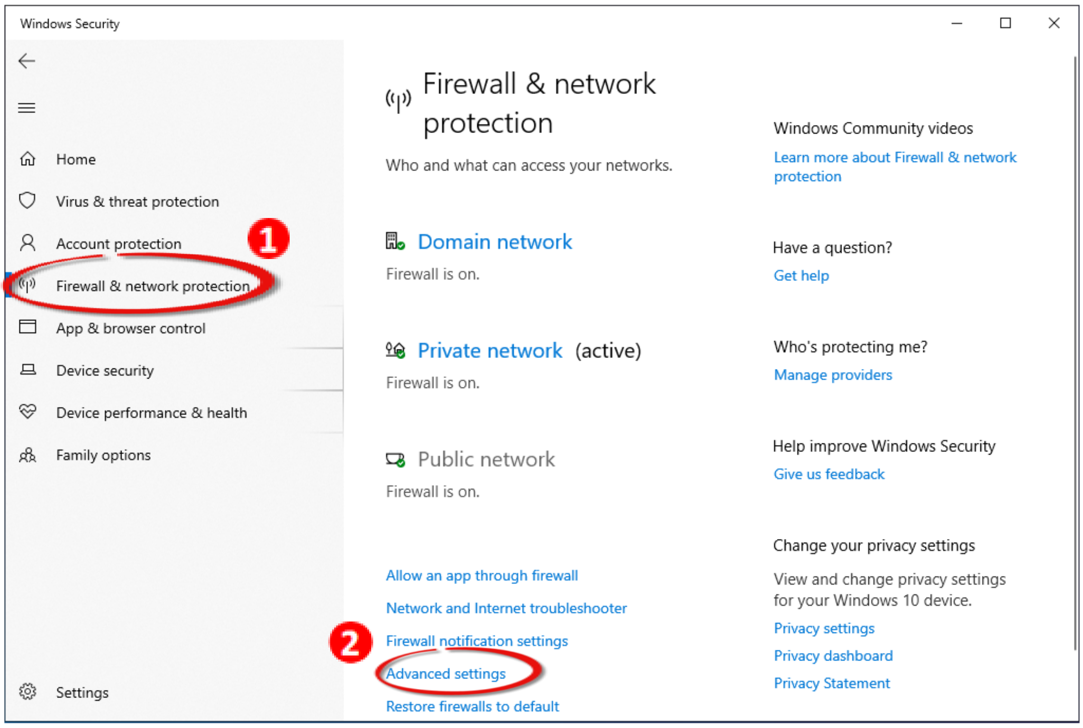
① Service status: Stopped

You can specify the start parameters that apply when you start the service from here.

Start parameters:

Step 3 Open Windows Port 1883 (the default Port for the MQTT)

3.1 Open the **Advanced Settings** section for the Windows Firewall.


Windows Security
Home
Virus & threat protection
Account protection
Firewall & network protection
App & browser control
Device security
Device performance & health
Family options
Settings
1
2
Firewall & network protection
Domain network
Private network (active)
Public network
Allow an app through firewall
Network and Internet troubleshooter
Firewall notification settings
Advanced settings
Restore firewalls to default
Windows Community videos
Learn more about Firewall & network protection
Have a question?
Get help
Who's protecting me?
Manage providers
Help improve Windows Security
Give us feedback
Change your privacy settings
Privacy settings
Privacy dashboard
Privacy Statement

Who and what can access your networks.

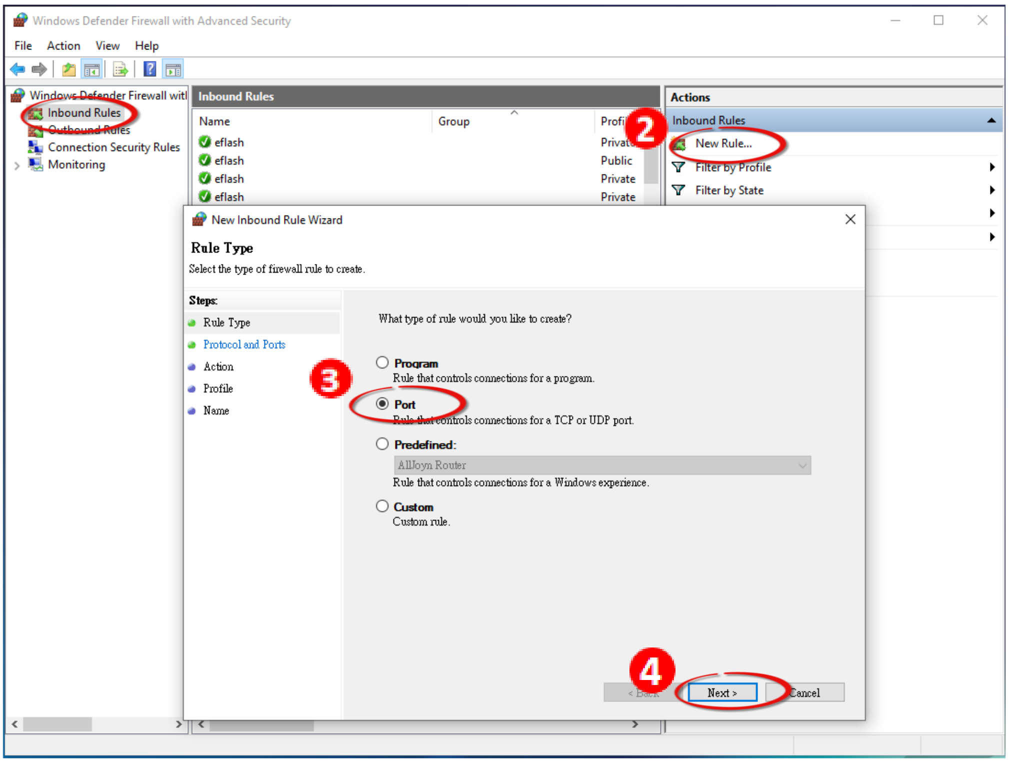
Firewall is on.

Firewall is on.

Firewall is on.

View and change privacy settings for your Windows 10 device.

3.2 Add a new rule. Click **Inbound Rules** and **New Rule**, and then select the **Port** option. Click the **Next** button to continue.


Windows Defender Firewall with Advanced Security
File
Action
View
Help
Windows Defender Firewall wit
Inbound Rules
Outbound Rules
Connection Security Rules
Monitoring
Inbound Rules
Name
Group
Profi
eflash
eflash
eflash
eflash
Private
Public
Private
Private
Actions
Inbound Rules
New Rule...
Filter by Profile
Filter by State
New Inbound Rule Wizard
Rule Type
Steps:
Rule Type
Protocol and Ports
Action
Profile
Name
< Back
Next >
Cancel
1
2
3
4

Select the type of firewall rule to create.

What type of rule would you like to create?

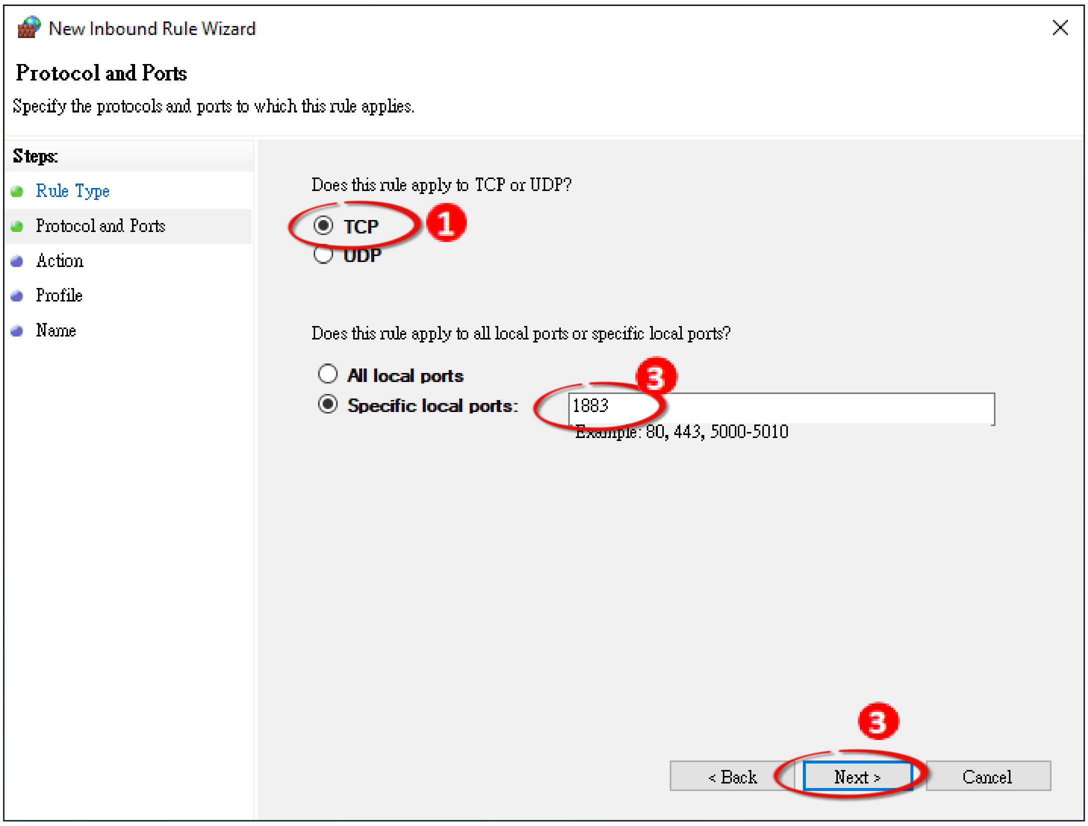
○ **Program**
Rule that controls connections for a program.

● **Port**
Rule that controls connections for a TCP or UDP port.

○ **Predefined:**
AllJoyn Router
Rule that controls connections for a Windows experience.

○ **Custom**
Custom rule.

3.3 Select the **TCP** option and then select **Specific local ports** and enter the value **1883**. Click the **Next** button to continue.



New Inbound Rule Wizard

Protocol and Ports

Specify the protocols and ports to which this rule applies.

Does this rule apply to TCP or UDP?

● TCP

○ UDP

Does this rule apply to all local ports or specific local ports?

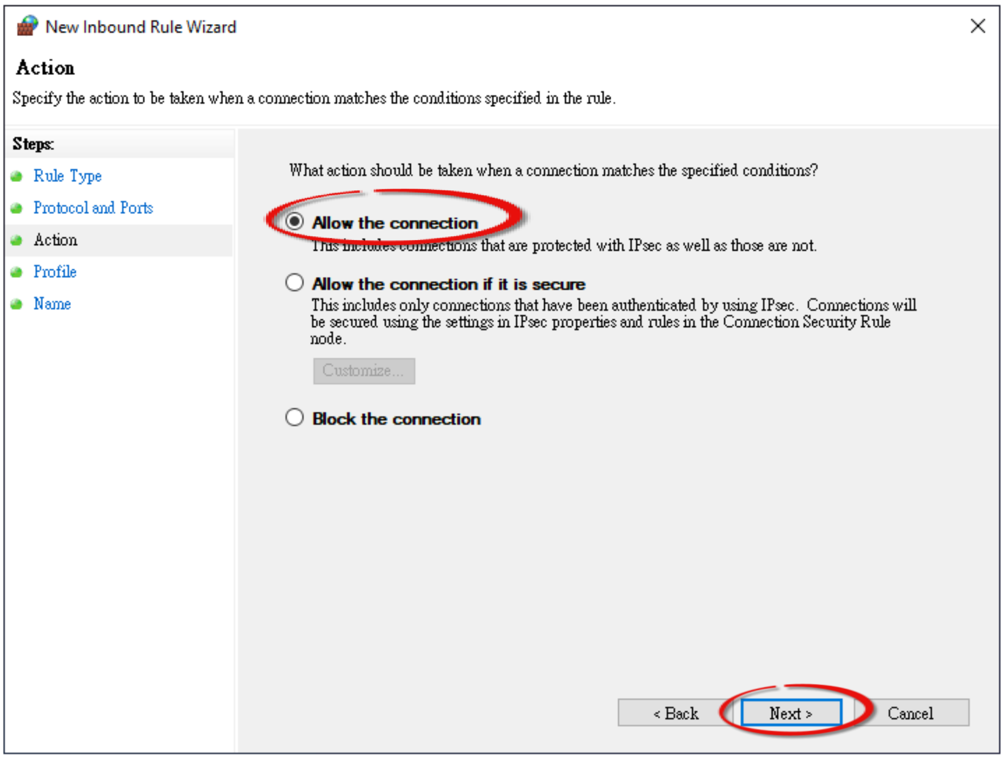
○ All local ports

● Specific local ports: 1883

Example: 80, 443, 5000-5010

Steps:
Rule Type
Protocol and Ports
Action
Profile
Name
1
3
3
< Back
Next >
Cancel

3.4 Select the **Allow the connection** option and then click the **Next** button to continue.



New Inbound Rule Wizard

Action

Specify the action to be taken when a connection matches the conditions specified in the rule.

What action should be taken when a connection matches the specified conditions?

● Allow the connection

This includes connections that are protected with IPsec as well as those are not.

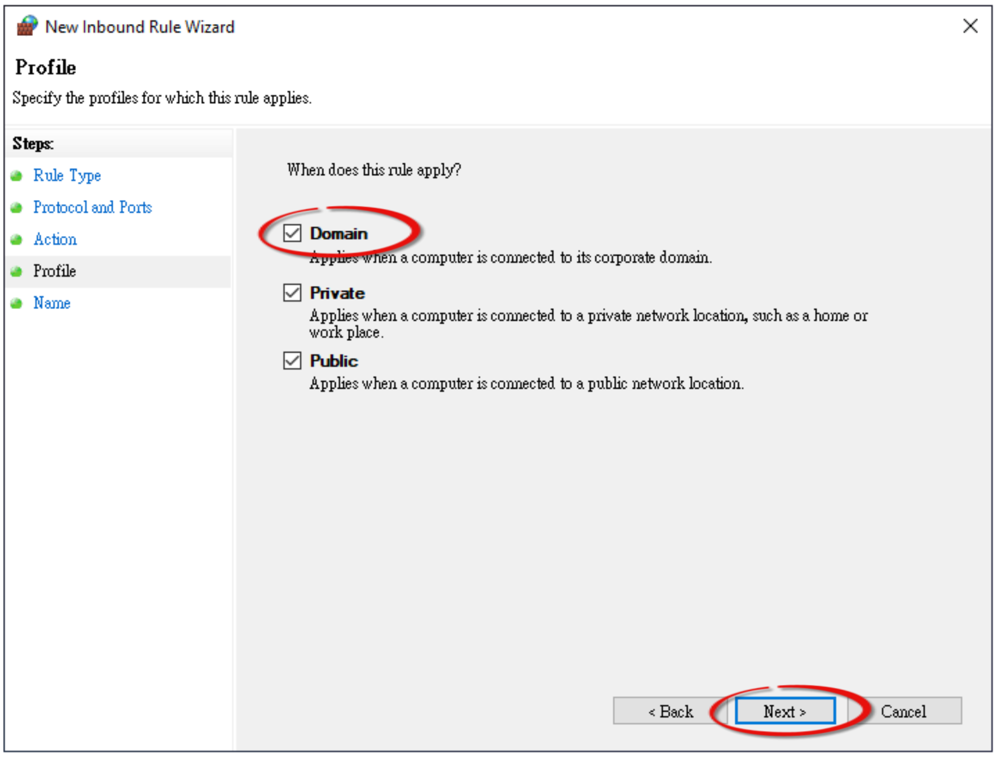
○ Allow the connection if it is secure

This includes only connections that have been authenticated by using IPsec. Connections will be secured using the settings in IPsec properties and rules in the Connection Security Rule node.

○ Block the connection

Steps:
Rule Type
Protocol and Ports
Action
Profile
Name
Customize...
< Back
Next >
Cancel

3.5 Select the **Domain** checkbox and click the **Next** button to continue.



New Inbound Rule Wizard

Profile

Specify the profiles for which this rule applies.

When does this rule apply?

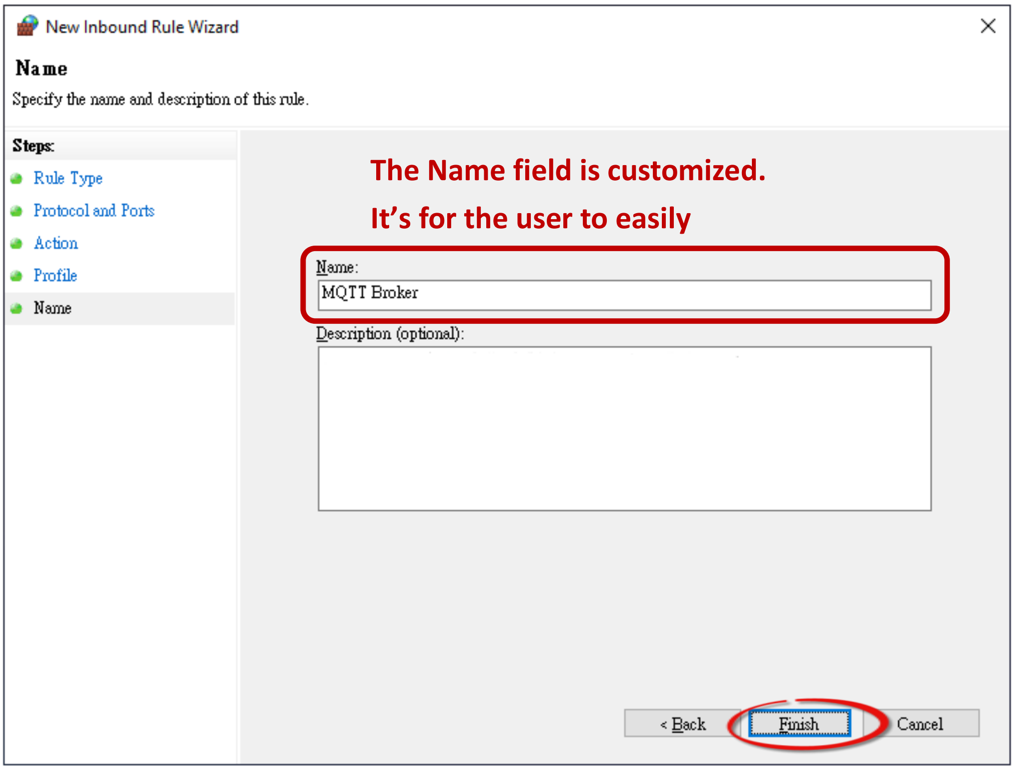
☑ **Domain**
Applies when a computer is connected to its corporate domain.

☑ **Private**
Applies when a computer is connected to a private network location, such as a home or work place.

☑ **Public**
Applies when a computer is connected to a public network location.

Steps:
Rule Type
Protocol and Ports
Action
Profile
Name
< Back
Next >
Cancel

3.6 Enter the name of the rule and then click the **Finish** button to create the rule. Enter the notes if desired.



New Inbound Rule Wizard

Name

Specify the name and description of this rule.

The Name field is customized.

It's for the user to easily

Name: MQTT Broker

Description (optional):

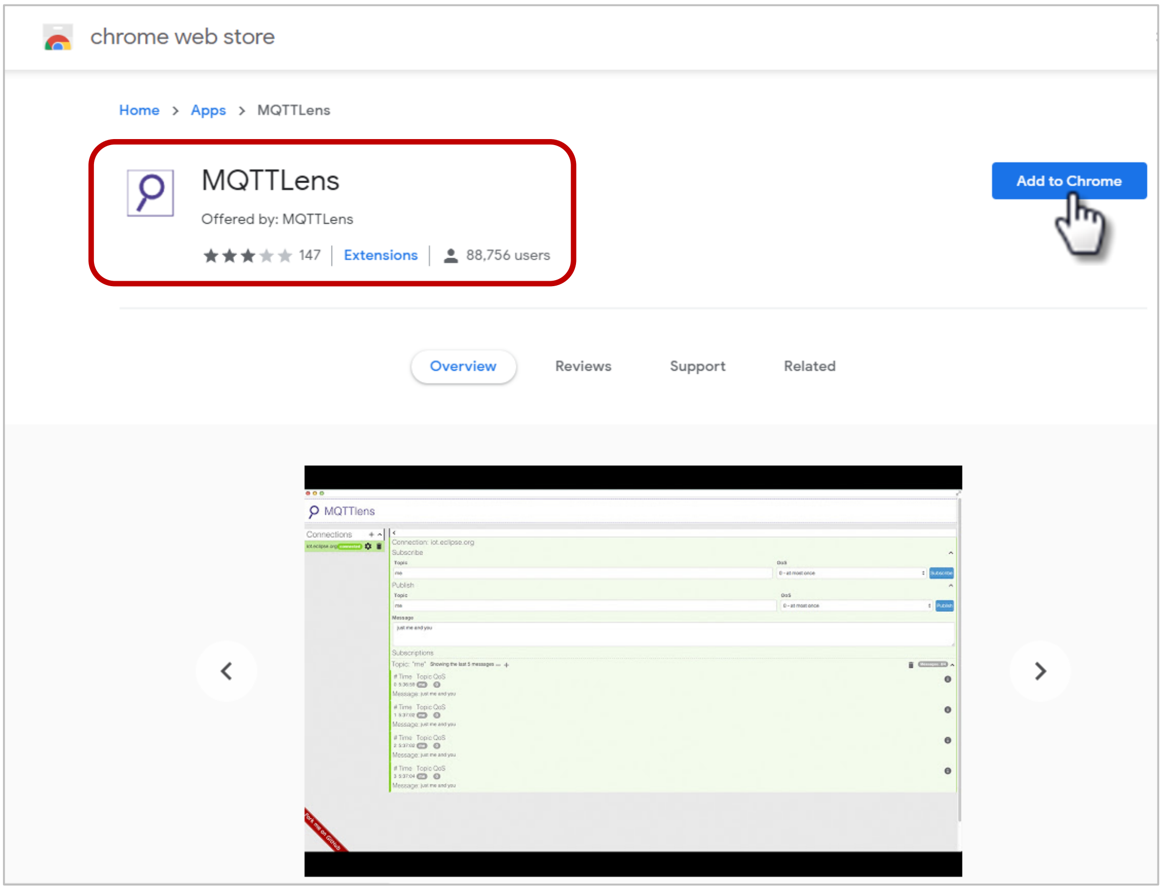
Steps:
Rule Type
Protocol and Ports
Action
Profile
Name
< Back
Finish
Cancel

4.17.2 Introduction to MQTTLens

MQTTlens is a free application that is available for the Chrome browser and can be found in the Chrome Web Store. This program enables you to publish a topic to the Broker and subscribe to a topic from the Broker. This section will use MQTTLens to implement the basic architecture for MQTT on Windows.

Step 1 Install MQTTLens

Open Chrome and search for the ‘MQTTLens chrome web store’. Click the ‘Add to Chrome’ button to install it on your system.

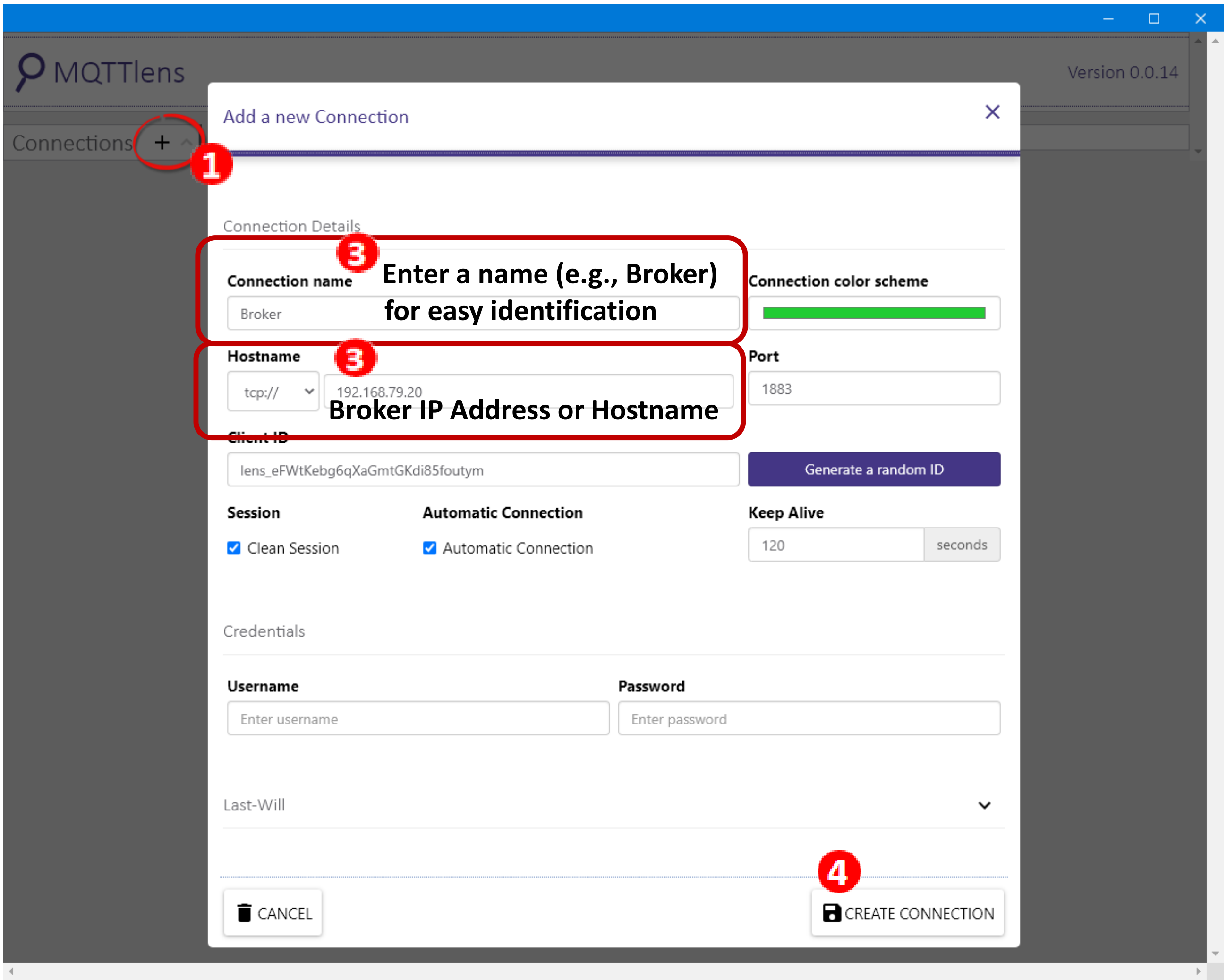

chrome web store
Home > Apps > MQTTLens
MQTTLens
Offered by: MQTTLens
★★★☆☆ 147 | Extensions | 88,756 users
Add to Chrome
Overview
Reviews
Support
Related
MQTTlens

Step 2 Connect the Broker

Execute MQTTLens on Chrome. Click the "+" button to add a connection and enter the IP address for the Broker, i.e., the IP address for the computer where the MQTT server is located. Click the **Create Connection** button to continue.

What is a Broker?

A Broker is a Server in the MQTT architecture. Refer to Section 4.12 MQTT for more details.


MQTTlens
Version 0.0.14
Connections +
Add a new Connection
×
Connection Details
Credentials
Last-Will
Generate a random ID
CANCEL
CREATE CONNECTION
1
3
3
4

Enter a name (e.g., Broker) for easy identification

Broker IP Address or Hostname

Connection name: Broker

Connection color scheme: 🟩

Hostname: tcp:// 192.168.79.20

Port: 1883

Client ID: lens_eFWtKebg6qXaGmtGKdi85foutym

Session: ☑ Clean Session

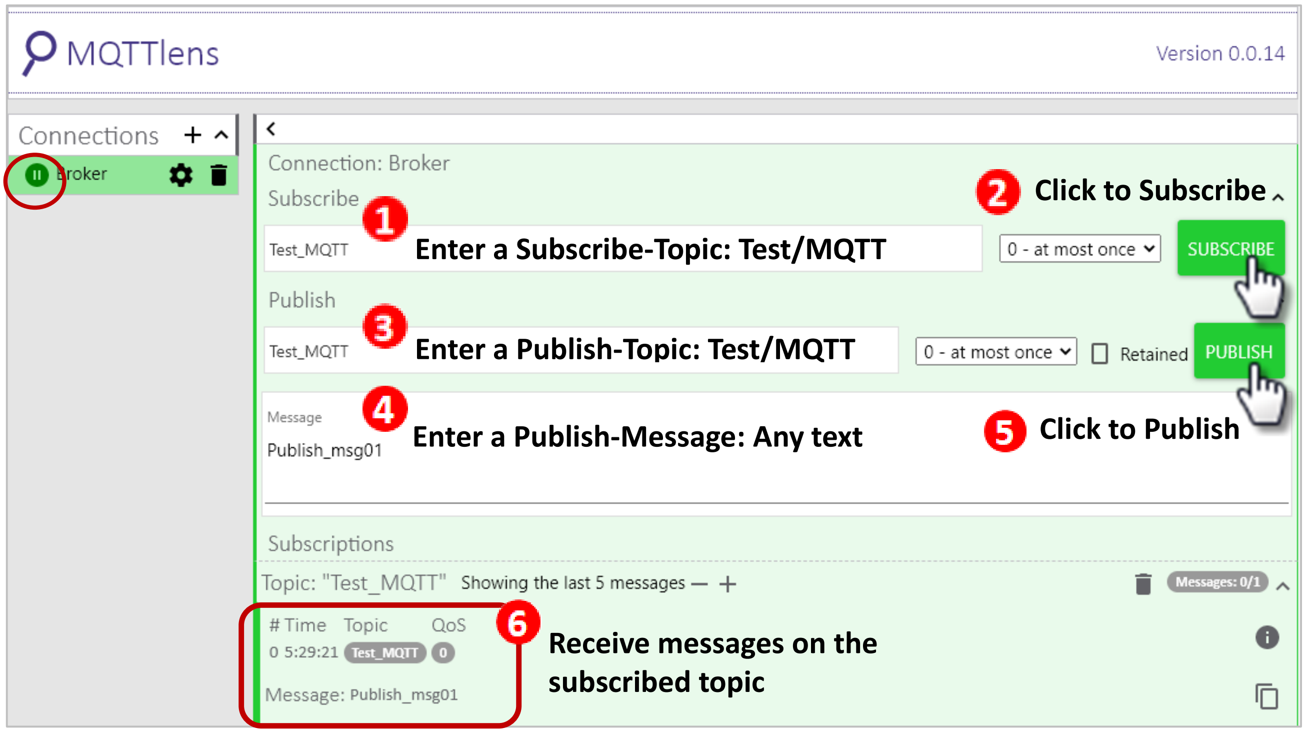
Automatic Connection: ☑ Automatic Connection

Keep Alive: 120 seconds

Username: Enter username

Password: Enter password

Step 3 Try to subscribe to a topic and publish a message. If the connection is operating normally, you will receive a message related to the defined topic, as follows.


MQTTlens
Version 0.0.14
Connections
Broker
Connection: Broker
Subscribe
SUBSCRIBE
Publish
☐ Retained
PUBLISH
Subscriptions
Showing the last 5 messages
Messages: 0/1

Subscribe: Test_MQTT — 0 - at most once

① Enter a Subscribe-Topic: Test/MQTT

② Click to Subscribe

Publish: Test_MQTT — 0 - at most once

③ Enter a Publish-Topic: Test/MQTT

Message: Publish_msg01

④ Enter a Publish-Message: Any text

⑤ Click to Publish

Topic: "Test_MQTT"

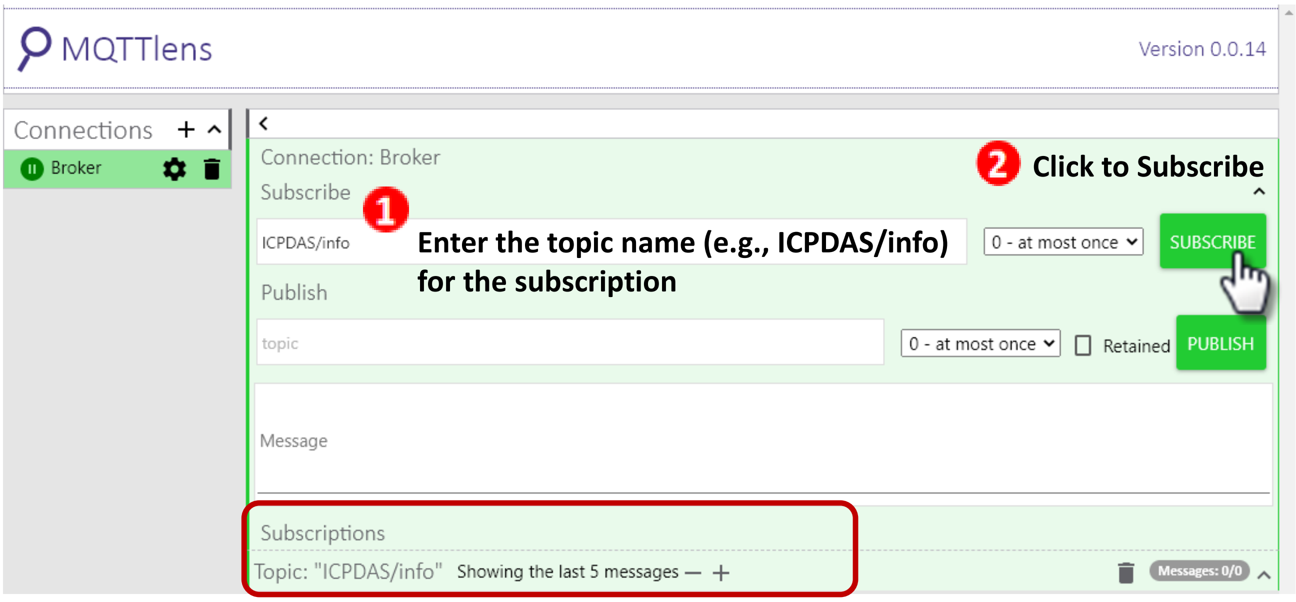
#	Time	Topic	QoS
0	5:29:21	Test_MQTT	0

Message: Publish_msg01

⑥ Receive messages on the subscribed topic

4.17.3 ET-2200 Periodic Publish Realization

Step 1 Refer Set up Mosquitto to install a Broker and refer to the Introduction to MQTTLens to subscribe to the ”ICP DAS/info” Topic.


MQTTlens
Version 0.0.14
Connections
Broker
Connection: Broker
Subscribe
Publish
topic
0 - at most once
Retained
PUBLISH
Message
Subscriptions
Messages: 0/0

ICPDAS/info

0 - at most once

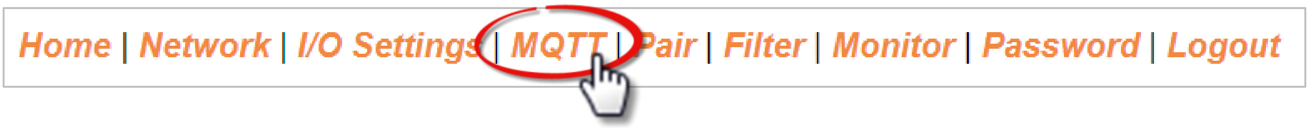
SUBSCRIBE

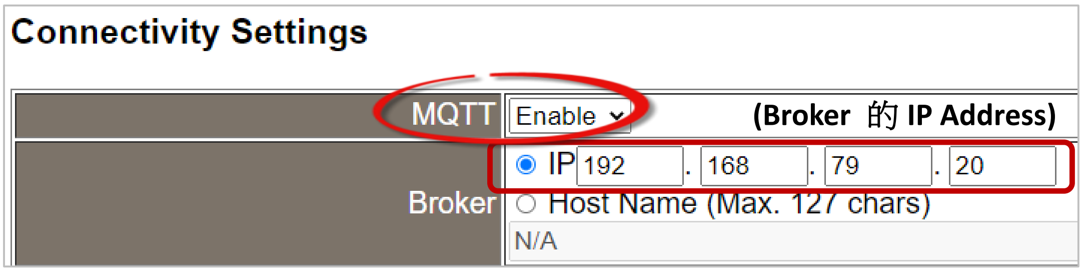
① Enter the topic name (e.g., ICPDAS/info) for the subscription

② Click to Subscribe

Topic: "ICPDAS/info" Showing the last 5 messages

Step 2 Log into the ET-2200 Web Server and click the MQTT page. Set the MQTT option to Enable and enter the IP address for the Broker.

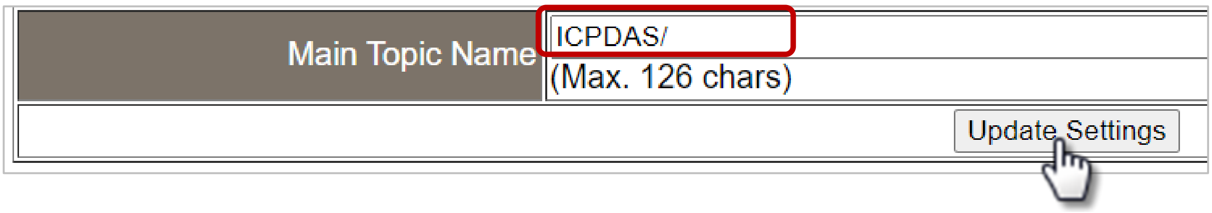

Home | Network | I/O Settings | MQTT | Pair | Filter | Monitor | Password | Logout



Connectivity Settings

MQTT	Enable **(Broker 的 IP Address)**
Broker	● IP 192 . 168 . 79 . 20 ○ Host Name (Max. 127 chars) N/A

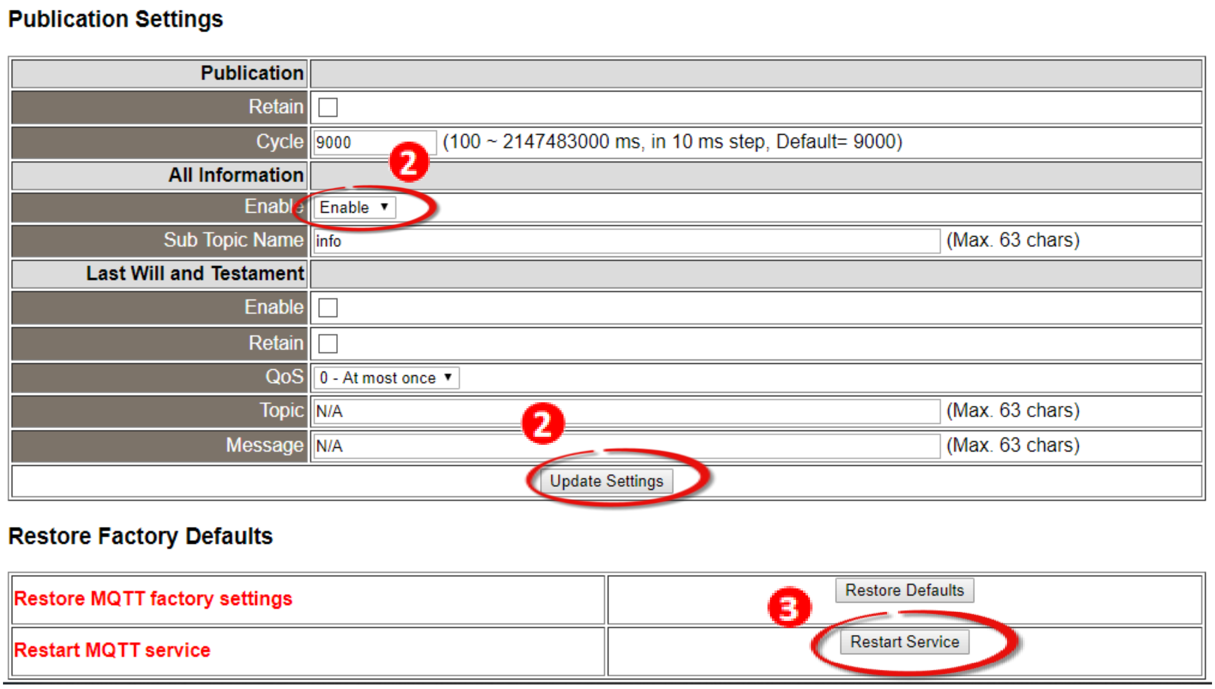
Step 3 Enter “**ICPDAS/**” in the Main Topic Name field and then click the **Update Settings** button.



Main Topic Name	ICPDAS/ (Max. 126 chars)

Update Settings

Step 4 Set the Enable field in the All Information section to **Enable** on the Publication Settings page, and then click the **Update Settings** button. Click the **Restart Service** button to restart the MQTT services.



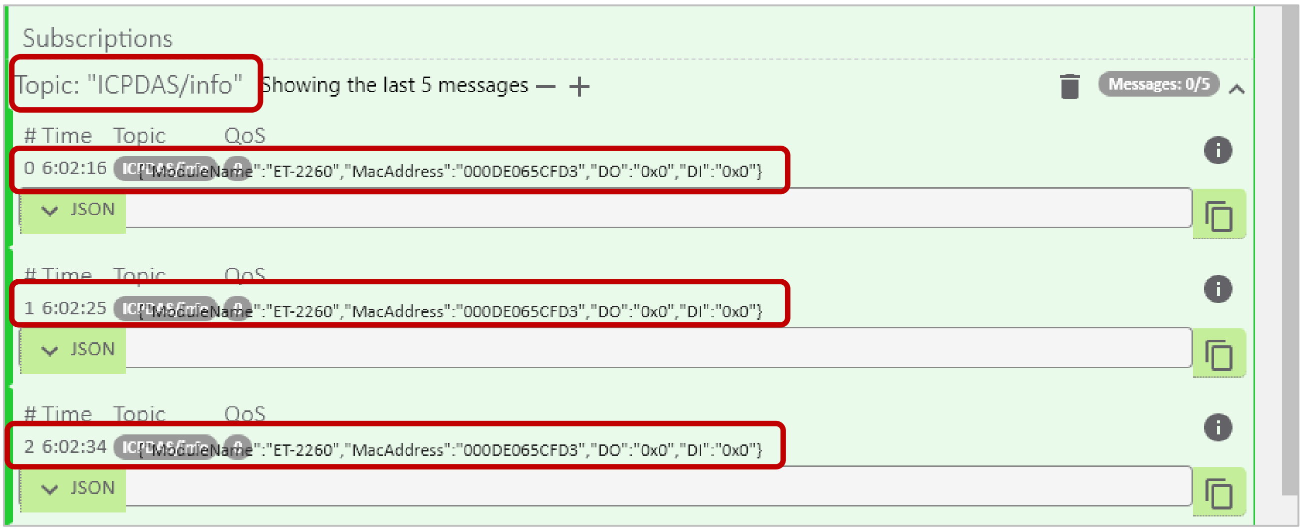
Publication Settings

Publication	
Retain	☐
Cycle	9000 (100 ~ 2147483000 ms, in 10 ms step, Default= 9000)
All Information	
Enable	Enable ▾
Sub Topic Name	info (Max. 63 chars)
Last Will and Testament	
Enable	☐
Retain	☐
QoS	0 - At most once ▾
Topic	N/A (Max. 63 chars)
Message	N/A (Max. 63 chars)

Restore Factory Defaults

Restore MQTT factory settings	Restore Defaults
Restart MQTT service	Restart Service

Step 5 Return to MQTTLens, the updated message for the subscription, including Module name, Mac Address, DO State, and DI State, has been received every 9000 ms (default cycle).



```
Topic: "ICPDAS/info"
# Time    Topic         QoS
0 6:02:16 ICPDAS/info   0   {"ModuleName":"ET-2260","MacAddress":"000DE065CFD3","DO":"0x0","DI":"0x0"}
# Time    Topic         QoS
1 6:02:25 ICPDAS/info   0   {"ModuleName":"ET-2260","MacAddress":"000DE065CFD3","DO":"0x0","DI":"0x0"}
# Time    Topic         QoS
2 6:02:34 ICPDAS/info   0   {"ModuleName":"ET-2260","MacAddress":"000DE065CFD3","DO":"0x0","DI":"0x0"}
```

What if no messages are received by MQTTLens?

Confirm that the settings for the Windows firewall and antivirus software are correct. Close the software to test if they are affecting your connection.

4.18 SNMP

The "SNMP" page provides the function for ET-2200 to send module information and I/O information to the SNMP Network Management Software or device to help administrators to monitor the status of the ET-2200 in real time.

If the Trap function is enabled, ET-2200 can actively send messages to the SNMP manager to keep track of data when the I/O status of the module changes or restarts. The detailed description is as follows.

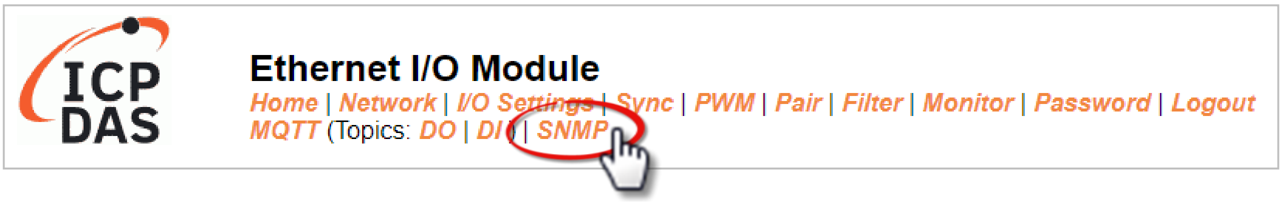
Note:

For DI/DO modules:

SNMP function is available for **Firmware v2.3.4** and later. It is not supported for older versions.

For AI/AO modules:

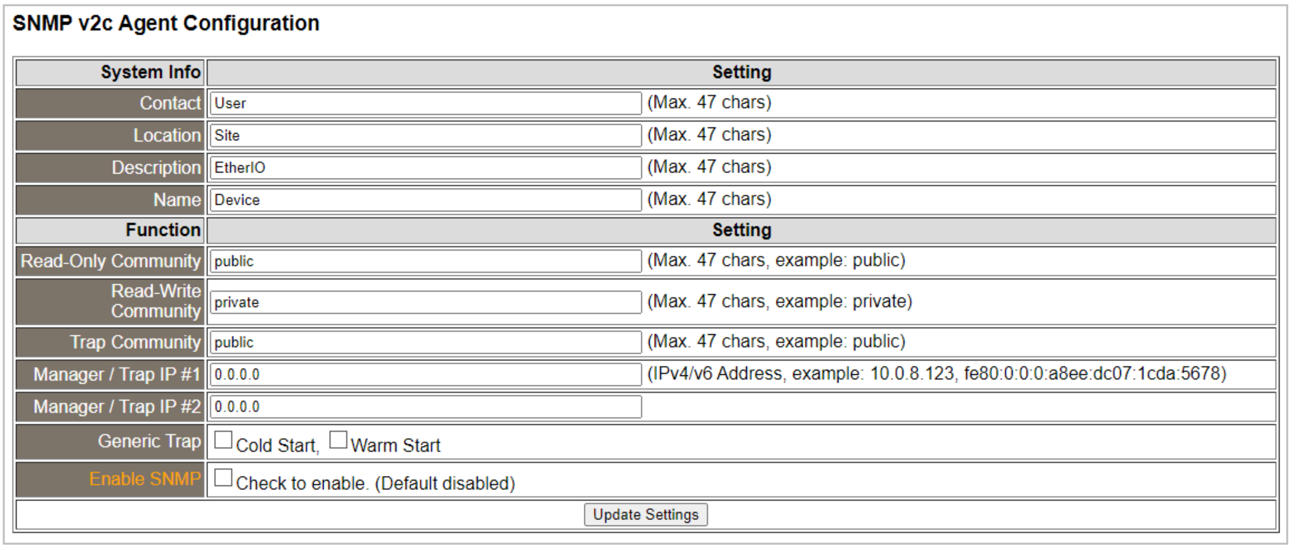
SNMP function is available for **Firmware v1.60** and later. It is not supported for older versions.


ICP DAS
Ethernet I/O Module
Home | Network | I/O Settings | Sync | PWM | Pair | Filter | Monitor | Password | Logout
MQTT (Topics: DO | DI) | SNMP

Note:

ET-2200 currently supports these MIB-II management groups such as sysContact, sysLocation, sysDescr, and sysName.

4.18.1 SNMP Configuration Setting



SNMP v2c Agent Configuration

System Info	Setting
Contact	User (Max. 47 chars)
Location	Site (Max. 47 chars)
Description	EtherIO (Max. 47 chars)
Name	Device (Max. 47 chars)
Function	**Setting**
Read-Only Community	public (Max. 47 chars, example: public)
Read-Write Community	private (Max. 47 chars, example: private)
Trap Community	public (Max. 47 chars, example: public)
Manager / Trap IP #1	0.0.0.0 (IPv4/v6 Address, example: 10.0.8.123, fe80:0:0:0:a8ee:dc07:1cda:5678)
Manager / Trap IP #2	0.0.0.0
Generic Trap	☐ Cold Start, ☐ Warm Start
Enable SNMP	☐ Check to enable. (Default disabled)

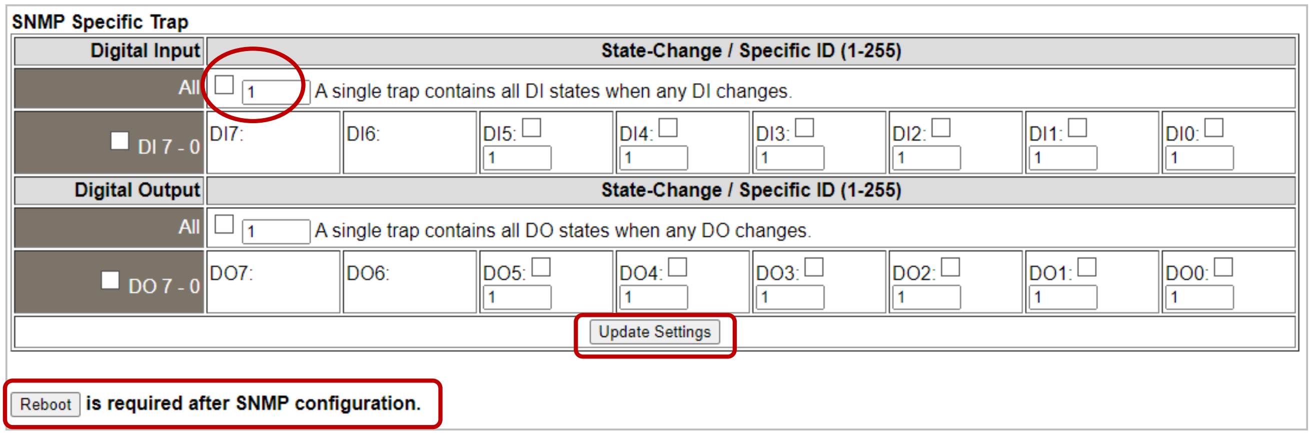
The table describes the parameters contained in the "**System Info** " section.

Item	Description	Default Value
Contact	The SNMP server's contact person	User
Location	The server's location	Site
Description	The description of the device displayed on the Server	EtherIO
Name	The name of the device displayed on the Server	Device

The table describes the parameters contained in the "**Function**" section.

Item	Description	Default Value
Read-Only Community	Set the community name of the module for read-only data	public
Read-Write Community	Set the community name of the module for read-write data	private
Trap Community	Set the community name of the module for the trap	public
Manager / Trap IP #1	Set the IP address of Trap IP #1	0.0.0.0
Manager / Trap IP #2	Set the IP address of Trap IP #2	0.0.0.0
Generic Trap	Select to enable the Cold Start or Warm Start function	Disabled
Enable SNMP	Select the box to enable the SNMP communication function and deselect to disable it	Disabled
Update Settings	After saving the settings, also reboot the module to take effect	

4.18.2 SNMP Specific Trap



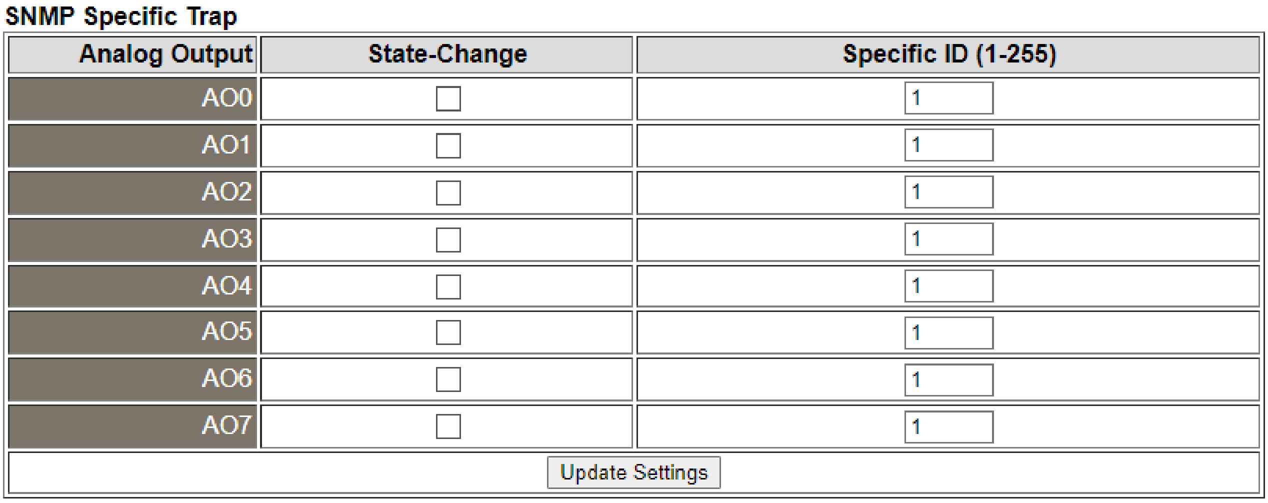
SNMP Specific Trap

Digital Input	State-Change / Specific ID (1-255)							
All	☐ 1 A single trap contains all DI states when any DI changes.							
☐ DI 7 - 0	DI7:	DI6:	DI5: ☐ 1	DI4: ☐ 1	DI3: ☐ 1	DI2: ☐ 1	DI1: ☐ 1	DI0: ☐ 1
Digital Output	**State-Change / Specific ID (1-255)**							
All	☐ 1 A single trap contains all DO states when any DO changes.							
☐ DO 7 - 0	DO7:	DO6:	DO5: ☐ 1	DO4: ☐ 1	DO3: ☐ 1	DO2: ☐ 1	DO1: ☐ 1	DO0: ☐ 1

Reboot is required after SNMP configuration.

The table describes the parameters contained in the " **Digital Input/ Digital Output** " section.

Item	Description
Digital Input	
All	All DI channels share a single Trap. Check the box to send a Trap message when any DI status changes. “Specific ID” is the ID number set for this Trap
DI 7-0	Each DI channel has a specific Trap. Check the box to enable the Trap function for that DI channel. “Specific ID” is the ID number set for individual channel
Digital Output	
All	All DO channels share a single Trap. Check the box to send a Trap message when any DO status changes. “Specific ID” is the ID number set for this Trap.
DO 7-0	Each DO channel has a specific Trap. Check the box to enable the Trap function for that DO channel. “Specific ID” is the ID number set for individual channel
Update Setting	After changing and saving the settings, also reboot the module to take effect
Reboot	Click the button to reboot the module



SNMP Specific Trap

Analog Output	State-Change	Specific ID (1-255)
AO0	☐	1
AO1	☐	1
AO2	☐	1
AO3	☐	1
AO4	☐	1
AO5	☐	1
AO6	☐	1
AO7	☐	1

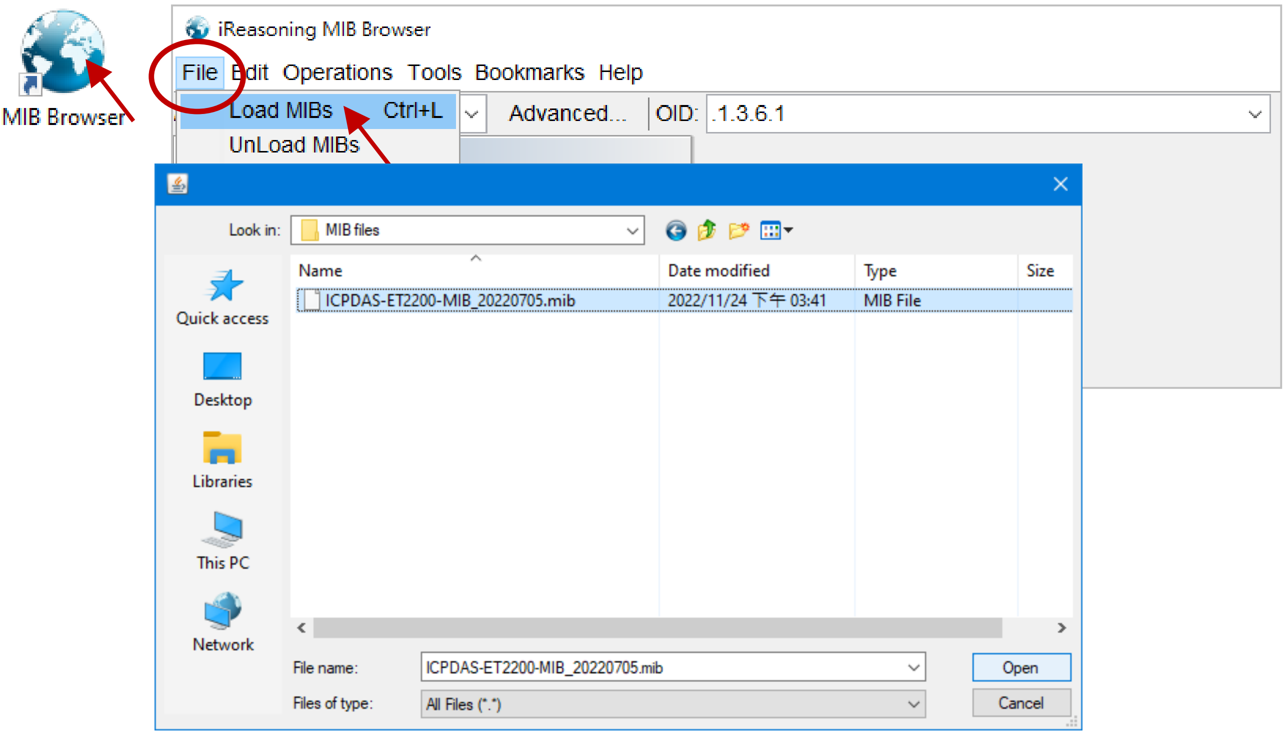
The table describes the parameters contained in the " **Analog Output** " section.

Item	Description
Analog Output	
AO 7-0	Each AO channel has a specific Trap. Check the box to enable the Trap function for that AO channel. “Specific ID” is the ID number set for individual channel
Update Setting	After changing and saving the settings, also reboot the module to take effect
Reboot	Click the button to reboot the module

4.18.3 SNMP I/O Example

In this article, we use **iReasoning MIB Browser** as an example. Please download the installer (V14) from its official website and run the installer.
http://www.ireasoning.com/mibbrowser.shtml

Step 1 Start the **iReasoning MIB Browser**. Click the **File → Load MIBs** on the menu bar and click the specified MIB file of the module (e.g. ICPDAS-ET2200-MIB_20220705.mib), then click the Open button to open it.


MIB Browser
iReasoning MIB Browser
File
Edit
Operations
Tools
Bookmarks
Help
Load MIBs
Ctrl+L
UnLoad MIBs
Advanced...
Quick access
Desktop
Libraries
This PC
Network
Name
Date modified
Type
Size
Open
Cancel

OID: .1.3.6.1

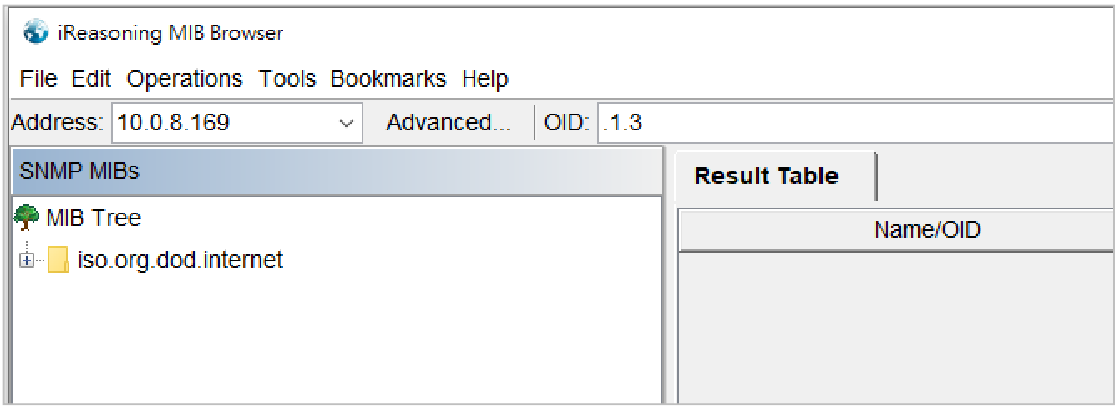
Look in: MIB files

Name	Date modified	Type	Size
ICPDAS-ET2200-MIB_20220705.mib	2022/11/24 下午 03:41	MIB File	

File name: ICPDAS-ET2200-MIB_20220705.mib

Files of type: All Files (*.*)

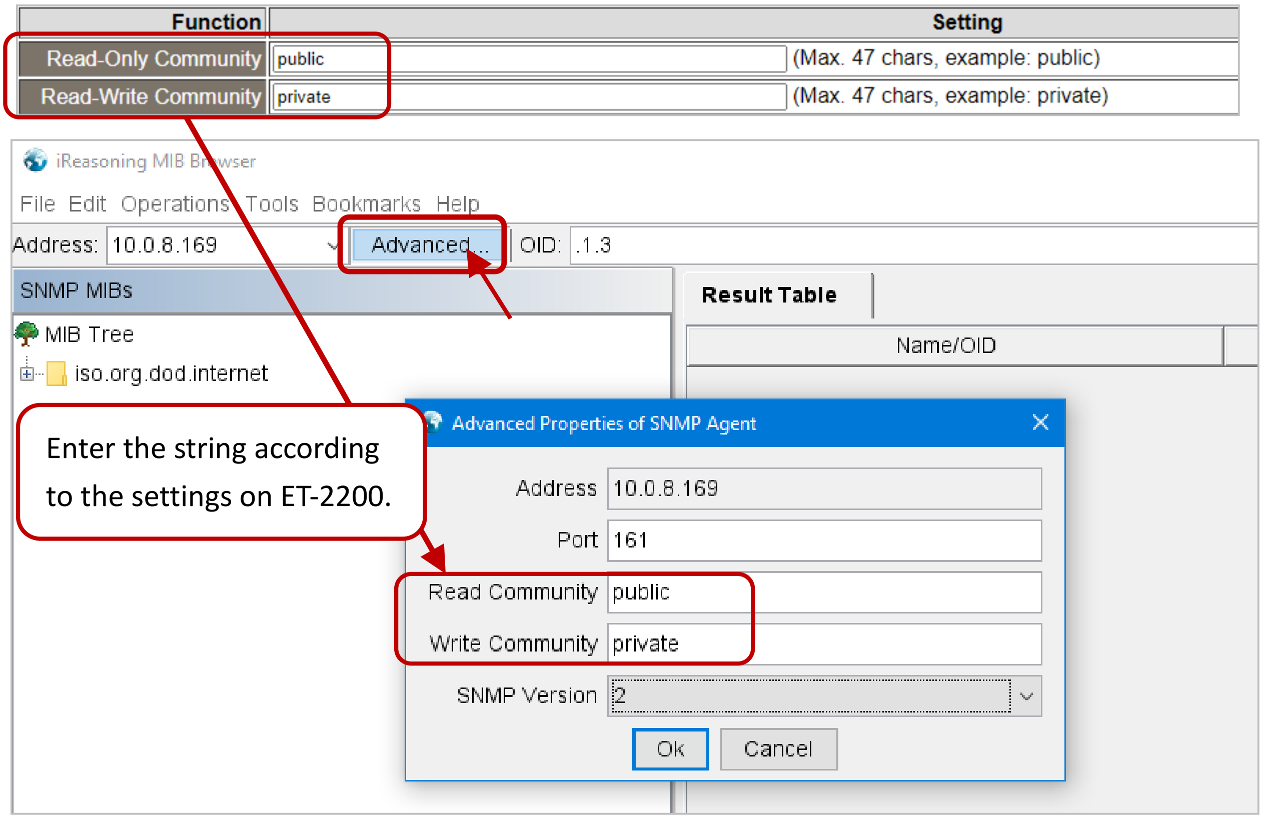
Step 2 Enter the IP address of the ET-2200 module in the **Address** field.


iReasoning MIB Browser
File
Edit
Operations
Tools
Bookmarks
Help
Advanced...
SNMP MIBs
MIB Tree
iso.org.dod.internet
Result Table
Name/OID

Address: 10.0.8.169

OID: .1.3

Step 3 Click "**Advanced…**" to set the parameters of the SNMP agent. Enter the string in the **Read/Write Community** fields according to the **Read-Only Community / Read-Write Community** settings on the ET-2200. If these strings are different on both sides, the agent will not work correctly.



Function	Setting
Read-Only Community	public (Max. 47 chars, example: public)
Read-Write Community	private (Max. 47 chars, example: private)

iReasoning MIB Browser
File Edit Operations Tools Bookmarks Help
Advanced...
SNMP MIBs
MIB Tree
iso.org.dod.internet
Result Table
Name/OID
Advanced Properties of SNMP Agent
Ok
Cancel

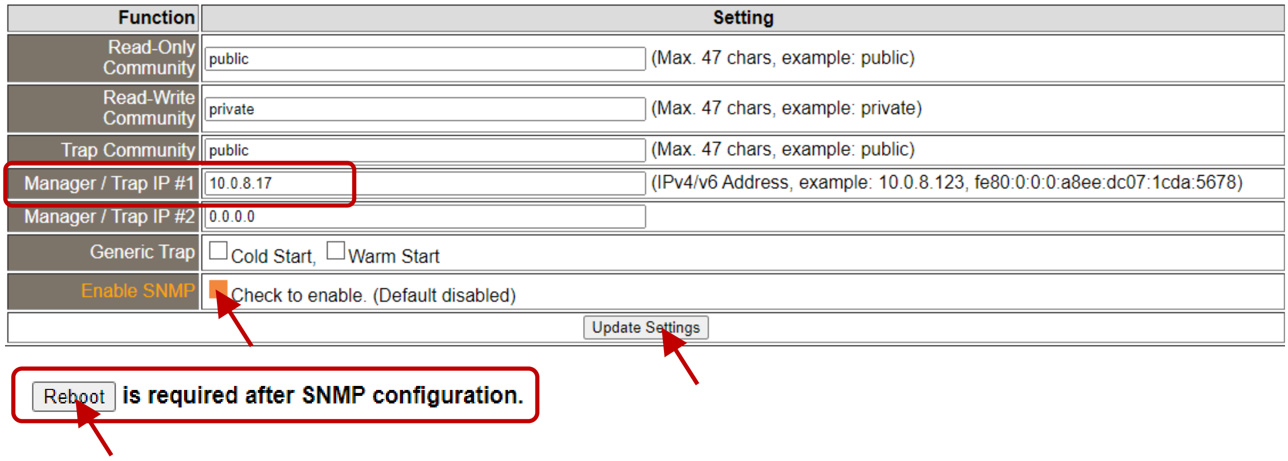
Address: 10.0.8.169
OID: .1.3

Enter the string according to the settings on ET-2200.

Address: 10.0.8.169
Port: 161
Read Community: public
Write Community: private
SNMP Version: 2

Note: If the **Write Community** field is not set, a Timeout error will occur during execution.

Step 4 Enter the IP address of **iReasoning MIB Browser** in the **Manager/Trap IP #1** field and enable the SNMP function, then click **Update Settings** to save the changes, and finally click the **Reboot** button to reboot the ET-2200 module.

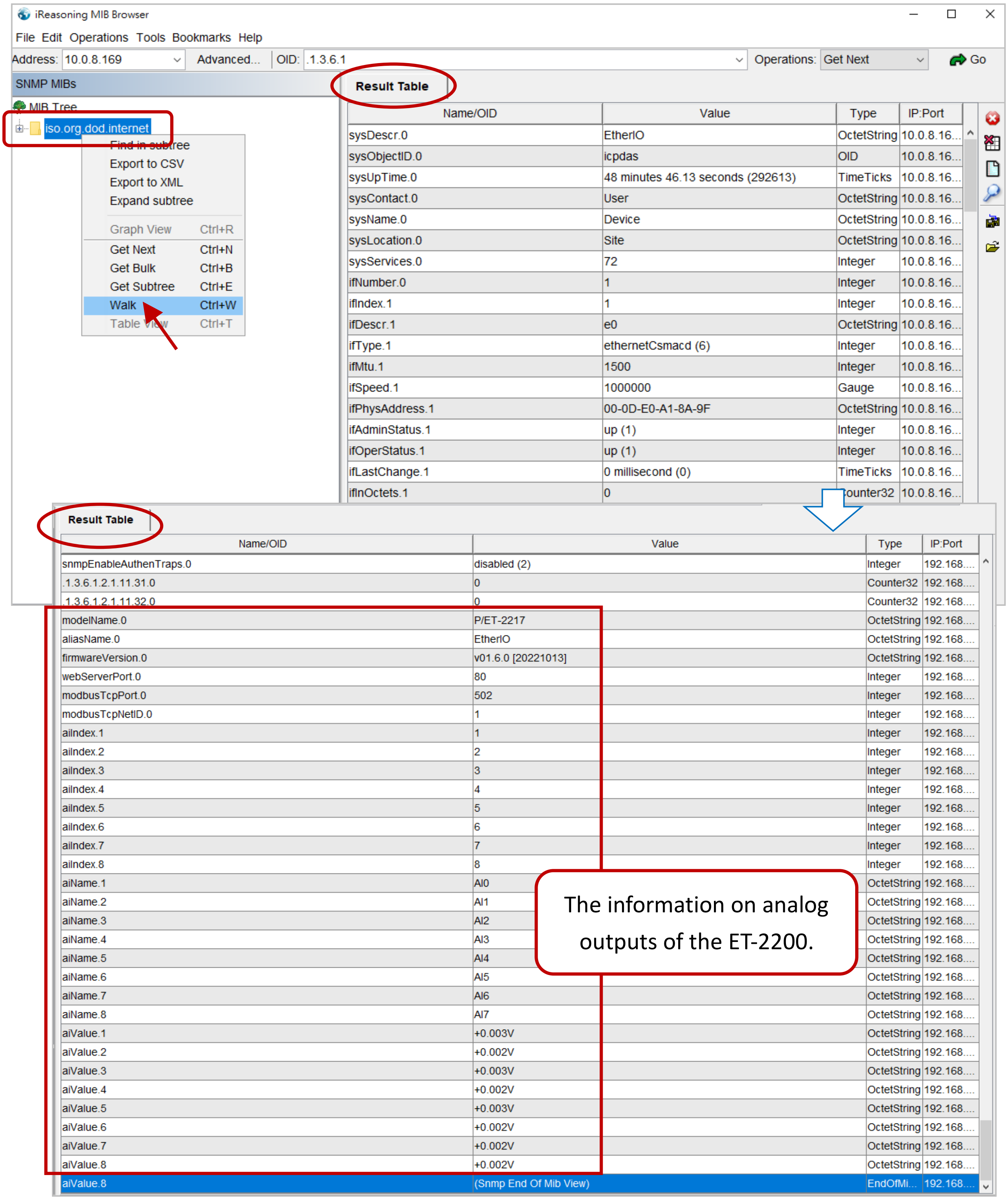


Function	Setting
Read-Only Community	public (Max. 47 chars, example: public)
Read-Write Community	private (Max. 47 chars, example: private)
Trap Community	public (Max. 47 chars, example: public)
Manager / Trap IP #1	10.0.8.17 (IPv4/v6 Address, example: 10.0.8.123, fe80:0:0:0:a8ee:dc07:1cda:5678)
Manager / Trap IP #2	0.0.0.0
Generic Trap	☐ Cold Start, ☐ Warm Start
Enable SNMP	☑ Check to enable. (Default disabled)
	Update Settings

Reboot **is required after SNMP configuration.**

Read the information of the ET-2200 – the Walk command

To do: Right-click the **iso.org.dod.internet** folder on the left side and click **Walk** to display the information of the ET-2200 in the **Result Table**.


iReasoning MIB Browser
File Edit Operations Tools Bookmarks Help
Address: 10.0.8.169
Advanced...
OID: .1.3.6.1
Operations: Get Next
Go
SNMP MIBs
MIB Tree
iso.org.dod.internet
Find in subtree
Export to CSV
Export to XML
Expand subtree
Graph View Ctrl+R
Get Next Ctrl+N
Get Bulk Ctrl+B
Get Subtree Ctrl+E
Walk Ctrl+W
Table View Ctrl+T
Result Table

Name/OID	Value	Type	IP:Port
sysDescr.0	EtherIO	OctetString	10.0.8.16...
sysObjectID.0	icpdas	OID	10.0.8.16...
sysUpTime.0	48 minutes 46.13 seconds (292613)	TimeTicks	10.0.8.16...
sysContact.0	User	OctetString	10.0.8.16...
sysName.0	Device	OctetString	10.0.8.16...
sysLocation.0	Site	OctetString	10.0.8.16...
sysServices.0	72	Integer	10.0.8.16...
ifNumber.0	1	Integer	10.0.8.16...
ifIndex.1	1	Integer	10.0.8.16...
ifDescr.1	e0	OctetString	10.0.8.16...
ifType.1	ethernetCsmacd (6)	Integer	10.0.8.16...
ifMtu.1	1500	Integer	10.0.8.16...
ifSpeed.1	1000000	Gauge	10.0.8.16...
ifPhysAddress.1	00-0D-E0-A1-8A-9F	OctetString	10.0.8.16...
ifAdminStatus.1	up (1)	Integer	10.0.8.16...
ifOperStatus.1	up (1)	Integer	10.0.8.16...
ifLastChange.1	0 millisecond (0)	TimeTicks	10.0.8.16...
ifInOctets.1	0	ounter32	10.0.8.16...

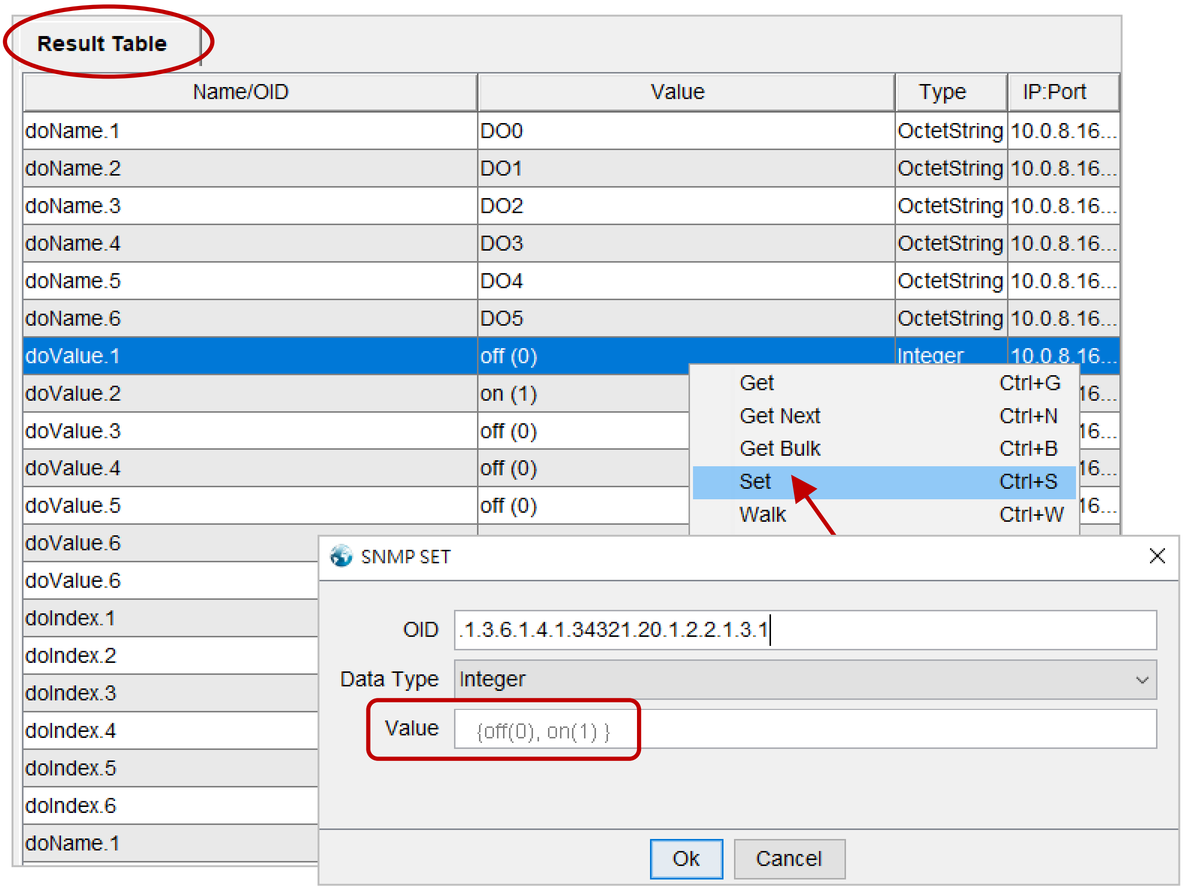
Result Table

Name/OID	Value	Type	IP:Port
snmpEnableAuthenTraps.0	disabled (2)	Integer	192.168....
.1.3.6.1.2.1.11.31.0	0	Counter32	192.168....
.1.3.6.1.2.1.11.32.0	0	Counter32	192.168....
modelName.0	P/ET-2217	OctetString	192.168....
aliasName.0	EtherIO	OctetString	192.168....
firmwareVersion.0	v01.6.0 [20221013]	OctetString	192.168....
webServerPort.0	80	Integer	192.168....
modbusTcpPort.0	502	Integer	192.168....
modbusTcpNetID.0	1	Integer	192.168....
aiIndex.1	1	Integer	192.168....
aiIndex.2	2	Integer	192.168....
aiIndex.3	3	Integer	192.168....
aiIndex.4	4	Integer	192.168....
aiIndex.5	5	Integer	192.168....
aiIndex.6	6	Integer	192.168....
aiIndex.7	7	Integer	192.168....
aiIndex.8	8	Integer	192.168....
aiName.1	AI0	OctetString	192.168....
aiName.2	AI1	OctetString	192.168....
aiName.3	AI2	OctetString	192.168....
aiName.4	AI3	OctetString	192.168....
aiName.5	AI4	OctetString	192.168....
aiName.6	AI5	OctetString	192.168....
aiName.7	AI6	OctetString	192.168....
aiName.8	AI7	OctetString	192.168....
aiValue.1	+0.003V	OctetString	192.168....
aiValue.2	+0.002V	OctetString	192.168....
aiValue.3	+0.003V	OctetString	192.168....
aiValue.4	+0.002V	OctetString	192.168....
aiValue.5	+0.003V	OctetString	192.168....
aiValue.6	+0.002V	OctetString	192.168....
aiValue.7	+0.002V	OctetString	192.168....
aiValue.8	+0.002V	OctetString	192.168....
aiValue.8	(Snmp End Of Mib View)	EndOfMi...	192.168....

The information on analog outputs of the ET-2200.

Control the DO channel to ON/OFF – the SET command

To do: Right-click the **doValue** entry in the **Result Table** and click **Set** to display the **SNMP SET** dialog box. Enter the value 0 (OFF) or 1 (ON) in the **Value** field to set the DO value.



Name/OID	Value	Type	IP:Port
doName.1	DO0	OctetString	10.0.8.16...
doName.2	DO1	OctetString	10.0.8.16...
doName.3	DO2	OctetString	10.0.8.16...
doName.4	DO3	OctetString	10.0.8.16...
doName.5	DO4	OctetString	10.0.8.16...
doName.6	DO5	OctetString	10.0.8.16...
doValue.1	off (0)	Integer	10.0.8.16...
doValue.2	on (1)		16...
doValue.3	off (0)		16...
doValue.4	off (0)		16...
doValue.5	off (0)		16...
doValue.6			
doValue.6			
doIndex.1			
doIndex.2			
doIndex.3			
doIndex.4			
doIndex.5			
doIndex.6			
doName.1			

OID .1.3.6.1.4.1.34321.20.1.2.2.1.3.1

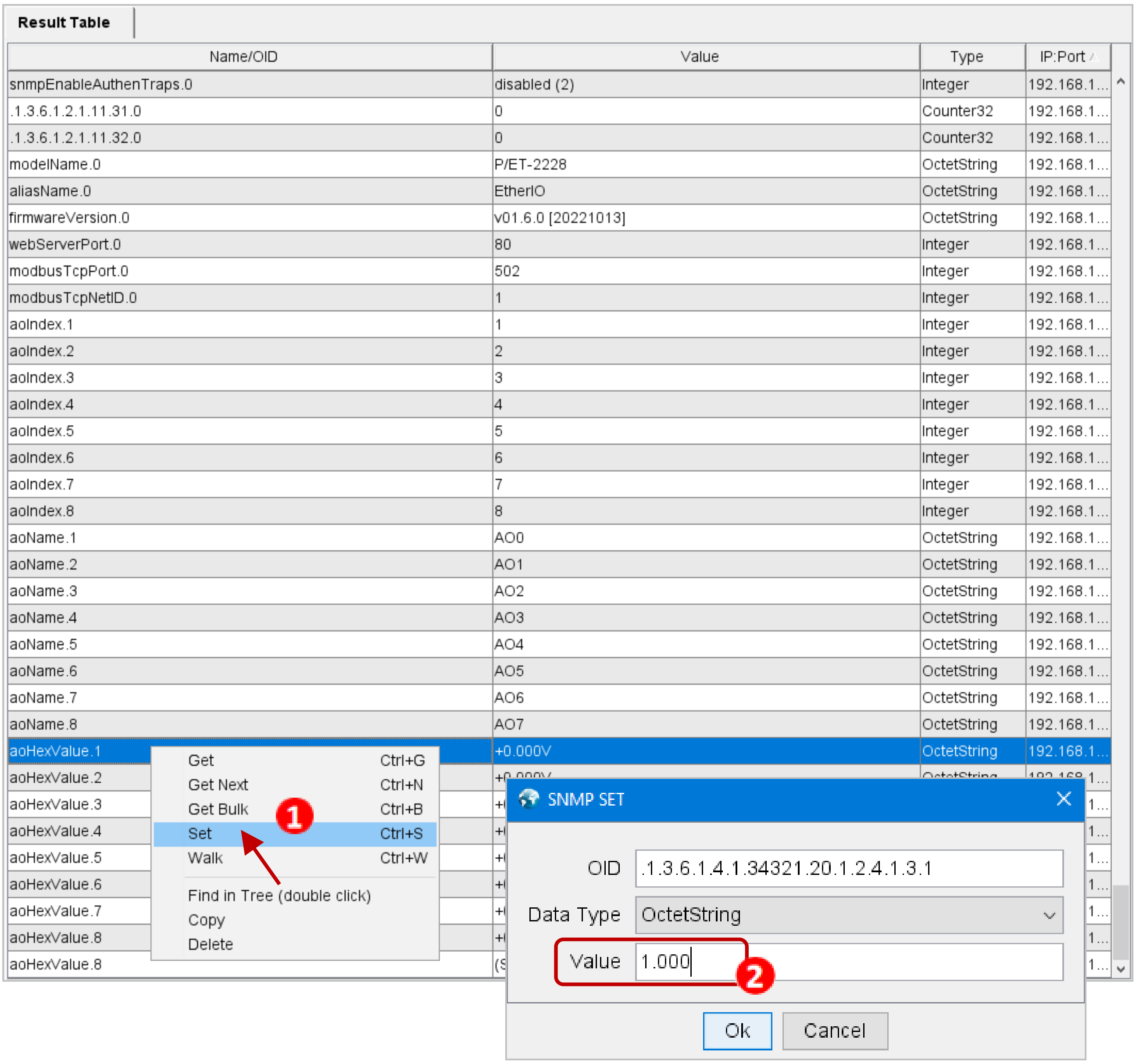
Data Type Integer

Value {off(0), on(1) }

After setting the value, execute the Walk command by right-clicking the **iso.org.dod.internet** folder on the left side of the window to update the value.

Set the outputs of the AO channel – the SET command

To do: Right-click the **aoValue** entry in the **Result Table** and click **Set** to display the **SNMP SET** dialog box. Enter the value **1.000** (output 1V) in the **Value** field to set the AO value.



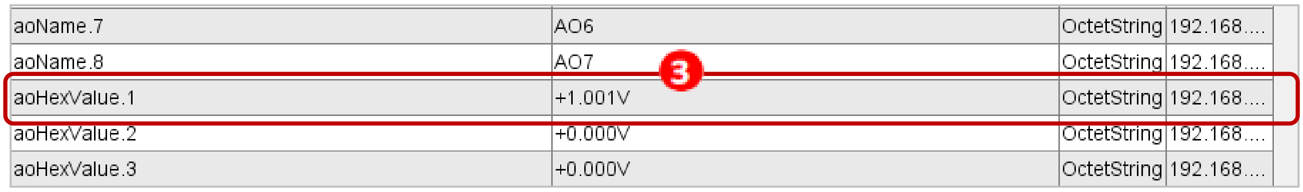
Name/OID	Value	Type	IP:Port
snmpEnableAuthenTraps.0	disabled (2)	Integer	192.168.1...
.1.3.6.1.2.1.11.31.0	0	Counter32	192.168.1...
.1.3.6.1.2.1.11.32.0	0	Counter32	192.168.1...
modelName.0	P/ET-2228	OctetString	192.168.1...
aliasName.0	EtherIO	OctetString	192.168.1...
firmwareVersion.0	v01.6.0 [20221013]	OctetString	192.168.1...
webServerPort.0	80	Integer	192.168.1...
modbusTcpPort.0	502	Integer	192.168.1...
modbusTcpNetID.0	1	Integer	192.168.1...
aoIndex.1	1	Integer	192.168.1...
aoIndex.2	2	Integer	192.168.1...
aoIndex.3	3	Integer	192.168.1...
aoIndex.4	4	Integer	192.168.1...
aoIndex.5	5	Integer	192.168.1...
aoIndex.6	6	Integer	192.168.1...
aoIndex.7	7	Integer	192.168.1...
aoIndex.8	8	Integer	192.168.1...
aoName.1	AO0	OctetString	192.168.1...
aoName.2	AO1	OctetString	192.168.1...
aoName.3	AO2	OctetString	192.168.1...
aoName.4	AO3	OctetString	192.168.1...
aoName.5	AO4	OctetString	192.168.1...
aoName.6	AO5	OctetString	192.168.1...
aoName.7	AO6	OctetString	192.168.1...
aoName.8	AO7	OctetString	192.168.1...
aoHexValue.1	+0.000V	OctetString	192.168.1...
aoHexValue.2	+0.000V	OctetString	192.168.1...
aoHexValue.3	+		1...
aoHexValue.4	+		1...
aoHexValue.5	+		1...
aoHexValue.6	+		1...
aoHexValue.7	+		1...
aoHexValue.8	+		1...
aoHexValue.8	(S		1...

OID: .1.3.6.1.4.1.34321.20.1.2.4.1.3.1

Data Type: OctetString

Value: 1.000

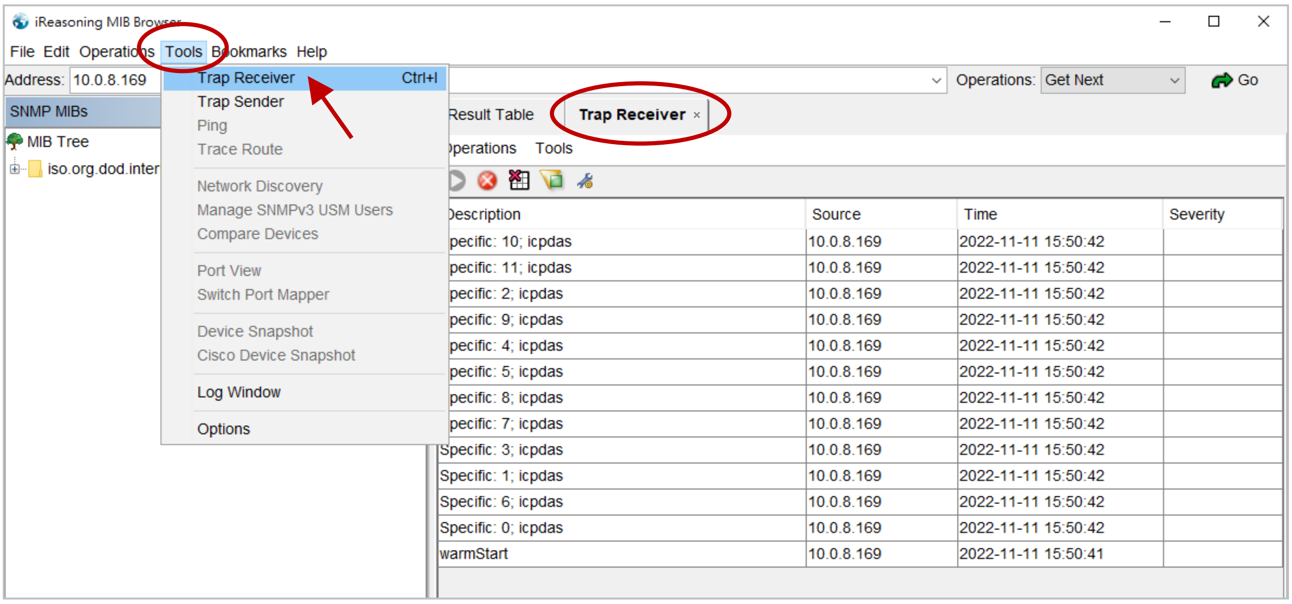
After completing the setting, execute the **Walk** command by right-clicking the **iso.org.dod.internet** folder on the left side of the window to update the value.



aoName.7	AO6	OctetString	192.168....
aoName.8	AO7	OctetString	192.168....
aoHexValue.1	+1.001V	OctetString	192.168....
aoHexValue.2	+0.000V	OctetString	192.168....
aoHexValue.3	+0.000V	OctetString	192.168....

4.18.4 SNMP Trap Example

Step 1 Click **Tools** → **Trap Receiver** on the menu bar to display the window for receiving the Trap messages.


iReasoning MIB Browser
File Edit Operations Tools Bookmarks Help
Address: 10.0.8.169
SNMP MIBs
MIB Tree
iso.org.dod.inter
Trap Receiver Ctrl+I
Trap Sender
Ping
Trace Route
Network Discovery
Manage SNMPv3 USM Users
Compare Devices
Port View
Switch Port Mapper
Device Snapshot
Cisco Device Snapshot
Log Window
Options
Operations: Get Next
Go
Result Table
Trap Receiver ×
)perations Tools

)escription	Source	Time	Severity
pecific: 10; icpdas	10.0.8.169	2022-11-11 15:50:42	
pecific: 11; icpdas	10.0.8.169	2022-11-11 15:50:42	
pecific: 2; icpdas	10.0.8.169	2022-11-11 15:50:42	
pecific: 9; icpdas	10.0.8.169	2022-11-11 15:50:42	
pecific: 4; icpdas	10.0.8.169	2022-11-11 15:50:42	
pecific: 5; icpdas	10.0.8.169	2022-11-11 15:50:42	
pecific: 8; icpdas	10.0.8.169	2022-11-11 15:50:42	
pecific: 7; icpdas	10.0.8.169	2022-11-11 15:50:42	
Specific: 3; icpdas	10.0.8.169	2022-11-11 15:50:42	
Specific: 1; icpdas	10.0.8.169	2022-11-11 15:50:42	
Specific: 6; icpdas	10.0.8.169	2022-11-11 15:50:42	
Specific: 0; icpdas	10.0.8.169	2022-11-11 15:50:42	
warmStart	10.0.8.169	2022-11-11 15:50:41	

Step 2 The Trap types for the alarms that receive from the ET-2200 module are as follows.

1. **Cold Start Trap:**

   The Cold Start Trap will be sent when the module restarts after it has been completely powered off.

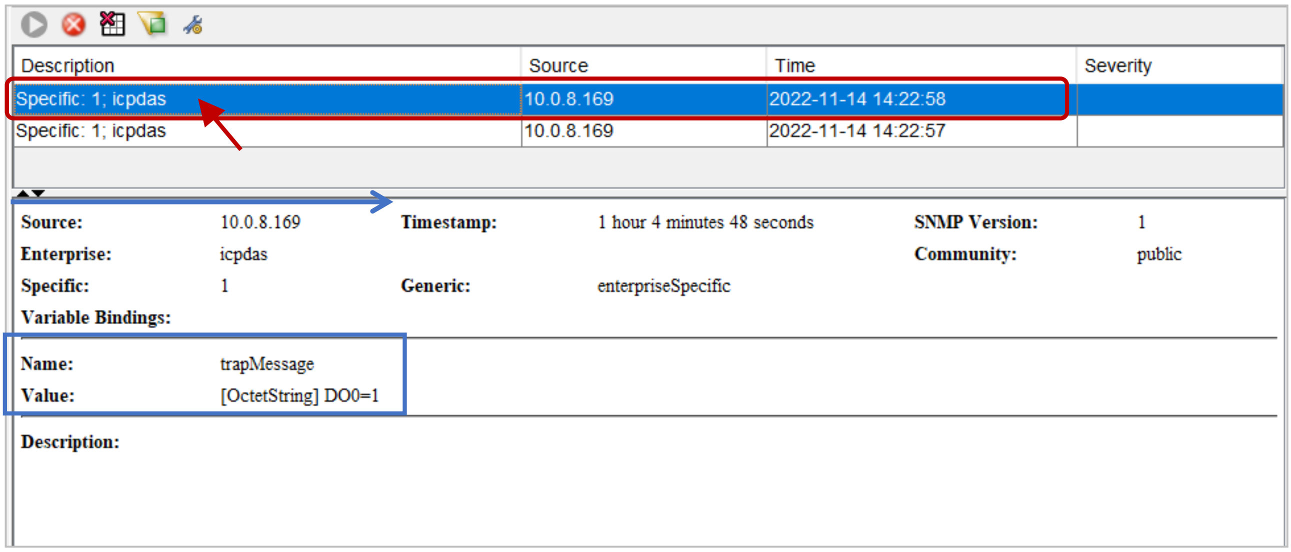
2. **Warm Start Trap:**

   The Warm Start Trap will be sent when the module restarts without turning off the power. For example, the reboot command or the watchdog mechanism.

3. **Specific Trap (DI/DO/AO State-Change):**

   When the specified DO/DI/AO channel is enabled, if the I/O status changes (e.g., ON/OFF or value change), a Trap message with a Specific ID, source IP, and time will be sent. This makes it easier to analyze the cause of the alarm and handle it appropriately.

Click the Trap message to view the details



Description	Source	Time	Severity
Specific: 1; icpdas	10.0.8.169	2022-11-14 14:22:58	
Specific: 1; icpdas	10.0.8.169	2022-11-14 14:22:57	

Source: 10.0.8.169 **Timestamp:** 1 hour 4 minutes 48 seconds **SNMP Version:** 1
Enterprise: icpdas **Community:** public
Specific: 1 **Generic:** enterpriseSpecific
Variable Bindings:
Name: trapMessage
Value: [OctetString] DO0=1
Description:

Item	Description
Source	The IP address of the Trap from the device
Timestamp	How much time has passed after the module starts
SNMP Version	The version of SNMP
Enterprise	The name of the enterprise
Community	SNMP community name according to the **Trap Community** setting on the ET-2200.
Specific	Specific ID
Generic	Generic ID
Name	The generic name for the Trap
Value	The I/O channel and status value of the module (e.g., 0 = OFF, 1 = ON, or an AO value)

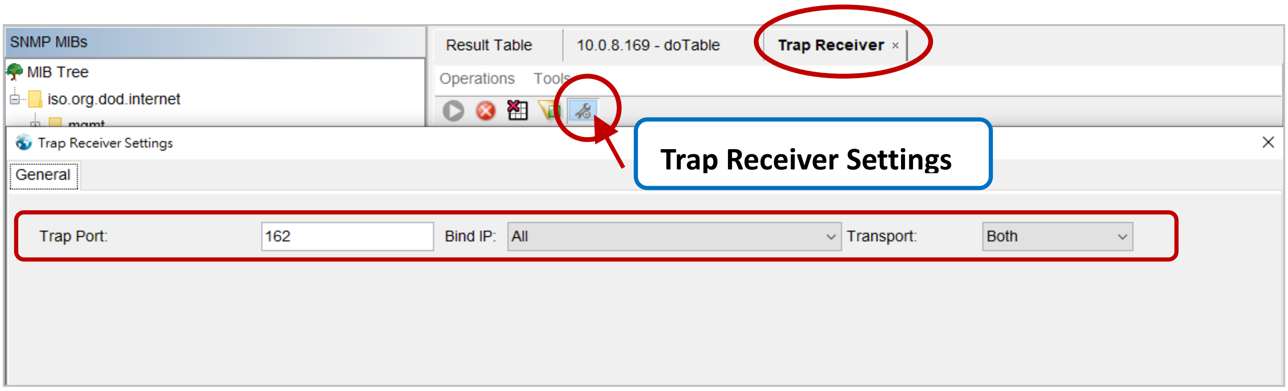
4.18.5 SNMP Problem Solving

Unable to receive the Trap message from the device

1. Check the setting of the Windows firewall or the Anti-virus software. These functions can be disabled during the testing.

2. Check the setting of the Trap port. Using **iReasoning MIB Browser** as an example,

   Click the **Trap Receiver Settings** button on the **Trap Receiver** page to open the window. Then, confirm the Trap Port, Bind IP, and Transport settings. The ET-2200 uses the default Trap port 162 according to the SNMP specification.


SNMP MIBs
MIB Tree
iso.org.dod.internet
mgmt
Result Table
10.0.8.169 - doTable
Trap Receiver ×
Operations
Tools
Trap Receiver Settings
General
Trap Receiver Settings

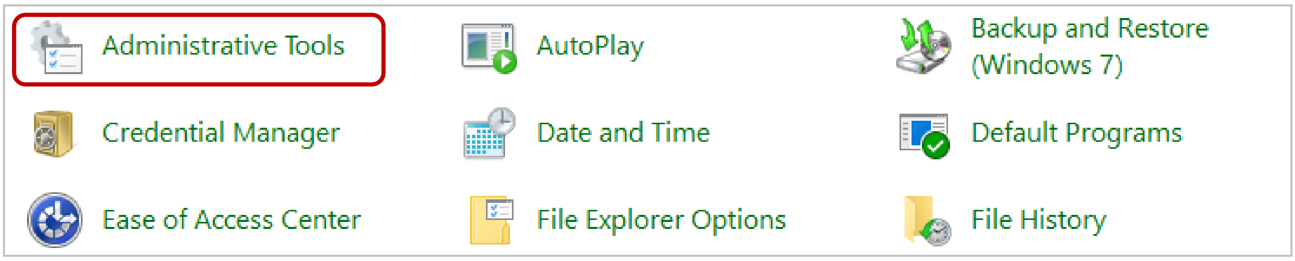
Trap Port: 162
Bind IP: All
Transport: Both

3. Disable Windows SNMP Trap Service.

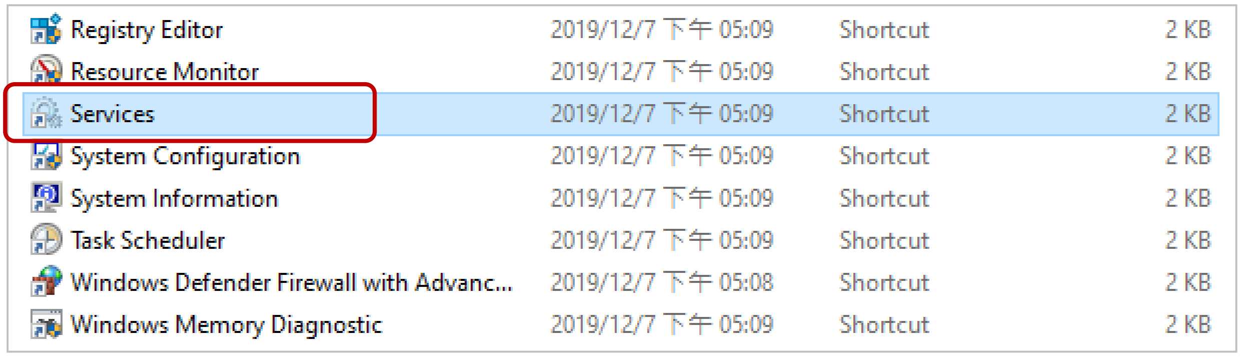
   Note:

   The configuration screen may be different depending on the Windows version. The following screens are on Windows 10.

Step 1 Open the **Control Panel** window and click **Administrative Tools**.

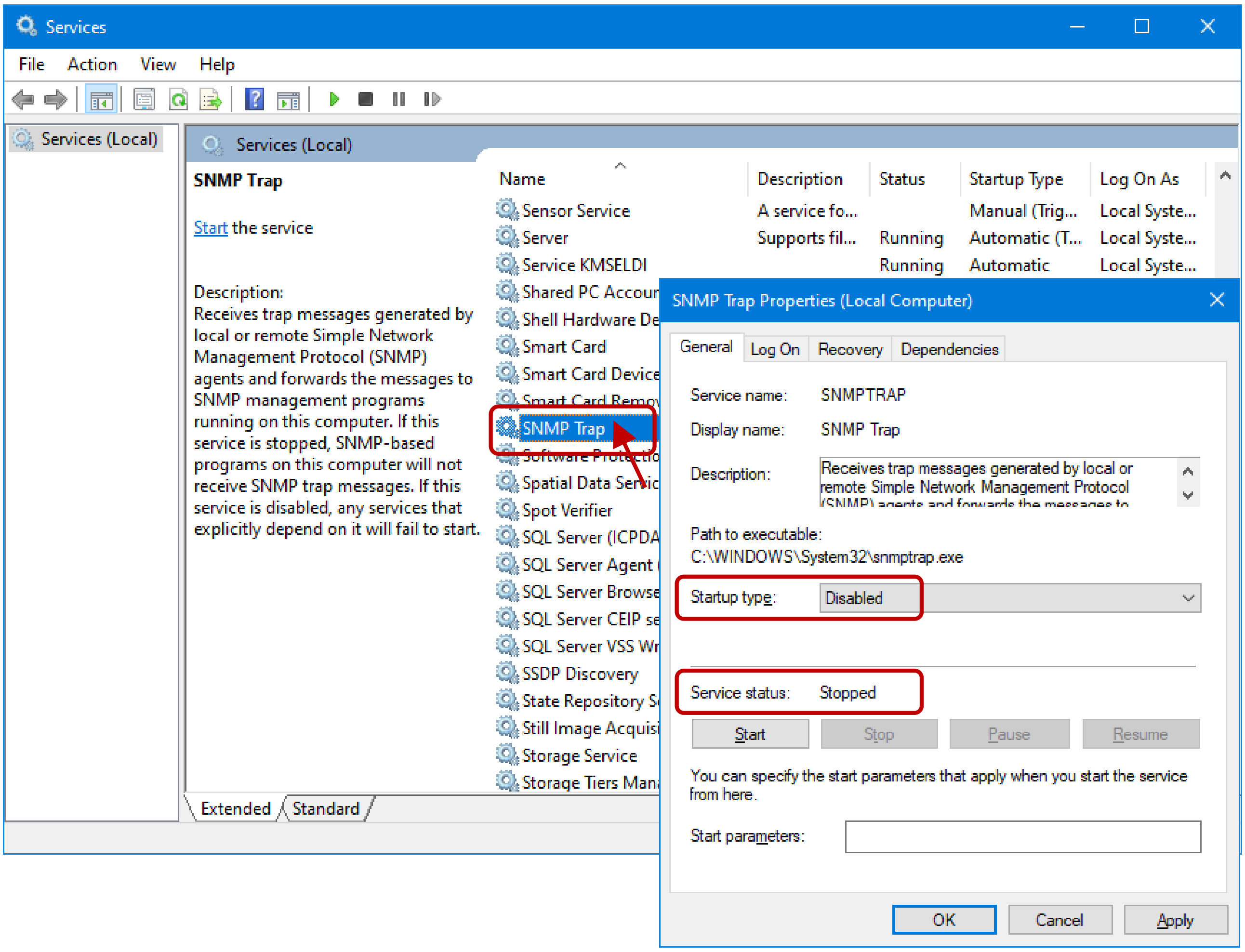

Administrative Tools
AutoPlay
Backup and Restore (Windows 7)
Credential Manager
Date and Time
Default Programs
Ease of Access Center
File Explorer Options
File History

Step 2 Double-click the **Services** icon.



Registry Editor	2019/12/7 下午 05:09	Shortcut	2 KB
Resource Monitor	2019/12/7 下午 05:09	Shortcut	2 KB
Services	2019/12/7 下午 05:09	Shortcut	2 KB
System Configuration	2019/12/7 下午 05:09	Shortcut	2 KB
System Information	2019/12/7 下午 05:09	Shortcut	2 KB
Task Scheduler	2019/12/7 下午 05:09	Shortcut	2 KB
Windows Defender Firewall with Advanc...	2019/12/7 下午 05:08	Shortcut	2 KB
Windows Memory Diagnostic	2019/12/7 下午 05:09	Shortcut	2 KB

Step 3 Double-click the **SNMP Trap** and confirm the **Startup type** is set to "**Disabled"** and the **Service status** is set to "**Stopped**".



SNMP Trap

Start the service

Description:
Receives trap messages generated by local or remote Simple Network Management Protocol (SNMP) agents and forwards the messages to SNMP management programs running on this computer. If this service is stopped, SNMP-based programs on this computer will not receive SNMP trap messages. If this service is disabled, any services that explicitly depend on it will fail to start.

Name	Description	Status	Startup Type	Log On As
Sensor Service	A service fo...		Manual (Trig...	Local Syste...
Server	Supports fil...	Running	Automatic (T...	Local Syste...
Service KMSELDI		Running	Automatic	Local Syste...
Shared PC Accour				
Shell Hardware De				
Smart Card				
Smart Card Device				
Smart Card Remov				
SNMP Trap				
Software Protectio				
Spatial Data Servic				
Spot Verifier				
SQL Server (ICPDA				
SQL Server Agent (				
SQL Server Browse				
SQL Server CEIP se				
SQL Server VSS Wr				
SSDP Discovery				
State Repository S				
Still Image Acquisi				
Storage Service				
Storage Tiers Mana				

SNMP Trap Properties (Local Computer)

Service name: SNMPTRAP

Display name: SNMP Trap

Description: Receives trap messages generated by local or remote Simple Network Management Protocol (SNMP) agents and forwards the messages to

Path to executable:
C:\WINDOWS\System32\snmptrap.exe

Startup type: Disabled

Service status: Stopped

You can specify the start parameters that apply when you start the service from here.

Start parameters:

5. I/O Pair Connection Applications

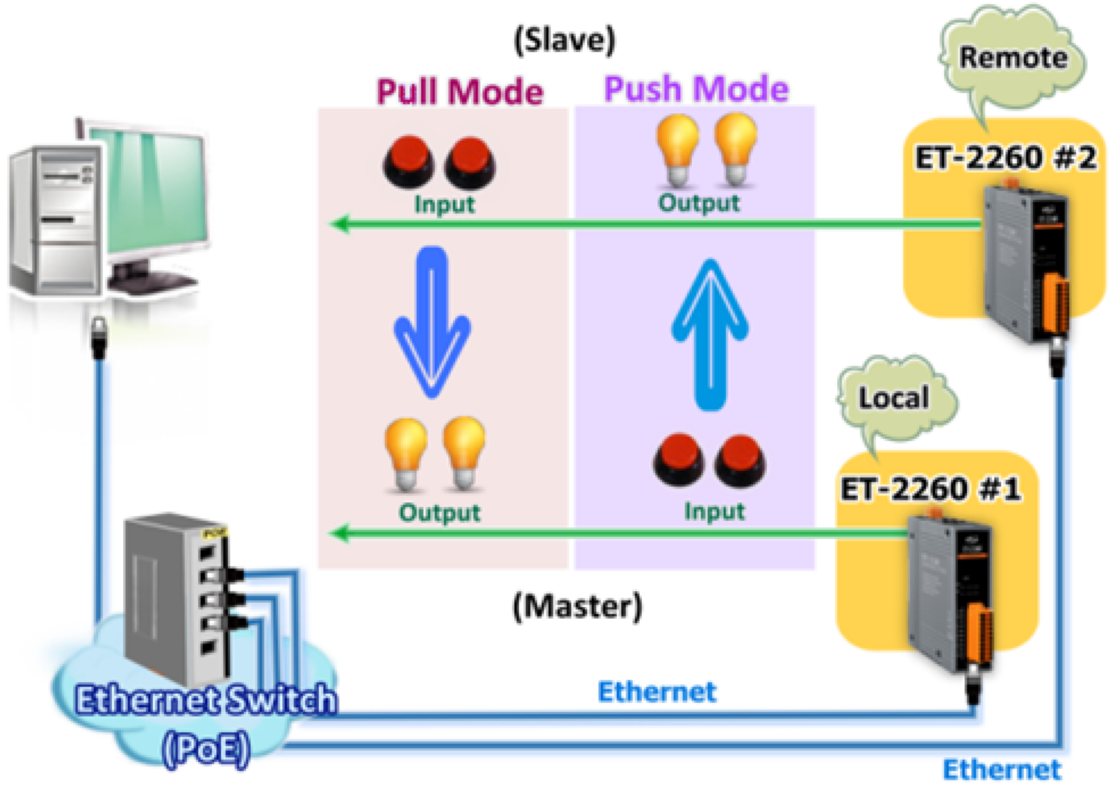
The ET-2200 series modules can be used to create DI-to-DO pair connections via the Ethernet. Once the configuration is complete, the modules can then poll the status of the local DI channels and then use the Modbus/TCP protocol to continuously write to a remote DO device in the background. This is useful when connecting digital I/O devices that do not themselves have Ethernet capability. The following will describe how to correctly configure the I/O pair-connection function.

5.1 One Module Polling the Remote DI/DO (1-to-1, Pull / Push Mode)

Step 1: Connect the device to a Network, a PC, and a Power supply.

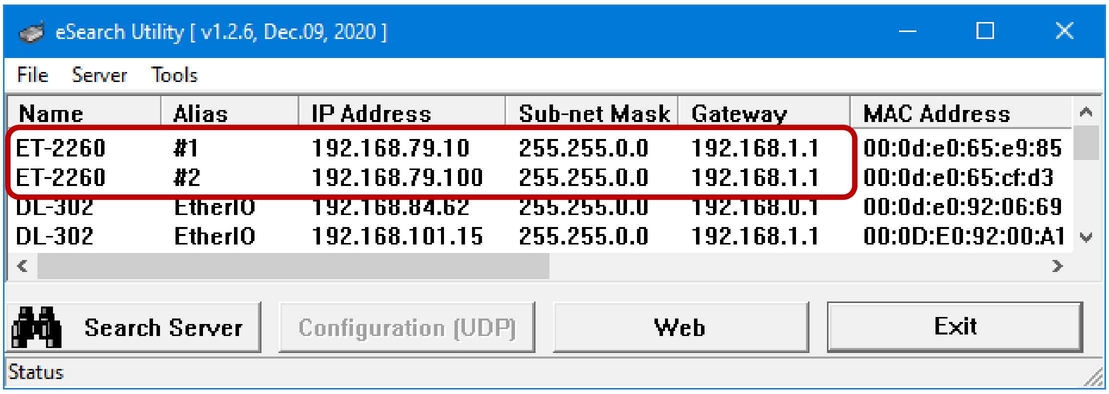
Confirm that the ET-2200 series modules are functioning correctly. Refer to Chapter 3 "Getting Started" for more details. An example configuration is shown below:

Note that the ET-2260 module is used in this example.


(Slave)
Remote
Pull Mode
Push Mode
ET-2260 #2
Input
Output
Local
ET-2260 #1
Output
Input
(Master)
Ethernet Switch
(PoE)
Ethernet
Ethernet

Step 2: Configure the Ethernet Settings

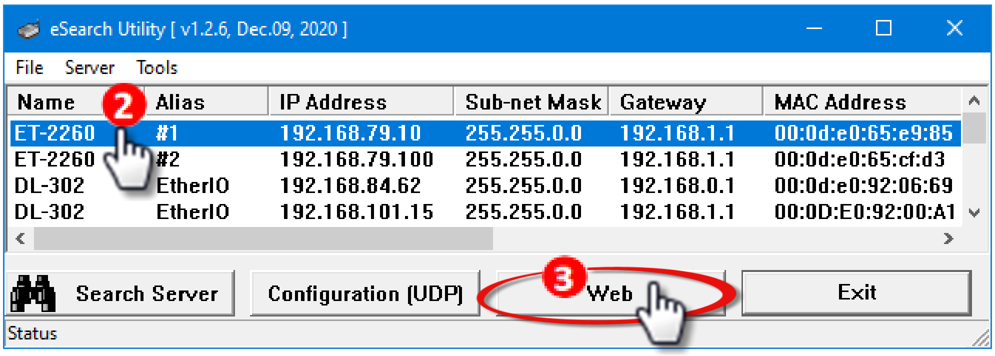
Contact your Network Administrator to obtain the correct network configuration information for the ET-2200 series modules (e.g., ET-2260 #1 and #2), such as the IP Address, Subnet Mask, and Gateway details. Refer to Section 3.3 "Configuring the Network Settings" for more details.


eSearch Utility [v1.2.6, Dec.09, 2020]
File
Server
Tools
Search Server
Configuration (UDP)
Web
Exit
Status

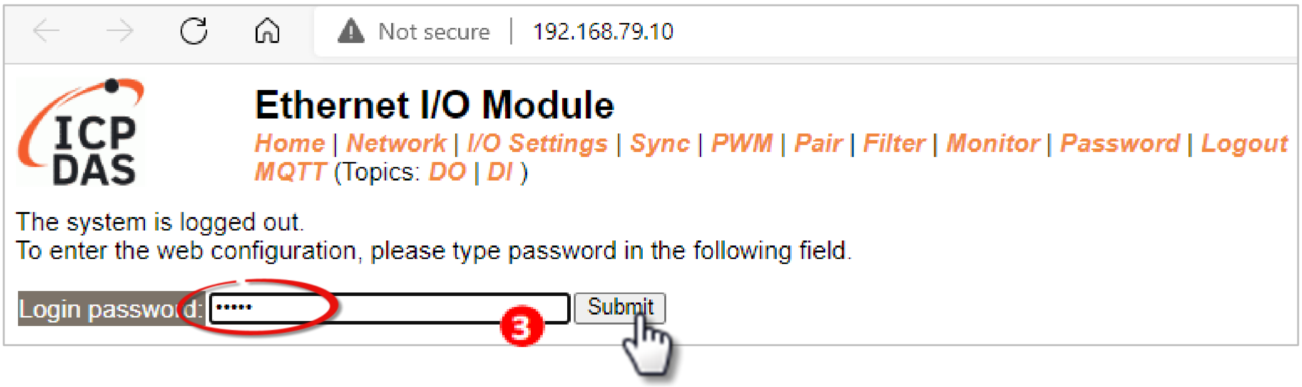
Name	Alias	IP Address	Sub-net Mask	Gateway	MAC Address
ET-2260	#1	192.168.79.10	255.255.0.0	192.168.1.1	00:0d:e0:65:e9:85
ET-2260	#2	192.168.79.100	255.255.0.0	192.168.1.1	00:0d:e0:65:cf:d3
DL-302	EtherIO	192.168.84.62	255.255.0.0	192.168.0.1	00:0d:e0:92:06:69
DL-302	EtherIO	192.168.101.15	255.255.0.0	192.168.1.1	00:0D:E0:92:00:A1

Step 3: Configure the I/O Pair connection on the Web Server

1. In the eSearch Utility, select the **ET-2260#1** module and then click the "**Web**" button to launch the browser program and connect to the web server.
2. Enter the password in the Login password field **(the default password is "Admin")**, and then click the **"Submit"** button to display the Web configuration page.


eSearch Utility [v1.2.6, Dec.09, 2020]
File
Server
Tools
2
3
Search Server
Configuration (UDP)
Web
Exit
Status

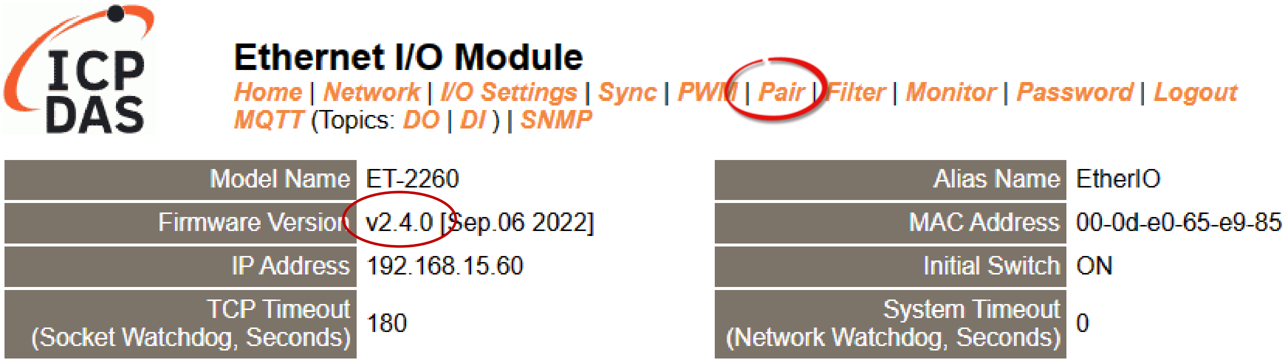
Name	Alias	IP Address	Sub-net Mask	Gateway	MAC Address
ET-2260	#1	192.168.79.10	255.255.0.0	192.168.1.1	00:0d:e0:65:e9:85
ET-2260	#2	192.168.79.100	255.255.0.0	192.168.1.1	00:0d:e0:65:cf:d3
DL-302	EtherIO	192.168.84.62	255.255.0.0	192.168.0.1	00:0d:e0:92:06:69
DL-302	EtherIO	192.168.101.15	255.255.0.0	192.168.1.1	00:0D:E0:92:00:A1


Not secure
192.168.79.10
ICP DAS
Ethernet I/O Module
Home | Network | I/O Settings | Sync | PWM | Pair | Filter | Monitor | Password | Logout
MQTT (Topics: DO | DI)
Submit
3

The system is logged out.
To enter the web configuration, please type password in the following field.

Login password: •••••

3. Click the **“Pair”** tab to display the I/O Pair-connection Settings page.



Ethernet I/O Module

Home | Network | I/O Settings | Sync | PWM | Pair | Filter | Monitor | Password | Logout
MQTT (Topics: DO | DI) | SNMP

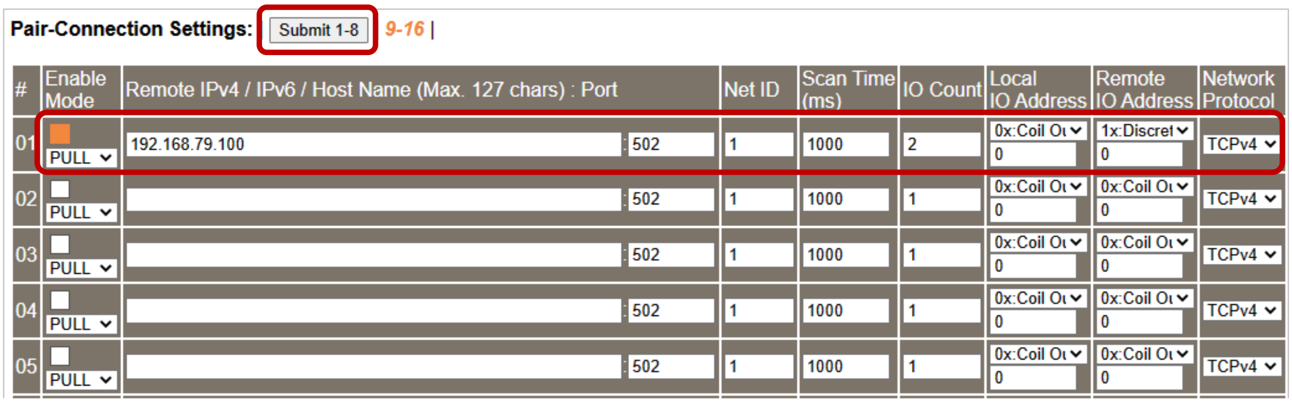
Model Name	ET-2260	Alias Name	EtherIO
Firmware Version	v2.4.0 [Sep.06 2022]	MAC Address	00-0d-e0-65-e9-85
IP Address	192.168.15.60	Initial Switch	ON
TCP Timeout (Socket Watchdog, Seconds)	180	System Timeout (Network Watchdog, Seconds)	0

5.1.1 Pull Mode

1. In the “**Pair-connection Settings**”, select **“PULL”** from the “**Enable Mode”** dropdown menu and select the box to enable the function.
2. Enter both the IP address and TCP port number of the remote **ET-2260#2** module in the “**Remote IP…: Port**” field.
3. Enter the amount of **DI** used on the remote **ET-2260#2** module in the “**IO Count**” field.

> Example of the **PULL** mode **(Remote DI to Local DO)**
>
> Enter **2** in the **IO Count** field and enter **0** in both **Local/Remote IO Address** fields which means **DI0** and **DI1** of **ET-2260#2** mapping to **DO0** and **DO1** of **ET-2260#1**.

4. Select “0x: Coil Output/**DO**” and enter a DO address in the “**Local IO Address**” field.
   Select “1x: Discrete Input/**DI**” and enter a DI address in the “**Remote IO Address**” field.
5. Select the Modbus protocol (e.g., **TCPv4**) from the “**Network Protocol**” dropdown menu.
6. Click the “**Submit 1-8**” button to complete the configuration.



Pair-Connection Settings:

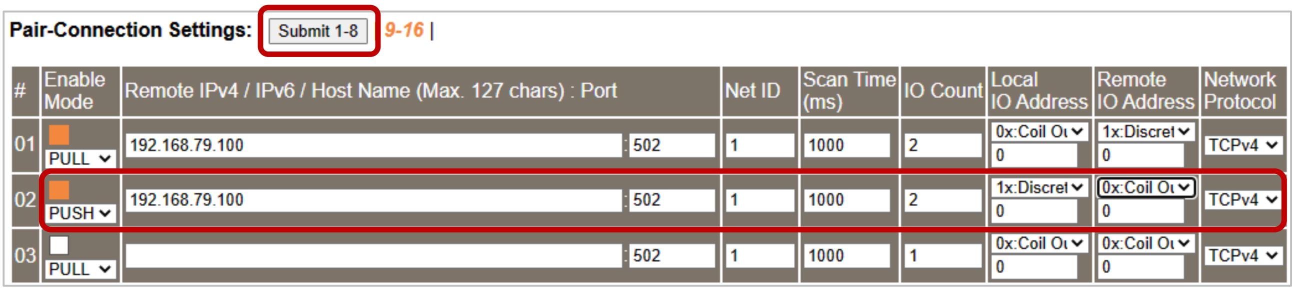
#	Enable Mode	Remote IPv4 / IPv6 / Host Name (Max. 127 chars) : Port		Net ID	Scan Time (ms)	IO Count	Local IO Address	Remote IO Address	Network Protocol
01	☑ PULL	192.168.79.100	502	1	1000	2	0x:Coil Ou 0	1x:Discret 0	TCPv4
02	☐ PULL		502	1	1000	1	0x:Coil Ou 0	0x:Coil Ou 0	TCPv4
03	☐ PULL		502	1	1000	1	0x:Coil Ou 0	0x:Coil Ou 0	TCPv4
04	☐ PULL		502	1	1000	1	0x:Coil Ou 0	0x:Coil Ou 0	TCPv4
05	☐ PULL		502	1	1000	1	0x:Coil Ou 0	0x:Coil Ou 0	TCPv4

5.1.2 Push Mode

1. In the “**Pair-connection Settings**”, select **“PUSH”** from the “**Enable Mode**” dropdown menu and select the box to enable the function.
2. Enter both the IP address and TCP port number of the remote **ET-2260#2** module in the “**Remote IP…: Port**” field.
3. Enter the amount of **DI** used on the **ET-2260#1** module in the “**IO Count**” field.

Example of the **PUSH** mode **(Local DI to Remote DO)**
Enter **2** in the **IO Count** field and enter **0** in both **Local/Remote IO Address** fields which means **DI0** and **DI1** of **ET-2260#1** mapping to **DO0** and **DO1** of **ET-2260#2**.

4. Select “1x: Discrete Input/**DI**” and enter a DI address in the “**Local IO Address**” field. Select “0x: Coil Output/**DO**” and enter a DO address in the “**Remote IO Address**” field
5. Select the Modbus protocol (e.g., **TCPv4**) from the “**Network Protocol**” dropdown menu.
6. Click the “**Submit 1-8**” button to complete the configuration.


Pair-Connection Settings: 9-16 |

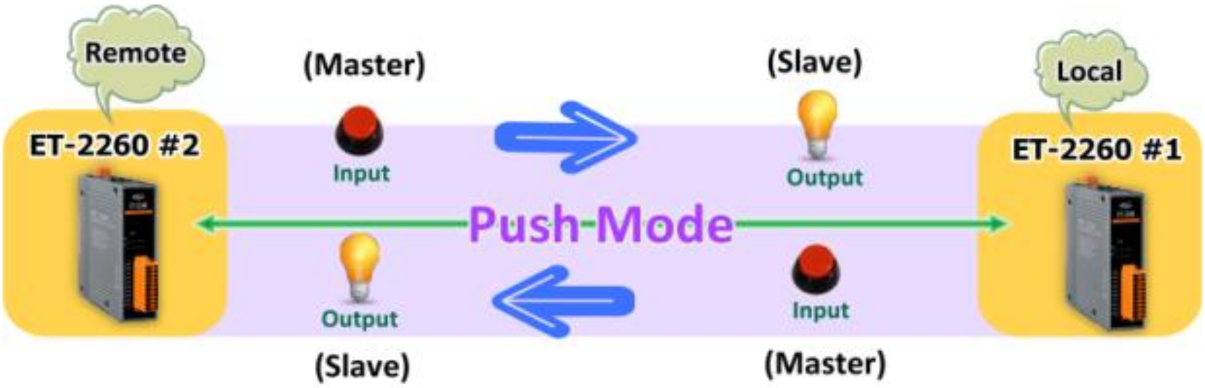
#	Enable Mode	Remote IPv4 / IPv6 / Host Name (Max. 127 chars) : Port	Net ID	Scan Time (ms)	IO Count	Local IO Address	Remote IO Address	Network Protocol
01	☑ PULL	192.168.79.100 : 502	1	1000	2	0x:Coil Ou 0	1x:Discret 0	TCPv4
02	☑ PUSH	192.168.79.100 : 502	1	1000	2	1x:Discret 0	0x:Coil Ou 0	TCPv4
03	☐ PULL	: 502	1	1000	1	0x:Coil Ou 0	0x:Coil Ou 0	TCPv4

5.2 Two Modules Pushing the Local DI to each other (1-to-1, Push Mode)

Step 1: Connect the device to a Network, a PC, and a Power supply.

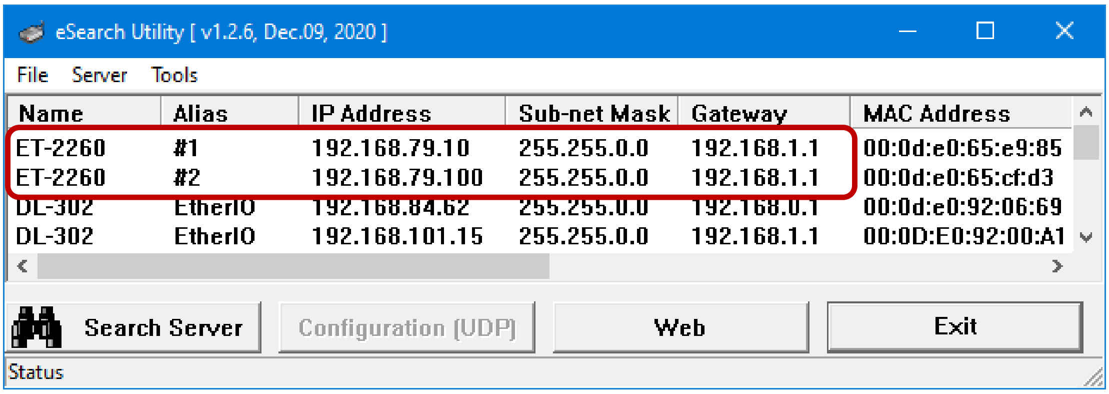
Confirm that the ET-2200 series modules are functioning correctly. Refer to Chapter 3 "Getting Started" for more details. An example configuration is shown below:

Note that the ET-2260 module is used in this example.


Remote
(Master)
(Slave)
Local
ET-2260 #2
Input
Output
ET-2260 #1
Push-Mode
Output
Input
(Slave)
(Master)

Step 2: Configure the Ethernet Settings

Contact your Network Administrator to obtain the correct network configuration information for the ET-2200 series modules (e.g., ET-2260 #1 and #2), such as the IP Address, Subnet Mask, and Gateway details. Refer to Section 3.3 "Configuring the Network Settings" for more details.


eSearch Utility [v1.2.6, Dec.09, 2020]
File Server Tools
Search Server
Configuration (UDP)
Web
Exit
Status

Name	Alias	IP Address	Sub-net Mask	Gateway	MAC Address
ET-2260	#1	192.168.79.10	255.255.0.0	192.168.1.1	00:0d:e0:65:e9:85
ET-2260	#2	192.168.79.100	255.255.0.0	192.168.1.1	00:0d:e0:65:cf:d3
DL-302	EtherIO	192.168.84.62	255.255.0.0	192.168.0.1	00:0d:e0:92:06:69
DL-302	EtherIO	192.168.101.15	255.255.0.0	192.168.1.1	00:0D:E0:92:00:A1

Step 3: Configure the I/O Pair connection on the **ET-2260 #1** module

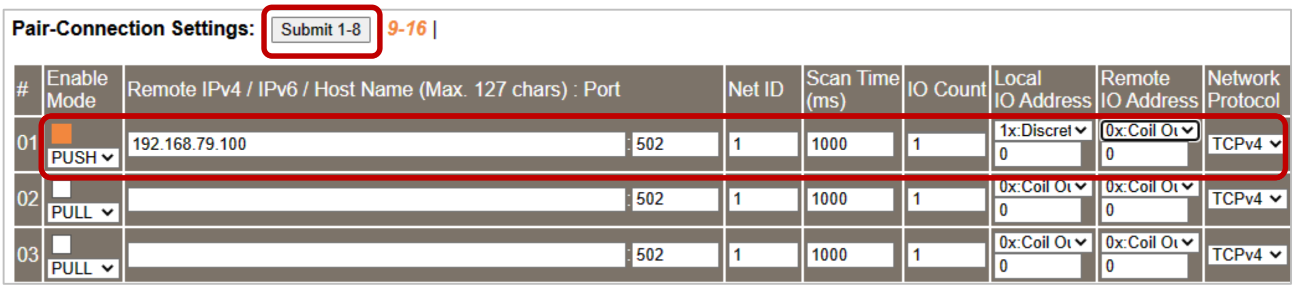
1. In the eSearch Utility, select the **ET-2260#1** module and then click the "**Web**" button to launch the browser program and connect to the web server.
2. Enter the password in the Login password field **(the default password is "Admin")**, and then click the **"Submit"** button to display the Web configuration page.
3. Click the **"Pair**" tab to display the I/O Pair-connection Settings page.

Refer to Section 5.1 – Step2 and 3 for instructions on how to perform the above procedures.

4. In the "**Pair-connection Settings**", select **"PUSH"** from the "**Enable Mode**" dropdown menu and select the box to enable the function.
5. Enter both the IP address and TCP port number of the remote **ET-2260#2** module in the "**Remote IP…: Port**" field.
6. Enter the amount of **DI** used on the **ET-2260#1** module in the "**IO Count**" field.

> Example of the **PUSH** mode **(Local DI to Remote DO)**
> Enter **1** in the **IO Count** field and enter **0** in both "**Local/Remote IO Address"** fields which means **DI0** of **ET-2260#1** mapping to **DO0** of **ET-2260#2**.

7. Select "1x: Discrete Input/**DI**" and enter a DI address in the "**Local IO Address**" field. Select "0x: Coil Output/**DO**" and enter a DO address in the "**Remote IO Address**" field
8. Select the Modbus protocol (e.g., **TCPv4**) from the "**Network Protocol**" dropdown menu.
9. Click the "**Submit 1-8**" button to complete the configuration.



Pair-Connection Settings: Submit 1-8 | 9-16 |

#	Enable Mode	Remote IPv4 / IPv6 / Host Name (Max. 127 chars) : Port	Net ID	Scan Time (ms)	IO Count	Local IO Address	Remote IO Address	Network Protocol
01	☑ PUSH	192.168.79.100 : 502	1	1000	1	1x:Discret 0	0x:Coil Ou 0	TCPv4
02	☐ PULL	: 502	1	1000	1	0x:Coil Ou 0	0x:Coil Ou 0	TCPv4
03	☐ PULL	: 502	1	1000	1	0x:Coil Ou 0	0x:Coil Ou 0	TCPv4

Step 4: Configure the I/O Pair connection on the **ET-2260 #2** module

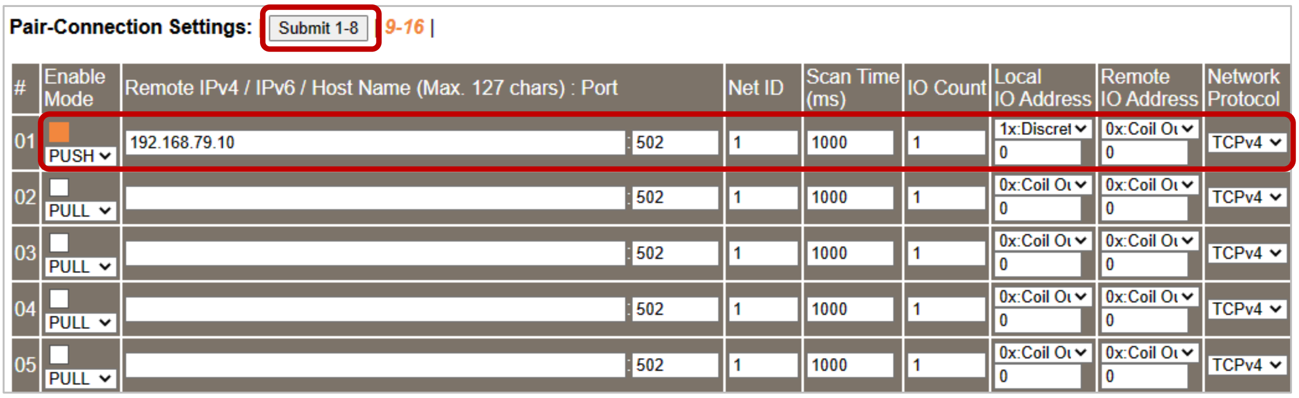
1. In the eSearch Utility, select the **ET-2260#2** module and then click the "**Web**" button to launch the browser program and connect to the web server.
2. Enter the password in the Login password field **(the default password is "Admin")**, and then click the **"Submit"** button to display the Web configuration page.
3. Click the **"Pair"** tab to display the I/O Pair-connection settings page.

Refer to Section 5.1 – Step2 and 3 for instructions on how to perform the above procedures.

4. In the "**Pair-connection Settings**", select **"PUSH"** from the "**Enable Mode**" dropdown menu and select the box to enable the function.
5. Enter both the IP address and TCP port number of the remote **ET-2260#1** module in the "**Remote IP…: Port**" field.
6. Enter the amount of **DI** used on the **ET-2260#2** module in the "**IO Count**" field.

> Example of the **PUSH** mode **(Local DI to Remote DO)**
>
> Enter **1** in the **IO Count** field and enter **0** in both "**Local/Remote IO Address"** fields which means **DI0** of **ET-2260#2** mappings to **DO0** of **ET-2260#1**.

7. Select "1x: Discrete Input/**DI**" and enter a DI address in the "**Local IO Address**" field. Select "0x: Coil Output/**DO**" and enter a DO address in the "**Remote IO Address**" field
8. Select the Modbus protocol (e.g., **TCPv4**) from the "**Network Protocol**" dropdown menu.
9. Click the "**Submit 1-8**" button to complete the configuration.



Pair-Connection Settings: Submit 1-8 | 9-16 |

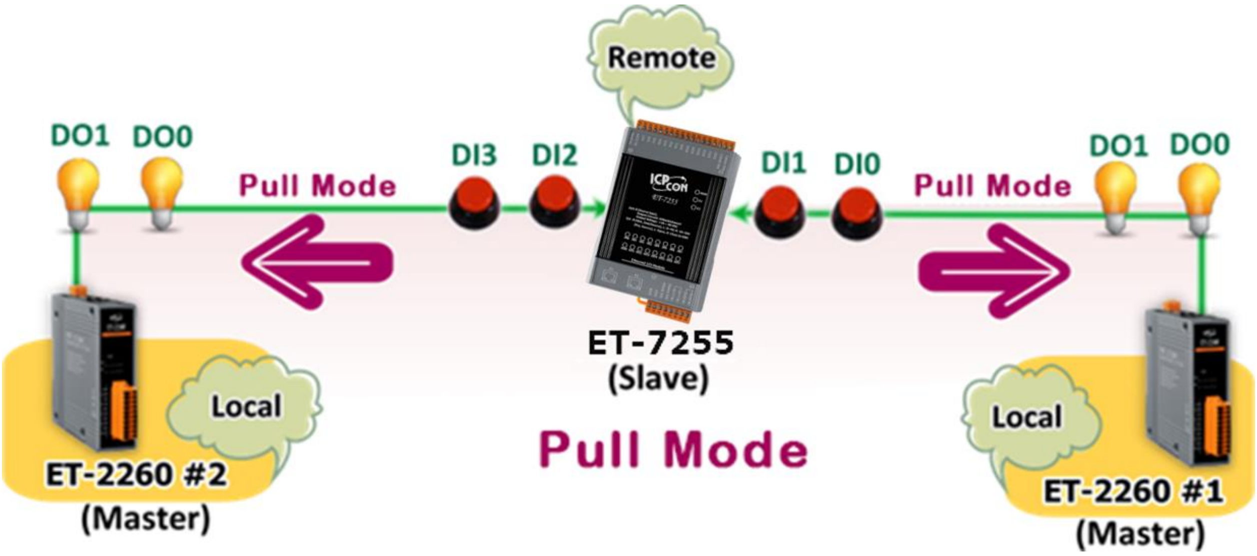
#	Enable Mode	Remote IPv4 / IPv6 / Host Name (Max. 127 chars) : Port		Net ID	Scan Time (ms)	IO Count	Local IO Address	Remote IO Address	Network Protocol
01	☑ PUSH	192.168.79.10	502	1	1000	1	1x:Discret 0	0x:Coil Ou 0	TCPv4
02	☐ PULL		502	1	1000	1	0x:Coil Ou 0	0x:Coil Ou 0	TCPv4
03	☐ PULL		502	1	1000	1	0x:Coil Ou 0	0x:Coil Ou 0	TCPv4
04	☐ PULL		502	1	1000	1	0x:Coil Ou 0	0x:Coil Ou 0	TCPv4
05	☐ PULL		502	1	1000	1	0x:Coil Ou 0	0x:Coil Ou 0	TCPv4

5.3 Several Modules Pulling the Remote DI (M-to-1) (Pull Mode)

Step 1: Connect the device to a Network, a PC, and a Power supply.

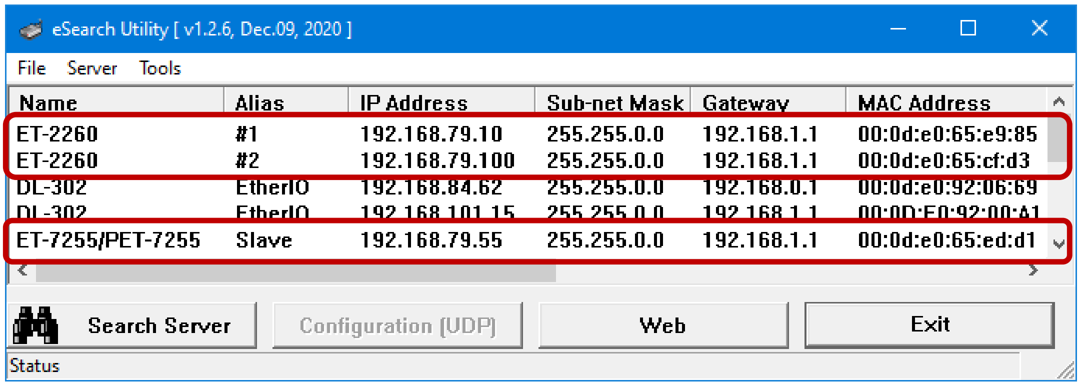
Confirm that the ET-2200 series modules and remote slave device are functioning correctly. Refer to Chapter 3 “Getting Started” for more details. An example configuration is shown below:

Note that ET-2260 and ET-7255 modules are used in this example.


Remote
DO1
DO0
Pull Mode
DI3
DI2
DI1
DI0
Pull Mode
DO1
DO0
ET-7255
(Slave)
Pull Mode
Local
ET-2260 #2
(Master)
Local
ET-2260 #1
(Master)

Step 2: Configure the Ethernet Settings

Contact your Network Administrator to obtain the correct network configuration information for the ET-2200 series modules and remote slave device (e.g., ET-2260 #1, #2, and ET-7255), such as the IP Address, Subnet Mask, and Gateway details. Refer to Section 3.3 “Configuring the Network Settings” for more details.


eSearch Utility [v1.2.6, Dec.09, 2020]
File
Server
Tools
Search Server
Configuration (UDP)
Web
Exit
Status

Name	Alias	IP Address	Sub-net Mask	Gateway	MAC Address
ET-2260	#1	192.168.79.10	255.255.0.0	192.168.1.1	00:0d:e0:65:e9:85
ET-2260	#2	192.168.79.100	255.255.0.0	192.168.1.1	00:0d:e0:65:cf:d3
DL-302	EtherIO	192.168.84.62	255.255.0.0	192.168.0.1	00:0d:e0:92:06:69
DL-302	EtherIO	192.168.101.15	255.255.0.0	192.168.1.1	00:0D:E0:92:00:A1
ET-7255/PET-7255	Slave	192.168.79.55	255.255.0.0	192.168.1.1	00:0d:e0:65:ed:d1

Step 3: Configure the I/O Pair connection on the **ET-2260 #1** module

1. In the eSearch Utility, select the **ET-2260#1** module and then click the “**Web**” button to launch the browser program and connect to the web server.
2. Enter the password in the Login password field **(the default password is “Admin”)**, and then click the **“Submit”** button to display the Web configuration page.
3. Click the **“Pair**” tab to display the I/O Pair-connection settings page.

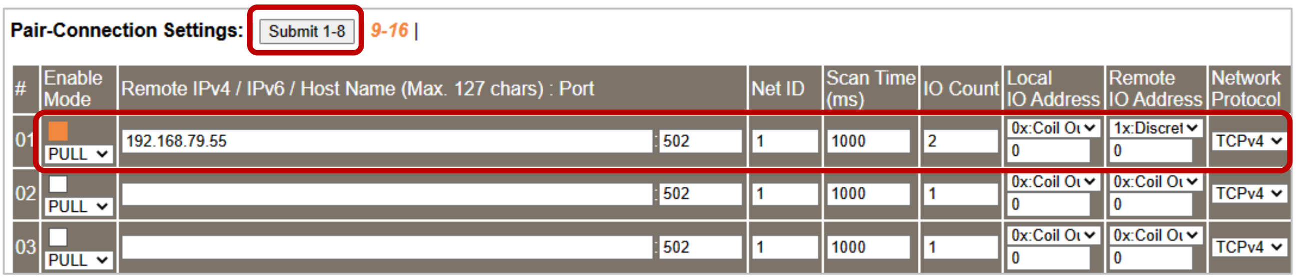
Refer to Section 5.1 – Step2 and 3 for instructions on how to perform the above procedures.

4. In the “**Pair-connection Settings**”, select **“PULL”** from the “**Enable Mode”** dropdown menu and select the box to enable the function.
5. Enter both the IP address and TCP port number of the remote **ET-7255** module in the “**Remote IP…: Port**” field.
6. Enter the amount of **DI** used on the remote **ET-7255** module in the “**IO Count**” field.

Example of the **PULL** mode **(Remote DI to Local DO)**
Enter **2** in the **IO Count** field and enter **0** in both **Local/Remote IO Address** fields which means **DI0** and **DI1** of **ET-7255** mapping to **DO0** and **DO1** of **ET-2260#1**.

7. Select “0x: Coil Output/**DO**” and enter a DO address (e.g., 0) in the “**Local IO Address**” field. Select “1x: Discrete Input/**DI**” and enter a DI address (e.g., 0) in the “**Remote IO Address**” field.

8. Select the Modbus protocol (e.g., **TCPv4**) from the “**Network Protocol**” dropdown menu.
9. Click the “**Submit 1-8**” button to complete the configuration.



Pair-Connection Settings: Submit 1-8 9-16 |

#	Enable Mode	Remote IPv4 / IPv6 / Host Name (Max. 127 chars) : Port		Net ID	Scan Time (ms)	IO Count	Local IO Address	Remote IO Address	Network Protocol
01	☑ PULL	192.168.79.55	502	1	1000	2	0x:Coil Ou 0	1x:Discret 0	TCPv4
02	☐ PULL		502	1	1000	1	0x:Coil Ou 0	0x:Coil Ou 0	TCPv4
03	☐ PULL		502	1	1000	1	0x:Coil Ou 0	0x:Coil Ou 0	TCPv4

Step 4: Configure the I/O Pair connection on the **ET-2260 #2** module

1. In the eSearch Utility, select the **ET-2260#2** module and then click the “**Web**” button to launch the browser program and connect to the web server.
2. Enter the password in the Login password field **(the default password is “Admin”)**, and then click the **“Submit”** button to display the Web configuration page.
3. Click the **“Pair**” tab to display the I/O Pair-connection Settings page.

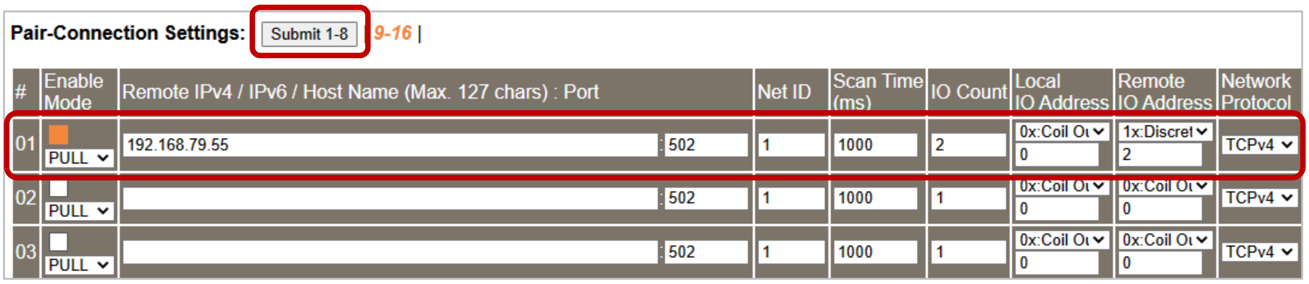
Refer to Section 5.1 – Step2 and 3 for instructions on how to perform the above procedures.

7. In the “**Pair-connection Settings**”, select **“PULL”** from the “**Enable Mode”** dropdown menu and select the box to enable the function.
8. Enter both the IP address and TCP port number of the remote **ET-7255** module in the “**Remote IP…: Port**” field.
9. Enter the amount of **DI** used on the remote **ET-7255** module in the “**IO Count**” field.

> Example of the **PULL** mode **(Remote DI to Local DO)**
> Enter **2** in the **IO Count** field and enter **0**/**2** in both **Local/Remote IO Address** fields which means **DI0** and **DI1** of **ET-7255** mapping to **DO0** and **DO1** of **ET-2260#2**.

10. Select “0x: Coil Output/**DO**” and enter a DO address (e.g., 0) in the “**Local IO Address**” field. Select “1x: Discrete Input/**DI**” and enter a DI address (e.g., 2) in the “**Remote IO Address**” field.

11. Select the Modbus protocol (e.g., **TCPv4**) from the “**Network Protocol**” dropdown menu.
12. Click the “**Submit 1-8**” button to complete the configuration.



Pair-Connection Settings:

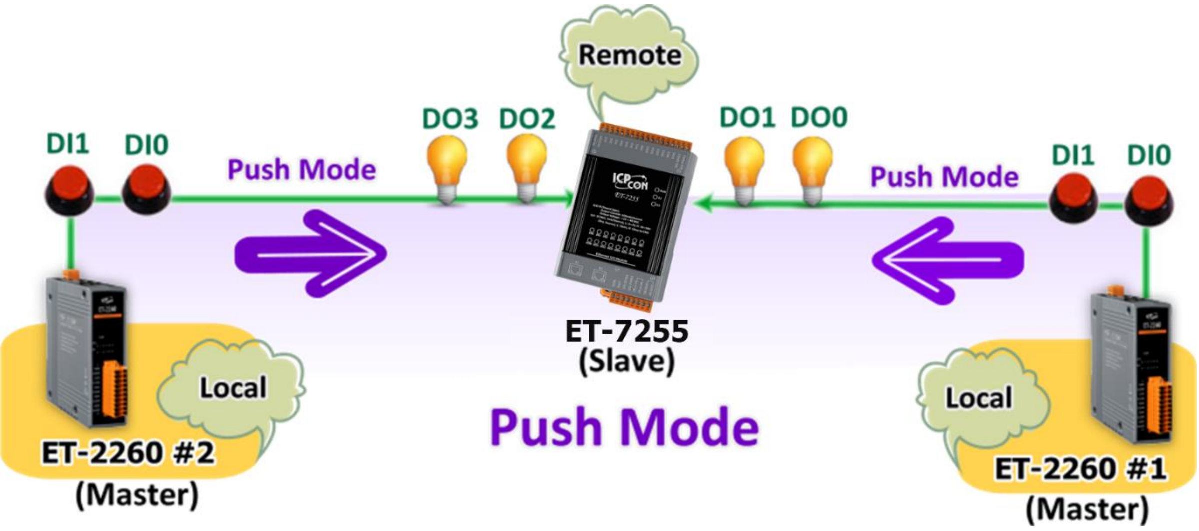
#	Enable Mode	Remote IPv4 / IPv6 / Host Name (Max. 127 chars) : Port		Net ID	Scan Time (ms)	IO Count	Local IO Address	Remote IO Address	Network Protocol
01	☑ PULL	192.168.79.55	502	1	1000	2	0x:Coil Ou 0	1x:Discret 2	TCPv4
02	☐ PULL		502	1	1000	1	0x:Coil Ou 0	0x:Coil Ou 0	TCPv4
03	☐ PULL		502	1	1000	1	0x:Coil Ou 0	0x:Coil Ou 0	TCPv4

5.4 Several Modules Pushing the Local DI (M-to-1) (Push Mode)

Step 1: Connect the device to a Network, a PC, and a Power supply.

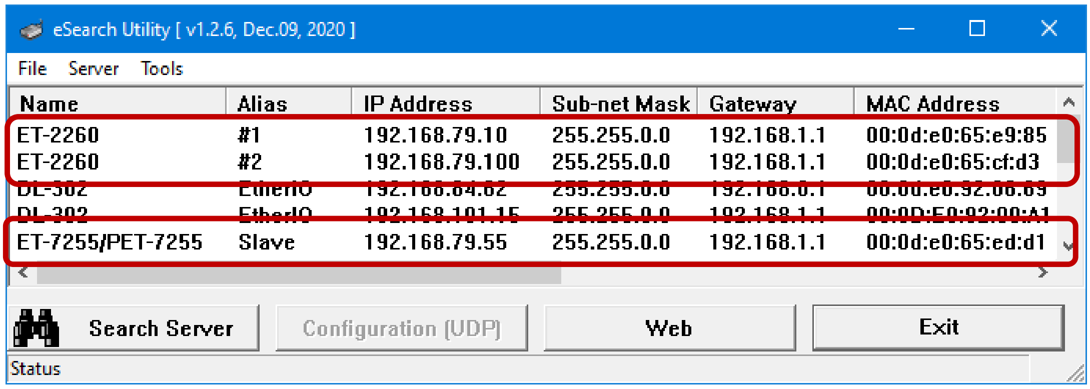
Confirm that the ET-2200 series modules and remote slave device are functioning correctly. Refer to Chapter 3 “Getting Started” for more details. An example configuration is shown below:

Note that ET-2260 and ET-7255 modules are used in this example.


Remote
DO3
DO2
DO1
DO0
DI1
DI0
Push Mode
Push Mode
DI1
DI0
ET-7255
(Slave)
Local
ET-2260 #2
(Master)
Push Mode
Local
ET-2260 #1
(Master)

Step 2: Configure the Ethernet Settings

Contact your Network Administrator to obtain the correct network configuration information for the ET-2200 series modules and remote slave device (e.g., ET-2260 #1, #2, and ET-7255), such as the IP Address, Subnet Mask, and Gateway details. Refer to Section 3.3 “Configuring the Network Settings” for more details.


eSearch Utility [v1.2.6, Dec.09, 2020]
File
Server
Tools
Search Server
Configuration (UDP)
Web
Exit
Status

Name	Alias	IP Address	Sub-net Mask	Gateway	MAC Address
ET-2260	#1	192.168.79.10	255.255.0.0	192.168.1.1	00:0d:e0:65:e9:85
ET-2260	#2	192.168.79.100	255.255.0.0	192.168.1.1	00:0d:e0:65:cf:d3
DL-302	EtherIO	[illegible]	255.255.0.0	192.168.0.1	[illegible]
DL-302	EtherIO	192.168.101.15	255.255.0.0	192.168.1.1	00:0D:E0:92:00:A1
ET-7255/PET-7255	Slave	192.168.79.55	255.255.0.0	192.168.1.1	00:0d:e0:65:ed:d1

Step 3: Configure the I/O Pair connection on the **ET-2260 #1** module

1. In the eSearch Utility, select the **ET-2260#1** module and then click the “**Web**” button to launch the browser program and connect to the web server.
2. Enter the password in the Login password field **(the default password is “Admin”)**, and then click the **“Submit”** button to display the Web configuration page.
3. Click the **“Pair**” tab to display the I/O Pair-connection Settings page.

Refer to Section 5.1 – Step2 and 3 for instructions on how to perform the above procedures.

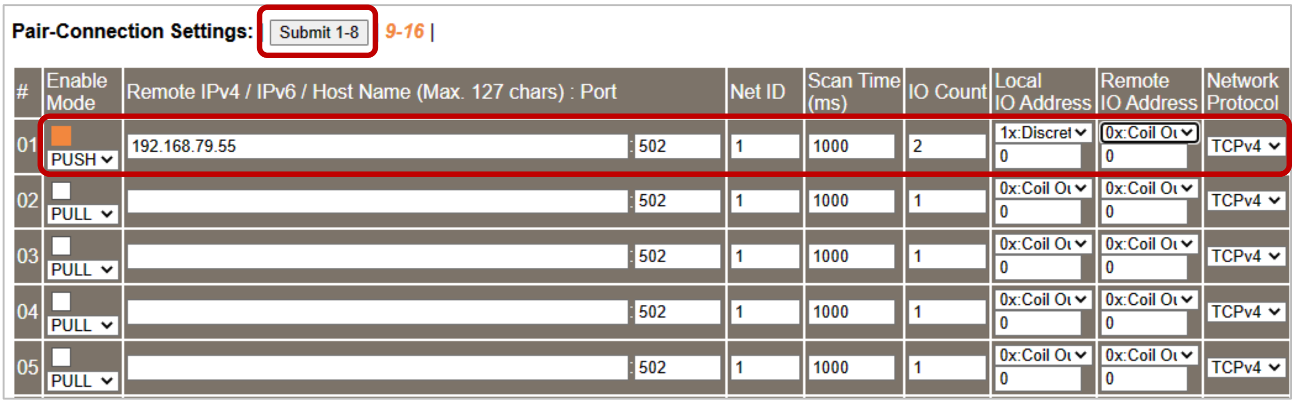
4. In the “**Pair-connection Settings**”, select **“PUSH”** from the “**Enable Mode**” dropdown menu and select the box to enable the function.
5. Enter both the IP address and TCP port number of the remote **ET-7255** module in the “**Remote IP…: Port**” field.
6. Enter the amount of **DI** used on the **ET-2260#1** module in the “**IO Count**” field.

Example of the **PUSH** mode **(Local DI to Remote DO)**

Enter **2** in the **IO Count** field and enter **0** in both **Local/Remote IO Address** fields which means **DI0** and **DI1** of **ET-2260#1** mapping to **DO0** and **DO1** of **ET-7255**.

7. Select “1x: Discrete Input/**DI**” and enter a DI address in the “**Local IO Address**” field.
   Select “0x: Coil Output/**DO**” and enter a DO address in the “**Remote IO Address**” field

8. Select the Modbus protocol (e.g., **TCPv4**) from the “**Network Protocol**” dropdown menu.
9. Click the “**Submit 1-8**” button to complete the configuration.



Pair-Connection Settings: Submit 1-8 9-16 |

#	Enable Mode	Remote IPv4 / IPv6 / Host Name (Max. 127 chars) : Port		Net ID	Scan Time (ms)	IO Count	Local IO Address	Remote IO Address	Network Protocol
01	☑ PUSH	192.168.79.55	502	1	1000	2	1x:Discret 0	0x:Coil Ou 0	TCPv4
02	☐ PULL		502	1	1000	1	0x:Coil Ou 0	0x:Coil Ou 0	TCPv4
03	☐ PULL		502	1	1000	1	0x:Coil Ou 0	0x:Coil Ou 0	TCPv4
04	☐ PULL		502	1	1000	1	0x:Coil Ou 0	0x:Coil Ou 0	TCPv4
05	☐ PULL		502	1	1000	1	0x:Coil Ou 0	0x:Coil Ou 0	TCPv4

Step 4: Configure the I/O Pair connection on the **ET-2260 #2** module

1. In the eSearch Utility, select **ET-2260 #2 module** and then click the "**Web**" button to launch the browser program and connect to the web server.
2. Enter the password in the Login password field **(the default password is "Admin")**, and then click the **"Submit"** button to display the Web configuration page.
3. Click the **"Pair**" tab to display the I/O Pair-connection Settings page.

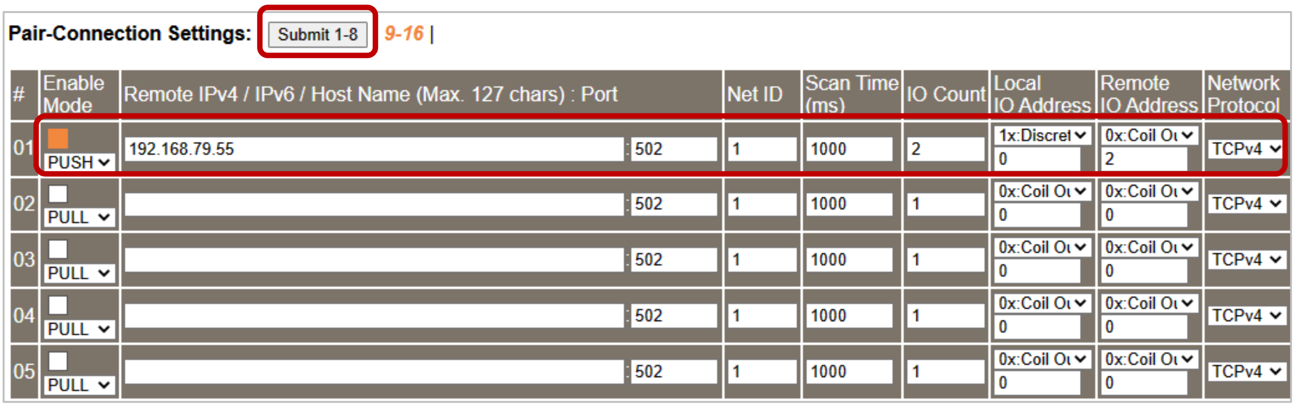
Refer to Section 5.1 – Step2 and 3 for instructions on how to perform the above procedures.

4. In the "**Pair-connection Settings**", select **"PUSH"** from the "**Enable Mode**" dropdown menu and select the box to enable the function.
5. Enter both the IP address and TCP port number of the remote **ET-7255** module in the "**Remote IP…: Port**" field.
6. Enter the amount of **DI** used on the **ET-2260#2** module in the "**IO Count**" field.

> Example of the **PUSH** mode **(Local DI to Remote DO)**
>
> Enter **2** in the **IO Count** field and enter **0**/**2** in both **Local/Remote IO Address** fields which means **DI0** and **DI1** of **ET-2260#2** mappings to **DO2** and **DO3** of **ET-7255**.

7. Select "1x: Discrete Input/**DI**" and enter a DI address (e.g., 0) in the "**Local IO Address**" field. Select "0x: Coil Output/**DO**" and enter a DO address (e.g., 2) in the "**Remote IO Address**" field

8. Select the Modbus protocol (e.g., **TCPv4**) from the "**Network Protocol**" dropdown menu.
9. Click the "**Submit 1-8**" button to complete the configuration.



Pair-Connection Settings:

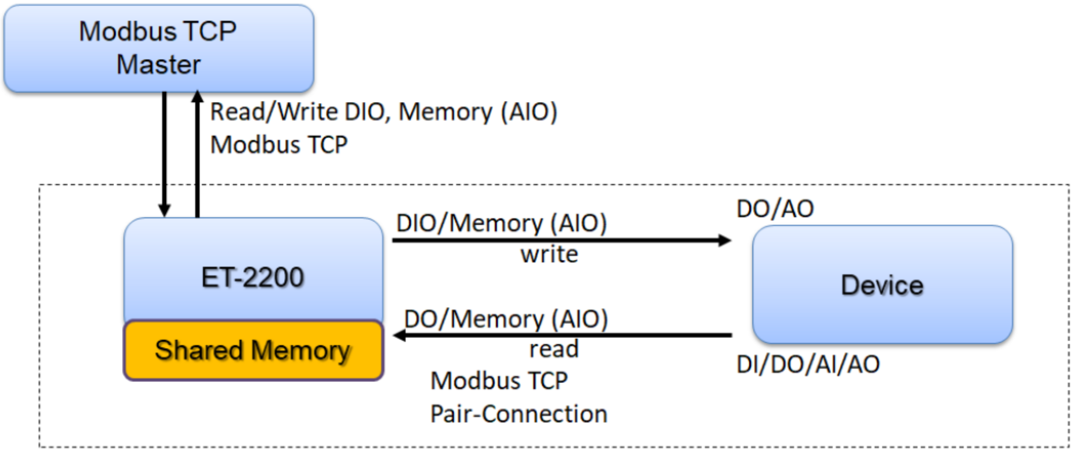
#	Enable Mode	Remote IPv4 / IPv6 / Host Name (Max. 127 chars) : Port		Net ID	Scan Time (ms)	IO Count	Local IO Address	Remote IO Address	Network Protocol
01	☑ PUSH	192.168.79.55	502	1	1000	2	1x:Discret 0	0x:Coil Ou 2	TCPv4
02	☐ PULL		502	1	1000	1	0x:Coil Ou 0	0x:Coil Ou 0	TCPv4
03	☐ PULL		502	1	1000	1	0x:Coil Ou 0	0x:Coil Ou 0	TCPv4
04	☐ PULL		502	1	1000	1	0x:Coil Ou 0	0x:Coil Ou 0	TCPv4
05	☐ PULL		502	1	1000	1	0x:Coil Ou 0	0x:Coil Ou 0	TCPv4

5.5 Shared Memory

The ET-2200 DIO series add a 512-byte shared memory which can be used as a tiny data concentrator to store both the AIO and DIO data (256 Registers or 4096-bit shared single memory).

Shared memory used with the Pair-Connection function can effectively lower the host load. It can also perform Bits/Registers data exchange, i.e., read data from the remote device and store them in the memory or output signals from the memory to the remote device.

Note: Shared memory is only available for the firmware v2.4.0 and later. The older version is not supported.


Modbus TCP
Master
Read/Write DIO, Memory (AIO)
Modbus TCP
ET-2200
Shared Memory
DIO/Memory (AIO)
write
DO/AO
Device
DO/Memory (AIO)
read
Modbus TCP
Pair-Connection
DI/DO/AI/AO

5.5.1 Address Mapping for Shared Memory

Shared Memory Register Name	3x, 4x (AIO) Register Address	Mapping (=)	Shared Memory Bit Name	0x, 1x (DIO) Bit Address
Register 0	3000	← →	Bit 0 ... Bit 15	3000 ... 3015
Register 1	3001	← →	Bit 16 ... Bit 31	3016 ... 3031
Register 2	3002	← →	Bit 32 ... Bit 47	3032 ... 3047
Register 3	3003	← →	Bit 48 ... Bit 63	3048 ... 3063
Register 4	3004	← →	Bit 64 ... Bit 79	3064 ... 3079
Register 5	3005	← →	Bit 80 ... Bit 95	3080 ... 3095
Register 6	3006	← →	Bit 96 ... Bit 111	3096 ... 3111
Register 7	3007	← →	Bit 112 ... Bit 127	3112 ... 3127
Register 8	3008	← →	Bit 128 ... Bit 143	3128 ... 3143
Register 9	3009	← →	Bit 144 ... Bit 159	3144 .. 3159
Register 10	3010	← →	Bit 160 ... Bit 175	3160 ... 3175
...				

Note: **All DI, DO, AI, and AO signals shared a single memory space. The storage address starts at 3000.**

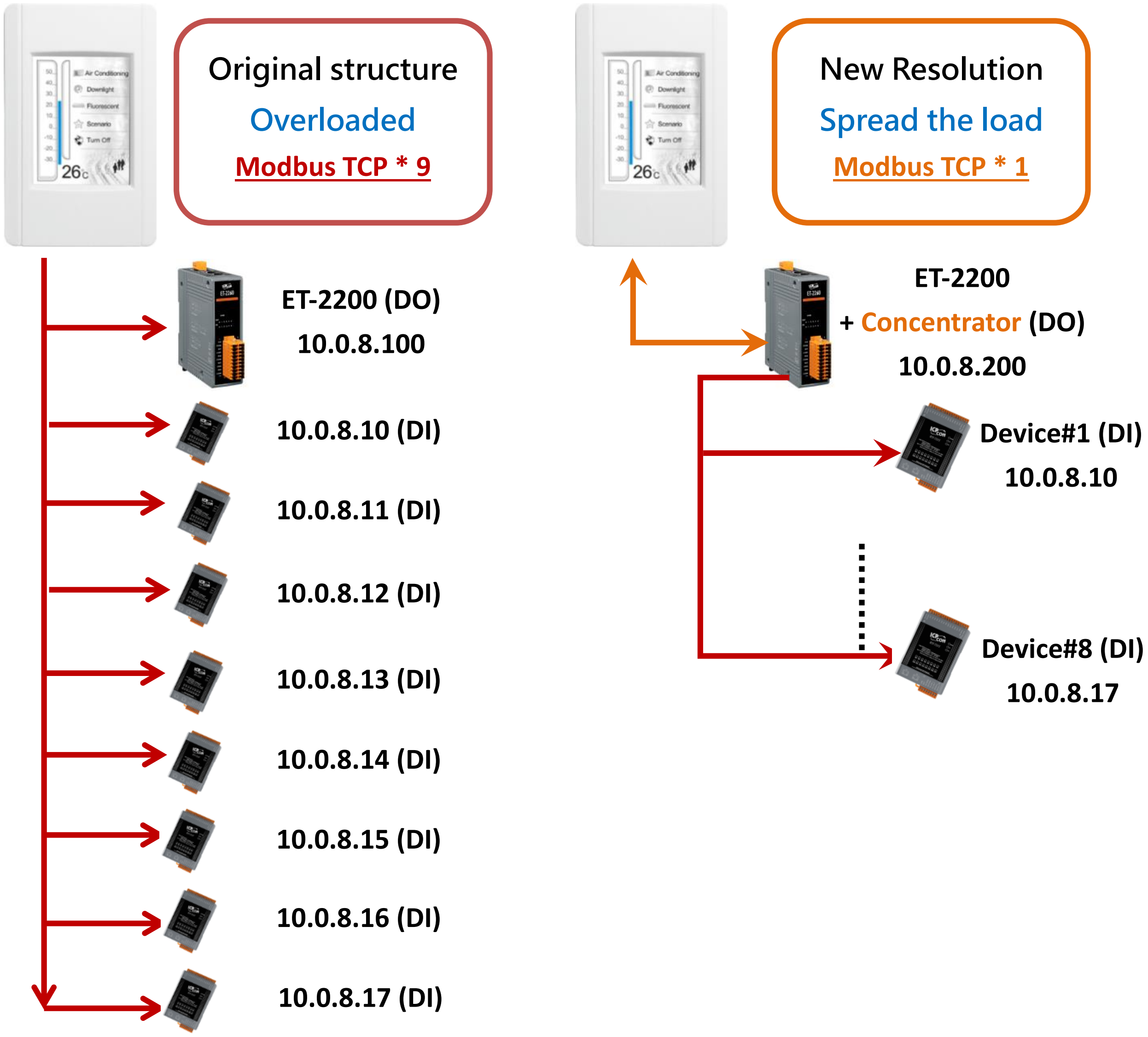
Writing 16 bits of DI/DO data to addresses **3000 – 3015** is equivalent to writing a 16-bit AI/AO register to the address **3000**.

Writing 16 bits of DI/DO data to addresses **3016 – 3031** is equivalent to writing a 16-bit AI/AO register to the address **3001**.

The correspondence of addresses is as follows, using the division to take the quotient and remove the remainder.

AIO_Address = (DIO_Address – 3000) / 16 + 3000

5.5.2 Application of spreading the load

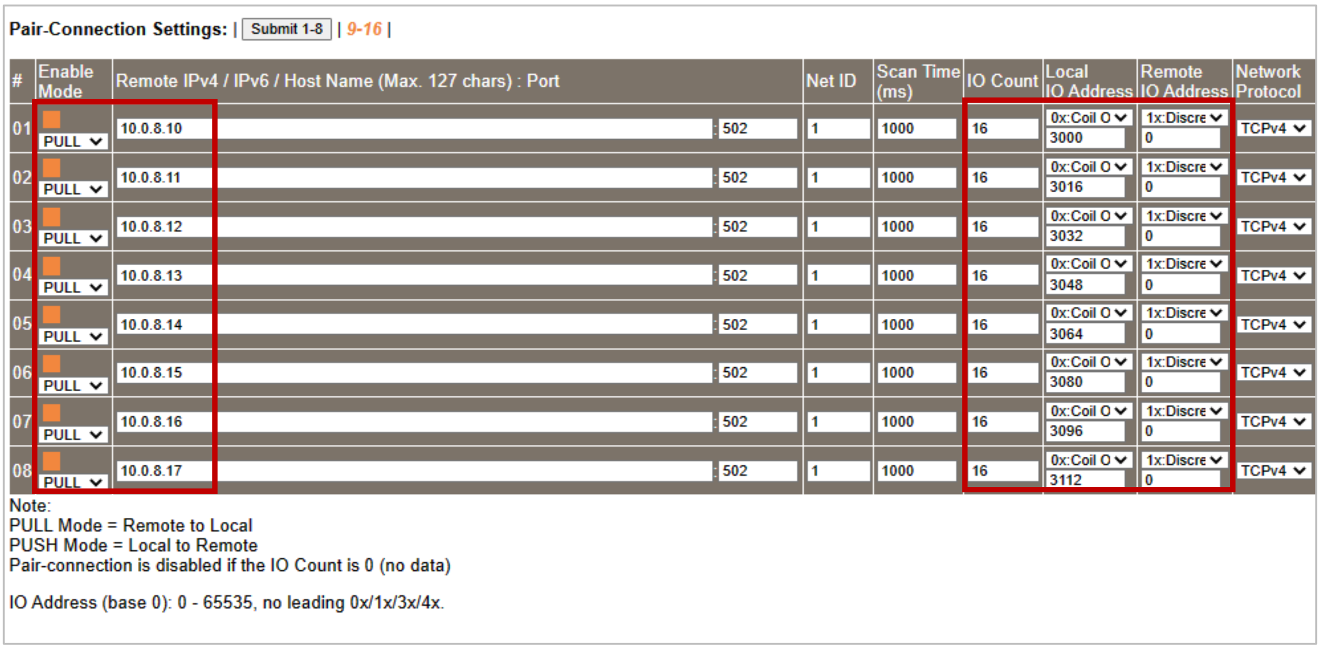

Original structure
Overloaded
Modbus TCP * 9
ET-2200 (DO)
10.0.8.100
10.0.8.10 (DI)
10.0.8.11 (DI)
10.0.8.12 (DI)
10.0.8.13 (DI)
10.0.8.14 (DI)
10.0.8.15 (DI)
10.0.8.16 (DI)
10.0.8.17 (DI)
New Resolution
Spread the load
Modbus TCP * 1
ET-2200
+ Concentrator (DO)
10.0.8.200
Device#1 (DI)
10.0.8.10
Device#8 (DI)
10.0.8.17

The original architecture on the left does not use the data concentrator feature, the host has to connect with all devices to exchange data (9 Modbus TCP connections in this case), and more devices will make the host overloaded.

The new architecture on the right uses the data concentrator feature on the ET-2200 series DIO module. The Pair-connection function supports up to 16 IP connections. The host can obtain the signals written in the data concentrator from Device#1 - #8 by connecting to the ET-2200 series DIO module. The number of Modbus TCP connections to the host is reduced from 9 to 1, which can effectively spread the load.

Please refer to Chapter 5 - I/O Pair Connection Application for detailed configuration.

Host	**ET-2200 + Concentrator IP**	**Remote IP (Slave #1-8)**	**IO Address (Shared Memory)**
	10.0.8.200	10.0.8.10	3000…3015
		10.0.8.11	3016…3031
		10.0.8.12	3032…3047
		10.0.8.13	3048…3063
		10.0.8.14	3064…3079
		10.0.8.15	3080…3095
		10.0.8.16	3096…3111
		10.0.8.17	3112…3127



Pair-Connection Settings: | Submit 1-8 | 9-16 |

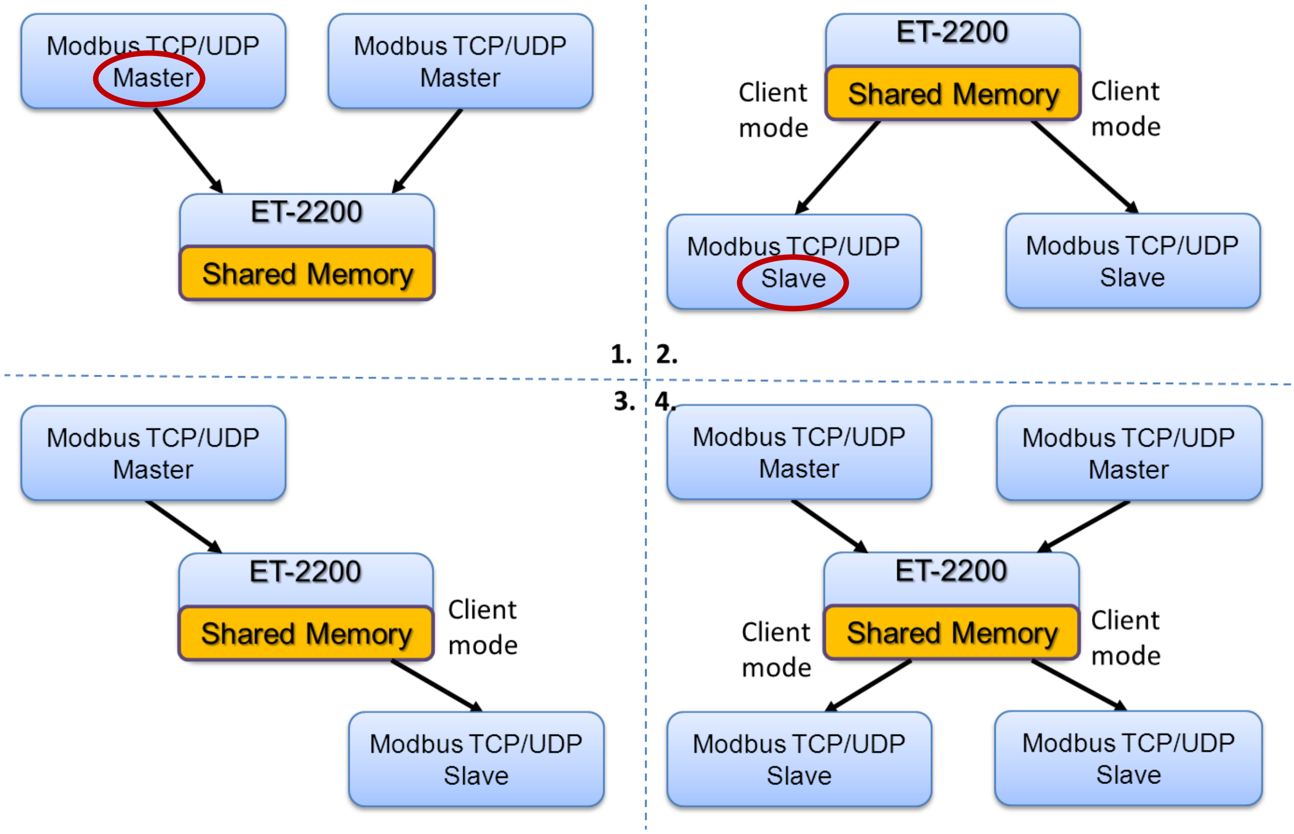
#	Enable Mode	Remote IPv4 / IPv6 / Host Name (Max. 127 chars) : Port		Net ID	Scan Time (ms)	IO Count	Local IO Address	Remote IO Address	Network Protocol
01	☑ PULL	10.0.8.10	502	1	1000	16	0x:Coil O 3000	1x:Discre 0	TCPv4
02	☑ PULL	10.0.8.11	502	1	1000	16	0x:Coil O 3016	1x:Discre 0	TCPv4
03	☑ PULL	10.0.8.12	502	1	1000	16	0x:Coil O 3032	1x:Discre 0	TCPv4
04	☑ PULL	10.0.8.13	502	1	1000	16	0x:Coil O 3048	1x:Discre 0	TCPv4
05	☑ PULL	10.0.8.14	502	1	1000	16	0x:Coil O 3064	1x:Discre 0	TCPv4
06	☑ PULL	10.0.8.15	502	1	1000	16	0x:Coil O 3080	1x:Discre 0	TCPv4
07	☑ PULL	10.0.8.16	502	1	1000	16	0x:Coil O 3096	1x:Discre 0	TCPv4
08	☑ PULL	10.0.8.17	502	1	1000	16	0x:Coil O 3112	1x:Discre 0	TCPv4

Note:
PULL Mode = Remote to Local
PUSH Mode = Local to Remote
Pair-connection is disabled if the IO Count is 0 (no data)

IO Address (base 0): 0 - 65535, no leading 0x/1x/3x/4x.

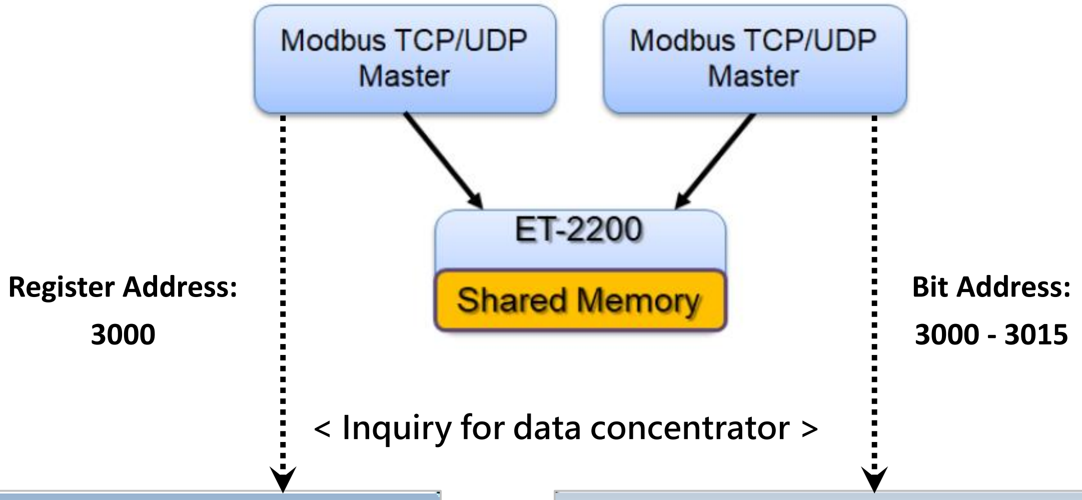
1. In this case, click to enable the Slave devices #01 ~ #08 and set them to **PULL** Mode (Remote Inputs to Local Outputs), then set the related fields.
2. Set the **Remote IP: 502**, **Net ID** (e.g., 1), **Scan Time** (e.g., 1000 ms), **IO Count** (e.g., 16), **Local/Remote IO Address**, and **Network Protocol** (e.g., TCPv4) according to your requirements. Take the **PULL** mode as an example, select “0x: Coil Output/**DO**” from the **Local IO Address** dropdown menu and enter the address of shared memory, then select “1x: Discrete Input/**DI**” from the **Remote IO Address** dropdown menu and enter the DI address of the remote device.
3. For the shared memory, the host can poll the ET-2200 with a Bit or Register address, both of which can read the same data. Accessing one register is equivalent to accessing 16 bits of data.

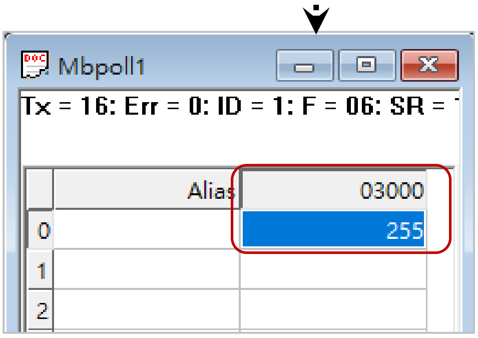
5.5.3 Master/Slave/MTCP/MUDP Data Exchange


Modbus TCP/UDP Master
Modbus TCP/UDP Master
ET-2200
Shared Memory
ET-2200
Shared Memory
Client mode
Client mode
Modbus TCP/UDP Slave
Modbus TCP/UDP Slave
1.
2.
3.
4.
Modbus TCP/UDP Master
ET-2200
Shared Memory
Client mode
Modbus TCP/UDP Slave
Modbus TCP/UDP Master
Modbus TCP/UDP Master
ET-2200
Shared Memory
Client mode
Client mode
Modbus TCP/UDP Slave
Modbus TCP/UDP Slave

1. Two hosts can exchange data via shared memory.
2. With the Pair-connection function, two Slave devices can also exchange data via shared memory.
3. With the Pair-connection function, the host can indirectly control the Slave device via the shared memory.
4. Shared memory can be used as a concentrator for multiple hosts and Slave devices to exchange data.

5.5.4 Bits / Registers Data Exchange

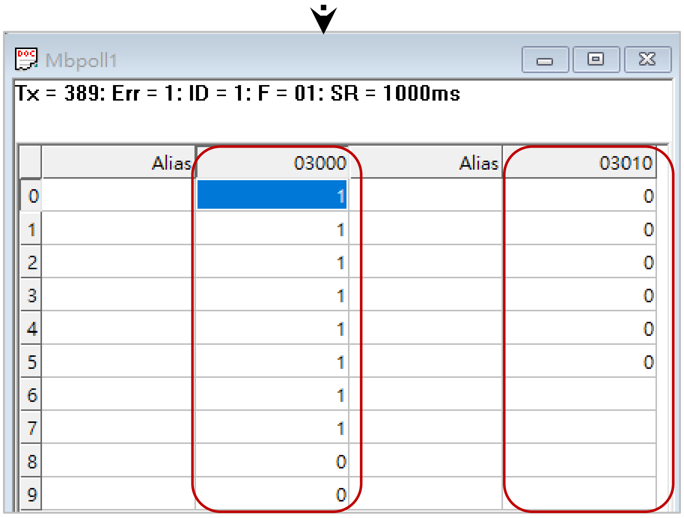

Modbus TCP/UDP Master
Modbus TCP/UDP Master
ET-2200
Shared Memory
Register Address:
3000
Bit Address:
3000 - 3015
< Inquiry for data concentrator >



Tx = 16: Err = 0: ID = 1: F = 06: SR =

	Alias	03000
0		255
1		
2		

< Master#1 diagram >



Tx = 389: Err = 1: ID = 1: F = 01: SR = 1000ms

	Alias	03000	Alias	03010
0		1		0
1		1		0
2		1		0
3		1		0
4		1		0
5		1		0
6		1		
7		1		
8		0		
9		0		

< Master#2 diagram >

Generally, the device cannot exchange the Bit and Register data directly, but this can achieve by using the shared memory of ET-2200 as a concentrator. As the diagram above, the Modbus Master#1 writes data **255 (0X00FF)** to the shared memory with a Register address **3000**. The Modbus Master#2 reads data from the shared memory with Bit addresses 3015 to 3000 and gets the result **0000 0000 1111 1111**.

The data stored in shared memory can be read with the Bit or Register address.

6. Modbus Information

The ET-2200 series is a family of IP-based Modbus I/O devices that allow you to remotely control DI/DO terminals via an Ethernet connection and uses a master-slave communication technique in which only one device (the master) can initiate a transaction (called queries), while other devices (slaves) respond by either supplying the requested data to the master or by taking the action requested in the query.

Most SCADA (Supervisory Control and Data Acquisition) and HMI software, such as Citect (Schneider Electric), ICONICS, iFIX, InduSoft, Intouch, Entivity Studio, Entivity Live, Entivity VLC, Trace Mode, Wizcon (ElUTIONS), and Wonderware, etc. can be used to easily integrate serial devices via the Modbus protocol.

6.1 What is Modbus TCP/IP?

Modbus is a communication protocol that was developed by Modicon Inc. in 1979. Detailed information regarding the Modbus protocol can be found at: http://www.modbus.org.

The different versions of the Modbus protocol used today include Modbus RTU, which is based on serial communication interfaces such as RS-485 and RS-232, as well as Modbus ASCII and Modbus TCP, which uses the Modbus RTU protocol embedded into TCP packets.

Modbus TCP is an internet protocol. The protocol embeds a Modbus frame into a TCP frame so that a connection-oriented approach is obtained, thereby making it more reliable. The master queries the slave and the slave responds with a reply. The protocol is open and, hence, highly scalable.

6.2 Modbus Message Structure

Modbus devices communicate using a master-slave (client-server) technique in which only one device (the master/client) can initiate transactions (called queries). The other devices (slaves/servers) respond by either supplying the requested data to the master or by taking the action requested in the query.

A query from a master will consist of a slave, or broadcast, address, a function code defining the requested action, any required data, and an error-checking field. A response from a slave consists of fields confirming the action taken, any data to be returned, and an error-checking field.

➢ The Modbus/TCP Message Structure

Bytes 00 - 05	Bytes 06 - 11
6-byte header	RTU Data

➢ The Leading 6 bytes of a Modbus/TCP Protocol Query

Byte 00	Byte 01	Byte 02	Byte 03	Byte 04	Byte 05
Transaction Identifier		Protocol Identifier		Length Field (upper byte)	Length Field (lower byte)

- ✓ **Transaction identifier =** Assigned by the Modbus/TCP master (client)
- ✓ **Protocol identifier =** 0
- ✓ **Length field (upper byte) =** 0 (since all messages are smaller than 256)
- ✓ **Length field (lower byte) =** The number of following RTU data bytes

➢ Modbus RTU Data Structure

Byte 06	Byte 07	Bytes 08 - 09	Bytes 10 - 11
Net ID (Station Number)	Function Code	Data Field	
		Reference Number (Address Mapping)	Number of Points

- ✓ **Net ID:** Specifies the address of the receiver (i.e., the Modbus/TCP slave).
- ✓ **Function Code:** Specifies the message type.
- ✓ **Data Field:** The data block.

Net ID (Station Number)

The first byte in the frame structure of a Modbus RTU query is the address of the receiver. A valid address is in the range of 0 to 247. Address 0 is used for general broadcast purposes, while addresses 1 to 247 are assigned to individual Modbus devices.

Function Code

The second byte in the message structure of a Modbus RTU query is the function code, which describes what the slave device is required to do. Valid function codes range between 1 and 255. To answer the query, the slave device uses the same function code as contained in the request. The highest bit of the function code will only be set to ‘1’ if an error occurs in the system. In this way, the master device will know whether or not the message has been correctly transmitted.

Code	Function	Reference (Address)
01 (0x01)	Read the Status of the Coils (Read DO Readback values)	0xxxx
02 (0x02)	Read the Status of the Input (Read DI values)	1xxxx
03 (0x03)	Read the Holding Registers (Read AO Readback values)	4xxxx
04 (0x04)	Read the Input Registers (Read AI values)	3xxxx
05 (0x05)	Force a Single Coil (Write DO value)	0xxxx
06 (0x06)	Set a Single Register (Write AO value)	4xxxx
15 (0x0F)	Force Multiple Coils (Write DO values)	0xxxx
16 (0x10)	Set Multiple Registers (Write AO values)	4xxxx

Data Field

Data is transmitted in 8-, 16- and 32-bit formats. The data for 16-bit registers is transmitted in high-byte first format. For example, 0x0A0B will be transmitted as 0x0A, 0x0B. The data for 32-bit registers is transmitted as two 16-bit registers and is low-word first. For example: 0x0A0B0C0D will be transmitted as 0x0C, 0x0D, 0x0A, 0x0B.

The data field for messages sent between a master device and a slave device contains additional information about the action to be taken by the master, or any information requested by the slave. If the master does not require this information, the data field can be empty.

Reference (Address)	Description
0xxxx	**Read/Write Discrete Outputs or Coils.** An 0x reference address is used to output device data to a Digital Output channel.
1xxxx	**Read Discrete Inputs.** The ON/OFF status of a 1x reference address is controlled by the corresponding Digital Input channel.
3xxxx	**Read Input Registers.** A 3x reference register contains a 16-bit value received from an external source, e.g. an analog signal.
4xxxx	**Read/Write Outputs or Holding Registers.** A 4x register is used to store 16 bits of numerical data (binary or decimal), or to send data from the CPU to an output channel.

⚠ **Note:**

For more details regarding the address mapping, refer to Section 6.3 (DIO) or Section 6.4 (AIO) "Modbus Register Table".

6.2.1 01(0x01) Read the Status of the Coils (Read DO Readback values)

This function code is used to read either the current status of the coils or the current Digital Output readback value from the ET-2200 series module.

[Request]

Byte	Description	Size	Value
00	Net ID (Station Number)	1 Byte	1 to 247
01	Function Code	1 Byte	0x01
02-03	Starting DO Address	2 Bytes	Refer to Section 6.3 or 6.4 "Modbus Register Table" to find the address. Byte 02 = high byte Byte 03 = low byte
04-05	Number of Points (Channels)	2 Bytes	Byte 04 = high byte Byte 05 = low byte

[Response]

Byte	Description	Size	Value
00	Net ID (Station Number)	1 Byte	1 to 247
01	Function Code	1 Byte	0x01
02	Byte Count	1 Byte	Byte Count of the Response (n = (Points+7)/8)
03	Data	n Bytes	n= 1; Byte 03 = data bit 7 to 0 n= 2; Byte 04 = data bit 15 to 8 .... n= m; Byte m+2 = data bit (8m-1) to 8(m-1)

[Error Response]

Byte	Description	Size	Value
00	Net ID (Station Number)	1 Byte	1 to 247
01	Function Code	1 Byte	0x81
02	Exception Code	1 Byte	Refer to the Modbus Standard Specifications for more details

Example: Function 01 (0x01), Readback DOs

- **Reads the Digital Output value**

	[Leading 6 bytes]	**[Request]**
Command:	01 02 00 00 00 06	01 01 00 00 00 02
	[Leading 6 bytes]	**[Response]**
Response:	01 02 00 00 00 04	01 01 01 03

- **A description of the command and response is as follows:**

Command:	**[Leading 6 bytes]**		
	Bytes 00-03	01 02 00 00	(Message Number)
	Bytes 04-05	00 06	(Number of bytes remaining in this frame)
	[Request]		
	Byte 00	01	(Net ID)
	Byte 01	01	(Function Code)
	Byte 02-03	00 00	(Starting DO Address)
	Byte 04-05	00 02	(Number of Points)

Response:	**[Leading 6 bytes]**		
	Bytes 00-03	01 02 00 00	(Message Number)
	Bytes 04-05	00 04	(Number of bytes remaining in this frame)
	[Response]		
	Byte 00	01	(Net ID)
	Byte 01	01	(Function Code)
	Byte 02	01	(Byte Count of the Response)
	Byte 03	03	(Value for DO0 to DO1)

6.2.2 02(0x02) Read the Status of the Input (Read DI values)

This function code is used to read the current Digital Input value from the ET-2200 series module.

[Request]

Byte	Description	Size	Value
00	Net ID (Station Number)	1 Byte	1 to 247
01	Function Code	1 Byte	0x02
02-03	Starting DI Address	2 Bytes	Refer to Section 6.3 or 6.4 “Modbus Register Table” to find the address. Byte 02 = high byte Byte 03 = low byte
04-05	Number of Points (Channels)	2 Bytes	Byte 04 = high byte Byte 05 = low byte

[Response]

Byte	Description	Size	Value
00	Net ID (Station Number)	1 Byte	1 to 247
01	Function Code	1 Byte	0x02
02	Byte Count	1 Byte	Byte Count of Response (n =(Points+7)/8)
03	Data	n Bytes	n= 1; Byte 03 = data bit 7 to 0 n= 2; Byte 04 = data bit 15 to 8 .... n= m; Byte m+2 = data bit(8m-1) to 8(m-1)

[Error Response]

Byte	Description	Size	Value
00	Net ID (Station Number)	1 Byte	1 to 247
01	Function Code	1 Byte	0x82
02	Exception Code	1 Byte	Refer to the Modbus Standard Specifications for more details

Example: Function 02 (0x02), ReadDIs

- **Reads the Digital Input value**

	[Leading 6 bytes]	**[Request]**
Command:	01 02 00 00 00 06	01 02 00 00 00 02
	[Leading 6 bytes]	**[Response]**
Response:	01 02 00 00 00 04	01 02 01 03

- **A description of the command and response is as follows:**

Command:	**[Leading 6 bytes]**		
	Bytes 00-03	01 02 00 00	(Message Number)
	Bytes 04-05	00 06	(Number of bytes remaining in this frame)
	[Request]		
	Byte 00	01	(Net ID)
	Byte 01	02	(Function Code)
	Byte 02-03	00 00	(Starting DI Address)
	Byte 04-05	00 02	(Number of Points)

Response:	**[Leading 6 bytes]**		
	Bytes 00-03	01 02 00 00	(Message Number)
	Bytes 04-05	00 04	(Number of bytes remaining in this frame)
	[Response]		
	Byte 00	01	(Net ID)
	Byte 01	02	(Function Code)
	Byte 02	01	(Byte Count of the Response)
	Byte 03	03	(Value for DI0 to DI1)

6.2.3 03(0x03) Read the Holding Registers (Read AO Readback values)

This function code is used to read back either the current values in the holding registers or the Analog Output value from the ET-2200 series module. These registers are also used to store the preset values for the Digital Counter, the host watchdog timer, the module name, the TCP timeout, etc.

[Request]

Byte	Description	Size	Value
00	Net ID (Station Number)	1 Byte	1 to 247
01	Function Code	1 Byte	0x03
02-03	Starting AO Address	2 Bytes	Refer to Section 6.3 or 6.4 "Modbus Register Table" to find the address... Byte 02 = high byte ; Byte 03 = low byte
04-05	Number of 16-bit Registers (Channels)	2 Bytes	Word Count Byte 04 = high byte ; Byte 05 = low byte

[Response]

Byte	Description	Size	Value
00	Net ID (Station Number)	1 Byte	1 to 247
01	Function Code	1 Byte	0x03
02	Byte Count	1 Byte	Byte Count of the Response (n=Points x 2 Bytes)
03~	Register Values	n Bytes	Register Values n= 2; Byte 03 = high byte Byte 04 = low byte .... n= m; Byte m+1 = high byte Byte m+2 = low byte

[Error Response]

Byte	Description	Size	Value
00	Net ID (Station Number)	1 Byte	1 to 247
01	Function Code	1 Byte	0x83
02	Exception Code	1 Byte	Refer to the Modbus Standard Specifications for more details

Example: Function 03 (0x03), Read AOs

- **Reads the name of the module for the ET-2260**

	[Leading 6 bytes]	**[Request]**
Command:	01 02 00 00 00 06	01 03 01 03 00 01
	[Leading 6 bytes]	**[Response]**
Response:	01 02 00 00 00 05	01 03 02 22 60

- **A description of the command and response is as follows:**

Command:	**[Leading 6 bytes]**		
	Bytes 00-03	01 02 00 00	(Message Number)
	Bytes 04-05	00 06	(Number of bytes remaining in this frame)
	[Request]		
	Byte 00	01	(Net ID)
	Byte 01	03	(Function Code)
	Byte 02-03	01 03	(Starting AO Address)
	Byte 04-05	00 01	(Number of Points)

Response:	**[Leading 6 bytes]**		
	Bytes 00-03	01 02 00 00	(Message Number)
	Bytes 04-05	00 05	(Number of bytes remaining in this frame)
	[Response]		
	Byte 00	01	(Net ID)
	Byte 01	03	(Function Code)
	Byte 02	02	(Byte Count of the Response)
	Byte 03-04	22 60	(Module Name)

6.2.4 04(0x04) Read the Input Registers (Read AI values)

This function code is used to read either the input registers or the current analog input value from the ET-2200 series module. These registers are also used to store the current value for the digital counter, the number of DI channels and the number of DO channels, etc.

[Request]

Byte	Description	Size	Value
00	Net ID (Station Number)	1 Byte	1 to 247
01	Function Code	1 Byte	0x04
02-03	Starting AI Address	2 Bytes	Refer to Section 6.3 or 6.4 “Modbus Register Table” to find the address. Byte 02 = high byte Byte 03 = low byte
04-05	Number of 16-bit Registers (Channels)	2 Bytes	Word Count Byte 04 = high byte Byte 05 = low byte

[Response]

Byte	Description	Size	Value
00	Net ID (Station Number)	1 Byte	1 to 247
01	Function Code	1 Byte	0x04
02	Byte Count	1 Byte	Byte Count of the Response (n=Points x 2 Bytes)
03~	Register Values	n Bytes	Register Values n= 2; Byte 03 = high byte Byte 04 = low byte .... n= m; Byte m+1 = high byte Byte m+2 = low byte

[Error Response]

Byte	Description	Size	Value
00	Net ID (Station Number)	1 Byte	1 to 247
01	Function Code	1 Byte	0x84
02	Exception Code	1 Byte	Refer to the Modbus Standard Specifications for more details.

Example: Function 04 (0x04), Read AIs

- **Reads the number of the DI channels on the ET-2260**

	[Leading 6 bytes]	**[Request]**
Command:	01 02 00 00 00 06	01 04 00 64 00 01
	[Leading 6 bytes]	**[Response]**
Response:	01 02 00 00 00 05	01 04 02 00 02

- **A description of the command and response is as follows:**

Command:	**[Leading 6 bytes]**		
	Bytes 00-03	01 02 00 00	(Message Number)
	Bytes 04-05	00 06	(Number of bytes remaining in this frame)
	[Request]		
	Byte 00	01	(Net ID)
	Byte 01	04	(Function Code)
	Byte 02-03	0064	(Starting AI Address)
	Byte 04-05	00 01	(Number of 16-bit Registers)

Response:	**[Leading 6 bytes]**		
	Bytes 00-03	01 02 00 00	(Message Number)
	Bytes 04-05	00 05	(Number of bytes remaining in this frame)
	[Response]		
	Byte 00	01	(Net ID)
	Byte 01	04	(Function Code)
	Byte 02	02	(Byte Count of the Response)
	Byte 03-04	00 02	(Number of DI channels on the ET-2260)

6.2.5 05(0x05) Force a Single Coil (Write DO value)

This function code is used to set the status of a single coil or a single Digital Output value for the ET-2200 series module.

[Request]

Byte	Description	Size	Value
00	Net ID (Station Number)	1 Byte	1 to 247
01	Function Code	1 Byte	0x05
02-03	DO Address	2 Bytes	Refer to Section 6.3 or 6.4 “Modbus Register Table” to find the address. Byte 02 = high byte ; Byte 03 = low byte
04-05	Output Value	2 Bytes	0xFF 00 sets the output to ON. 0x00 00 sets the output to OFF. All other values are invalid and will not affect the coil. Byte 04 = high byte ; Byte 05 = low byte

[Response]

Byte	Description	Size	Value
00	Net ID (Station Number)	1 Byte	1 to 247
01	Function Code	1 Byte	0x05
02-03	DO Address	2 Bytes	The value is the same as Bytes 02-03 of the Request
04-05	Output Value	2 Bytes	The value is the same as Bytes 04-05 of the Request

[Error Response]

Byte	Description	Size	Value
00	Net ID (Station Number)	1 Byte	1 to 247
01	Function Code	1 Byte	0x85
02	Exception Code	1 Byte	Refer to the Modbus Standard Specifications for more details.

Example: Function 05 (0x05), Write DO

- **Sets channel DO1 to ON**

	[Leading 6 bytes]	**[Request]**
Command:	01 02 00 00 00 06	01 05 00 01 FF 00
	[Leading 6 bytes]	**[Response]**
Response:	01 02 00 00 00 06	01 05 00 01 FF 00

- **A description of the command and response is as follows:**

Command:	**[Leading 6 bytes]**		
	Bytes 00-03	01 02 00 00	(Message Number)
	Bytes 04-05	00 06	(Number of bytes remaining in this frame)
	[Request]		
	Byte 00	01	(Net ID)
	Byte 01	05	(Function Code)
	Byte 02-03	0001	(DO Address)
	Byte 04-05	FF 00	(Sets the output to ON)

Response:	**[Leading 6 bytes]**		
	Bytes 00-03	01 02 00 00	(Message Number)
	Bytes 04-05	00 06	(Number of bytes remaining in this frame)
	[Response]		
	Byte 00	01	(Net ID)
	Byte 01	05	(Function Code)
	Byte 02-03	00 01	(DO Address)
	Byte 04-05	FF 00	(Indicates that the DO has been set to ON)

6.2.6 06(0x06) Set a Single Register (Write AO value)

This function code is used to set a specific holding register to store the configuration values for the ET-2200 series module.

[Request]

Byte	Description	Size	Value
00	Net ID (Station Number)	1 Byte	1 to 247
01	Function Code	1 Byte	0x06
02-03	AO Address	2 Bytes	Refer to Section 6.3 or 6.4 “Modbus Register Table” to find the address. Byte 02 = high byte Byte 03 = low byte
04-05	Register Value	2 Bytes	Register Value Byte 04 = high byte Byte 05 = low byte

[Response]

Byte	Description	Size	Value
00	Net ID (Station Number)	1 Byte	1 to 247
01	Function Code	1 Byte	0x06
02-03	AO Address	2 Bytes	The value is the same as Bytes 02-03 of the Request
04-05	Register Value	2 Bytes	The value is the same as Bytes 04-05 of the Request

[Error Response]

Byte	Description	Size	Value
00	Net ID (Station Number)	1 Byte	1 to 247
01	Function Code	1 Byte	0x86
02	Exception Code	1 Byte	Refer to the Modbus Standard Specifications for more details.

Example: Function 06 (0x06), WriteAO

- **Sets the system timeout to 60 seconds**

	[Leading 6 bytes]	**[Request]**
Command:	01 02 00 00 00 06	01 06 01 08 00 3C
	[Leading 6 bytes]	**[Response]**
Response:	01 02 00 00 00 06	01 06 01 08 00 3C

- **A description of the command and response is as follows:**

Command:	**[Leading 6 bytes]**		
	Bytes 00-03	01 02 00 00	(Message Number)
	Bytes 04-05	00 06	(Number of bytes remaining in this frame)
	[Request]		
	Byte 00	01	(Net ID)
	Byte 01	06	(Function Code)
	Byte 02-03	0108	(AO Address)
	Byte 04-05	003C	(Sets the system timeout to 60 seconds)

Response:	**[Leading 6 bytes]**		
	Bytes 00-03	01 02 00 00	(Message Number)
	Bytes 04-05	00 06	(Number of bytes remaining in this frame)
	[Response]		
	Byte 00	01	(Net ID)
	Byte 01	06	(Function Code)
	Byte 02-03	01 08	(AO Address)
	Byte 04-05	003C	(Indicates that the system timeout has been set to 60 seconds)

6.2.7 15(0x0F) Force Multiple Coils (Write DO values)

This function code is used to set the status of multiple coils or to write multiple Digital Output values for the ET-2200 series module.

[Request]

Byte	Description	Size	Value
00	Net ID (Station Number)	1 Byte	1 to 247
01	Function Code	1 Byte	0x0F
02-03	Starting DO Address	2 Bytes	Refer to Section 6.3 or 6.4 “Modbus Register Table” to find the address. Byte 02 = high byte ; Byte 03 = low byte
04-05	Number of Output Channels (Points)	2 Bytes	Byte 04 = high byte ; Byte 05 = low byte
06	Byte count	1 Byte	n = (Points +7)/8
07	Output value	n Bytes	A bit corresponds to a channel. A value of 1 for a bit denotes that the channel is ON, while a value of denotes that the channel is OFF. n= 1; Byte 07 = data bit 7 to 0 n= 2; Byte 08 = data bit 15 to 8 .... n= m; Byte m+6 = data bit (8m-1) to 8 (m-1)

[Response]

Byte	Description	Size	Value
00	Net ID (Station Number)	1 Byte	1 to 247
01	Function Code	1 Byte	0x0F
02-03	Starting DO Address	2 Bytes	The value is the same as Bytes 02-05 of the Request
04-05	Number of Output Channels (Points)	2 Bytes	

[Error Response]

Byte	Description	Size	Value
00	Net ID (Station Number)	1 Byte	1to 247
01	Function Code	1 Byte	0x8F
02	Exception Code	1 Byte	Refer to the Modbus Standard Specifications for more details.

Example: Function 15 (0x0F), Write DOs

- **Sets the safe value (DO0 ~ DO1)**

	[Leading 6 bytes]	**[Request]**
Command:	01 02 00 00 00 08	01 0F 01 0B 00 02 01 03
	[Leading 6 bytes]	**[Response]**
Response:	01 02 00 00 00 06	01 0F 01 0B 00 02

- **A description of the command and response is as follows:**

Command:	**[Leading 6 bytes]**		
	Bytes 00-03	01 02 00 00	(Message Number)
	Bytes 04-05	00 08	(Number of bytes remaining in this frame)
	[Request]		
	Byte 00	01	(Net ID)
	Byte 01	0F	(Function Code)
	Byte 02-03	010B	(Starting DO Address)
	Byte 04-05	0002	(Number of Output Channels)
	Byte 06	01	(Byte Count)
	Byte 07	03	(Output Value)

Response:	**[Leading 6 bytes]**		
	Bytes 00-03	01 02 00 00	(Message Number)
	Bytes 04-05	00 06	(Number of bytes remaining in this frame)
	[Response]		
	Byte 00	01	(Net ID)
	Byte 01	0F	(Function Code)
	Byte 02-03	01 0B	(Starting DO Address)
	Byte 04-05	00 02	(Number of Input Channels)

6.2.8 16(0x10) Set Multiple Registers (Write AO values)

This function code is used to set multiple holding registers that are used to store the configuration values for the ET-2200 series module.

[Request]

Byte	Description	Size	Value
00	Net ID (Station Number)	1 Byte	1 to 247
01	Function Code	1 Byte	0x10
02-03	Starting AO Address	2 Bytes	Refer to Section 6.3 or 6.4 "Modbus Register Table" to find the address. Byte 02 = high byte ; Byte 03 = low byte
04-05	Number of 16-bit Registers (Channels)	2 Bytes	Word Count. Byte 04 = high byte ; Byte 05 = low byte
06	Byte Count	1 Byte	n =Points x 2 Bytes
07	Register Values	n Bytes	Register Values. n= 2; Byte 03 = high byte Byte 04 = low byte .... n= m; Byte m+1 = high byte Byte m+2 = low byte

[Response]

Byte	Description	Size	Value
00	Net ID (Station Number)	1 Byte	1 to 247
01	Function Code	1 Byte	0x10
02-03	Starting AO Address	2 Bytes	The value is the same as Bytes 02-03 of the Request
04-05	Number of 16-bit Registers (Channels)	2 Bytes	The value is the same as Bytes 04-05 of the Request

[Error Response]

Byte	Description	Size	Value
00	Net ID (Station Number)	1 Byte	1 to 247
01	Function Code	1 Byte	0x90
02	Exception Code	1 Byte	Refer to the Modbus Standard Specifications for more details.

Example: Function 16 (0x10), WriteAOs

- **Sets the preset value for the digital counter**

	[Leading 6 bytes]	**[Request]**
Command:	01 02 00 00 00 0B	01 10 00 32 0 001 02 03 E8 00 00
	[Leading 6 bytes]	**[Response]**
Response:	01 02 00 00 00 06	01 10 00 32 00 01

- **A description of the command and response is as follows:**

Command:	**[Leading 6 bytes]**		
	Bytes 00-03	01 02 00 00	(Message Number)
	Bytes 04-05	00 0B	(Number of bytes remaining in this frame)
	[Request]		
	Byte 00	01	(Net ID)
	Byte 01	10	(Function Code)
	Byte 02-03	0032	(Starting AO Address)
	Byte 04-05	0001	(Number of 16-bit Registers)
	Byte 06	02	(Byte Count)
	Byte 07-10	03 E8 00 00	(Preset value for the digital counter)

Response:	**[Leading 6 bytes]**		
	Bytes 00-03	01 02 00 00	(Message Number)
	Bytes 04-05	00 06	(Number of bytes remaining in this frame)
	[Response]		
	Byte 00	01	(Net ID)
	Byte 01	10	(Function Code)
	Byte 02-03	0032	(Starting AO Address)
	Byte 04-05	00 01	(word count)

6.3 Modbus Register Table (For DIO Module)

Data from 16-bit registers is transmitted in high-byte first order. For example: 0x0A0B ==> 0x0A, 0x0B. Data from 32-bit registers is transmitted as two 16-bit registers and is in low-word first order. For example: 0x0A0B0C0D ==> 0x0C, 0x0D, 0x0A, 0x0B.

6.3.1 Common Functions

- **0xxxx: DO Address (Base 0)**

Starting Address	Points	Description	Bits per Point	Range	Access Type
127 (0x7F)	1	Restores all default web settings	1	1 = Restore	W (Pulse)
128 (0x80)	1	Default ID Settings	1	1 = Restore	W (Pulse)
133 (0x85)	1	Reboots the ET-2200 module	1	1 = Reboot	W (Pulse)
Notes	"**W**": Write				

- **3xxxx: AI Address (Base 0)**

Starting Address	Points	Description	Bits per Point	Range	Access Type
151 (0x97)	1	Firmware Version	16	"123" denotes that the version is 1.2.3	R
158 (0x9E)	1	Modbus Communication Status	16	0 = No Error 1 = Timeout	R
160 (0xA0)	1	Pair-Connection Status	16	0 = Normal 1 = Timeout 2 = Disconnected	R
Notes	"**R**": Read				

4xxxx: AO Address (Base 0)

Starting Address	Points	Description	Bits per Point	Range	Access Type
255 (0xFF)	1	CPU Reset Status	16	1 = Reset at Power-on 2 = Reset by the WDT 3 = Reset using the reset command	R/W
257 (0x101)	1	Sets the Host Watchdog Timer (WDT)	16	**<5:** Disabled **5 to 65535:** Enabled (units: seconds) **0:** Default If the ET-2200 series module loses communication with the host PC for more than the period defined in the WDT settings, the DO channels will revert to their safe values and the Host WDT Events Counter will be increased by one.	R/W/F
258 (0x102)	1	Host WDT Events	16	Denotes how many Host WDT Events have occurred since the last CPU reset	R/W
259 (0x103)	1	Module Name	16	Module Name	R
263 (0x107)	1	Sets the TCP Timeout Value	16	**<5:** Disabled **5 to 65535:** Enabled (units: seconds) **0:** Default	R/W/F
264 (0x108)	1	Sets the System Timeout Value	16	**<30:** Disabled **30~65535:** Enabled (unit: second) **0:** Default	R/W/F
Notes	**"R":** Read; **"W":** Write; **"F":** Setting is recorded in flash as default. **Warning:** Frequent writing to the Flash can cause it to become corrupt.				

6.3.2 Specific Functions

The nDI and nDO parameters for each ET-2200 series module used in the following Modbus Address Tables are as follows:

Model Name	Universal DIO (UDIO)	Number of DO channels (nDO)	Number of DI channels (nDI)
ET-2242/ET-2242U	-	16	-
ET-2251	-	-	16
ET-2254/ET-2254P	16	Depend on your configuration	Depend on your configuration
ET-2255/ET-2255U	-	8	8
ET-2260	-	6	6
ET-2261	-	10	-
ET-2261-16	-	16	-
ET-2268	-	8	-

➢ 0xxxx: DO Address (Base 0)

Starting Address	Points	Description	Bits per Point	Range	Access Type
0 (0x00)	1 to nDO	Digital Output Channels	1	0 = Off 1 = On	R/W
32 (0x20)	1	Clears the status of all high-latched DI Channels	1	1 = Clear	W
33 (0x21)	1	Clears the status of all low-latched DI Channels	1	1 = Clear	W
34 (0x22)	1 to nDI	Clears the high-speed digital counter for all DI Channels	1	1 = Clear	W
60 (0x3C)	1	Saves specific data to Flash (The access type for some registers labeled with an “**E**”)	1	0: cannot write 1: can be write	W
100 (0x64)	1 to nDO	Enables the PWM for all DO Channels	1	0 = Off 1 = On (Default= 0)	R/W
150 (0x96)	1	Enables the high and low latches for all DI Channels	1	0 = Disable 1 = Enable (Default= 0)	R/W/F

Starting Address	Points	Description	Bits per Point	Range	Access Type
151 (0x97)	1 to nDI	Enables the high-speed digital counter for all DI Channels	1	0 = Disable 1 = Enable (Default= 0)	R/W/F
190 (0xBE)	1 to nDI	Enables frequency measurement for all DI Channels	1	0 = Disable 1 = Enable (Default= 0)	R/W/F
235 (0xEB)	1 to nDO	Sets the Power-on value for all DO Channels	1	0 = Off 1 = On (Default= 0)	R/W/F
267 (0x10B)	1 to nDO	Sets the Safe value for all DO Channels	1	0 = Off 1 = On (Default= 0)	R/W/F
299 (0x12B)	1	Force the DI/DO Mode. **(for the ET-2254 only)** 0 = Dynamic I/O type based on DO requests. 1 = Static I/O type by configuration (web or Modbus).	1	0 = Dynamic 1= Static	R/W
300 ~ 315 (0x12C ~ 0x13B)	1 to UDIO	Sets the Universal DIO channels to DI or DO Port. **(for the ET-2254 only)** 300 is the CH0 address, 301 is the CH1 address, and so on.	1	0 = DO type 1= DI type	R/W
Notes	"**R**": Read "**W**": Write "**F**": Settings are recorded in flash by default "**E**": After writing DO[60] register, the data will be stored in flash. **Warning:** Frequency writing to the Flash can cause it to become corrupt.				

Note:

Because of the characteristics of the relay functions, it is recommended that the PWM on ET-2260/2261/2268 series (i.e., modules with relay functions) is not used for extended periods.

1xxxx: DI Address (Base 0)

Starting Address	Points	Description	Bits per Point	Range	Access Type
0 0x00)	1 to nDI	The status of all Digital Input Channels	1	0 = Off 1 = On	R
32 (0x20)	1 to nDI	The status of all high-latched DI Channels	1	0 = None 1 = Latched	R
64 (0x40)	1 to nDI	The status of all low-latched DI Channels	1	0 = None 1 = Latched	R
Notes	"**R**": Read				

3xxxx: AI Address (Base 0)

Starting Address	Points	Description	Bits per Point	Value	Access Type
16 (0x10)	1 to nDI	The Digital Counter Value	32	0 to 4294967296	R
64 (0x40)	1 to nDI	The frequency Value is * 1,000. (Note: The Client must first divide the value by 1,000.)	32	0 to 4294967296	R

Note:

The "DI Counter (0x10)" and "DI Frequency (0x40)" record data as a 32-bit value and are transmitted as two 16-bit registers. Consequently, the register's address has an offset of 2, i.e., the address of the second channel will be at the starting address +2, and so on. You can refer to "FAQ_How do I read DI Counter for the PETL/t(P)ET/ET-2200 Series Modules correctly" for more detailed information.

Example: Reads the 6 DI Counter on the ET-2260.

```
                [Leading 6 bytes]          [Request]
Command:        01 02 00 00 00 06          01 04 00 10 00 0C
```

Starting Address (00 10)

6 channels * 2 registers = 12 registers (0C)

100 (0x64)	1	Number of DI Channels	16	nDI	R
110 (0x6E)	1	Number of DO Channels	16	nDO	R
121 (0x79)	1	Number of high-speed counters	16	nDI	R
Notes	"**R**": Read				

4xxxx: AO Address (Base 0)

Starting Address	Points	Description	Bits per Point	Range	Access Type
50 (0x32)	1 to nDI	The preset value for the high-speed digital counter	32	0 to 4294967296	R/W/E
100 (0x64)	1 to nDO	The duty cycle for the DO PWM The first word (16-bit register) is the high pulse width, while the second word is the low pulse width. The units rein ms and the resolution is about 10 ms.	32	0 to 65535; 0 to 65535;	R/W/E
150 (0x64)	1 to nDO	The Scan mode for the DI frequency measurement. Refer to Section 4.4.2 “DI/DO Configuration” for more details.	16	1000= 1000ms 100= 100ms 2000=Single pulse	R/W/F
200 (0x64)	1 to nDI	The moving average of the DI frequency measurement.	16	1= No average 2=Average 2 values 4=Average 4 values 8=Average 8 values	R/W/F
268 (0x10C)	1 to nDO	The Min-Switching Time for all DO Channels	16	1 to 65535 second	R/W/F
284 (0x11C)	1 to nDO	The Auto-off Time for all DO Channels	16	1 to 65535 second	R/W/F
Notes	“**R**”: Read “**W**”: Write “**F**”: Settings are recorded in flash by default “**E**”: After writing the DO[60] register, the data will be stored in flash. **Warning:** Frequent writing to the Flash can cause it to become corrupt.				

Note:

“Preset DI Counter Value (0x32)” that the records data as a 32-bit value and is transmitted as two 16-bit registers. Consequently, the register’s address has an offset of 2, i.e., the address of the second channel will be at the starting address +2, and so on. You can refer to “FAQ_How do I read DI Counter for the t(P)ET/ET-2200 Series Modules correctly” for more detailed information.

Example: Reads the preset value of 6DI Counter on the ET-2260.

[Leading 6 bytes] [Request]

Command: 01 02 00 00 00 06 01 04 00 32 00 **0C**

6 channels * 2 registers = 12 registers

Starting Address

6.4 Modbus Register Table (For AIO Module)

6.4.1 Modbus Register Table for (P)ET-2217

Coils (0xxxx)

Register		Points	Description	Data Format	Attribute	Factory Value
DEC	HEX					
00162: 00169	00A2: 00A9	8	Clear 1-ch historical AI max. value	1: Clear	W	-
00194: 00201	00C2: 00C9	8	Clear 1-ch historical AI min. value	1: Clear	W	-
00226	00E2	1	Reset the I/O settings to the factory default state	1: Reset	W	-
00233	00E9	1	Reboot the module	1: Reboot	W	-
00435: 00438	01B3: 01B6	4	Enable/Disable the DO power-on value function	0: Disable 1: Enable	R/W	0
00515: 00518	0203: 0206	4	Enable/Disable the DO safe value function	0: Disable 1: Enable	R/W	0
00595: 00602	0253: 025A	8	Enable/Disable the AI function	0: Disable 1: Enable	R/W/E	1
00628	0274	1	Set the AI sampling rate	0: Normal mode (20 Hz) 1: Fast mode (200 Hz)	R/W/E	0
00631	0277	1	Set the AI data format	0: Hexadecimal format 1: Engineering unit	R/W/E	0
00632	0278	1	Reset the AI calibration to the factory settings	1: Reset	W	-
00634	027A	1	Clear all historical AI max. values	1: Clear	W	-
00635	027B	1	Clear all historical AI min. values	1: Clear	W	-
00636: 00643	027C: 0283	8	Enable/Disable the AI high alarm function	0: Disable 1: Enable	R/W/E	0

Register		Points	Description	Data Format	Attribute	Factory Value
DEC	HEX					
00668: 00675	029C: 02A3	8	Enable/Disable the AI low alarm function	0: Disable 1: Enable	R/W/E	0
00700: 00707	02BC: 02C3	8	Set the AI high alarm mode	0: Momentary mode 1: Latching mode	R/W/E	0
00732: 00739	02DC: 02E3	8	Set the AI low alarm mode	0: Momentary mode 1: Latching mode	R/W/E	0
00764: 00771	02FC: 0303	8	Clear the AI high alarm status	1: Clear	W	-
00796: 00803	031C: 0323	8	Clear the AI low alarm status	1: Clear	W	-
00830	033E	1	Enable/Disable the AI calibration	0: Disable 1: Enable	R/W	-
00831	033F	1	Zero calibration for channel 0	1: Set	W	-
00832	0340	1	Span/Gain calibration for the channel 0 ~ 7	1: Set	W	-

Discrete Inputs (1xxxx)

Register		Points	Description	Data Format	Attribute
DEC	HEX				
10224: 10231	00E0: 00E7	8	Read AI high alarm status. When the AI value is higher than the high alarm value, the status becomes 1.	0: Normal 1: Alarmed	R
10256: 10263	0100: 0107	8	Read AI low alarm status. When the AI value is lower than the low alarm value, the status becomes 1.	0: Normal 1: Alarmed	R

Input Register (3xxxx)

Register		Points	No. Per Point	Description	Data Format	Attribute
DEC	HEX					
30000: 30007	0000: 0007	8	1	AI value	-32768 to 32767 (0x0000 to 0xFFFF)	R
30236: 30243	00EC: 00F3	8	1	AI historical max. value	-32768 to 32767 (0x0000 to 0xFFFF)	R
30268: 30275	010C: 0113	8	1	AI historical min. value	-32768 to 32767 (0x0000 to 0xFFFF)	R
30320	0140	1	1	Number of the AI channel	8	R
30351	015F	1	1	Firmware version	0x123 means version 1.2.3	R
30360	0168	1	1	Communication state of the pair-connection	0: Normal < 0: Failed	R

Holding Register (4xxxx)

Register		Points	No. Per Point	Description	Data Format	Attribute	Factory Value
DEC	HEX						
40271	010F	1	1	Set the module identification (Modbus NetID)	0 to 255	R/W/E	1
40296: 40303	0128: 012F	8	1	Set the AI high alarm value	-32768 to 32767 (0x0000 to 0xFFFF)	R/W/E	32767 (0x7FFF)
40328: 40335	0148: 014F	8	1	Set the AI low alarm value	-32768 to 32767 (0x0000 to 0xFFFF)	R/W/E	-32768 (0x8000)
40427: 40434	01AB: 01B2	8	1	Set the AI range	0x07: 4 ~ 20 mA 0x08: +/-10 V 0x09: +/-5 V 0x0A: +/-1 V 0x0B: +/-500 mV 0x0C: +/-150 mV 0x0D: +/-20 mA 0x1A: 0 ~ 20 mA	R/W/E	0x08

Register		Points	No. Per Point	Description	Data Format	Attribute	Factory Value
DEC	HEX						
40555	022B	1	1	Read the module reset status	1: Power-on 2: Module Watchdog 3: Software Reset Command	R	-
40556	022C	1	1	Read the boot count of the module. The factory default value is 0 when the settings are set to the factory default values.	1 to 32767	R	-
40559	022F	1	1	Read the module name	0x2217	R	-

6.4.2 Modbus Register Table for ET-2217CI

➢ 3xxxx: AI Address / 4xxxx: AO Address (Base 0)

Address	Description	Attribute
30000 ~ 30007 40000 ~ 40007	Analog input values of channels 0 to 7	R
30100 40100	Number of the digital input channels	R
30110 40110	Number of the digital output channels	R
30120 40120	Number of the analog input channels	R
30130 40130	Number of the analog output channels	R
30151 40151	Firmware version	R
30180 ~ 30194 40180 ~ 40194	Alias name	R
40212 ~ 40219	Type codes of analog input channels 0 to 7	R/W
40257	Ethernet host watchdog timeout value, 5 to 65535, in second, 0 to disable.	R/W
30258 40258	Ethernet host watchdog timeout count.	R
30259 ~ 30260 40259 ~ 40260	Module name.	R
40263	TCP disconnection timeout value, 5 to 65535, in second, 0 to disable.	R/W
40264	Module reset timeout value, 30 to 65535, in second, 0 to disable. Only for Modbus TCP protocol	R/W
30512 ~ 30519 40512 ~ 40519	High latched analog input value of channel 0 to 7	R
30544 ~ 30551 40544 ~ 40551	Low latched analog input value of channel 0 to 7	R

Address	Description	Attribute
40864	RTC year, 2000 to 2159	R/W
40865	RTC month, 1 to 12	R/W
40866	RTC date, 1 to 31	R/W
40867	RTC hour, 0 to 23	R/W
40868	RTC minute, 0 to 59	R/W
40869	RTC second, 0 to 59	R/W
40870 ~ 40871	The index of the last log record	R
40872 ~ 40873	The index of the log record to be read	R/W
40874	The status of the data logging, 0: stopped, 1: running	R
40875	The data logger command, 0: stop, 1: run in continuous mode, 2: run in a period mode	R/W
40876	Continue writing when the data logger is full, 0: no, 1: yes	R/W
40878	Data logger sampling period in seconds	R/W
40879	Data logger sampling period in milliseconds, 0 ~ 1000. It should be a multiple of 5.	R/W
40880	Starting year when logging in period mode, 2000 ~ 2159	R/W
40881	Starting month when logging in period mode, 1 to 12	R/W
40882	Starting date when logging in period mode, 1 to 31	R/W
40883	Starting hour when logging in period mode, 0 to 23	R/W
40884	Starting minute when logging in period mode, 0 to 59	R/W
40885	Starting second when logging in period mode, 0 to 59	R/W
40886	Ending year when logging in period mode, 2000 to 2159	R/W
40887	Ending month when logging in period mode, 1 to 12	R/W
40888	Ending date when logging in period mode, 1 to 31	R/W
40889	Ending hour when logging in period mode, 0 to 23	R/W
40890	Ending minute when logging in period mode, 0 to 59	R/W
40891	Ending second when logging in period mode, 0 to 59	R/W
40898 ~ 40899	The index of the first log record	R

Address	Description	Attribute
34097 ~ 34206 44097 ~ 44206	Read log data and it should be multiple of 11 registers. For every 11 registers, they are a value of channel 0, ..., the value of channel 7, time stamp low word, time stamp high word, and millisecond time stamp. The timestamp is in Epoch time format.	R
00096 ~ 00103 10096 ~ 10103	Under range status of channel 0 to 7 for 0mA to 20mA and 4mA to 20mA ranges	R
00127	Write 1 to reload the default settings	W
00128	Write 1 to set Modbus TCP ID to 1	W
00133	Write 1 to reboot the module	W
00140	Data format, 0: hex, 1: engineering	R/W
00141	Sampling rates, 0: 10Hz, 1: 200Hz	R/W
00142	Write 1 to reload factory calibration parameters	W

6.4.3 Modbus Register Table for (P)ET-2224/2228

Coils (0xxxx)

Register		Points	Description	Data Format	Attribute	Factory Value
DEC	HEX					
00226	00E2	1	Reset the I/O settings to the factory default state	1: Reset	W	-
00233	00E9	1	Reboot the module	1: Reboot	W	-
00631	0277	1	Set the AO data format	0: Hexadecimal format 1: Engineering unit	R/W/E	0
00632	0278	1	Reset the AO calibration to the factory settings	1: Reset	W	-

Discrete Inputs (1xxxx)

Register		Points	Description	Data Format	Attribute
DEC	HEX				
10290: 10297	0122: 0129	4/8	Read the Current mode wire break status.	0: Normal 1: Wire Break	R

Input Register (3xxxx)

Register		Points	No. Per Point	Description	Data Format	Attribute
DEC	HEX					
30330	014A	1	1	Number of the AO channel	8	R
30351	015F	1	1	Firmware version	0x123 means version 1.2.3	R
30360	0168	1	1	Communication state of the pair-connection	0: Normal <0: Failed	R

Holding Register (4xxxx)

Register		Points	No. Per Point	Description	Data Format	Attribute	Factory Value
DEC	HEX						
40000: 40007	0000: 0007	4/8	1	AO value	-32768 to 32767 (0x0000 to 0xFFFF)	R/W	-
40271	010F	1	1	Set the module identification (Modbus NetID)	0 to 255	R/W/E	1
40360: 40367	0168: 016F	4/8	1	Set the power-on value for the AO channel	-32768 to 32767 (0x0000 to 0xFFFF)	R/W/E	0
40392: 40399	0188: 018F	4/8	1	Set the safe value for the AO channel	-32768 to 32767 (0x0000 to 0xFFFF)	R/W/E	0
40459: 40466	01CB: 01D2	4/8	1	Set the AO range	0x30: 0~20 mA 0x31: 4~20 mA 0x32: 0~10 V 0x33: +/-10 V 0x34: 0~5 V 0x35: +/-5 V	R/W/E	0x32

Register		Points	No. Per Point	Description	Data Format	Attribute	Factory Value
DEC	HEX						
40523: 40530	020B: 0212	4/8	1	Set the AO slew rate range	0x00: Immediate 0x01: 0.0625 V/sec or 0.125 mA/sec 0x02: 0.125 V/sec or 0.25 mA/sec 0x03: 0.25 V/sec or 0.5 mA/sec 0x04: 0.5 V/sec or 1.0 mA/sec 0x05: 1.0 V/sec or 2.0 mA/sec 0x06: 2.0 V/sec or 4.0 mA/sec 0x07: 4.0 V/sec or 8.0 mA/sec 0x08: 8.0 V/sec or 16 mA/sec 0x09: 16 V/sec or 32 mA/sec 0x10: 32 V/sec or 64 mA/sec 0x11: 64 V/sec or 128 mA/sec 0x12: 128 V/sec or 256 mA/sec 0x13: 256 V/sec or 512 mA/sec 0x14: 512 V/sec or 1024 mA/sec	R/W/E	0x00

Register		Points	No. Per Point	Description	Data Format	Attribute	Factory Value
DEC	HEX						
40555	022B	1	1	Read the module reset status	1: Power-on 2: Module Watchdog 3: Software Reset Command	R	-
40556	022C	1	1	Read the boot count of the module. The factory default value is 0 when the settings are set to the factory default values.	1 to 32767	R	-
40557	022D	1	1	Set the Host WDT timeout (unit: second)	0: Disable the Host WDT 6 to 65535: Enable the Host WDT	R/W/E	0
40558	022E	1	1	Read the WDT event count. The initial value is 0 when the module is reset and is increased when the WDT event happens.	0 to 32767	R	-
40559	022F	1	1	Read the module name	0x2224/0x2228	R	-

6.5 Analog Input Type and Data Format Table

Type Code	Input Type	Data Format	Max.	Min.
05	-2.5 to +2.5 V	Engineering unit	+25000	-25000
		2’s comp HEX	7FFF	8000
06	-20 to +20 mA	Engineering unit	+20000	-20000
		2’s comp HEX	7FFF	8000
07	+4 to +20 mA	Engineering unit	+20000	+4000
		2’s comp HEX	FFFF	0000
08	-10 to +10 V	Engineering unit	+10000	-10000
		2’s comp HEX	7FFF	8000
09	-5 to +5 V	Engineering unit	+5000	-5000
		2’s comp HEX	7FFF	8000
0A	-1 to +1 V	Engineering unit	+10000	-10000
		2’s comp HEX	7FFF	8000
0D	-20 to +20 mA	Engineering unit	+20000	-20000
		2’s comp HEX	7FFF	8000
1A	0 to +20 mA	Engineering unit	+20000	0
		2’s comp HEX	FFFF	0000

Appendix A: Troubleshooting

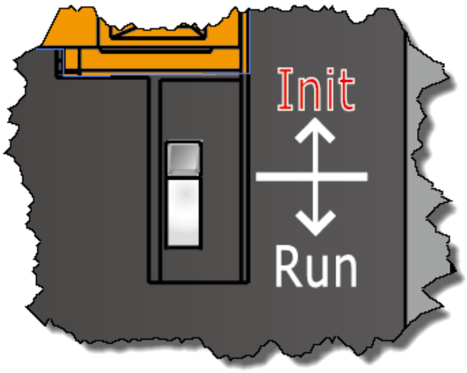
A.1 How do I restore the web password for the module to the factory defaults?

The instructions below outline the procedure for resetting the web password to the factory default value.

⚠ **Note:** **Be aware that all settings will be restored to the factory default values after the module is reset.**

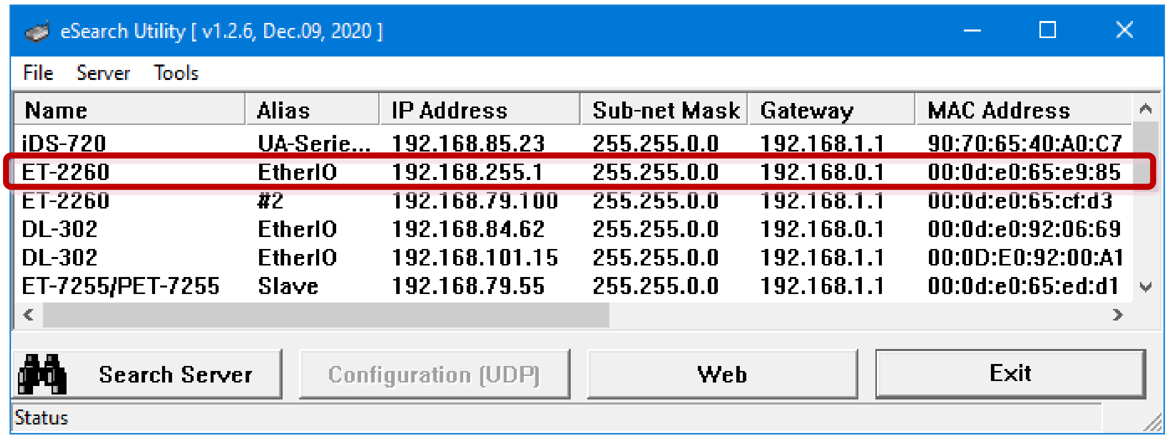
Step 1

Locate the Init/Run switch that can be found on the top side of the ET-2200 module and set it to the **"Init"** position. Reboot the module to **load the factory default settings** including the default web password.



Step 2

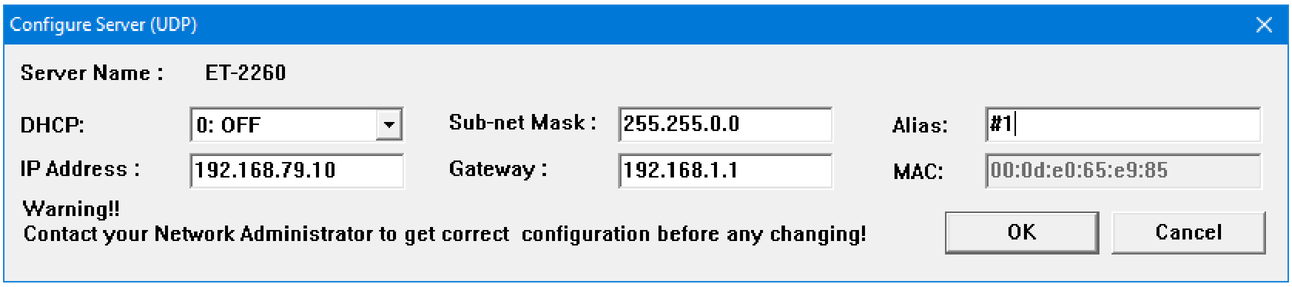
Execute either the eSearch Utility or the VxComm Utility to search for any ET-2200 modules connected to the network. Verify that the ET-2200 has been reset to the original factory default settings. The default IP address is 192.168.255.1.



Name	Alias	IP Address	Sub-net Mask	Gateway	MAC Address
iDS-720	UA-Serie...	192.168.85.23	255.255.0.0	192.168.1.1	90:70:65:40:A0:C7
ET-2260	EtherIO	192.168.255.1	255.255.0.0	192.168.0.1	00:0d:e0:65:e9:85
ET-2260	#2	192.168.79.100	255.255.0.0	192.168.1.1	00:0d:e0:65:cf:d3
DL-302	EtherIO	192.168.84.62	255.255.0.0	192.168.0.1	00:0d:e0:92:06:69
DL-302	EtherIO	192.168.101.15	255.255.0.0	192.168.1.1	00:0D:E0:92:00:A1
ET-7255/PET-7255	Slave	192.168.79.55	255.255.0.0	192.168.1.1	00:0d:e0:65:ed:d1

Step 3

Double-click the name of the module to open the Configure Server (UDP) dialog box, modify the basic settings as necessary, e.g., the IP, Mask, and Gateway addresses, and then click the **"OK"** button to save the new settings.



Configure Server (UDP)

Server Name : ET-2260

DHCP: 0: OFF

Sub-net Mask : 255.255.0.0

Alias: #1

IP Address : 192.168.79.10

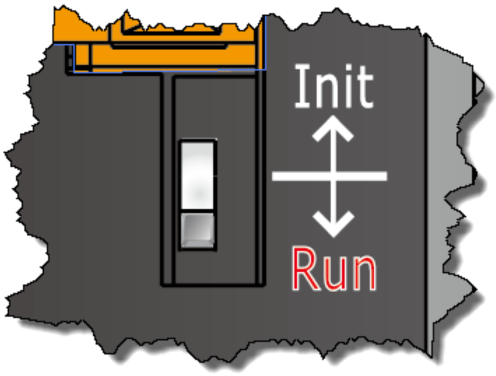
Gateway : 192.168.1.1

MAC: 00:0d:e0:65:e9:85

Warning!!
Contact your Network Administrator to get correct configuration before any changing!

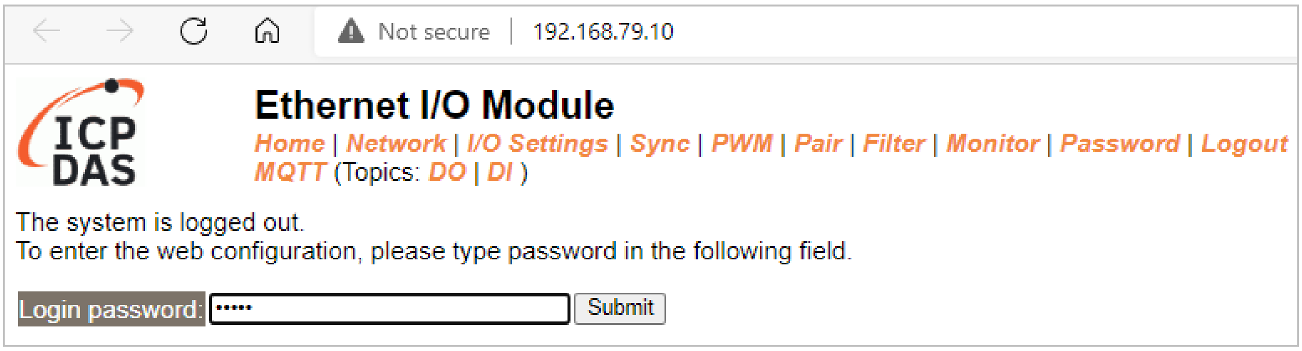
Step 4

Reset the Init/Run switch on the ET-2200 module to the **"Run"** position and reboot the device.



Step 5

Log in to the web configuration pages for the ET-2200 module, using the default web password, **"Admin"**.



Not secure | 192.168.79.10

Ethernet I/O Module

Home | Network | I/O Settings | Sync | PWM | Pair | Filter | Monitor | Password | Logout
MQTT (Topics: DO | DI)

The system is logged out.
To enter the web configuration, please type password in the following field.

Login password: •••••

Submit

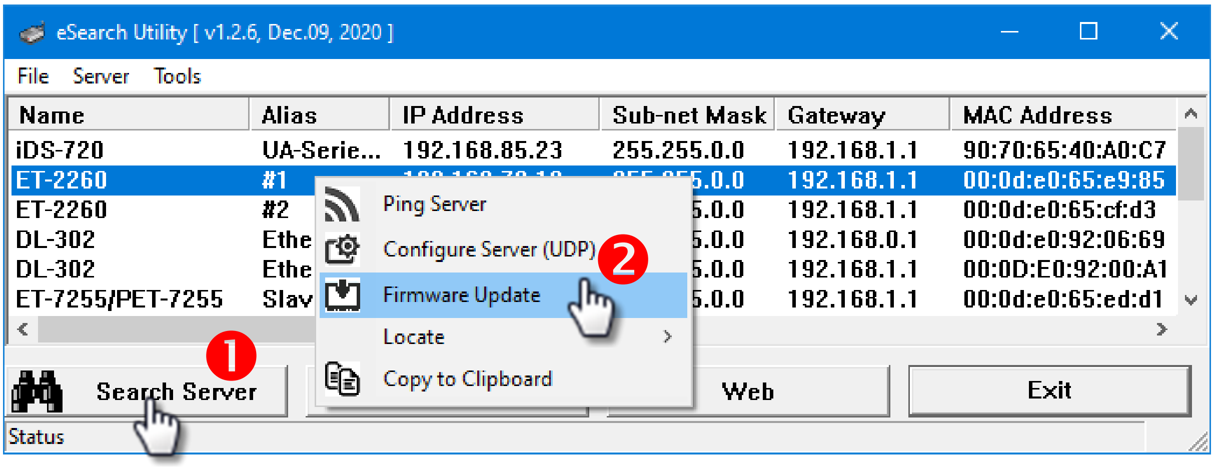
A.2 How to update the firmware via Ethernet?

If the module is not functioning correctly (e.g. there is no response to a search request, or if the system LED is continuously displayed as either OFF or ON), download new firmware from the ICPDAS website. http://www.icpdas.com/en/download/show.php?num=2626

To update the Firmware for your ET-2200 module, connect the ET-2200 module and PC in the same sub-network. Please note that there should be only one network card on the PC. Then, download and install the **eSearch Utility**:
http://www.icpdas.com/en/product/guide+Software+Utility_Driver+eSearch__Utility

Step 1: Run the **eSearch utility** and click on the **Search Server** button to find the ET-2200 module.

Step 2: Right-click on the module name and select **Firmware Update**.

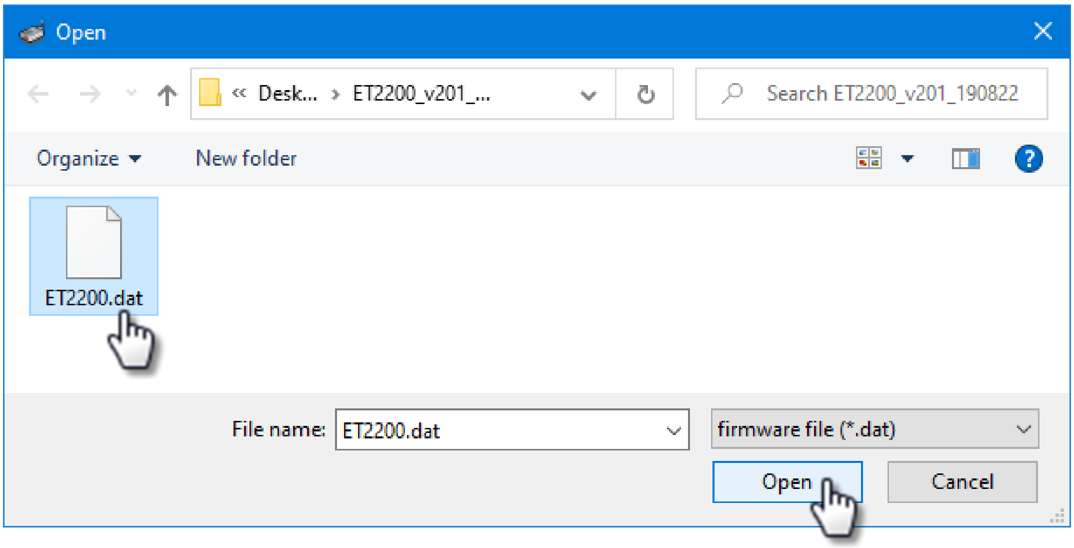


eSearch Utility [v1.2.6, Dec.09, 2020]

Name	Alias	IP Address	Sub-net Mask	Gateway	MAC Address
iDS-720	UA-Serie...	192.168.85.23	255.255.0.0	192.168.1.1	90:70:65:40:A0:C7
ET-2260	#1		5.0.0	192.168.1.1	00:0d:e0:65:e9:85
ET-2260	#2		5.0.0	192.168.1.1	00:0d:e0:65:cf:d3
DL-302	Ethe		5.0.0	192.168.0.1	00:0d:e0:92:06:69
DL-302	Ethe		5.0.0	192.168.1.1	00:0D:E0:92:00:A1
ET-7255/PET-7255	Slav		5.0.0	192.168.1.1	00:0d:e0:65:ed:d1

File
Server
Tools
Ping Server
Configure Server (UDP)
Firmware Update
Locate
Copy to Clipboard
❶
❷
Search Server
Web
Exit
Status

Step 3: Select the firmware file and click on the **Open** button.



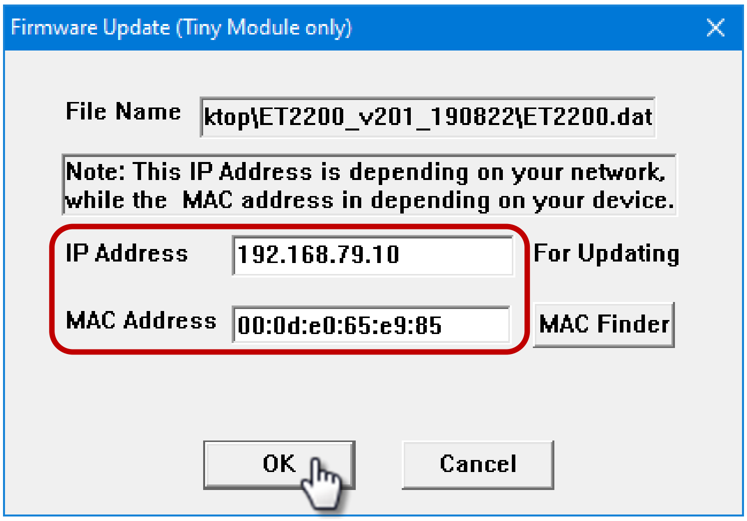
Open

File name: ET2200.dat

firmware file (*.dat)

« Desk... › ET2200_v201_...
Search ET2200_v201_190822
Organize
New folder
ET2200.dat
Open
Cancel

Step 4: Make sure the IP address and MAC address are correct. Click on the OK button.



Firmware Update (Tiny Module only)

File Name: ktop\ET2200_v201_190822\ET2200.dat

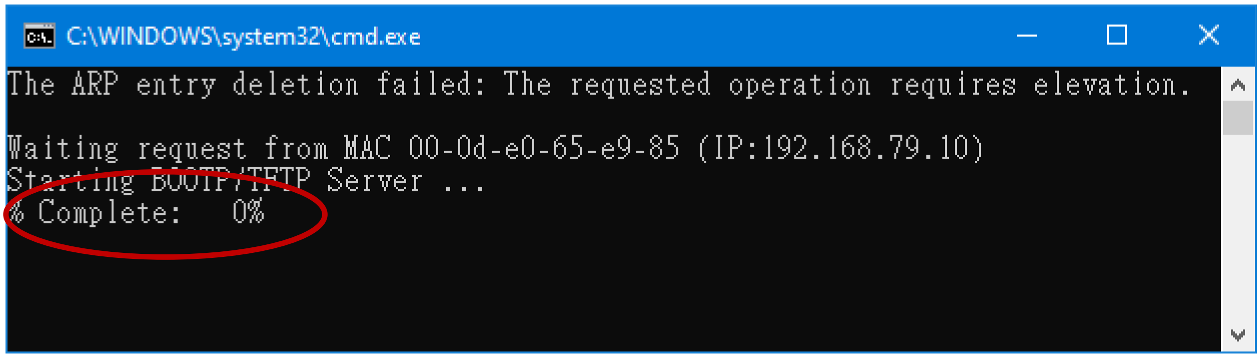
Note: This IP Address is depending on your network, while the MAC address in depending on your device.

IP Address: 192.168.79.10 For Updating

MAC Address: 00:0d:e0:65:e9:85

MAC Finder
OK
Cancel

Step 5: The progress 0% will be displayed in a command prompt window. Follow the steps.



C:\WINDOWS\system32\cmd.exe

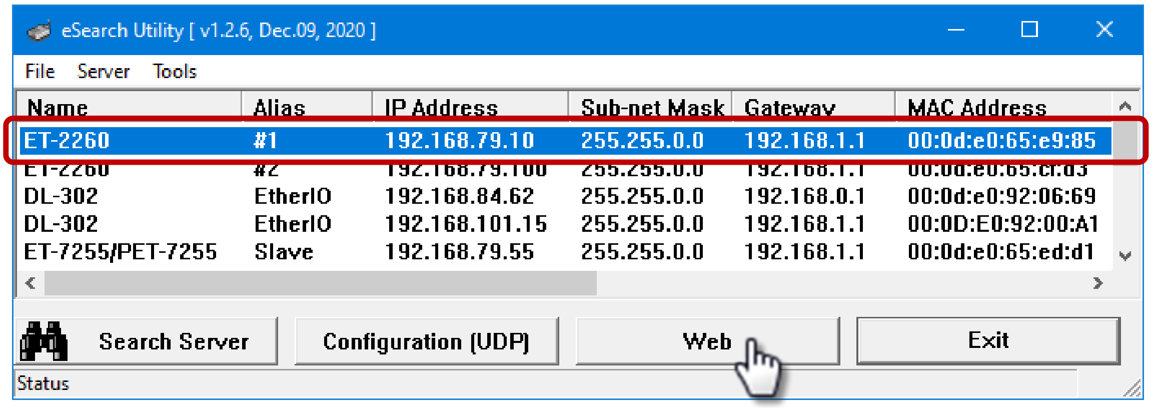
```
The ARP entry deletion failed: The requested operation requires elevation.

Waiting request from MAC 00-0d-e0-65-e9-85 (IP:192.168.79.10)
Starting BOOTP/TFTP Server ...
% Complete:    0%
```

<u>Method 1 - Local Update</u>:

Set the Init/Run switch to the **"Init"** position and reboot the module to start the update.

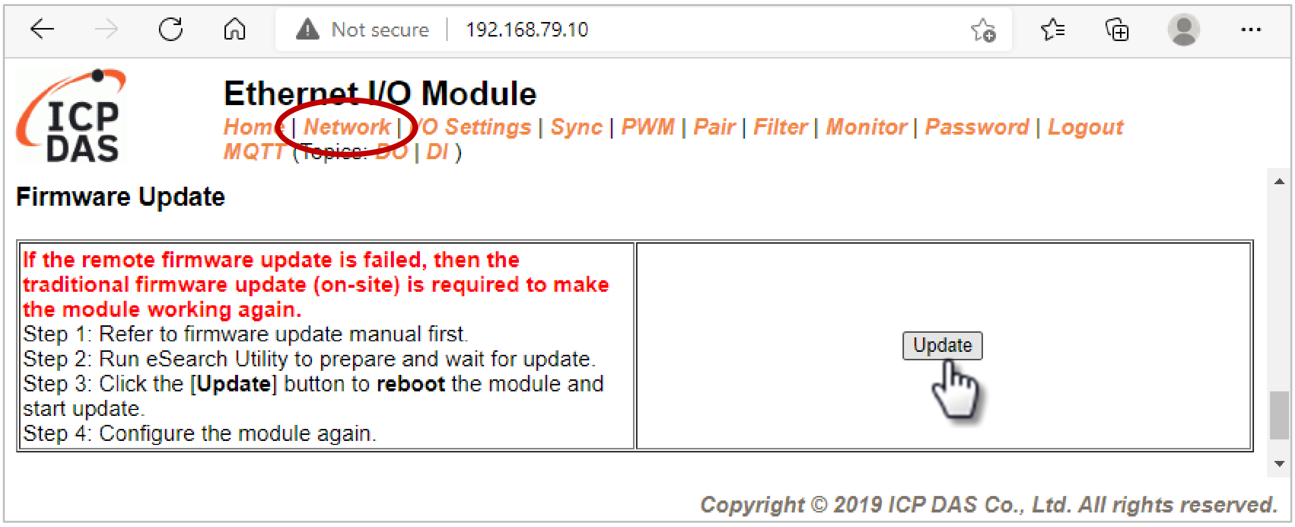
<u>Method 2 - Remote Update</u>:

Click the **Web** button and log into the web page of the module, and then click the **Update** button on the **Network** page to start the update.



eSearch Utility [v1.2.6, Dec.09, 2020]
File
Server
Tools
Search Server
Configuration (UDP)
Web
Exit
Status

Name	Alias	IP Address	Sub-net Mask	Gateway	MAC Address
ET-2260	#1	192.168.79.10	255.255.0.0	192.168.1.1	00:0d:e0:65:e9:85
ET-2260	#2	192.168.79.100	255.255.0.0	192.168.1.1	00:0d:e0:65:cf:d3
DL-302	EtherIO	192.168.84.62	255.255.0.0	192.168.0.1	00:0d:e0:92:06:69
DL-302	EtherIO	192.168.101.15	255.255.0.0	192.168.1.1	00:0D:E0:92:00:A1
ET-7255/PET-7255	Slave	192.168.79.55	255.255.0.0	192.168.1.1	00:0d:e0:65:ed:d1

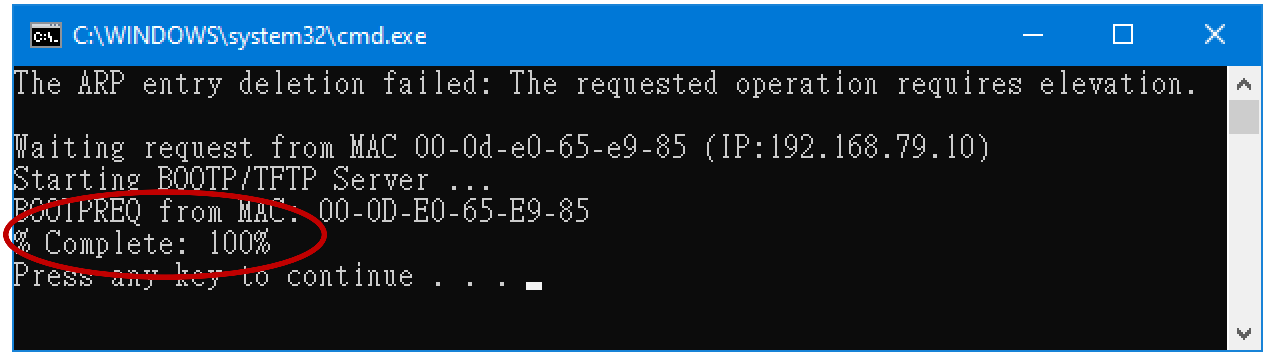

Not secure
192.168.79.10
Ethernet I/O Module
Home | Network | I/O Settings | Sync | PWM | Pair | Filter | Monitor | Password | Logout
MQTT (Topics: DO | DI)
Update

Firmware Update

If the remote firmware update is failed, then the traditional firmware update (on-site) is required to make the module working again. Step 1: Refer to firmware update manual first. Step 2: Run eSearch Utility to prepare and wait for update. Step 3: Click the [**Update**] button to **reboot** the module and start update. Step 4: Configure the module again.	Update

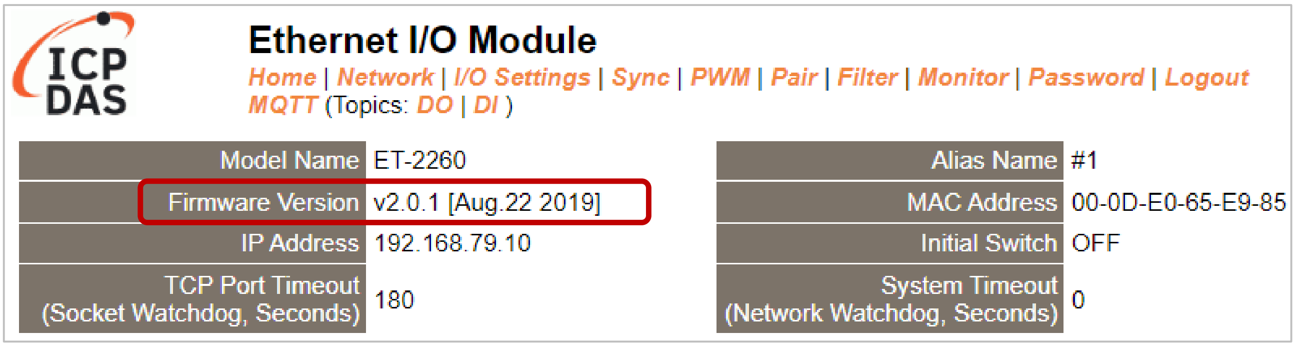
Copyright © 2019 ICP DAS Co., Ltd. All rights reserved.

Step 6: After the update is complete, press any key to close the window. For the local update, Set the Init/Run switch to the **"Run"** position and reboot the module.


C:\WINDOWS\system32\cmd.exe

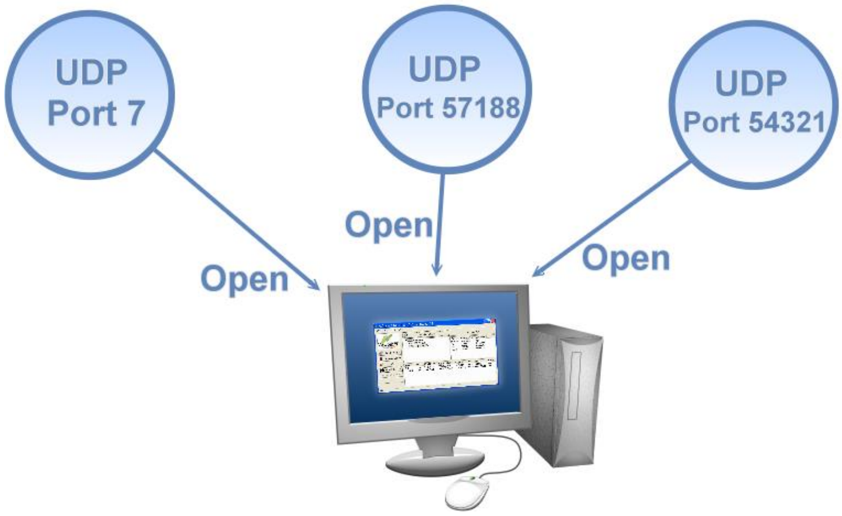
```
The ARP entry deletion failed: The requested operation requires elevation.

Waiting request from MAC 00-0d-e0-65-e9-85 (IP:192.168.79.10)
Starting BOOTP/TFTP Server ...
BOOTPREQ from MAC: 00-0D-E0-65-E9-85
% Complete: 100%
Press any key to continue . . .
```

Step 7: Search the module again and log into the web page by using the **eSearch Utility**. After that, the user can check the **Firmware Version** on the **Home** page.


Ethernet I/O Module
Home | Network | I/O Settings | Sync | PWM | Pair | Filter | Monitor | Password | Logout
MQTT (Topics: DO | DI)

Model Name	ET-2260	Alias Name	#1
Firmware Version	v2.0.1 [Aug.22 2019]	MAC Address	00-0D-E0-65-E9-85
IP Address	192.168.79.10	Initial Switch	OFF
TCP Port Timeout (Socket Watchdog, Seconds)	180	System Timeout (Network Watchdog, Seconds)	0

A.3 Why is the Host computer unable to ping or search for the ET-2200 module?



The Host computer can only establish communication with a module through specific ports. Confirm with your network administrator that access to UDP Port 7, Port 57188, and Port 54321 is not being denied by another network device.

The following provides more detailed information related to TCP/UDP ports:

TCP Port:

Port Number	Description
80	HTTP (Hyper Text Transport Protocol)
502	Modbus Data Port

UDP Port:

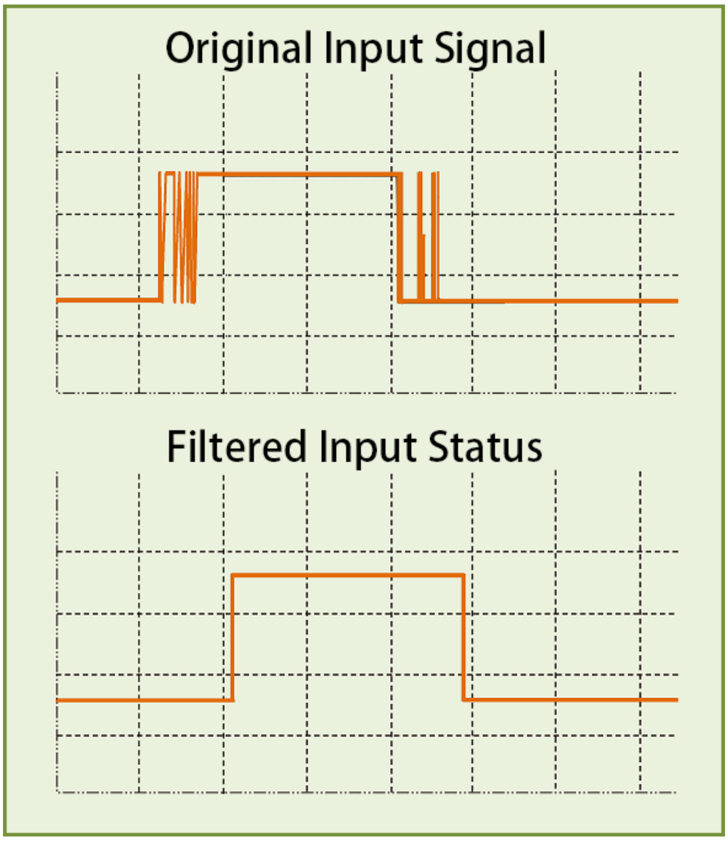
Port Number	Description
7	Echo (Ping)
57188	UDP Search Request
54321	UDP Search Response

A.4 What is Digital-Input Filter (DI Filter)?

A: An input signal can come from a myriad of sources, such as buttons, switches, sensors, relays, etc. Each of these types of mechanical devices also contributes to a common problem - "**contact bounce**".

The switch between Digital Input states is usually accompanied by several unwanted pulses, known as "switch bounce". In certain environments and situations, these input signals may inevitably generate an unstable signal or noise, which can potentially cause incorrect data counting or operation failure. Consequently, these errors must be removed from the input signals, especially if the signals are used in crucial applications.

A low-pass Digital Input filter is a software function that can be used to eliminate high-frequency interference from input signals. The input state will only be changed when the width of any new signal is greater than the value specified as the filtering time, meaning that short, high-frequency interference pulses will be ignored, as illustrated in the diagram below. This is especially useful when attempting to eliminate contact bounce.



Appendix B: Revision History

The table below shows the revision history.

Revision	Date	Description
1.6.0	Mar. 2023	1. Revise Section 6.4.1. The sampling rate of PET-2217 in fast mode is 200 Hz, and in normal mode is 20 Hz. 2. Revise Section 2.2. Modify the URL of the data sheet to the English version 3. Revise Section 6.4.2. The address 31000-31109 and 41000-41109 has been modified to 34097-34206 and 44097-44206
	Jan. 2023	Simplify the content of the hardware information in Chapter 2
	Dec. 2022	1. Revise Sections 4.8, 5.1 to 5.4 2. Add Section 5.5 Shared Memory
	Nov. 2022	Add Section 4.18 SNMP
	Sep. 2022	Add the model ET-2217 (The AI module)
	Jun. 2022	Add the model ET-2224/ ET-2228 (The AO module)
	Apr. 2002	Revise Sections 2.2, 2.3, 2.4, and 2.6, add new models
	Jan. 2022	1. Add Modbus addresses in Section 6.4 2. Add Section 6.5 Analog Input Type and Data Format Table
	Nov. 2021	Support MQTT protocol
	Oct. 2021	Add Section 1.3 Application
	Sep. 2021	1. Add the information about ET-2217CI/ 2217CI-4 2. Add Chapter 6.4 Modbus Register (AIO) 3. Add Appendix A.2 ~ A.4
1.5.0	Jun. 2020	Modify the official website-related links.
1.4.0	Sep. 2019	Added the information on the MQTT function.
1.3.0	Jun. 2018	Added the hardware information about the ET-2261-16.

Revision	Date	Description
1.2.0	Jul. 2017	1. Add the software and hardware information about the ET-2242U and ET-2255U. 2. Updated the information about the Firmware Version v1.4.6 [Jun.16, 2017] in Chapter 4 Web Configuration. 3. Add Chapter Appendix A: Troubleshooting. 4. Add Chapter Appendix B: Revision History.
1.1.3	Feb. 2016	1. Added the software and hardware information about the ET-2254P, ET-2261 and ET-2268. 2. Updated the information about the Firmware Version v1.3.9 [Jan.20, 2016] in Chapter 4 Web Configuration.
1.1.0	Nov. 2015	Add the software and hardware information about the ET-2242, ET-2251 and ET-2255.
1.0.0	Sep. 2015	Initial issue